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ABSTRACT OF THESIS

AN ANALYSIS OF TEXTILE-IMPRESSED CERAMICS FROM SLACK FARM (15UN28), KENTUCKY

This thesis represents a study of textile-impressed ceramics from Slack Farm, a Late Mississippian Caborn-Welborn phase site in Union County, Kentucky. The goal of this study was to use the textile impressions to provide additional insight into Caborn-Welborn social organization. The Caborn-Welborn phase represents the reconfiguration of communities in the Lower Ohio River Valley after the collapse of the Angel chiefdom and other nearby Mississippian polities. Results indicate that there was an increase in textile structural variation in the fabric used for the impressions at Slack Farm and other Caborn-Welborn sites from earlier Mississippian assemblages. Increased textile structural variation may be associated with the reconfiguring of the Caborn-Welborn social organization during this phase. Textile types associated with Oneota tribal groups were also identified at Slack Farm and suggest Oneota women were in residence at the site. Textile patterns assumed to be associated with an elite status were not identified in this study. Overall, the textile-impressed assemblage reflects the response of weavers to changes in the Caborn-Welborn social organization.

KEYWORDS: Textile-impressed ceramics, Caborn-Welborn, fabric, Oneota, Slack Farm

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August 30, 2008

AN ANALYSIS OF TEXTILE-IMPRESSED CERAMICS
FROM SLACK FARM (15UN28), KENTUCKY

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THESIS

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The Graduate School
University of Kentucky

2008

AN ANALYSIS OF TEXTILE-IMPRESSED CERAMICS
FROM SLACK FARM (15UN28), KENTUCKY

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Sciences in the
College of Arts and Sciences
at the University of Kentucky

By

Christina Amalia Pappas

Lexington, Kentucky

Director: Dr. Christopher A. Pool, Professor of Anthropology

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2008

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ACKNOWLEDGEMENTS

I would like to thank my advisor, Dr. Christopher Pool, and my committee members, Dr. Richard Jefferies, Dr. George Crothers, and Dr. David Pollack, for their support, advice, and patience, during this project. Their willingness to read and comment on various drafts of this thesis has greatly improved its content. Their encouragement and help have allowed me to be successful in this endeavor.

Dr. James Adovasio and Mr. Jeff Illingworth at the Mercyhurst Archaeological Institute have always made time to answer questions and identify random impressions and for this I am eternally grateful. In addition to letting me pester him with questions, Jeff supplied me with the necessary materials for my analysis (15 pounds of brightly colored clay) and tracked down hard to find articles and dissertations. Thanks Jeff, I owe you one.

I would like to thank the staff at the Kentucky Archaeological Survey and the Department of Anthropology at the University of Kentucky for all their help while I finished my thesis and for keeping my spirits up when they were low. Hayward Wilkinson helped prepare the figures in Chapter 4 and willingly accepted cookies for his effort and I thank him for that. I would also like to thank the Graduate School at the University of Kentucky for their support in funding travel for research and conferences. I learned a great deal on those trips and my research is better for it.

My friends in the department have always been there for me, especially when things looked their worse. I would have thrown my hands up in surrender had you not been there. Thanks. To my friends outside the department, thank you for always allowing me to vent and provide an objective opinion. You have kept me sane.

My family has always been my rock, and they have made me the person I am today. Their love and support, as well as relentless encouragement, mean more to me than anything. I would like to especially thank my parents. You always made me ask why, even when I did not want to. You have always been the best role models in my life.

And finally, I would like to thank my husband, Chris, for having put up with me through everything, and always standing by my side. You are my best friend. Thank you.

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1. Chapter 1: Textiles and Textile Impressions at Slack Farm

Introduction

This thesis presents the results of an analysis of textile-impressed ceramics from the late Mississippian Caborn-Welborn phase site of Slack Farm in Union County, Kentucky. This analysis was undertaken to see what information about the socio-political organization at the site could be determined from a sample of textile-impressed ceramics. Previous research has suggested that activities typically associated with an elite presence, such as feasting and extraregional trade, were occurring at Caborn-Welborn phase sites, including Slack Farm (Green and Munson 1978, Pollack and Munson 1998, Pollack 1998, 2004, 2006). However, these sites lack features such as mound construction and a concentration of prestige goods, traits also associated with an elite presence. The individuals responsible for the organization of these activities are believed to be aspiring elites, aggrandizing lineage heads who may have sought to re-establish earlier chiefdom status patterns (Pollack 1998:378). An analysis of the textile-impressed ceramics was undertaken in an effort to contribute to the understanding of how socio-political organization functioned at Slack Farm. Previous research on the textile-impressed ceramics from this site, although limited, identified higher rates of structural variation and textile types previously unknown in the Southeast and further analysis was recommended (Drooker 1992). The selection of Slack Farm for this study was based upon this recommendation, as well as the size of the site and the high density of artifacts.

By the beginning of the fifteenth century, the Angel chiefdom, and other Mississippian chiefdoms in and around the Ohio River Valley, had collapsed and the associated populations began to reorganize (Black 1967; Hilgeman 2000; Muller 1986; Pollack 2004). Some of the Angel population is believed to have migrated downstream from the confluence of the Green and Ohio Rivers just west of Evansville, Indiana, to the confluence of the Ohio and Wabash Rivers (Green and Munson 1978; Pollack and Munson 1998; Pollack 1998 and 2004). Other households

may have relocated to this area following the collapse of Mississippian polities located along the Lower Ohio River to the west. In this area, the remnants of these Mississippian polities developed the cultural traditions that are recognized today as the Caborn-Welborn phase. These populations retained many traits from the earlier Angel chiefdom (Green and Munson 1978, Pollack 1998 and 2004). Their villages were centered on plazas with similarly styled storage pits and wall-trench houses. The crops also were similar, with the continued growing of maize, and starchy seed plants. Pottery vessels also retained similar morphological characteristics but the methods with which they were decorated shifted from painted to incised and punctated designs (Pollack 2004). Feasting and extraregional trade continued during the Caborn-Welborn phase. Many of these activities were organized and regulated by elites in earlier chiefdoms. That they continued into the Caborn-Welborn phase would suggest that some degree of status differentiation continued following the collapse of the Angel Chiefdom. However, other correlates of chiefly society, such as platform mound construction, separate elite residential areas, and a concentration of prestige goods at a regional administrative center, are absent (Green and Munson 1978; Pollack 1998 and 2004). The reorganization of social and political relationships following the collapse of the Angel chiefdom raise questions about how these changes were reflected in material culture, specifically textiles.

Textiles have been used successfully in delineating a variety of kinds of social organization, including instances of status differentiation (Adovasio 1986, Kuttruff 1988, Sibley and Jakes 1988, Scheffler 1988, Drooker 1992). Analysis of textile impressions from Slack Farm has the means to define differences in the characteristics of the fabric used in the impressions and to see if any patterns that may be present are a reflection of the social organization of the population of the site. Textiles are among the most sensitive classes of material culture in responding to changes in culture (Schneider 1987). Different aspects of a culture, such as social organization, affect changes in the use of raw materials, methods of manufacture and embellishment, styles of the final product, and the circumstances under which a fabric is used and

discarded. Careful analysis of these items can provide information on a group's social structure and contribute to the greater understanding of that culture.

The purpose of this study was to analyze of a sample of textile-impressed ceramics from Slack Farm to gain insight into Caborn-Welborn social organization. To achieve this purpose, the first goal of this thesis was to identify and describe the range of textile structures in the impressions present at Slack Farm. This was followed by a comparison of this data set to other assemblages from earlier Mississippian sites and other Caborn-Welborn sites. The textile structures from Slack Farm were identified using standardized terminology based on the work of Irene Emery (1966) and James Adovasio (1977), which allowed for the creation of detailed textile type descriptions. In addition to qualitative descriptions of each textile structure, quantitative descriptions were generated through an analysis of the metric traits of the impressions. This information, both qualitative and quantitative, produced a rich data set on textile utilization at Slack Farm. This data set was then examined to determine if intersite patterns could be identified that reflect aspects of Caborn-Welborn social organization at Slack Farm.

Relative to earlier Mississippian groups, Caborn-Welborn structural variation in the sample from Slack Farm was found to be much higher. Greater structural variation may be a reflection increased social signaling between different social groups living at Caborn-Welborn settlements and with Oneota groups to the north and other Mississippian groups to the southeast. Also identified were textile structures typically associated with Oneota tribal groups. These structures were found impressed on Caborn-Welborn pans and suggest that Oneota women had married into the village. Overall, this research suggests a pattern at Slack Farm related to the re-organization of the population after the collapse of nearby Mississippian chiefdoms and is consistent with the results of previous research.

Slack Farm was continuously occupied from AD 1400 through AD 1700 and represents the largest Caborn-Welborn village (Pollack 1998 and 2004). Eight discreet residential/mortuary areas were defined at the site with the five largest clusters centered on an oval-shaped plaza

(Pollack 2004). These areas consist of house basins, posts, storage pits, hearths, and an associated cemetery. Based upon the settlement patterns, artifact assemblages, and other lines of evidence, the political organization during this phase was most similar to a confederacy, such as those seen among historic native populations (Pollack 1998, 2004). The collapse of the Angel chiefdom and other nearby Mississippian polities created the opportunity for a restructuring of socio-political organization within the region. As the population at Caborn-Welborn phase sites adjusted to the changing socioeconomic landscape in the Lower Ohio River Valley, their material culture was adapted to this process and is reflected in items such as textiles. As preservation at Slack Farm did not allow for the recovery of the actual fabric, textile-impressed ceramics can be studied to help understand the Caborn-Welborn population's response.

The assumptions guiding this research were that the weavers at Slack Farm were responsible for producing the necessary textile items for their household, that the textiles produced by these weavers belonged to a technological system (Lemonnier 1989, 1993) within which social information was communicated through both the symbolic and functional qualities of the object, and that textiles produced within the household were also utilized in its ceramic production. The assumption that weavers at Slack Farm produced the majority of the textiles consumed by their household stems from limited ethnohistoric evidence (Espinosa 1746 [1942]) that assigns this task to women. The technological system of the textiles produced within the household represents the expression of social knowledge of the weaver, which includes their ideas about socio-political organization, in the symbolic and functional attributes of the textile (Lemonnier 1989: 156-7). Textiles are used to signal ideas about status, gender, and ethnicity (Schneider and Weiner 1986), but they must also be functional objects. Clothing, and other textile objects, may signal one's membership within a specific tribal group, but they must still be functional as clothes. These artifacts must be capable of providing protection from the elements and everyday activities, and the technological choices involved in their production reflect the dual nature of textiles (Lechtman 1977). The functional attributes of a textile include its structural

characteristics, such as textile structure, thread diameter, direction and angle of twist, and edge treatment (Petersen 1996).

Structural studies of textiles have been previously used to define social organization (Adovasio 1970, 1971, 1977, 1986; Barber 1991, Carr and Neitzel 1995, Heckenberger 1990, Kuttruff 1993, Schneider 1987, Schneider and Weiner 1986). Changes in the direction of the twist of thread can be used to trace the movement of populations (Hyland 1997, Hyland and Adovasio 2000, Petersen et al. 1996, Petersen et al. 2000). The use of designs and decorative elements can signal ideas about ethnicity and status (Swanton 1946, Kuttruff 1988, Schreffler 1988). Careful analysis of the technological choices made during the production of textiles, such as textile structure and thread quality, can reveal patterns that relate to these ideas. When these attributes are examined in conjunction with one another, a more complete understanding of the technological system of a group can be determined.

The final assumption of this research was the idea that the textiles produced within a household were also used in the manufacture of ceramic pans. This assumption has received little, if any, discussion in previous research but is a necessary part in any analysis of textile-impressed ceramics. This assumption does not mean that by impressing a ceramic vessel with a textile, it absorbed the textile's symbolic qualities. Here this assumption is tied to the technological system of textiles (Lemonnier 1989). They were everyday objects, such as skirts, mantels, and shawls, and were the most expedient fabric available to a potter (Arnold 1985). The size of these objects would have made them better suited for use in ceramic manufacture than rags, and the generally light wear on the resultant sample of impressions supports this idea. Taken together, it is these assumptions that have guided this research.

Organization of this Thesis

This thesis is organized into seven chapters. In the next chapter, I present background information on the archaeology of the Lower Ohio River Valley during the Caborn-Welborn

phase. In Chapter three, I briefly summarize textile analysis in the Southeastern United States on Mississippian period assemblages. This chapter highlights information pertaining to Caborn-Welborn social organization and status. A discussion of the confusing nature of the terminology associated with textile analysis and its pitfalls is also presented in conjunction with the terminology that is used in this study.

In Chapter four, I outline the methods used in this study. A discussion of the sampling methods employed in generating the data as well as the techniques involved in the actual data collection are summarized and illustrated. This chapter also presents a more thorough treatment of the assumptions used in this research. In Chapters five and six, I present the data gathered using these methods. I focus upon the textile type descriptions in Chapter 5, while in Chapter six I present a statistical analysis of the data. This analysis was conducted to understand and explain any trends or patterns present in the data.

I conclude this thesis in Chapter seven with a brief discussion of the results of this project. This discussion summarizes the results of the analysis in relation to Caborn-Welborn social organization. Also, avenues for further research are proposed and briefly discussed.

2. Chapter 2: Origin and Influences of the Caborn-Welborn Phase and Slack Farm

Introduction

The goal of this chapter is to present background information on the Caborn-Welborn phase and Slack Farm. The roots of the Caborn-Welborn phase can be traced to the earlier Angel chiefdom. Much of the social processes that shaped the cultural history of Caborn-Welborn sites, such as Slack Farm, originated with this chiefdom. Understanding these origins and influences, and how they impacted individuals during this phase, can shed light on interpretations of status based on material culture.

The goal of this project was to analyze a sample of the textile-impressed ceramics from Slack Farm in an effort to generate a better understanding of Caborn-Welborn social organization at that site. Caborn-Welborn phase sites, including Slack Farm, lack some of the traits associated with an elite status, such as mound building, and do not appear to have maintained the same level of socio-political organization as the earlier Ohio Valley chiefdoms (Green and Munson 1978, Pollack 2004, Peebles and Kus 1977). However, previous research has shown that activities most commonly associated with Mississippian elites, such as feasting and the development of new trade partners, were taking place during the Caborn-Welborn phase (Pollack 2004, 2006). An analysis of the textile-impressed ceramics from Slack Farm may provide additional information to understand how socio-political organization would have influenced material culture at the site. Previous analysis of textiles in the Southeastern United States has been successful in identifying different social patterns, and includes helping to define socially discrete groups such as elites (Kuttruff 1998, 1993; Schreffler 1988). These studies have focused on how differences in the characteristics of textiles, such as raw material and weave, corresponded to differences in social status. The previous success of similar research to identify differences in social status has shown that textile analysis may help further define social process at Caborn-Welborn phase sites.

The Late Prehistoric in the Lower Ohio River Valley

Green and Munson initially defined the Caborn-Welborn phase as “a late Mississippian occupation centered near the mouth of the Wabash River in the Ohio Valley...[lacking] a single large village or town dominating the settlement pattern; instead it is characterized by a number of smaller settlements dispersed along the floodplains and terraces” (1978:294). Radiocarbon dates from Caborn-Welborn phase sites have placed this phase beginning at approximately AD 1400 and ending roughly at AD 1700 (Green and Munson 1978; Pollack 1998, 2004).

The roots of the Caborn-Welborn phase are believed to be in the decline and collapse of the nearby Angel chiefdom (Pollack 2004:2-3). Chiefdom collapse was a common trend among Mississippian polities in the Southeastern United States, signaled by a decline in population density, in extraregional exchange, and in sociopolitical complexity (Anderson 1994).

Populations associated with the earlier Mississippian chiefdoms of Cahokia, Kincaid, Wickliffe, and others appeared to have mostly dispersed, creating what is now referred to as the “Vacant Quarter” (Figure 2-1) centered in Illinois, Indiana, and Kentucky (Williams 1990). However, the Vacant Quarter was not completely devoid of settlements. Caborn-Welborn phase sites are located in the Vacant Quarter along an approximately 100 km stretch the floodplain of the Ohio River from near Geneva, Kentucky to the mouth of the Saline River in Illinois (Green and Munson 1978; Pollack 1998, 2004; Cobb and Butler 2002).

The Angel Phase

The Angel site (Figure 2-2) was the largest Mississippian mound center in the Lower Ohio River Valley and the center of the Angel chiefdom, lasting from approximately AD 1100 to 1400 (Green and Munson 1978, Hilgeman 2000, Pollack 2004). The Angel site encompassed more than 40 hectares along a bluff on the Ohio River upstream from the Green River in Indiana (Hilgeman 2000, Muller 1986). A palisade enclosed the site and 11 mounds were constructed around the central plaza. A large, multilevel, pyramid-shaped platform mound dominated

Figure 2-1: Vacant Quarter showing the location of the Caborn-Welborn area (Pollack 1998:3)

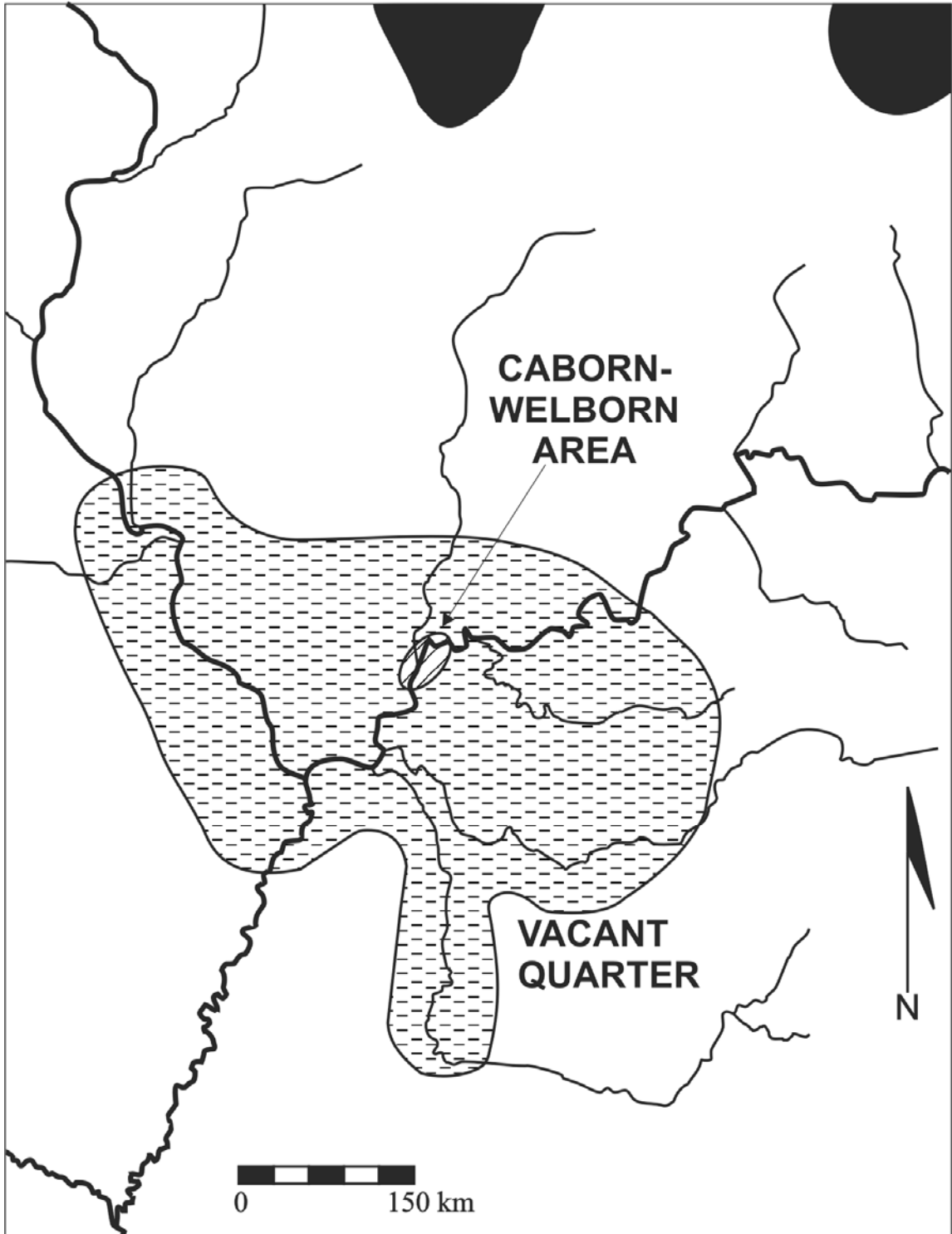
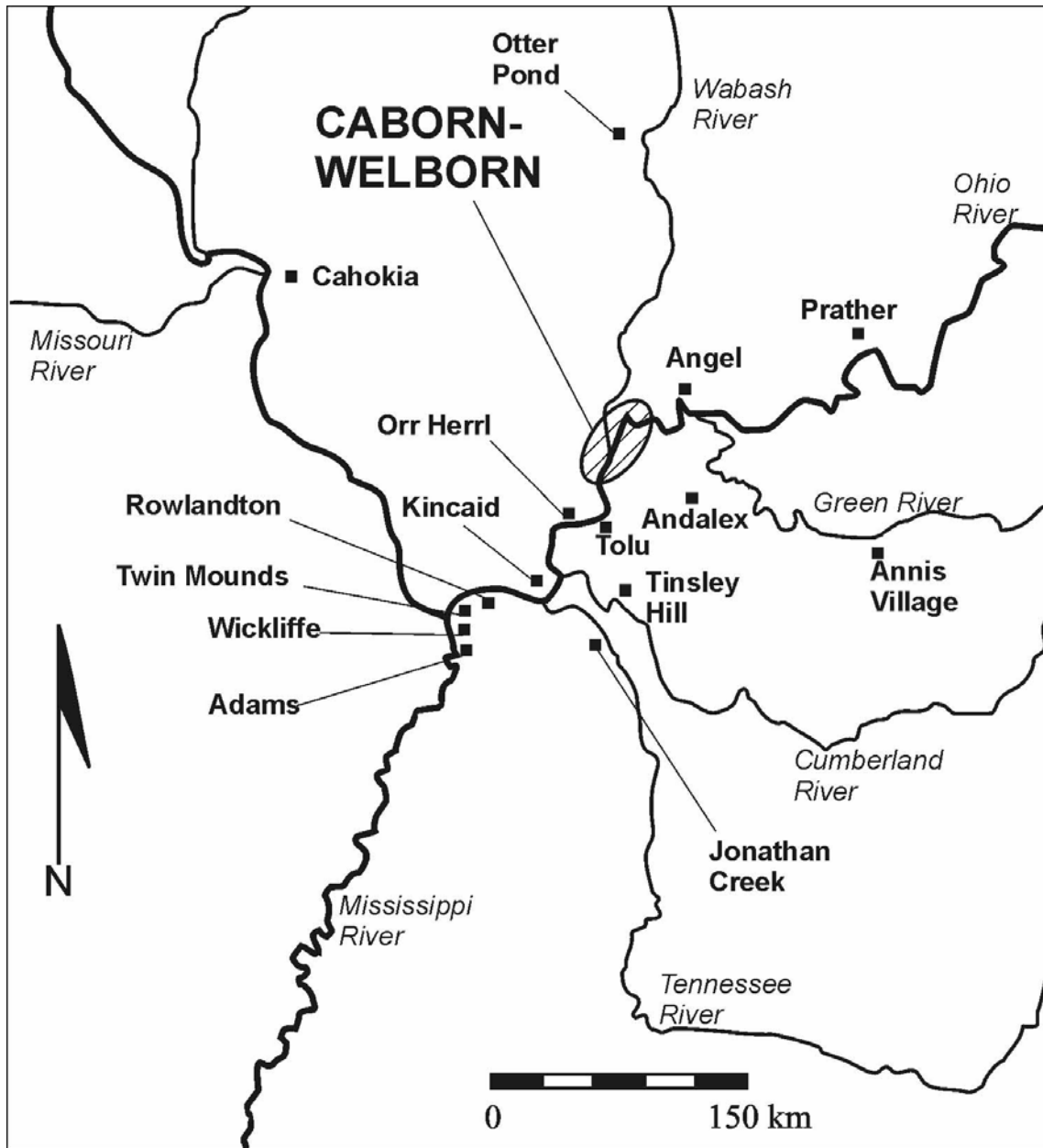


Figure 2-2: Mississippian sites in relation to the Caborn-Welborn region (Pollack 1998:59)



the center of the site (Black 1967, Hilgeman 2000, Muller 1986) and the population for the Angel chiefdom is estimated at a few thousand individuals (Green and Munson 1978).

The Angel chiefdom possessed many traits typical of a Mississippian polity, such as a settlement hierarchy and mound construction, which reflected social differentiation and ranking within the population (Green and Munson 1978, Muller 1986, Peebles and Kus 1977, Pollack 2004). The majority of the population of the chiefdom seems to have been concentrated at and within the vicinity of the Angel site with smaller villages, agricultural farmsteads, and hamlets scattered in the surrounding areas (Green and Munson 1978:319). The small village and habitation sites near Angel share a similar ceramic and artifact assemblage indicative of an association with this administrative mound center (Hilgeman 2000:16). While these smaller settlements shared some material culture with Angel, they had less access to non-local raw materials and goods (Pollack 2004:21). Also, few burials have been found away from Angel, suggesting the mound center was the preferred cemetery locality during this phase (Schurr 1992; Pollack 2004:15). The Angel site, being the largest community and the only site with mounds and cemeteries, represented the ritual and political center of the Angel chiefdom.

Within the Angel site, house construction may have been a further expression of social differentiation (Schurr 1992:306). The platform mounds were constructed to varying heights and some of the houses built on top would have been situated higher than others. The height of an individual's house, or even one's proximity to a mound, would have been an indication of social status at Angel and within the chiefdom.

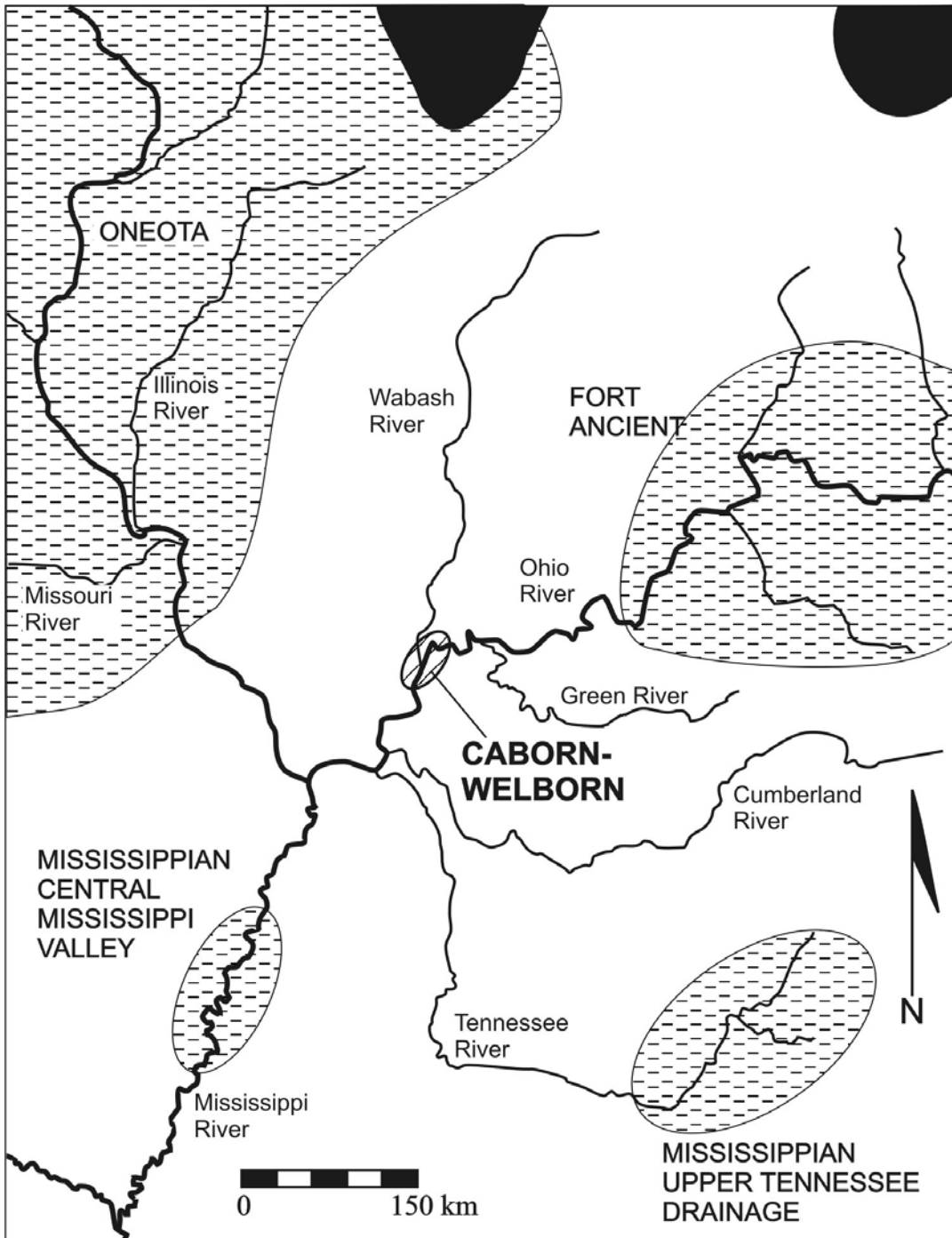
Of the 310 burials identified and excavated at the Angel site, 281 provided information about how individuals were treated at death (Schurr 1992:307) and can be used to assess hierarchical ranking and status (Peebles and Kus 1977:431). Placement of the grave, how the body is treated, and the amount and quality of the materials included in the burial are indicative of status. The position of interment and treatment of the body at death were highly variable at Angel

(Schurr 1992). The average burial was fully extended and the majority of graves were located in an area of the site that was used as a cemetery. A small number of disarticulated burials were recovered from excavations in one mound; however, it is not known if these individuals were interred contemporaneously with or post-date the occupation of Angel. Slightly less than 10 percent of the identified burials included utilitarian grave goods, such as undecorated pottery, bone awls, and chipped-stone tools, or items of personal adornment, such as shell and pottery earpins, a bone bead, and a copper crescent. Decorated pottery was only associated with two burials, an infant and an adolescent. Given the size of the Angel site and the amount of mound construction that occurred, differences in mortuary practice and the use of grave goods may not have been as important in expressing hierarchical ranking as were daily reminders of status position, such as house placement. The burials from the cemetery may be more of a reflection of the general population than the ruling elite (Schurr 1992:314). The importance of the elite of the Angel chiefdom may have come more from their ability to organize communal activities, such as feasting, than from their control of non-local goods (Pollack 2004:18). The demise of the Angel chiefdom, as well as other Mississippian chiefdoms, in the fifteenth century were most likely due to a combination of internal and external factors (e.g. crop degradation and a breakdown of the flow of prestige goods) that undermined the perceived prestige of the elite.

The Caborn-Welborn Phase

Centered in a region slightly downstream from the Angel site at the mouth of the Wabash River, more than 80 Caborn-Welborn phase sites have been identified along a roughly 100 km stretch of the Ohio River (Figure 2-3) (Green and Munson 1978; Pollack 1998, 2004, & 2006; Pollack and Munson 1998). Radiocarbon dates place the beginning of the Caborn-Welborn phase during the collapse of the Angel chiefdom (Pollack 2004:24). The overlapping of radiocarbon dates and similarities in Angel and Caborn-Welborn material culture suggest some cultural continuity between these two phases. Caborn-Welborn phase sites continued to be located along

Figure 2-3: Caborn-Welborn region in relation to other contemporaneous regions (Pollack 1998:14)



the floodplain levees of the Ohio River and included similar settlement types, such as small villages, hamlets, and farmsteads (Green and Munson 1978, Pollack 2004:27). However, cemeteries were no longer restricted to just one site but were present at several small and large villages (Pollack 2004:113). The absence of a regional mound center distinguishes the Caborn-Welborn settlement hierarchy from that of the Angel chiefdom and other Mississippian chiefdoms. Regional mound centers were the focal point of Mississippian political power (Anderson 1994, Barker and Pauketat 1992, Welch and Butler 2006) and the absence of such a center points to a decentralization of political power during the Caborn-Welborn phase. However, Caborn-Welborn phase sites did retain a settlement hierarchy, which points to some degree of political ranking.

Similar sets of crops including maize, squash, tobacco, and starchy seeded plants continued to be grown, and wild resources associated with the river were exploited. Similar stone tool types have been identified at sites from both phases and include flaked-stone hoes of Mill Creek and Dover chert as well as triangular projectile points and knives (Green and Munson 1978:302). Artifacts and imagery associated with the Southeastern Ceremonial Complex have also been recovered from Caborn-Welborn phase sites and show continuity from the Angel phase as well as interaction with other Mississippian polities (Green and Munson 1978:303). “Thunderbird” and “weeping eye” images have been found on some objects and Mississippian-style slate and shell gorgets and cannel coal disks also are recovered at these sites.

Many traits of the Caborn-Welborn ceramic traits also show continuity in manufacture and use from the Angel phase (Pollack 2004:124). For instance, similar bowl, jar, pan and bottle forms were manufactured (Green and Munson 1978:300). Trends in ceramic manufacture that started during the Angel phase also continued into the Caborn-Welborn phase and include a widening and thinning of the jar handles, an increase in the decoration of bowls with notched or beaded rims, and an increase in the number of shallow bowls with out-slanting walls (Pollack 2004:28-9). Decorative ceramic types from the Angel phase and the Caborn-Welborn phase

included Angel/Kincaid Negative Painted, Old Town Red, O'Byam Incised/Engraved, Manly Punctate, and Matthews Incised (Pollack 2004:76). Series of line-filled triangles are still a common decorative motif and similar ceramic objects include pestles, disks, earplugs, and owl effigy pendants (Pollack 2004:131). When considered together, the continuation of these ceramic traits as well as the similarity in settlement patterns and stone tools from the Angel phase through to the Caborn-Welborn phase suggest a common population.

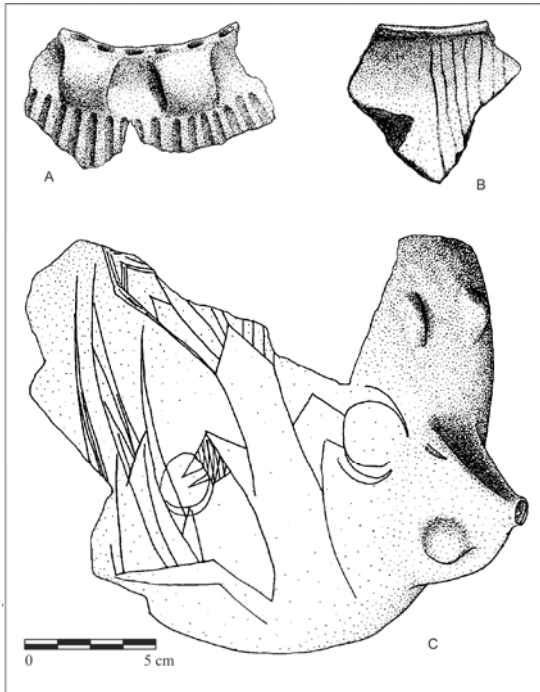
Caborn-Welborn phase sites can be differentiated from earlier Angel phase sites by a change in ceramic decoration, the lack of a regional mound center, and other changes in material culture and mortuary practices (Green and Munson 1978, Pollack 1998, 2004, 2006). The primary motif used in Caborn-Welborn Decorated ceramics was a series of rising and descending triangles filled with either lines or punctuations (Pollack 2004:51). This decorative motif is similar to earlier motifs used within the Angel chiefdom but it was executed in a different manner. Also, decorated ceramics with motifs similar to those of the Oneota (Figure 2-4) and other Southeastern Mississippian populations (Figure 2-5a and b) have been identified, which reflect interaction with groups to the north and a continued extraregional interaction initiated during the earlier Angel phase with groups to the southwest (Pollack and Munson 1998:190, Pollack 2004:63-76). Trace element analysis of these ceramics has shown that they were manufactured at Caborn-Welborn sites and were not imported (Shergur et al. 2003).

Caborn-Welborn Decorated ceramics (Figure 2-6) are found in greater numbers in storage/trash pits than other ceramic types (Pollack 1998, 2004, 2006; Pollack and Munson 1998:193). It is possible that Caborn-Welborn Decorated vessels were used for public ceremonies that helped to strengthen intra- and extraregional relationships. The process through which these relationships were strengthened may have included the exchange of marriage partners. The placement of ceramic vessels with the deceased can be viewed as a continued participation in at least some of the rituals of the Southeastern Ceremonial Complex (Pollack 2004).

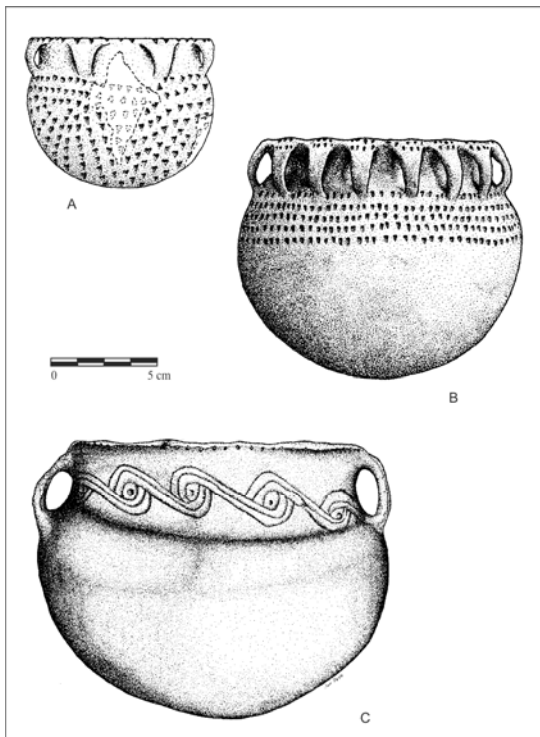
Figure 2-4: Oneota-like designs on Caborn-Welborn ceramics made from local clays (photo courtesy of David Pollack)



Figure 2-5: Central Mississippi Valley ceramics



(Pollack 1998:135)



(Pollack 1998:130)

Figure 2-6: Caborn-Welborn Decorated Jar fragment from Slack Farm (photo courtesy of David Pollack)



Other changes in the material culture from the Angel to the Caborn-Welborn phase include the introduction of large numbers of triangular endscrapers (Figure 2-7) and the acquisition of Euro-American trade items such as brass or copper tubes, coils, and bracelets (Green and Munson 1978:303, Pollack 2004:78). Also, catlinite disk pipes (Figure 2-8), slate gorgets, cannel coal disks, and shell-mask gorgets are found at Carbon-Welborn phase sites.

Changes in the mortuary practices at Caborn-Welborn phase sites include an increase in the number of grave goods buried with individuals and the location of cemeteries (Pollack 2004:32). The location of cemeteries at or around village sites is a change from the earlier Angel chiefdom. Burials appear to have been primarily interred at the mound center in the earlier phase but then are associated with several village sites during the Caborn-Welborn phase (Pollack 2004:119). Cemetery placement is also not consistent; some cemeteries were placed within the village while some were placed on nearby bluff-tops (Pollack 2004:119, 165). However, Caborn-Welborn phase cemeteries were always relatively close to a village.

Overall, Caborn-Welborn phase sites exhibit enough similarities with the earlier Angel phase to suggest a common social identity and some continuity from one phase to the next. Also, influences from extraregional interaction with Oneota groups and other Mississippian polities are present in the Caborn-Welborn material culture. Differing amounts of decorated ceramics and mortuary trends in the Caborn-Welborn region point to subgroupings of sites; materials in central and eastern Caborn-Welborn phase sites show a greater continuity with the Angel chiefdom and a stronger Oneota influence while western sites are more aligned with southern Mississippian polities (Figures 2-2 and 2-3) (Pollack 2004:203). These subgroups do not appear to represent a different cultural tradition, but do suggest that western sites interacted more with Mississippian polities to the south.

While the political structure of the Caborn-Welborn phase was more decentralized than the earlier Angel chiefdom, there are still signs of a hierarchy. Large villages were the most

Figure 2-7: Caborn-Welborn phase projectile points and endscapers (Pollack 1998:47)

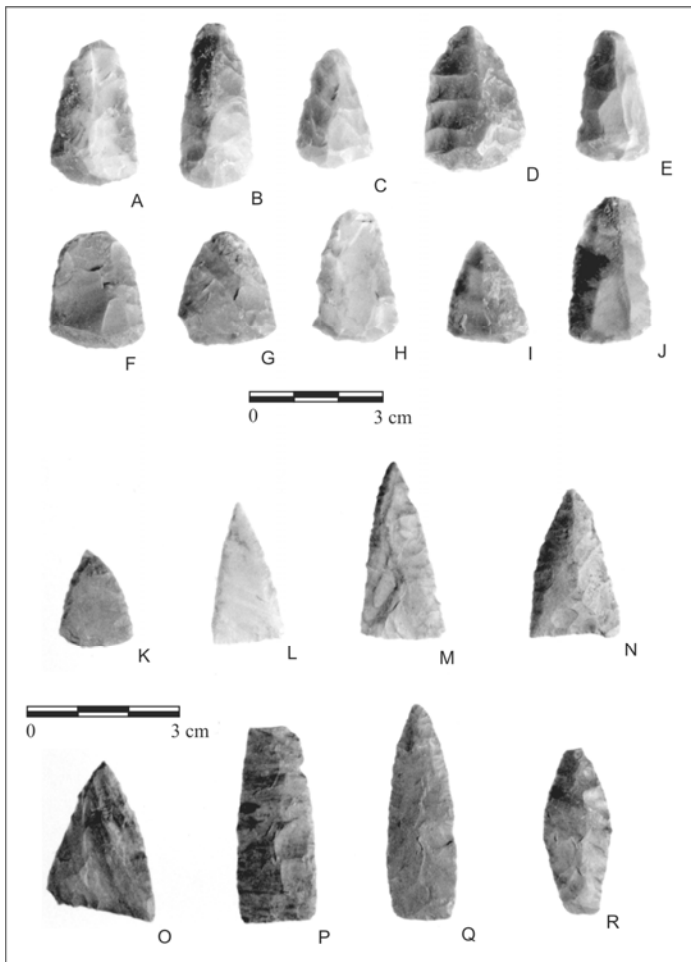


Figure 2-8: Caborn-Welborn phase catlinite stone pipes (photo courtesy of David Pollack)

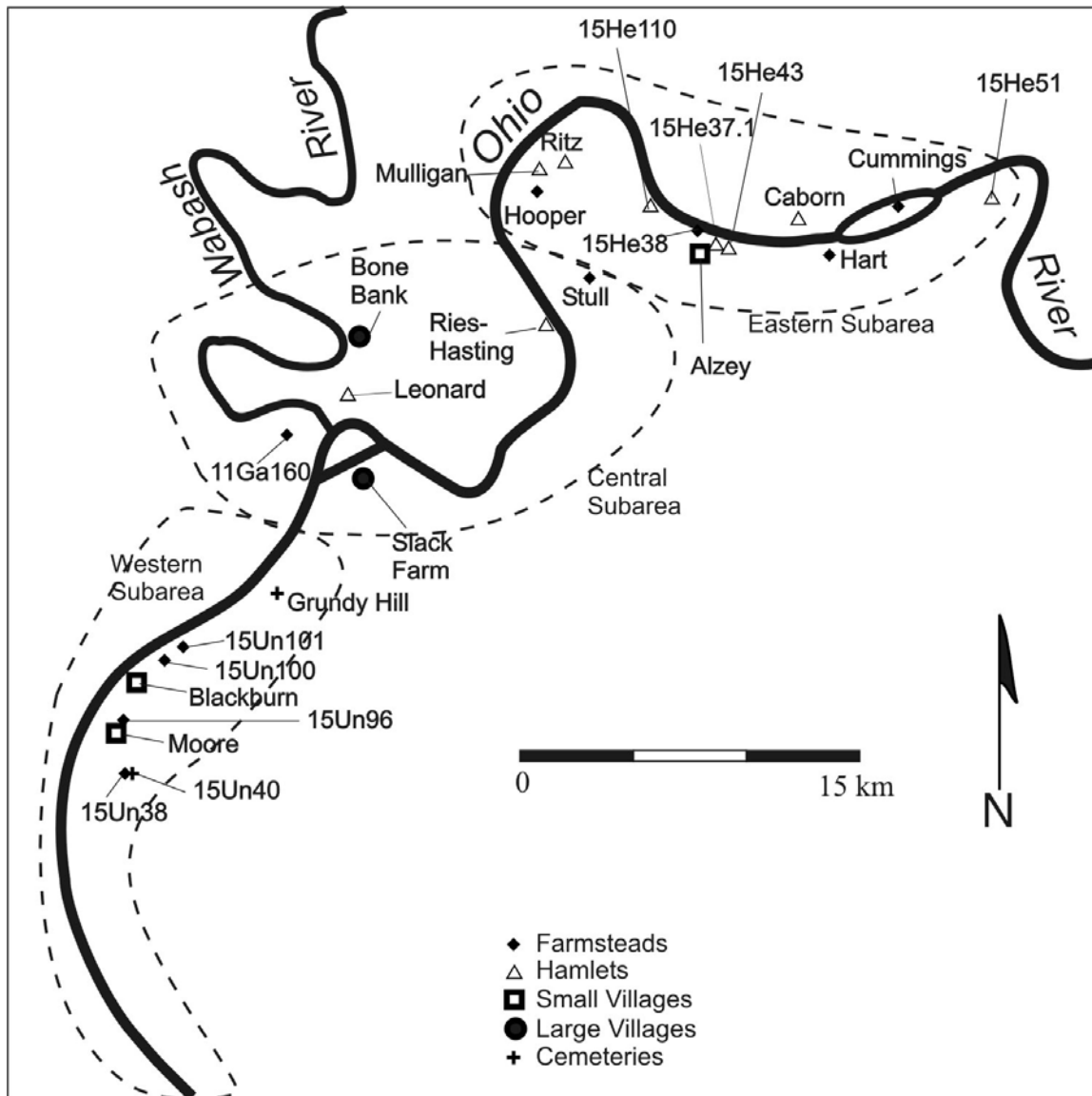


probable focal points of ceremonies and were home to aspiring elites or other aggrandizing individuals who competed and cooperated with one another at various times (Pollack 2004:179, 190). Throughout the Caborn-Welborn region, the population would have been linked by a common ideology, by kinship, and by political alliances. Following the demise of the Angel chiefdom, power may have shifted from a centralized elite to a decentralized leadership that resided at several large villages (Pollack 1998:425).

The Site of Slack Farm

Located on a terrace that projects from the base of the Ohio River bluffs and its associated levee in Union County, Kentucky, the site of Slack Farm is the largest Caborn-Welborn phase site in the region. It encompasses more than 14 ha, and it is the most centrally located village in the region (Figure 2-9 and 2-10) (Pollack 2004:101, Pollack 2006:317). Sidney Lyon (1871) conducted the first survey and testing of Slack Farm and other sites in Union County for the Smithsonian Institution in the late 1800s. It was not until C. Wesley Cowan collected a small sample of artifacts from the surface of Slack Farm that it was officially designated as a site (Pollack 1998:272, Tune 1991). Slack Farm was not investigated again by archaeologists until early in 1988 when the site was heavily looted (Pollack 1998:272). Over 450 looter's holes were investigated and most of the materials recovered from Slack Farm come from these excavations. All disturbed contexts at the site were examined and hundreds of features were mapped. Radiocarbon and flotation samples were recovered from select features (Table 2-1). A minimum of 650 to 750 burials was disturbed by looters at the site (Pollack 2004:103). Despite the destruction caused by the looters, archaeologists were able to learn a considerable amount about the site's Caborn-Welborn component.

Figure 2-9: Middle Caborn-Welborn phase sites by regional subdivision (Pollack 1998:179)



Note: Not all Caborn-Welborn phase sites are illustrated

Figure 2-10: Map of Slack Farm (Pollack 1998:273)

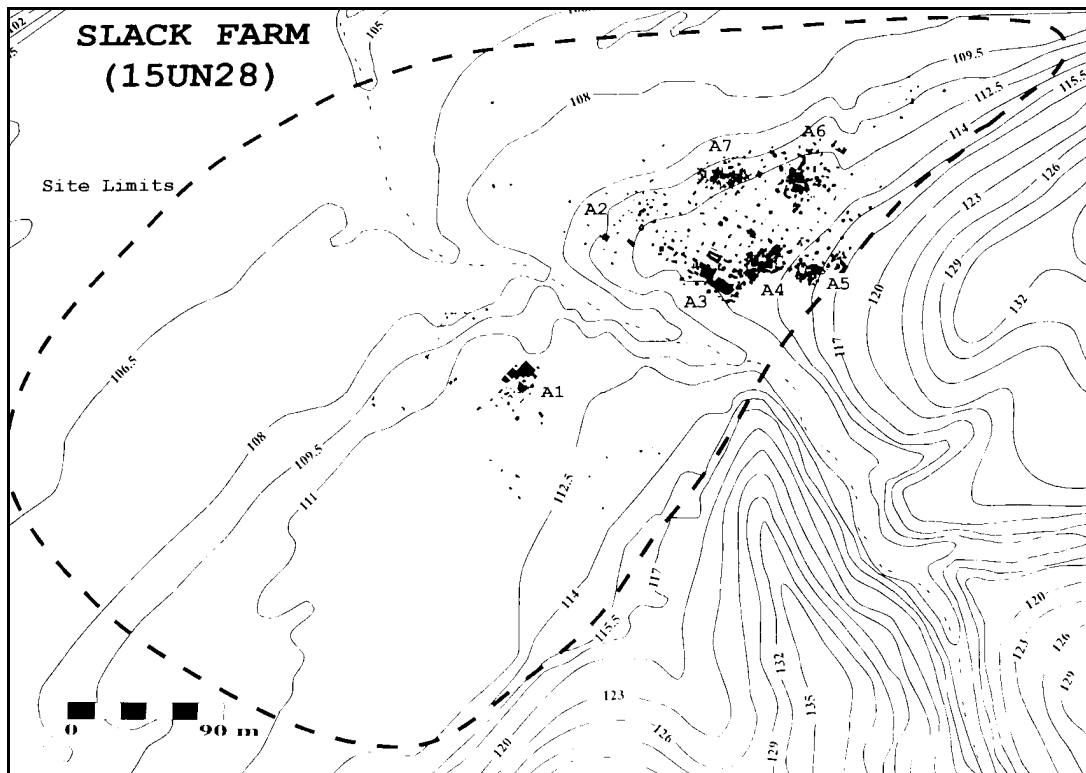


Table 2-1: Radiocarbon dates for Slack Farm

Sample No.	Age BP	Calibrated date	Material
ISGS-2849	640±70	1270 (1307, 1360, 1379) 1430	Corn
Beta-62688	630±60	1280 (1310, 1353, 1385) 1430	Wood
Beta-62695	600±50	1290 (1328, 1333, 1395) 1430	Wood
ISGS-2851	570±70	1290 (1403) 1450	Corn
Beta-62689	570±50	1300 (1403) 1440	Corn
Beta-62690	550±50	1300 (1408) 1440	Corn
ISGS-2850	470±70	1320 (1438) 1630	Corn
Beta-62694	420±50	1420 (1454) 1640	Corn
ISGS-2853	390±70	1410 (1478) 1650	Corn
Average	541±19	1400 (1410) 1430	

Note: From Pollack 2004:16, Munson 2000, Pollack and Munson 1998

Features identified during the excavation of the residential area at Slack Farm included house basins, post-holes, hearths, and small and large pits. Houses were constructed in a manner very similar to earlier Angel phase settlements—wall trenches set in shallow basins with the sides of the structures covered in wattle and daub. Large pits were located in close proximity to the house basins, and some were as large as 2 meters in diameter and depth (Pollack 2004:103). Sprouted corn kernels and other remains suggest that these large pits were used to store foodstuffs and were able to sustain enough individuals so that not all of the food was consumed before it spoiled. Mapping of these structures and storage pits shows they occur in seven discrete clusters around a large, central plaza and each cluster is situated adjacent to or near a cemetery (Figures 2-11, and 2-12) (Pollack and Munson 1998:166). An eighth cluster was defined as an amalgamation of nearby structures and storage pits. Evidence from radiocarbon dates, examination of human remains, and other aspects of material culture, point to the residential areas and cemeteries being contemporaneous and occupied for the duration of the Caborn-Welborn phase (Pollack 1998:272, Pollack and Munson 1998). As with other Caborn-Welborn sites, there is an absence of platform mounds.

Over 350,000 ceramic sherds were recovered from Slack Farm and slightly more than 30% of the approximately 15,000 analyzed rims, appendages, and decorated sherds, were classified as Caborn-Welborn Decorated (Pollack and Munson 1998:166, Pollack 1998:283). Caborn-Welborn Decorated ceramics were not found equally in all contexts at Slack Farm. Only 18.4% of the analyzed ceramics recovered from house contexts were classified as Caborn-Welborn Decorated while 53.4% of the ceramics recovered from pits were of the same type (Pollack 2004:103). This is a similar pattern found at other Caborn-Welborn phase sites and may represent jars that were meant to be seen by individuals outside one's household. These vessels may have been used in feasting activities or other ritual occasions organized by aspiring elites (Hayden 2001:30-1).

Figure 2-11: Example of a residential/mortuary cluster at Slack Farm (Pollack 1998:275)

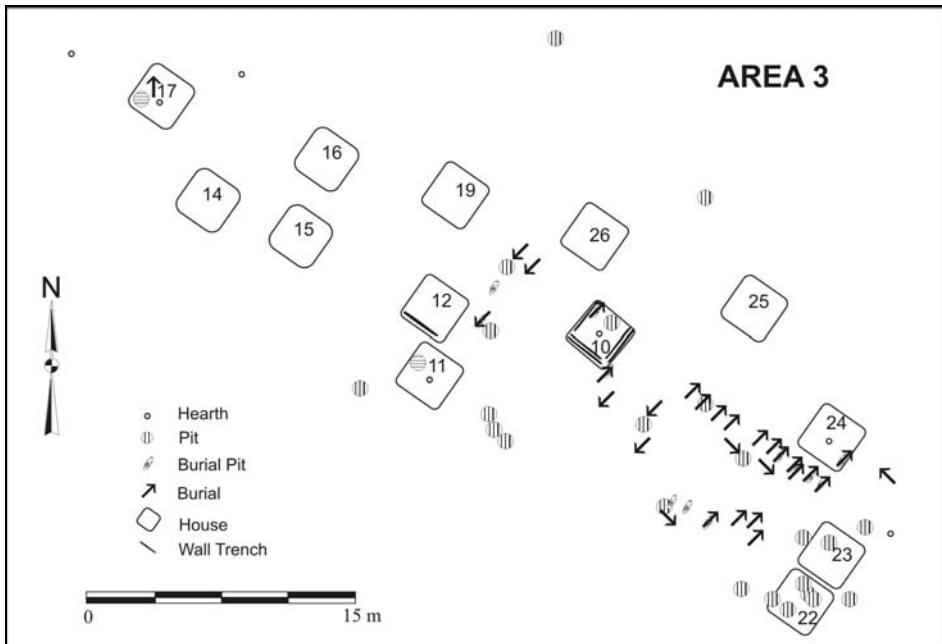
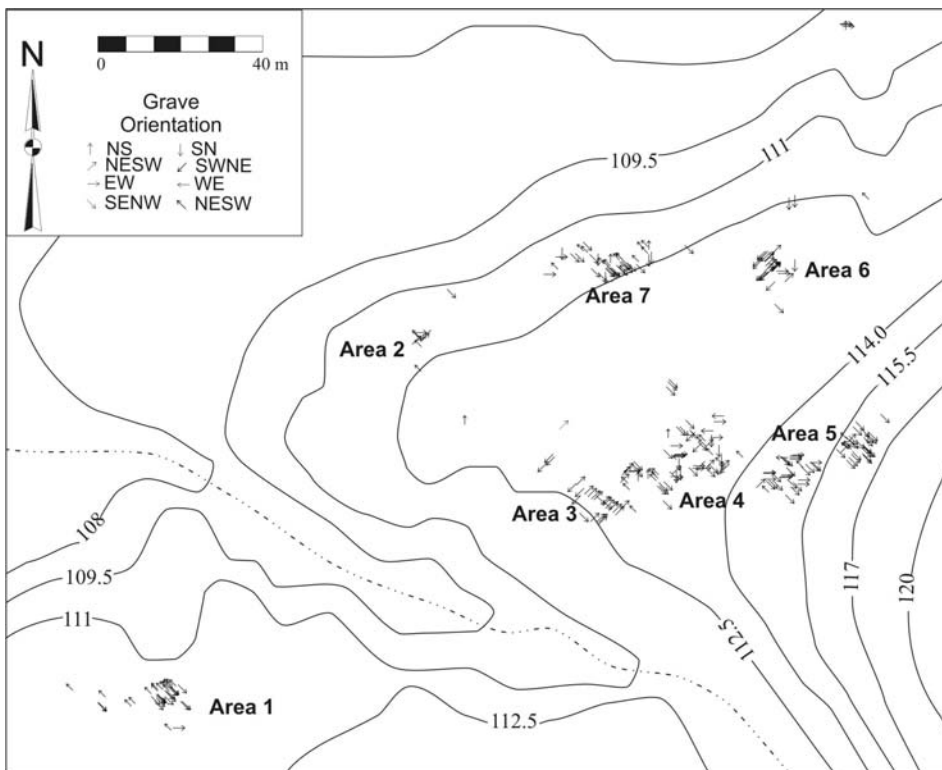


Figure 2-12: Burials at Slack Farm (Pollack 1998:274)



Ceramic types associated with feasting activities (i.e. used in the preparation, serving, and consumption of food and included pans and bowls) are also more common at villages than smaller farmsteads and hamlets and may signify a higher occurrence of these activities at larger sites to foster group cohesiveness (Pollack 2006:313). The average diameter of some types of ceramics associated with food preparation and serving was also generally larger at Slack Farm than other sites (Pollack 2004:174). This again points to the greater importance of larger serving vessels for feasting at Slack Farm.

Nearly 5,600 sherds recovered from Slack Farm were fabric, net, or cord impressed (Henderson 1999 & 2003, Henderson et al. 1996, Pollack 1998, Pollack and Munson 1998). These impressions were found on the exterior of Late Mississippian pans (Kimmeswick Fabric-impressed); large, shallow ceramic vessels coarsely tempered with shell (Pollack 2004). These pans would have been used in the preparation and consumption of food and were primarily recovered from household contexts at Slack Farm. Previous research on these impressions is detailed in the next chapter.

Ceramics decorated with motifs similar to those used by other Mississippian polities and Oneota tribal groups also were found at Slack Farm (Pollack 1998, 2004, 2006) and trace analysis of these sherds points to local manufacture (Shergur et al. 2003). There is a preference for the Mississippian-like ceramics being found within burials while the Oneota-like ceramics were found in association with pits and venues related to the public consumption of food. The Mississippian-like ceramics appear to show a continued association with at least part of the Southeastern Ceremonial Complex by individuals at Slack Farm while the Oneota-like ceramics indicate a strengthening of the relationship between individuals at the site and the Oneota. This relationship may have been strengthened through the exchange of women between the groups and, assuming women were the primary potters, would help to account for the presence of Oneota-like ceramics made of local clays at Slack Farm (Pollack 2004:195-6).

Examination of burials at Slack Farm showed that the deceased were typically interred in an extended position in parallel rows (Pollack 2004:106). Some burials were found one on top of one another but there was little disturbance of the earlier burial. The consistent alignment and the lack of disturbance between burials indicate that the cemetery was maintained and graves may have been marked in some fashion. Items interred with the deceased were generally placed near the torso and included Mississippian-style ceramic vessels; disk pipes; copper or brass beads, tubes, bracelets, and coils; shell beads and ear plugs; conch shell bowls; and glass beads (Pollack 2004:106). Differences in the grave goods in these cemeteries may indicate status differentiation, however, there is little contextual information on the patterning of these items at the site and further testing is required (Pollack 2006:317). There is a higher incidence of some ceramic forms, such as long-necked bottles and effigy bowls, which are similar to some Mississippian types, in burials at Slack Farm than in other Caborn-Welborn cemeteries. The higher occurrence of such ceramics may be an indication of a greater role that individuals at Slack Farm played within in the Caborn-Welborn region. The association of cemeteries with residential clusters at Slack Farm may represent related kin-groups residing in the different areas but further investigation is needed to understand how they were used (Pollack 1998:270, 2004:113).

When the central location of Slack Farm, the size of the site, and the quantity of artifacts recovered are considered together, it becomes apparent that this site was an important Caborn-Welborn settlement (Pollack 1998, 2004, 2006). A greater emphasis appears to have been placed on objects associated with the public consumption of food than at other sites, and this may be related to feasts or other rituals to foster group cohesion staged by aspiring elites. However, the lack of platform mounds and other architectural features that may demarcate elite areas suggests that social ranking at Slack Farm did not achieve the same degree of social differentiation as that of the Angel polity.

The Place of this Research

Previous research at Slack Farm has shown it may have been a focal point of social and political activity during the Caborn-Welborn phase (Pollack 2006:317). Higher proportions of ceramics associated with large-scale preparation and consumption of food has shown that such public rituals were more important at Slack Farm than other Caborn-Welborn phase sites. Also, there is evidence for the expansion of the interaction sphere of this population and the movement of individuals from Oneota tribal groups into the site. It is still unclear what role these individuals had within the site. The nature of these activities, and how the population at Slack Farm interacted, still needs further research. Material culture may provide additional insights into these activities and interactions within the population and textiles are among the classes of material culture most affected by these processes. The textile-impressed ceramic assemblage from Slack Farm provides an opportunity to explore what trends may be present that relate to these ideas. This will help to provide a better understanding of how to define such activities at other sites during the Caborn-Welborn phase as well as other Late Prehistoric occupations.

3. Chapter 3: Mississippian Period Textile Analysis in the Southeastern United States

Introduction

This chapter presents a brief synopsis of previous research on textiles in the Southeastern United States and at Slack Farm. The intent is to show how textiles have come to be used in archaeological studies of material culture that relate to the research questions of this project. The temporal focus of this discussion will be restricted to the Mississippian period. This chapter will also detail what is known about the textile tradition at Slack Farm and help to relate the goals of this project to the study of textiles.

Research into Native American textiles has a long history in the Southeast and elsewhere in the United States. Early explorers and travelers would sometimes include descriptions of the weaving traditions of the native groups that they encountered, but such descriptions were not detailed. This ethnohistoric information has aided textile researchers in understanding the objects they analyze by providing a context for the use of some items, but these descriptions often lack the structural and technical information that is needed to understand the textile's role within a given society. Also, textiles have received far less attention from researchers than artifact classes such as pottery or lithics (Schneider and Weiner 1986, Schneider 1987), a problem that was recognized by early researchers (e.g. Holmes 1896, Miner 1936). Most textiles are constructed from organic materials that do not survive common depositional environments, and as such they are rarely encountered. Consequently, many researchers are unaware of the probable textile traditions that once existed in the regions they study (Drooker 1992), and textiles often are only discussed within the footnotes of larger works (Ericksen et al. 2000:60). These are problems that have plagued textile researchers from the very beginning.

The earliest textile analysts sought to describe the textiles they encountered. They described the fabric type and its designs and offered commentary on how they felt the textiles were produced and used, but the terminology used varied from fabric to fabric and from

individual to individual. Therefore, comparison among textile assemblages based on this literature has been difficult (Minar 1995). Also, these descriptions gave little thought to classifications or the textile's relationship to other textile assemblages (Minar 1995, Schneider 1987). Over time, this changed and consideration of such practices is seen in the recent work of textile researchers. Textiles have begun to be recognized for their importance in the clues they offer for understanding the socio-political characteristics of a group. James Adovasio (1986) and James Petersen (2000) have succeeded in using textiles to analyze the movement of social groups while researchers like Jenna Kuttruff (1986) and Virginia Schreffler (1988) have shown that textiles may also reflect social status in burial contexts. Comparisons of textiles within and between sites and regions as well as the development of more comprehensive methodologies sparked new and exciting avenues of textile research that are still being explored.

Earliest Ethnohistoric Descriptions

The first descriptions of southeastern Native American textiles come from the chronicles of the De Soto expedition in North America from 1539-1543. With each new cacique, or chief, that De Soto and his men met, gifts of food, animal skins, and blankets, were presented as a sign of peace to De Soto (see Clayton et al. 1993 for an updated translation of the chronicles of De Soto). The clothing is described as “blankets of both coarse and fine linen. They make the thread from the bark of the mulberry trees; not from the outside but rather the middle; and they know how to process and spin and prepare it so well and weave it, that they make very pretty blankets...The thread is such that he who found himself there certified to me that he saw the women spin it from that bark of mulberry trees and make it as good as the most precious thread from Portugal...” (Oviedo 1851 reprinted in Clayton et al. 1993:271). These blankets are also described as shawls or mantles that were a part of the tribute paid to the cacique (Elvas 1557 reprinted in Clayton et al. 1993:75, 83). The textiles were woven from mulberry bark, nettle, or an unidentified flax-like fiber, and some included feathers. Colors described for the fabric

include white, green, vermillion, and yellow, which would have been applied through dyeing or painting. De Soto's chroniclers mention the presence of textiles and clothing being interred with the burials of nobles and cloaks of prized animal skins being restricted to elite classes (Swanton 1946:440). While the descriptions from De Soto's chronicles only hint at the textile tradition present in the North America, it does show that the textiles produced by these populations were of high quality and value.

Accounts of Le Page du Pratz and James Adair provide slightly more detailed information on the textile and weaving traditions of Native Americans; however, these accounts are from the 1700s, 200 years after De Soto's expedition. The textiles and other aspects of their production had been influenced by contact with Euro-Americans, but the information provided is still a viable link to pre-contact technologies. Du Pratz describes the manufacture of mantles from mulberry fiber:

The bark they take from young mulberry shoots that rise from the roots of trees that have been cut down; after it is dried in the sun they beat it to make all the woody part fall off, and they give the threads that remain a second beating, after which they bleach them by exposing them to the dew. When they are well whitened they spin them about the coarseness of pack-thread, and weave them in the following manner: they plant two stakes in the ground about a yard and a half asunder, and having stretched a cord from the one to the other, they fasten their thread of bark double to this cord, and then interweave them in a curious manner into a cloak of about a yard square with a wrought border round the edges. (du Pratz [1774] 1975:363)

This description of the weaving among the Natchez of the Louisiana territory would have produced a textile very similar to those manufactured prehistorically and one may assume that this technology did not change a great deal after contact with Euro-Americans. Further support of this comes from du Pratz's descriptions of woven, colored figures in some textiles (du Pratz [1774] 1975:361) that are also known from Mississippian sites such as Spiro Mound in Oklahoma

(King and Gardner 1981). These descriptions show that there was at least some continuity in weaving traditions from prehistory to the 1700s.

Adair provides a similar description of the manufacture of textiles and some elaboration on the accoutrements associated with the weaving process. Adair describes the use of a distaff and a clay weight for spinning thread (a spindle and spindle-whorl) (Adair [1775] 1930:453) whereas prehistoric spinning in the Southeastern United States was thought to mainly encompass thigh-spinning (see Alt 1999 for an example of spindle-whorls in the American Bottom). Spindle spinning would allow for the creation of finer threads composed of more plies than what is thought possible with thigh-spinning. Spindle spinning was more common prehistorically in the Western United States, Mesoamerica, and South America, where the average thread diameter was smaller and more tightly twisted than what is encountered in the Southeast (Teague 1998). Also described by Adair is the use of cane as a shuttle in the actual weaving of the textiles (Adair [1775] 1930:453). There is no other mention or identification in the use of shuttles, or shuttle-like implements, in the Southeast. The use of spindle spinning and shuttles in textile production in Adair's accounts may represent a more complex set of manufacturing techniques for fabric in the prehistoric Southeast than has been previously assumed or may represent the adoption of techniques from other regions (i.e. the Western United States or Europe). The colorful figures woven on textiles noted by du Pratz are also noted but Adair mentions that these figures may also be painted on and included scenes depicting the social roles of individuals (Adair [1775] 1930:453-4). Painted images on textiles are known from several Southeastern Mississippian sites, including Spiro Mound and Etowah Mound. Concerning the raw materials used in the weaving, Adair mentions mulberry bark, nettle, and bison hair, as well as the use of feathers and beads for further embellishment.

Unfortunately, the information on textiles and weaving recorded in early ethnohistoric accounts of the Southeastern Native Americans is not as detailed as one would like. There is no direct mention of the use of twining, but du Pratz's descriptions of a "curious manner of

weaving” may be an indication of its use. Loom-woven fabric using plain weave would have been the norm in the 1700s and it is unlikely that du Pratz would have encountered frame-based twining of the kind used by Native Americans prior to his residence in the Louisiana territory. This textile technique had not been used to produce clothing in Europe for several hundred years and during the 1700s would have been used primarily for basket-making (Barber 1991). The raw materials and methods of decoration described have been identified in some archaeological textile fragments from the Southeast. De Soto’s chronicles also provide information on the differential use of certain textiles based on social class. This information supports ideas concerning textile use by prehistoric Southeastern populations proposed by textile researchers.

Early Textile Analysis in the Southeast

The earliest and most comprehensive textile reports published come from William Henry Holmes. In 1884, Holmes published *Prehistoric Textile Fabrics of the United States, Derived from Impressions on Pottery* and in 1896 the *Prehistoric Textile Art of the Eastern United States*, both through the Smithsonian Institution’s Bureau of American Ethnology, and was the first to publish specifically on the textiles of the New World (Drooker 1992). Holmes had undertaken the study of the textile impressions encountered on ceramic sherds from archaeological sites and was one of the first to recognize the variety of textile types present in the New World. His 1896 study was a summary of the textile traditions then defined for the eastern United States. Holmes’s analysis of the textile impressions led him to the conclusion that the textiles were impressed upon pottery to aid in the manufacture of the pot to regulate the drying of the clay (Holmes 1884). As Holmes states:

The inference to be drawn...is that the fabric was applied to the exterior of the vessel after it was completed and inverted, for the purpose of enhancing its beauty. When we recollect, however, that these vessels were probably built for service only, with thick walls and rude finish, we are at a loss to see why so much pains should have been taken in their embellishment. It seems highly

probable that, generally, the inspiring idea was one of utility, and that the fabric served in some way as a support to the pliable clay, or that the network of shallow impressions was supposed to act after the manner of a *degraissant* to neutralize the tendency to fracture. (Holmes 1884:409)

Holmes recognized the potential of Native American textiles and their utility in aiding an archaeological understanding of prehistory. As he states at the conclusion of his 1896 study of textiles, “The lesson of the prehistoric textile art of [the] eastern United States is simple and easily read, and goes far to round out the story of native occupation and culture” (Holmes 1896:46). Holmes rightfully recognized the information that a study of textiles could impart and paved the way for future generations.

While Holmes’s work was one of the earliest to recognize that textile impressions on pottery were an avenue of research worth pursuing in the Southeast, Holmes offered no discussion of a chronology or comparison between the textiles of different sites. Holmes divided the textile impressions within his sample into broad groups based on similarities in the appearance of the textiles. He discussed each group as a whole regardless of the mixing of impressions from different sites and periods. Holmes’s goal in this early work was not to analyze the textile impressions that he examined, but rather he wished to present a review to make other researchers aware to the impressions’ existence and research possibilities (Holmes 1884:397). In doing so Holmes’s grouping of textile types was one of the first classification systems used and a precursor to the current systems in use today.

Recognizing that ethnographic textiles and weaving techniques can be used to trace relationships between ethnic groups, Horace Miner applied this idea to archaeological textiles in the Southeast (Miner 1935,1936:181). Miner’s 1935 thesis examined textiles that were in museum collections and archaeological assemblages as well as what had been described in literature to piece together a textile chronology for the Southeast. Miner noted the potential use of twist direction to define ethnic groups, called for standardized metric measurements (1936:187,

189), and was able to discern that different textiles, and their associated manufacturing techniques, represent different archaeological cultures (Miner 1936:192). Also, Miner noted the confusion of terms used by different authors and the need for a standardized terminology that may be used for all textile materials (Miner 1936:184). Miner's terminology was based upon differences in the structural elements of the textiles he analyzed. While some of this original terminology is no longer in use, it is an early first step in a broader understanding of the role of textiles in prehistory. It would be several decades before Miner's suggestions would be widely used by textile analysts.

While Holmes and Miner were among the first to recognize the importance of textile analysis, the Spiro Mound textiles were the first assemblage to be intensively described and analyzed. Spiro Mound in Oklahoma was a major mound center during the Mississippian Period and important in the Southeastern Ceremonial Complex (King and Gardner 1981; Muller 1986). From 1933 to 1936, Spiro was heavily looted (Trowbridge 1938; Willoughby 1952; King and Gardner 1981). Looters dug into all the mounds in a search for artifacts and left the site almost completely destroyed; the ground was described as being littered with textile fragments as the stolen artifacts were divided (Willoughby 1952:108). The full degree preservation at Spiro will never be completely known but based upon private and museum collections that have been examined, the preservation of textiles and other perishable artifacts exceeded that of Cahokia, Etowah, and Moundville, and was nearly perfect (King and Gardner 1981). The textile evidence recovered from Spiro was not in the form of impressions upon clay, but came in the form of the actual textiles produced and used by the Mississippian population.

While the looter's activity destroyed or caused some form of damage to all the textiles (King and Gardner 1981), a wealth of information was recovered. Fragments of textiles with images of geometric patterns and icons from the Southeastern Ceremonial Complex have been identified and extensively studied (Trowbridge 1938; Baerreis 1947; Willoughby 1952; King and Gardner 1981; Kuttruff 1988, 1993; Rogers et al. 2002). Not all of these images were painted on

the surface of the textiles; many of the more elaborate human-like figures were woven using a form of twined tapestry (King and Gardner 1981:133). The images are all the more vivid due to the presence of dyed yarns giving the figures life. These yarns were spun and intentionally dyed before being woven into the garment (Willoughby 1952). Twined tapestry with colored yarns is both unique and important because such examples in the Eastern United States are rare and the examples from Spiro show the extent of the planning and ingenuity of Mississippian weavers. Also, since there are very few examples of the actual textiles produced in the Southeastern United States and even fewer that are not carbonized, it shows that these populations were successful in learning the rather difficult process of causing pigment to bond with fibers and the great diversity of hues they could create (King and Gardner 1981:10).

The initial interest by scholars such as Holmes and Miner and that generated from sites such as Spiro stimulated many archaeologists to provide summary descriptions of any textiles they encountered during excavation. These descriptions, however, were not consistent in terminology, detail, or function of the textiles. The archaeologists offered little conjecture as to the role they played in prehistoric society and almost never used the textiles to answer complex questions about concepts such as social patterns (Minar 1995). By the 1960s, archaeologists and other researchers began to realize that textiles are useful in understanding society and began to examine and analyze fabric. However, the lack of standardized methodologies and terminologies prevented many from utilizing the information in the textiles to its fullest potential.

Terminology and Methodology

In 1966, Irene Emery published *The Primary Structures of Fabrics: An Illustrated Classification through The Textile Museum in Washington, D.C.* Emery's book came about as a response to the growing critique amongst researchers that there was no standardized vocabulary that was used in the analysis of textiles and therefore little ability to conduct cross-cultural comparisons (Emery 1966). As Emery states in her foreword, "if technological information about

a given fabric is to contribute to knowledge in any field of study, two things are essential: someone must understand and be able to record its technical nature, and the recorded information must be communicable” (1966:xi). Emery saw the growing need of a detailed record of fabric structures and terminology that could be made available to any researcher allowing their analysis to be standardized and comparable. Emery undertook the difficult and consuming task of surveying almost all known textile structures, describing their characteristics, and presenting the information in an organized and straight forth volume that is still in use today (Minar 1995).

Emery’s 1966 book functioned as the definitive vocabulary for describing textiles, but she failed to present a methodology for their analysis. Researchers were able to have access to a standardized terminology in their descriptions, but as quantitative analysis became more popular and important, there was a lack of standardized analytical techniques. In 1977, James Adovasio presented an answer to this with *Basketry Technology: A Guide to Identification and Analysis*. Adovasio’s book deals specifically with basketry, but as he correctly asserts, “[baskets] are technically a class or variety of textile” (1977:1) and his methodology is easily translated for the analysis of fabric. Adovasio presents a system for analyzing and describing basketry that details each measurement that should be assessed for each type of basket, how that measurement should be taken, and what that measurement represents. By following Adovasio’s methodology, textiles can be analyzed in the same manner regardless of type or culture area. The data generated and conclusions drawn from textiles analyzed in this manner are replicable, thus allowing comparison in quantitative terms, a goal that had long eluded textile researchers. Adovasio’s book helped to move textile analysis into a serious enterprise for archaeologists.

As the use of Emery’s terminology and Adovasio’s methodology became more widespread, a new generation of textile researchers began to emerge. They used textiles and other perishable materials to answer questions regarding socio-political organization and status, placing textiles on par with other forms of material culture in the questions that they can answer.

Recent Textile Analysts

Jenna Kuttruff's 1986 dissertation from Ohio State University marked a turning point in textile studies in the Southeastern United States. Kuttruff's research used quantitative analysis to generate a Textile Production Complexity Scale that could assess differential production and use of textiles by high and low status groups within Caddoan Mississippian groups from the Craig Burial Mound at the Spiro Mound Site and the Ozark Mountain Bluff Shelters in Missouri and Arkansas (Kuttruff 1986, 1988, 1993). This scale is similar to the production-step measure used in ceramic manufacture (Feinman et al. 1981). Both are an ordinal scale index that can be used to assess labor input in an object's manufacture. This scale was the first use of textiles to determine social differentiation and has been adapted by other researchers such as Penelope Drooker (1989,1992). Kuttruff assessed the textile's complexity by looking at the number of threads per centimeter (grouped by range), the number of different textile structures present in an individual textile, and the number of different colored (dyed) yarns as well as the number of different types of threads and raw materials present (Kuttruff 1988:778). The higher the score within each defined category, such as a high number of threads per centimeter and use of multiple textile structures, thread colors, and raw materials, the greater the amount of labor required for its production and the more costly or valuable the textile. Kuttruff's working assumption guiding her research question was that the individuals interred at the Craig Mound were of high status because they were interred with large quantities of grave goods while the Ozark burials, interred with a relatively small amount of material, were of lower status (Kuttruff 1986). Kuttruff found that "all of the materials and technology available and utilized in low status contexts were also available and utilized in high status contexts" (1988:782); however, "the possession of exotic textile goods may have been restricted to individuals of high status" (1993:140). The textiles in Kuttruff's sample differed little in the use of raw material and textile structure; the differences lay in the appearance of the textile. Kuttruff found that the more vibrantly colored textiles with extensive use of dyeing, decorative fringes, and stitched edges that were associated with complex

garments were restricted to the high status contexts (1993:140-1). These textiles required the greatest amount of labor expenditure and therefore were the most valuable. The status distinction being made with the textiles was achieved through the additional steps in their manufacture.

Kuttruff was able to show that while the knowledge of textile production was not restricted to the high status members of the Caddoan population, certain textiles were. Burials of both high and low status had textiles that made use of very similar weaving techniques; the difference between the textiles was the level of embellishment and the combination of multiple structural elements present in the elite burial contexts versus those of the non-elite. The additional steps required in the manufacture of the textiles recovered from elite burials would have added to their production cost in raw materials and labor expenditure. The increase in the embellishment of the textiles increased their complexity. When the differing amounts and qualities of the grave goods were considered as well, a trend of higher quality textiles associated with higher status becomes apparent. Kuttruff found that textiles were differently used based on status and such trends can help in assessing status differentiation.

Two years after Kuttruff developed her Textile Production Complexity Scale, Virginia Schreffler's dissertation examined a similar set of questions using textiles from the Etowah Mound Site in Georgia (1988). Schreffler sought to determine the status of the individuals interred in and around Burial Mound C primarily using the textiles with grave goods as supporting evidence (1988:105-109). The burials recovered from Burial Mound C were all believed to be of elite members of the population; however, Schreffler hoped that an analysis of the textiles from the interments would help define gradations of rank (1988:1-3). The trends Schreffler expected to see in the textiles of higher status individuals were similar to Kuttruff's expectations, increasing textile complexity with increasing social status, and her results supported these trends.

The textiles and grave goods were differentially placed in the burials of individuals of a presumed higher status at Etowah. Within the Mound C burials, there are differences in the type

of burial and the amount and quality of grave goods. Individuals were interred in log tombs or rectilinear pits, alone, in groups, as secondary interments, and with varying amounts of grave goods such as copper celts and ear spoons, shell gorgets, shark teeth, pearls, and projectile points (Schreffler 1988:114). Differences in the burial type and associated grave goods showed that there was status-based ranking between the individuals in these interments and examination of the textile remains produced similar results (Schreffler 1988: 152-4). The textiles from the higher-ranked burials were more elaborate, and therefore more complex, because of the additional steps required in their manufacture. These textiles used a greater variety of structures, raw materials, dyeing, painting, and embellishment than those textiles recovered from other burial contexts and were interred in log tombs that included high numbers of associated artifacts such as copper ear spoons (Schreffler 1988:152-4). Schreffler, like Kuttruff, was able to demonstrate that textiles were produced and used differently based on status.

Lucy Sibley and Kathryn Jakes (1986, 1989, 1996) have taken a different approach in their understanding of textile complexity and status differentiation. Sibley and Jakes see “archaeological textiles as products of decision making by early peoples and represent efforts to manage environmental, economic, and human resources for a variety of purposes” (1989:37). Sibley and Jakes were interested in seeing how the textiles functioned as a social signifier and not just as a consumable good at the Etowah Mound Site (1989:38). Their methodology also helped to set them apart. Sibley and Jakes used more intensive physical and chemical analytical techniques than any other textile researcher to date (Minar 1995). Their analyses required testing for the raw material of the textile as well as for the type of pigment used in its coloration in addition to assessing the textile structures and characteristics. Of all the textile researchers discussed thus far, Sibley and Jakes were the first to use such analyses as the primary medium to answer questions about societal textile use. Their analysis lead to the conclusion that determining a textile to have been used as a social regulator and indicative of status differentiation cannot be

determined by assumptions regarding the relationship between associated grave goods and status alone. As Sibley and Jakes state:

The assumption that the fragment is valued highly because it was recovered from a high status grave is not necessarily accurate...It is likely and probable that the fabric did connote high status, but the value placed upon it would have been from the intricacy of the structure and its quality rather than from its association (1989:43).

Sibley and Jakes found, as did Kuttruff and Schreffler, that the raw material and technology were available to all members of the group. What set the fabric apart was the high quality of the craftsmanship of the textile. Threads were wrapped in additional material to increase their softness and ability to absorb pigment (Sibley and Jakes 1989, 1996). The textile was of such a degree of complexity that it would have required a considerable expenditure time and energy to produce and expense to acquire. The cost in raw materials and labor expenditure of such fabrics would have placed them out of reach to most of the population. A select few would have been able to acquire such luxuries and individuals of high social status would be the most able. This is different from the idea that only members of higher social status were able to obtain and make use of such textiles; economic reasons would have been the limiting factor, not social class. They found that what was considered to be indicative of a high status grave good often occurred in burials that were not high status and may represent the acquisition of such goods through methods other than status. It was only the combination of the objects in the grave, the location of the grave, and type of grave that indicated status (Sibley and Jakes 1986:272; 1996:80-86).

The similarity of the work of Kuttruff, Schreffler, Sibley and Jakes is in its use of a scale of increasing complexity of textile production to assess its value and its relationship to status. Kuttruff and Schreffler used this scale by assessing the structural complexity of the textile-increasing threads per centimeter, multiple textile structures, and so forth. Sibley and Jakes used

these indices but also looked at the chemical signature and microscopic traits of the textile to see aspects that not only increased the value of the textile, but the time used in its production.

Kuttruff's scale was originally based upon using complexity as a way of assessing the production time with a view towards showing that higher complexity indicated a longer and more involved production sequence and as such was to be associated with elite contexts (1986, 1989). Sibley and Jakes's analysis added additional characteristics to be considered in assessing the complexity of a textile that can be, and has been, used to fine-tune Kuttruff's scale to create a more detailed and in-depth picture of textile consumption and manipulation by prehistoric populations (Sibley and Jakes 1996, 2000).

Drawing from the scale developed by Kuttruff and Sibley and Jakes, Penelope Drooker analyzed the textile-impressed sherds from the mound site of Wickliffe in Ballard County, Kentucky. The Wickliffe Mound Site was first discovered in 1930 during the construction of U.S. Highways 51, 60, and 62 when archaeological deposits were cut into (Wesler 2001). Fain King purchased the site shortly after its discovery wishing to preserve the site and have it become a center for education and research (Drooker 1992; Wesler 2001). In 1983, the Wickliffe Mound Site was donated to Murray State University, which began the long process of salvaging the remains of the site from the work of amateur archaeologists and other enthusiasts (Wesler 2001). Murray State developed the Wickliffe Mounds Research Center whose excavations have produced the bulk of reliable data available today on the site. Drooker's 1989 Master's Thesis, *Textile Impressions on Mississippian Pottery at the Wickliffe Mounds Site (15BA4)*, Ballard County, Kentucky, and her 1992 book, *Mississippian Village Textiles at Wickliffe*, represent one of the largest and most widely available studies of textile-impressed pottery to date.

Drooker's goal was to understand how textiles were being produced and used at Wickliffe (1989, 1990, 1992). Because textiles and clothing are highly visible markers of social status, interpreting how they were used at this site could help shed light on the activities within the village. Wickliffe shows no evidence of a hierarchical settlement pattern, in contrast with the

nearby Kincaid and Angel sites (Drooker 1989, 1992). Were textiles used as a social marker within this site in place of the settlement hierarchy? Exactly how important were textiles to the socioeconomic welfare at Wickliffe? Elite textiles and clothing would have been used to demarcate social standing within the site. The design and quality of the textiles would have been far superior to that of the non-elite members. These technical attributes and trends are what Drooker expected to see if the textiles were being used as status markers (Drooker 1990, 1992).

As the textiles were not preserved, Drooker drew her sample from the impressed sherds excavated from the site. Her analysis of the technical attributes from these sherds showed a wide variety of decorative variations (Drooker 1992:174). These decorations were primarily manipulations of the textile structures to create geometric designs but did not appear to be restricted in use at Wickliffe. These decorative variations could represent an extensive exchange system among the neighboring polities. Interaction with neighboring polities would have influenced the weavers at Wickliffe, encouraging them to incorporate more textile structures into their weaving. Exposure to a wider array of decorated textiles would have provided new ideas for design motifs, but also may have lead the Wickliffe weavers to produce fabric that was capable of signaling their ethnic identity. The quality and structural complexity exhibited in the impressions is evidence of a significant investment of labor by these weavers (Drooker 1992:166). Had these objects not been important to the group's survival, it is doubtful that such elaboration and detail would be seen.

The results of Drooker's analysis showed that the textiles were probably not created specifically for the purpose of impressing into pottery (Drooker 1992:152). These fabrics were more likely garments, such as skirts and mantles, or everyday items, such as blankets and mats, which were easily accessible to women potters. More "expensive" fabrics, probably limited in use to ceremonial occasions, would have been both too valuable and more unsuitable for impressing (Drooker 1992:171). The high labor input associated with their production would have probably saved them from such utilitarian activities while the additional embellishment

would have gouged the pots and slowed the manufacturing time. The few carbonized textile fragments recovered from Wickliffe are evidence of such an idea (Kuttruff 1990). Such “expensive” items were present at the site but were not used in pottery manufacture.

Overall, Drooker did not identify any textile impressions that would indicate that some textiles were restricted to elites (Drooker 1992:173). No textile structures were limited to specific contexts at Wickliffe nor was there a difference in quality among the textiles. The technology and raw material necessary for the production of any of the fabric used in the impressions appears to have been available to all members of the site. Only one incidence of a potential elite context was noted where a very fine fabric was used in the impression on a very thin-walled pot (Drooker 1992:173-4).

Drooker’s analysis and regional comparisons (1992:218) of the textiles from Wickliffe has shown that textiles from the northern portion of the Southeastern United States tend to be more complex and common than those from Mississippian sites located further to the south. Still, caution must be taken when trying to use specific textile structures as diagnostic artifacts; this may not be indicative of different weaving traditions but instead be a function of what was considered most appropriate for use in manufacturing ceramic vessels (Drooker 1992:172). Selvages, or edge treatments, however, have the greatest potential for defining regional affiliations (Drooker 1992:218). Drooker (1992:231-4) concluded that the textile impressions at Wickliffe demonstrated textile production was a common and valued activity at the site that was performed as much as other household activities.

The research conducted by Drooker in the analysis of the textile-impressed sherds from Wickliffe shows the amount of information that can be generated from the analysis of textile impressions in the Southeastern United States. Her research has drawn from the earlier work of Kuttruff, Scheffler, Sibley, Jakes, and others. This research asked questions regarding socio-economic and political organization and looked to the textile evidence for answers. It has shown that textile analysis can be used to effectively answer such questions.

Textiles of the Caborn-Welborn Phase

To date, no textiles have been recovered from Caborn-Welborn phase sites. What is known about the textile and weaving traditions of this Late Mississippian culture has come from textile-impressed ceramics. The earliest descriptions of these impressions come from an account in 1828 by Charles-Alexandre Lesueur. Lesueur visited the site of Bone Bank in Indiana to conduct limited excavations and made detailed notes and drawings of the artifacts he encountered, including the textile-impressed ceramics. His drawings of complete textile-impressed ceramic vessels were so detailed that the manner in which the textiles were overlapped may be discerned. Also, Lesueur noted the patterns created on the vessels from the impressions in sufficient detail that the textile types may be seen. Lesueur's drawings indicate that 2-ply, Z-spun, S-twist yarn was used to create variants of Plain twining consistent with what is known for textile-impressed ceramics at Caborn-Welborn sites (Henderson 2003). Unfortunately, little is known about the contexts from which Lesueur excavated these sherds, and the actual materials appear not to have survived. Lesueur's drawings, however, were a first step in textile analysis in the Lower Ohio River Valley.

During her master's research, Drooker analyzed a small sample (n=127) of textile-impressed sherds from Slack Farm (Drooker 1989, 1992). All the sherds in Drooker's sample were identified as variants of twining, with Open Plain twining being the most common (82.5%) and slightly more than one-third (34.9%) exhibited some sort of structural decoration (Drooker 1992:184). Of the variants of twining examined by Drooker, the most noteworthy were four textile-impressed sherds with Z-twisted warp twining (Figure 3-1) (Drooker 1992:185). Thus far these are the only known examples of this structure in the Southeastern United States (while these types were present in her sample, none were identified in the sample selected for this study). Other characteristics of the textiles she examined were similar to those identified at Wickliffe, but with Slack Farm textiles being notably finer. The high incidence of decorated textiles lead

Figure 3-1: Example of Z-twist Warp twining from Slack Farm



Drooker to characterize the assemblage from Slack Farm as mainly garments (Drooker 1992:185) whereas the Wickliffe assemblage was composed of a mix of garments and other household textiles. In general, Drooker suggested that Caborn-Welborn weavers invested a greater amount of time in textile production than their predecessors (Drooker 1992:233). Drooker recommended the analysis of a much larger and more representative sample of sherds from Slack Farm as well as from other Caborn-Welborn sites. Such research may have the potential to see textiles as indicating and differentiating group affiliation during increased group-oriented interactions (1992:240).

Research since Drooker's study on Caborn-Welborn textiles has focused on large villages (Hovey Lake [12Po10], Bone Bank [12Po4], and Slack Farm [15Un28]) and a hamlet (Caborn [12Po32]) (Henderson 1996, 1999, 2003). Following Drooker, Henderson classified textile-impressions by fabric type and described noteworthy features (such as overlain fabrics and selvages). She has used this qualitative information to compare and contrast the Caborn-Welborn textile industries from several sites. This work has set the stage for understanding the similarities and differences between the textile traditions of the earlier Mississippian and Caborn-Welborn populations, but as Henderson (1999:8) has noted, this type of analysis can only go so far in answering research questions about status differentiation and other socio-political research goals. Henderson (1996, 1999, 2003) has identified a trend of increasing complexity and number of textile structures relative to earlier Mississippian groups in the samples she has analyzed and has been able to show their continuity from earlier Mississippian populations. However, this research has been conducted with little analysis of the structural components of the textiles beyond general identification and description. This research has laid the groundwork for understanding the Caborn-Welborn textile tradition and provides a starting point for this study.

Summary

This limited review of textile research in the Southeast has shown some interesting trends. Recognition of the importance and potential questions that could be answered through the examination of textiles came early with Holmes's and Miner's work. This recognition continued after the looting of the Spiro mound group and continued as new researchers asked new questions and applied new methodologies in the study of textiles. It is evident that textile analysis has the ability to answer a variety of questions pertaining to the socio-economic background of a group and can be used to assess questions such as social differentiation. What have also been shown are the gaps in previous research and the possibilities that exist for future investigations. Textile research has primarily been in qualitative terms with descriptions and comparisons. The application of standardized quantitative analytical techniques has the potential to make textiles useful in answering a broader range of questions relating to culture.

The goal of this research is to analyze a sample of textile-impressed ceramics from Slack Farm to see what additional insights into Caborn-Welborn social organization can be provided. Textiles have been used to help define high status burials at Mississippian mound sites (Kuttruff 1986, Schreffler 1988) and it is believed that textile-impressed ceramics may be used with similar success. As textile production occurs within a technological system that articulates the textile's symbolic and functional qualities, the structural characteristics of fabric, and therefore its impression in clay, are able to relate information that can communicate different aspects of social organization. It is these structural characteristics, such as thread diameter and twist direction, that are analyzed here.

The use of standardized quantitative analysis will allow for the detection of patterns of Caborn-Welborn social organization. The metric data generated can then be used for a trait-by-trait comparison of the textile impressions to see where differences exist among types, houses, and residential clusters. If there are households, or household clusters, with higher quality textiles than the rest of the site, this may be an indication of higher status areas. Changes in the

structural qualities of textiles may relate to the introduction of new individuals to the site. This information also has the potential to highlight differences in the weaving techniques between clusters and may even be able to identify groups of weavers. The standardized methodology and terminology will make the analytical results of this project easily replicable by other researchers and can be applied to other assemblages. The wide applicability of this may help create a more inclusive and accessible data set of information on textiles and textile-impressed ceramics across the Southeastern United States. This will have the potential to clearly define the different weaving and textile traditions and how they responded to change and migration as well as compare traditions with one another and between different regions. This will not only help to contextualize these traditions in prehistory, but make the data available to a wider range of researchers.

4. Chapter 4: Methodology

Introduction

The assumptions guiding this research have placed textile production within a technological system where the symbolic and functional characteristics of a textile are linked (Lemonnier 1989) and are fully detailed below. These functional characteristics include the physical attributes of the textile, and decisions made during the object's construction are embedded in the social system of the producer. Textiles are one of the few classes of material culture that retain most of their production information and proper analysis of the structural attributes can explain different aspects of social organization (Adovasio 1970, 1971, 1977, 1986; Barber 1991, Carr and Neitzel 1995, Heckenberger 1990, Kuttruff 1993, Schneider 1987, Schneider and Weiner 1986). Variations in the diameter and spin of the thread, complexity of the structure, and use of additional embellishments provide information on the function of the textile, economic ability of the producer of the object, and their social status. Patterning of the differences in these traits across a site can be used to define different residential and activity areas and may correspond to different boundaries based on social position. Textiles, and specifically the fabric produced and used in ceramic impressions, can provide insight into these patterns. The use of textiles in ceramic manufacture preserved a partial record of the household's textile tradition. The structural qualities of these objects and the contexts of their use can be used to identify status differences, and, possibly, residence patterns. Presented below is a description of the methods used in the study of the textile-impressed ceramics from Slack Farm.

The Use of Textile-Impressed Ceramics to Understand Social Organization

The research presented here is guided by three interrelated assumptions about textile-impressed ceramics from Slack Farm. The first is that the weavers at Slack Farm produced most of their own household's textile needs. The second is that the textiles they produced embodied

the weaver's understanding of their household's place in the social organization of their community. The third assumption is that the textiles used in each household's ceramic production were derived mainly from textiles also produced within their household. These assumptions are common in other studies of textile-impressed ceramics in the Southeastern United States, and there are well-established arguments that support the first two assumptions (Adovasio 1986; Drooker 1992; Kuttruff and Kuttruff 1996; Teague 1998). However, this still leaves the issue of linking the textile impressions found on fabric-impressed ceramics with domestic textile production. Is it possible to say that the fabrics used to impress ceramics were manufactured by members of the same household that made the pot? Clearly demonstrating that this is so at Slack Farm, or other sites in the Southeastern United States, is difficult given the perishable nature of fabrics. However, some considerations are offered below as a first step to more firmly establishing why potters should acquire textiles for fabric-impressed ceramics 'in-house.'

The ethnohistoric evidence, as was discussed previously, provides only a glimpse of what daily life was like in the Southeast prior to European arrival. While this information is vague in many aspects regarding textiles and textile production, it is stated clearly in at least one source for the Caddo (Espinosa 1746 [1942]:160) that women were responsible for the textile production for their individual households. It was the responsibility of these women to produce the textile items necessary for their families, and these items would have included fabric as well as baskets, mats, bags, and blankets. This account does not preclude that textiles were acquired through trade or tribute, and there are many descriptions of great stores of tribute cloth from De Soto's chronicles (Clayton 1993). However, the Caddo example suggests that the majority of the textile items consumed by the household were also produced by the household, and the evidence from de Soto's chronicles do not indicate that textiles that moved in tribute came from sources outside of households. It is through this assumption that textile production and use is linked to the

household. The weavers at Slack Farm would have been responsible for producing textiles for their household needs.

The assumption that textiles embody a weaver's understanding of their culture is based on "the fact that both the finite number of logical alternatives and the possible combinations [in textile production]...are culturally determined to a very high degree" (Adovasio 1986:45, emphasis in original). The "finite number of logical alternatives and the possible combinations" are the various structural and decorative elements that compose a textile object. Not only are these elements culturally bounded, they are visible on the object and therefore available for study (Adovasio 1986:45). Within a given social group, their ideas about what is and is not acceptable in an object are clearly defined and transmitted to a producer as they learn the manufacturing process (Adovasio 1986, Minar 1999) and are therefore embodied in the final product (Schneider 1987). This idea represents the technological system of which textiles are a part (Lemonnier 1989). Textiles are symbolic of ideas about wealth, status, and socio-political organization, but they are also functional objects within their society. It is because textiles can behave as both a symbolic and a functional object at the same time, and therefore use the same set of technological choices in production, that functional traits may be studied in the same way as symbolic traits. In this way textiles come to "embody the sum of individual and societal behaviors, combining individual decisions and group-derived conventions with the social patterns of a given time and place" (Ericksen et al. 2000:69).

The ability of textiles to be used in many different forms and contexts allow them to become easily invested with meaning (Schneider 1987:412). They become materialized symbols of the social system that they belong to and as such may be used to understand how it was expressed and how it functioned (DeMarrias et al. 1996, Braithwaite 1982:81). When a textile is used as a symbol, it is able to communicate a variety of information, including ideas about social organization (Adovasio 1986; Adovasio et al. 1980; Adovasio and Gunn 1977; Bernick 1987; Carr and Maslowski 1995; Croes 1989; Ericksen et al. 2000; Petersen 1996; Schneider 1987:409;

Webster and Drooker 2000; Wobst 1977). Gender, status, and ethnicity may be translated into textiles and it is through the link created between these that social structures may be comprehended (Petersen 1996:10). *Inija* string belts among the Mehinaku and *pesimak* string aprons among the Yanomamo, both Amazonian groups, are worn daily by women as representations of their gender, sexuality, and femininity (Petersen 1996:11). Embroidered *buzi* insignia badges worn on the front and back of garments by men were important in the ancient Chinese social order as symbols for social and political status (Vollmer 2000:19). Australian Aboriginal dilly bags are not only everyday utilitarian items, but represent the spiritual guardian of water holes (Caruana 1993). The 'Hill Tribes' of Southeast Asia use clothing as markers of different ethnic groups (Fraser-Lu 1988). Quiché Maya in highland Guatemala use huipil brocading to reflect household architecture, village layout, and the structure of their music, stories, and ritual (Tedlock and Tedlock 1985). A textile's ability to communicate symbolic information about individuals, social groups, and polities, as well as their role in legitimating social processes, makes them effective tools for understanding social organization (Earle 1990:75, Wobst 1977).

When a textile exists as a symbol, it also exists as a functional object. The physical characteristics of a textile needed to fulfill its intended purpose are a part of both its symbolic qualities and its functional qualities. Because these physical characteristics are present regardless of whether a textile is acting as a symbol or as a functional object, they maybe used to determine the cultural norms and patterning that informed its production (Lechtman 1977: 11). So, the technological style of textiles can be viewed in its structural traits (Petersen 1996:15). Raw material, structural form, spin and twist direction, splice technique, and other physical aspects of the textile's construction have been associated with behavioral traits that may be used for communication (Lemonnier 1989: 157, Wiessner 1990:106). These aspects of textile production are related to the way their manufacture is typically taught (Adovasio 1970; Minar 1999, 2001) and become perceived as cultural norms. A clear example of this is in the final twist of cordage

(Adovasio 1970, 1986; Adovasio and Gunn 1977; Hyland 1997; Hyland and Adovasio 2000; Maslowski 1984 and 1996; Petersen et al. 1987; Petersen and Wolford 2000). Twist direction is determined by the handedness of the spinner, twist direction of previous plies, method of spinning, raw material used, and the social conception of what is most appropriate. All other factors being equal, it is the social norm of what is expected for twist direction that has the biggest impact (Petersen et al. 2001). The producers of textiles may make different objects for different purposes, but these traits remain consistent from object to object.

Production choices of the individual during the construction of an object are a reflection of their culture and their understanding of their place in the world, and explain the process as much as the actual object (Wiessner 1984, Adovasio 1986). “The study of the relations between material culture and society then becomes the study of the conditions of coexistence and of reciprocal transformations of a technical system and of the socioeconomic organization of the society in which it operates” (Lemonnier 1986: 154). The link between a textile and the culture with which it was created is based upon the object’s ability to function as a symbol as well as the way technical knowledge was transmitted. The technological system within which textile production occurs encompasses the technical knowledge that is necessary for the production of the textile, the actual textile, and the symbolic meaning associated with it (Lemonnier 1989:156). This is possible because “[a]ny technique, in any society...is always the physical rendering of mental schemas learned through tradition and concerned with how things work, are to be made, and to be used” (Lemonnier 1993:3, also Adovasio 1986:45). Textiles do not exist within a vacuum; they are not only symbols or only tools but rather are often both at the same time. A textile may be worn as a mantle to signify one’s membership in a given social group, as well as to keep warm. It is in the articulation of symbolic and functional traits that constitute the larger technological system within which textiles, and therefore textile-impressed ceramics, may be understood (Dobres and Hoffman 1999:8, Bourdieu 1979, Lechtman 1999: 224, Lemonnier 1989 and 1993). In this research, it is also argued that the technological system that involves these

meanings also involved the understanding of how to use textiles as tools in the manufacture of ceramic pans for the cooking and serving of food. Textile-impressed ceramics preserve at least a partial record of the textiles used by households.

The final assumption of this research is that the textiles produced and used within a household were also used in ceramic manufacture to create textile-impressed ceramics. This idea does not mean that once a pot was impressed with a textile the pot took on the textile's social meaning, but rather the impression became a sort of photocopy of the textile with which it was impressed. This assumption has received the least amount of discussion despite its importance in textile-impressed ceramics research. This assumption is not without merit, especially if the textiles used in ceramic manufacture were originally created for household use. If ethnohistoric accounts can be generalized from the Caddo to the Eastern United States, then it can be assumed that the majority of those items would have been produced within the household (Espinosa 1746 [1942], Swanton 1946:549). Drooker's (1992) research at Wickliffe gives some support to this, as she identified the majority of the textiles used in the manufacture of fabric-impressed ceramics were originally mantels, shawls, skirts, and other items that were utilized by households. These items were readily available and their acquisition would not have added to the production cost of textile-impressed ceramics.

This concept follows ideas about how far one will travel for the necessary resources for ceramic production (Arnold 1985:35). This idea, the exploitable threshold model (Arnold 1985), essentially states that resources of sufficient quality used by a potter for successful ceramic production must be located in close enough proximity to the potter's production locale that the cost of their acquisition will not diminish the returns of production. The distance one travels to obtain these raw materials may vary and when the distance is greatest, the trip is usually made periodically only if a sufficient supply of raw materials maybe acquired. For those resources required for the construction of the actual pot, and not necessarily its decoration, the distance a potter will travel is approximately 1 km (Arnold 1985:52). If the textiles produced within the

household were considered suitable for use in ceramic production, then one's household would be the most expedient locale for acquiring the textiles necessary for ceramic construction.

A final rationale for the assumption that textiles produced within a given household were also used for that household's ceramic production is the technological system to which they belonged (Lemonnier 1989). The textiles produced within a household were not just symbols that represented status or gender, but they were also tools. The products of textile manufacture, such as everyday articles of clothing like mantels and skirts, were used for protection from the elements, for comfortable surfaces for sitting and sleeping, for the transporting of other objects, and even for the processing of food. And because these items were also tools, they were a part of the household's tool kit necessary for everyday tasks, including ceramic production. Textiles were used to both control the drying of the pot and to lift the pot from its mold (Holmes 1889, Brown 1980). Larger textile items, such as mantels, shawls, and skirts, would have provided better coverage for the pot to provide consistent moisture control during drying and provided better support when removing the object from its mold. Using rags and scraps of fabric would have created uneven coverage of the pot and therefore uneven drying of the clay. If the rags were inconsistently sized, then they would not provide sufficient support during the pot's removal from its mold. The production cost of using rags in ceramic manufacture would have been greater than using household textiles. This is an admittedly simplistic argument for the rationale behind assuming that the textiles used in ceramic manufacture were produced within the household and it is not without problems. Further research is necessary to quantify this idea but for the present research project, that is how this assumption is being used.

Sampling

The sample for this analysis came from the 1988 excavations at Slack Farm. These excavations were conducted to document the looting and recover as much information as possible (Pollack 1998, 2004, Pollack and Munson 1998, Tune 1991). The cemeteries, house contexts,

and storage pits were all disturbed by the looters' holes and artifacts were recovered from the surface, the back-dirt piles, and within the holes as they were cleaned. While the excavation circumstances are far from ideal, archaeologists were able to associate some artifacts with specific houses and pits (Pollack 2004). The sample drawn for this study comes from these contexts. Sherds were drawn from contexts large enough to be statistically viable (more than 30 rims, appendages, or decorated sherds, that were greater than 4 cm in size). The resulting sample was of sufficient size to characterize the Caborn-Welborn textile tradition and to make intra-site comparisons but not so large that it could not be completed in a reasonable time frame. This represents a 15 percent sample of the textile-impressed ceramics recovered from Slack Farm.

The Impressions

The soil chemistry of Kentucky is conducive to the preservation of perishable artifacts in only rare circumstances (Drooker 1992). No textiles were recovered from the excavations at Slack Farm, and an understanding of the textile tradition must be achieved through indirect methods. In this research, the impressing of textiles in ceramics during manufacture was not being done to imbue the vessel with the textile's symbolic meaning. Textiles were being used essentially as tools in this process. However, ceramic manufacture created a record of the textile's structural characteristics that may be treated in a manner similar to the actual textile (Figure 4-1) (Hurley 1979, Drooker 1992). The textiles were both symbolic and functional objects (Lemonnier 1989, Adovasio 1986), with the attributes of one aspect informed by the other. The functional characteristics of textiles are being examined here to understand what information they may provide about social organization. The practice of impressing ceramic vessels with fabric and other textiles essentially creates a cast of the object, recording almost all the same information that would be otherwise available with the original object. In this sample, textiles were used to regulate the drying of the ceramic vessels to minimize fracture and support the pans as they were lifted from their molds. The textile was pressed into the wet clay of the

Figure 4-1: Close-up of clay cast from textile-impressed sherd; note detail of thread visible



vessel and once fired retained the impression of the textile and all its associated structural evidence. These negative images are all that remains of the textile industry at Slack Farm. While it is possible to study the structural characteristics of the fabric directly from the sherd bearing its impression, this is in fact quite difficult. Obtaining the positive impression of the textile makes it possible to clearly see and identify the details of the fabric (Adovasio 1986, Drooker 1992, Minar 1995). This is done through casting, or impressing the sherd into clay. The plasticity of the clay captures the positive image of the textile and its structural characteristics. The textile-impressed sherds from Slack Farm included in this sample were impressed with Crayola© Modeling Clay to capture the positive image. These clay casts were then used for analysis.

The casting process began by kneading the clay to soften it. It was then rolled out on a flat surface to form a disc roughly the diameter of the sherd and approximately a half-inch thick. The clay was then pressed into the sherd starting from its center. The impression was created by using the thumbs to press the clay evenly and completely into the sherd while supporting its back with the forefingers. Once the entire sherd had clay pressed into the surface, the clay disc was carefully peeled away from the sherd and examined. It is necessary to offer a word of caution. The casting process not only imparts the positive image of the textile from the sherd to the clay, but also imparts some of the clay's chemical signature to the sherd. This chemical signature is able to skew any residue analysis conducted on the sherd. Therefore it is prudent to only cast a sample of the collection and within that sample to closely examine each sherd before it is cast for any organic residue adhering to its surface. If any organic residue is present, it is recommended that it be sampled for testing before the casting is done. Also, sherds that are fragile and/or heavily eroded should not be cast, if possible. The casting process places a great deal of tensile stress on the sherd and can cause its disintegration. A visual examination of these sherds should be done to discern as much information as possible.

Once cast, the impressions were studied to sort the sherds based upon textile type. As there is almost no typology for textile types in the Southeastern United States beyond

differentiating between exterior (Kimmeswick Fabric-impressed) and interior (Tolu Fabric-impressed) textile impressions, a textile typology based upon fabric type was developed, which may be used by other researchers to allow for future comparisons. The textile types present in the sample were primarily Open Simple S-twist Twining with variations on the manipulations of the warps- usually Diagonal or Cross-Warp. Other types of twining were also present, such as Oblique Twining, but these represented a small portion of the sample. Developing a textile typology was a necessary step as it is not only easier to analyze textiles separated by type, but it is easier to discuss the characteristics of the textile as well (Adovasio 1977).

The Analysis

Analysis began once the sorting of sherds and their impressions by textile type was completed. A sherd and its impression were laid out so they appeared as mirror images of one another. This placement was important in quickly answering questions about anomalies in the clay impression- what may appear has a knot or an over-laid thread often was a disconformity in the surface of the sherd caused by wear or temper. Warp and weft diameter was measured at the thickest portion of an individual final thread twist(Adovasio 1977, Hurley 1979). This provides a general indication of the mean thickness of the thread and therefore the thickness and weight of the fabric. Smaller average diameters were indicative of thinner threads and finer textiles while higher average diameters represented heavier, and occasionally coarser, fabrics (Kuttruff 1993).

The structure of the thread, including its direction of twist, was also assessed (Figure 4-2). The spin direction of any plies and the final twist of the cord were recorded using the methodology and terminology as put forth by Hurley in *Prehistoric Cordage: Identification of Impressions on Pottery* (1979). This method is similar to how stitch slant is determined for twined textiles (Figure 4-3 and 4-4). Threads whose twist slants from top-left to bottom-right are considered S-twisted while threads slanting from top-right to bottom-left are Z-twisted. The diameter of the warp and weft units was also recorded (Figure 4-5, 4-6, and 4-7). For weft units,

Figure 4-2: Determination of S-twist and Z-twist for a cord



Figure 4-3: S-twist weft twining

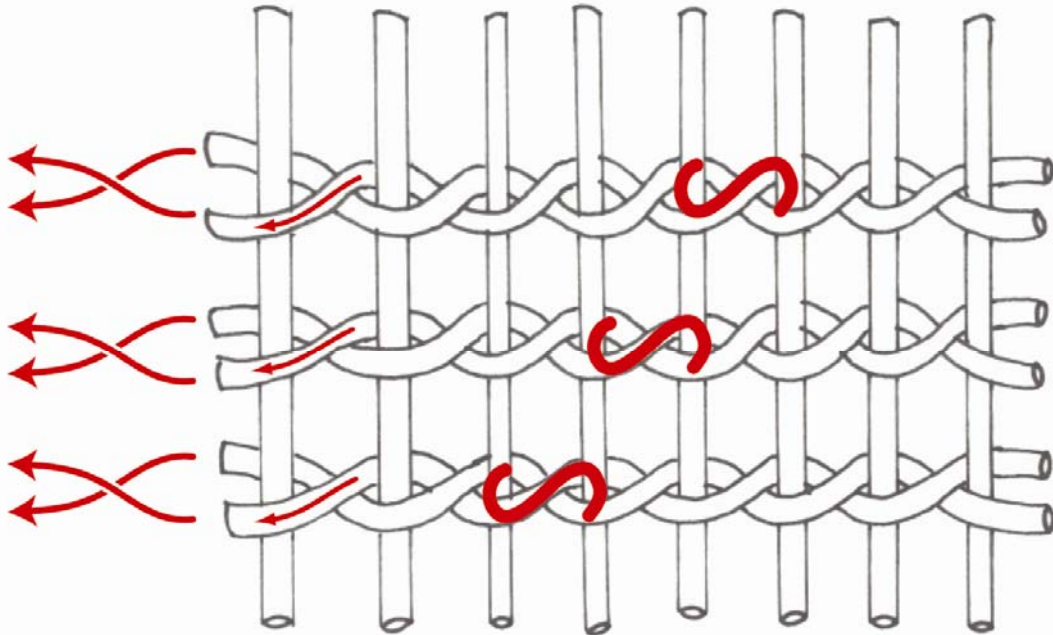


Figure 4-4: Z-twist weft twining

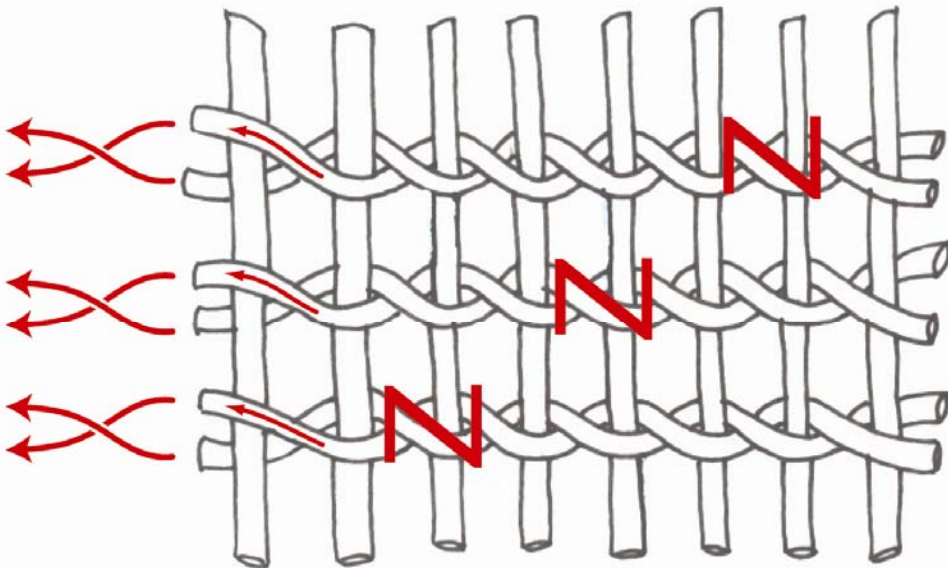


Figure 4-5: Measuring cord diameter

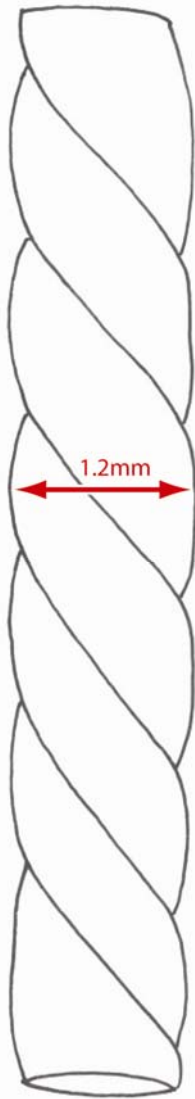


Figure 4-6: Measuring warp and weft diameter

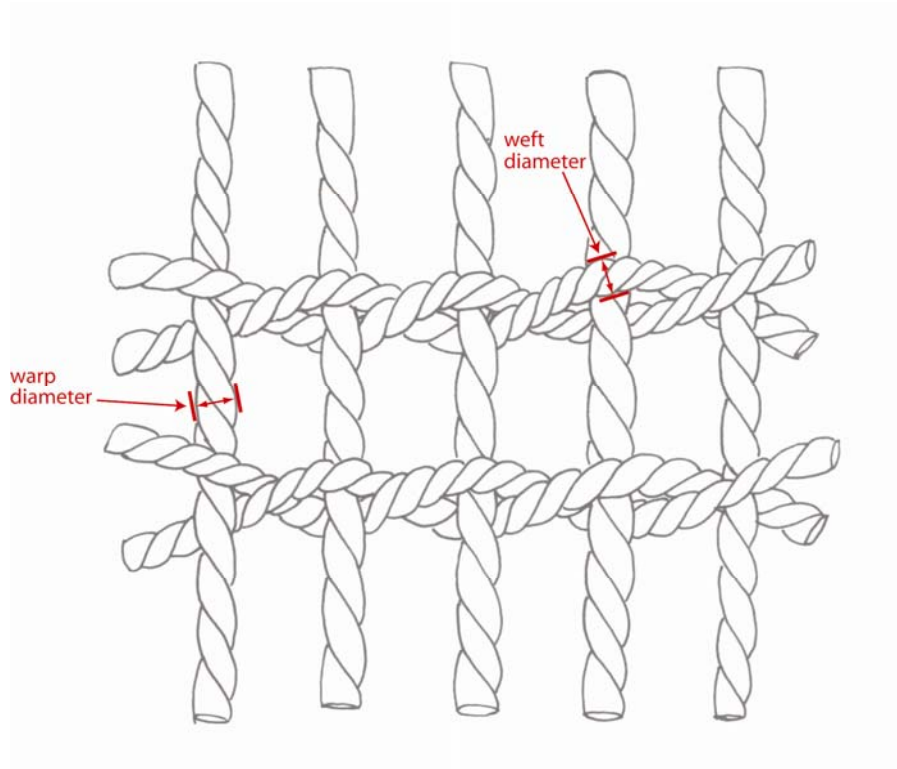
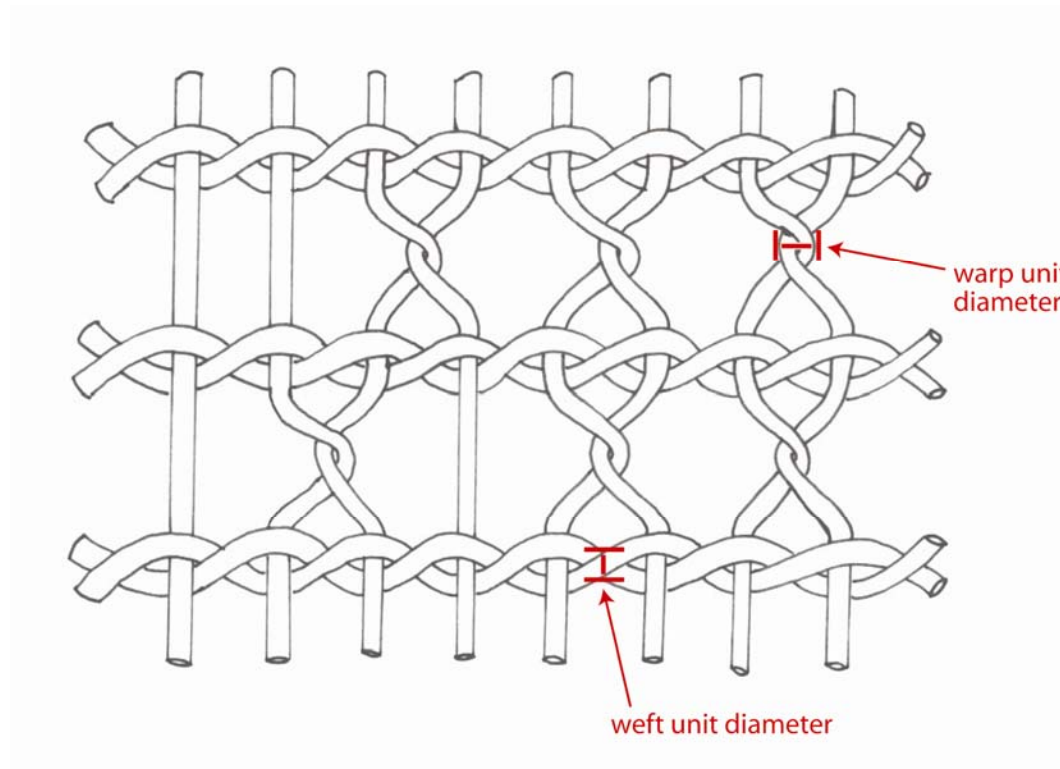


Figure 4-7: Measuring warp and weft unit diameter



this was the diameter of the elements at their crossing between two warp rows. The warp unit diameter was only recorded when there were two or more warps interacting with one another (as in Transposed Interlaced Warps). These measurements helped to assess the tightness of the weave and were used in determining the energy expended on the manufacture of the textile. The smaller the unit diameter the tighter the weave and the higher the amount of energy expended upon its manufacture. The number of twists per centimeter for warps and wefts was assessed by counting the number of 360° rotations made by the final twist of the thread in one centimeter (Figure 4-8, 4-9, and 4-10). The angle of twist of a thread is measured as the angle of deviation from the central axis of the thread (Figure 4-11) (Drooker 1992). As the number of twists per centimeter increases, the angle of twist of the thread will decrease. This inverse relationship is an indication of increased production time and strength for the thread. The number of warp and weft elements per centimeter was also recorded.

By noting the number of elements per centimeter in consideration of the twining type (Open or Close), it was possible to gauge the fineness of the textile. Typically, the greater the number of warp or weft elements per centimeter the finer and more opaque the textile. This is not always the case with Open twined textiles in that very fine weft elements may be spaced so only one is encountered every centimeter. The space between the warp and weft rows was also measured. This is accomplished by measuring the distance between the edge of the last warp or weft and the edge of the successive warp or weft. Analysis of this attribute helps in seeing patterning created by differing gaps between the elements as well as assessing the standardization of textile production at Slack Farm. In addition to the measurement of the structural characteristics of the textile impressions, the length, width, and thickness of the sherd was recorded. All measurements were recorded in millimeters unless stated otherwise and a standardized analysis sheet (Appendix 1) was used. A pair of Helios© dial needle-nose metric calipers were used for all measurements.

Figure 4-8: Measuring cord twists per centimeter

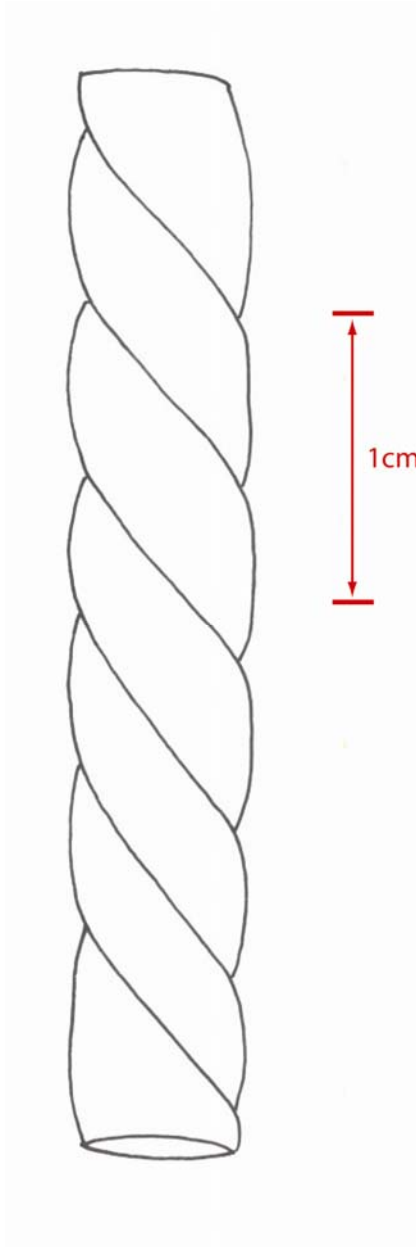


Figure 4-9: Measuring warp and weft twists per centimeter

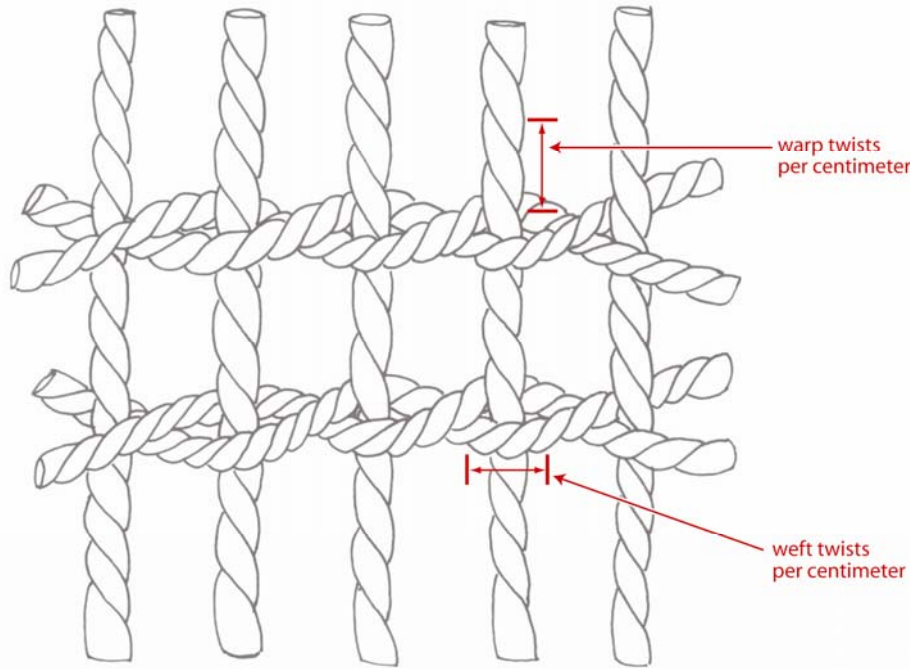


Figure 4-10: Measuring space between weft rows and weft twining twists per centimeter

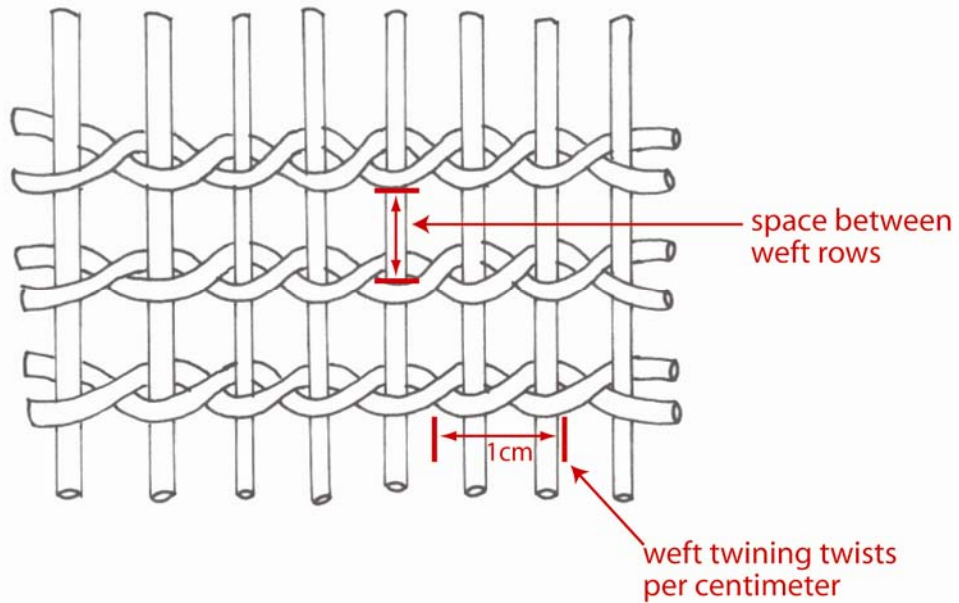
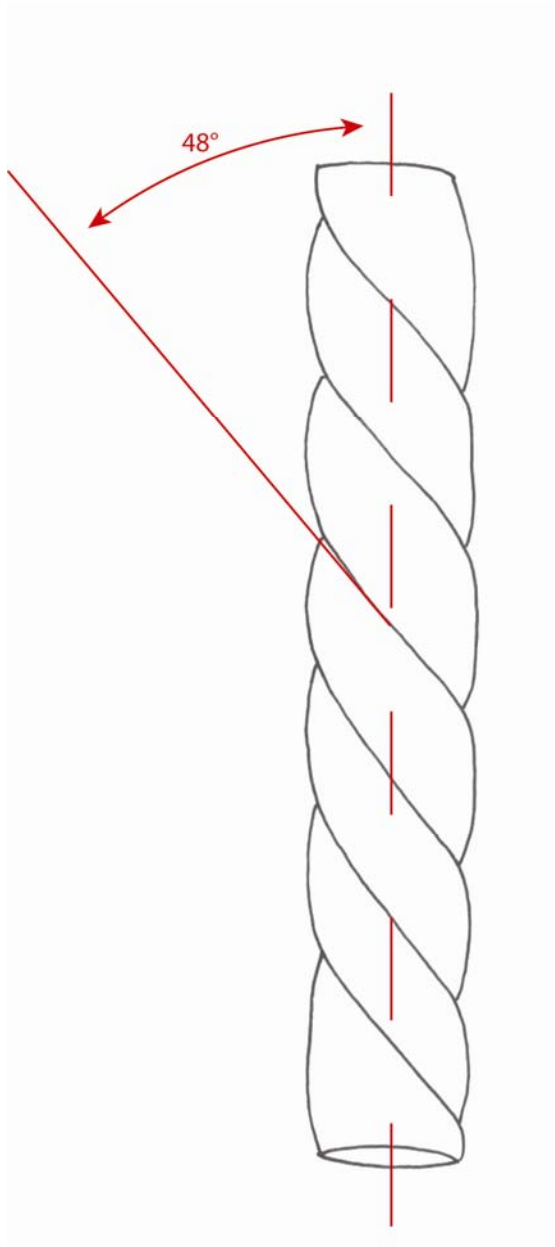


Figure 4-11: Measuring cord angle of twist



Once the structural characteristics were measured and recorded, the impression was examined for any other pertinent information. Where present, splicing technique and selvage treatment were examined and described. These two textile attributes are the most representative of the idiosyncrasies of the weaver (Adovasio 1986) and are discussed in the following chapter. Splicing is the addition of new threads, or elements, to exhausted threads (Adovasio 1977). This can be done in a variety of ways: knotting, twisting, and laying-in, are the most common. Splicing is typically taught weaver-to-weaver and is a decision in the production process that is often solely that of the weaver (Adovasio 1971, 1977, 1986). Selvage treatment refers to how the textile is both started and finished (Adovasio 1977, Emery 1966). Selvages are subject to the same idiosyncrasies as splicing techniques but also provide information on textile production, specifically how the object was woven (this may also inform as to the possible use of the item produced) (Adovasio 1986, Barber 1991). The condition, or wear, of the textile at the time of its impression into the wet clay of the given pottery vessel was noted as well. Wear was described as no wear/light wear, medium wear, and heavy wear. Textile impressions that had threads neatly twisted together, consistent angles of intersection between the warps and wefts, and had little to no frayed elements visible in the thread were considered no wear/light wear. Medium wear textile impressions had some frayed elements, inconsistent warp and weft intersections and showed some evidence of having been utilized. Textile impressions that displayed heavy fraying, inconsistent angles of intersection, missing elements, and mends were considered to have heavy wear. Within this sample, wear varied from pristine textiles with no visible imperfections or signs of use to textiles that were heavily worn, frayed, and/or exhibiting mends. Also, any over- or under-laying textile structures were noted, described, and measured according to the above methodology.

Expected Trends

The analysis undertaken in this study is more detailed than that typically conducted, except for a few exceptions (e.g. Adovasio 1977, Drooker 1992, Kuttruff 1988, Minar 1995). Textile analysis is often more qualitative than quantitative, with researchers describing textile structures and providing little quantitative information for comparison. The descriptive nature of much of the previous research has ignored many structural characteristics best suited to measurement (such as warp and weft diameter or angle of twist). For example, the angle of twist is often assessed in categories ranging from loosely to tightly spun. While this allows for general characterizations of how much energy was expended in the production of thread, it does not allow for any other analysis. By recording the actual angle of the twist, not only can the tightness of spin be assessed, any patterns or trends can be identified. For example, this can allow for the identification of individual weavers or families of weavers (Adovasio 1971, 1986) in addition to energy expenditure in production (Kuttruff 1986).

The structural characteristics of textiles are their functional attributes. Technological choices made during textile production are informed by the weaver's social system and are culturally bounded (Lemonnier 1993, Adovasio 1986). When a household makes the functional choice to use textiles they produce in their ceramic manufacture, the functional attributes are preserved in the ceramic even the textile does not survive. These attributes were chosen for analysis because they can provide information on the energy expenditure in textile manufacture, can help identify clusters of traits associated with individuals, and can provide insight into what the fabric's initial purpose may have been. The goal of this research is to use textile-impressed ceramics to generate a better understanding of Caborn-Welborn social organization. The variety of attributes recorded will be used to generate a data set that can be used to document intersite and intrasite variation in textile production, use, and discard. Because textile production occurs within a technological system, the patterns identified also may provide insight into status, ethnicity, and residential patterning. This data, when considered with other lines of evidence

from Slack Farm, should provide a more complete picture of Caborn-Welborn social organization.

5. Chapter 5: Textile-Imprinted Ceramics from Slack Farm

Introduction

This chapter presents descriptions of the textile types identified during analysis of the sample from Slack Farm. The sample generated for this analysis was drawn from the 1988 excavation of Slack Farm. All fabric-impressed ceramics that could be confidently assigned to a particular house or pit were analyzed. This resulted in 870 sherds analyzed, which constitutes a 15 percent sample of the fabric-impressed sherds from Slack Farm. The looting and resulting excavations of the site were focused on Clusters 3, 4, 6, and 7 and are better represented within the sample.

The textile types defined in this chapter and used in the analysis of the fabric-impressed sherds from Slack Farm were defined using established terminology and techniques based on structural differences in the fabric. This technique produces a list of traits that each object must have in order to be categorized as a given textile type and limits the possibility of fitting an object into multiple types. These traits are objective, they limit researcher-based bias in assigning objects to types, and the classification can easily be replicated.

The Textile Type Descriptions

Nineteen different textile types were identified in this sample. Seventeen variants of twining, one of oblique interlacing, and one of twill plaiting were identified. Of the twining types, four main subtypes were present: Simple twining (or Plain twining), Diagonal twining (or Alternate Pair twining), Cross-warp twining (or Transposed Interlaced warps), and Oblique twining. All splices, mends, selvages, and decoration were noted, described, and measured. In total, approximately twenty-two observations were recorded for each fabric-impressed sherd for a total of 19,140 data points. Table 5-1 summarizes the metric data for the fabric-impressions

Table 5-1: Textile types and their frequencies identified in sample from Slack Farm

Type Number	Textile Type	Count	Percent of Total (%)
Ia	Open Twining	24	2.8
Ib	Close Twining	2	0.2
Ic	Open Simple S-twist Twining	525	60.3
Id	Close Simple S-twist Twining	4	0.5
Ie	Open Simple S-twist Twining with Gaps	106	12.2
If	Close Simple S-twist Twining with Gaps	17	2
Ig	Open and Close Simple S-twist Twining	7	0.8
IIa	Open Diagonal S-twist Twining	89	10.2
IIb	Close Diagonal S-twist Twining	12	1.4
IIc	Open Diagonal S-twist Twining with Gaps	12	1.4
IId	Close Diagonal S-twist Twining with Gaps	7	0.8
IIE	Open and Close Diagonal S-twist Twining	1	0.1
IIIa	Open Simple and Diagonal S-twist Twining	1	0.1
IIIb	Open Simple and Diagonal S-twist Twining with Gaps	1	0.1
IVa	Open Simple Cross-warp S-twist Twining	54	6.2
Va	Open Simple, Diagonal, and Cross-warp S-twist Twining	2	0.2
VIa	Close Oblique S-twist Twining	3	0.3
VIIa	Oblique Interlacing	2	0.2
VIIb	Twill Weave, 3/2 Interval	1	0.1

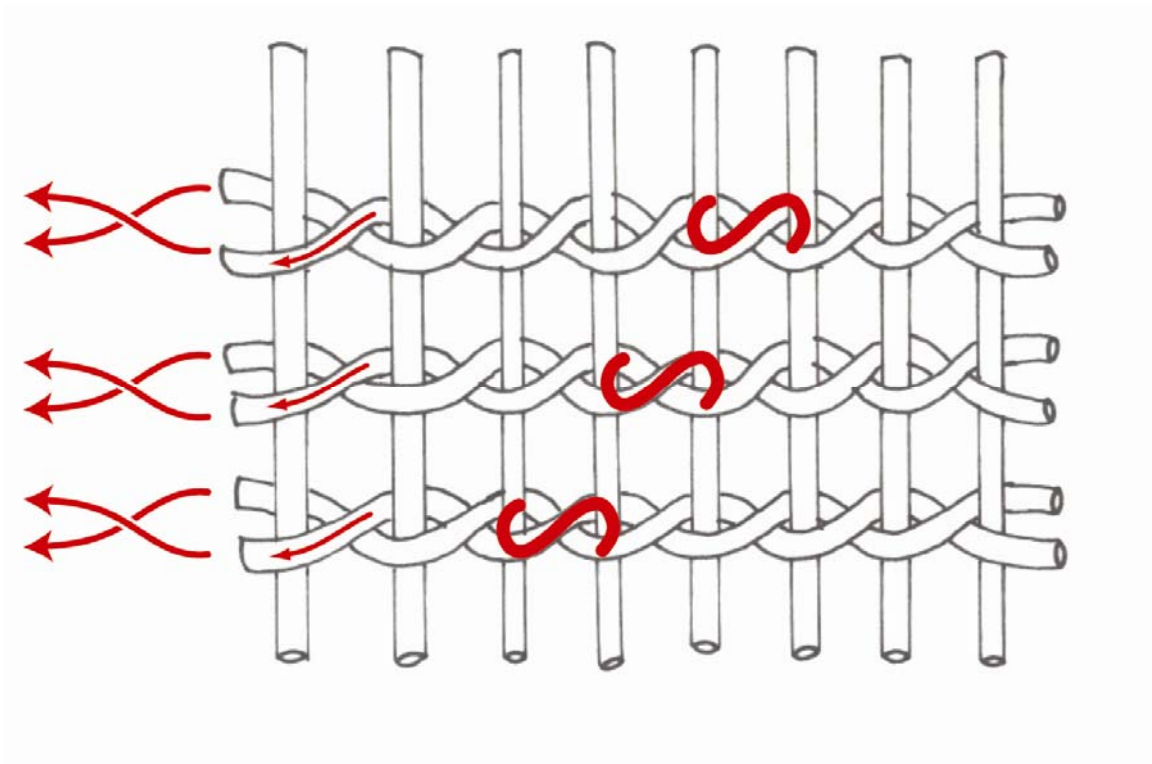
n=870 n=100%

analyzed. The order of the types, from Ia to VIIIb, constitutes an ordinal scale of increasing complexity. The textile impressions in this sample can be classified as Plain weave or Twined textiles. Sixteen of the nineteen textile structures identified were forms of Simple twining, Diagonal twining, or Cross-Warp twining. Two examples of a mix of twined structure types were also identified and will be discussed.

Twined Textile Structures

The action of twining involves two or more threads or elements twisting around a third element, usually perpendicular to the moving pair (Figure 5-1) (Adovasio 1977, Emery 1980). The twisting elements can be vertical warps or horizontal wefts and both can be active (twisting) at the same time (as in Oblique Twining) (Emery 1980). Paired active elements are the most common, but trebled and quadrupled elements are also used. What is important to note is that when the active elements are even, both faces of the fabric's structure are identical (Adovasio 1977, Emery 1980). However, when analyzing textile impressions, only one side of the object may be observed and thus the number of active elements may only be determined from one face of the object. Without prior knowledge of what textile structure was used, the analyst must then assume that both sides of the textile are identical. Weft twining denotes a subclass of textile structure "that is manufactured by passing moving [or active] horizontal elements, called wefts, around stationary vertical elements, called warps" (Adovasio 1977:15). The warp elements are stationary in that they do not engage the weft elements. Two or more weft elements will twist around a single warp element and slant in either a left-to-right/top-to-bottom fashion (S-twisted) or right-to-left/bottom-to-top (Z-twisted) while the warp elements hang inactive (Adovasio 1977:20). This contrasts with plaiting (Plain weave or interlacing) in which both the warps and wefts are moving and active. Weft rows in twining can be either open or close (Adovasio 1977:16). This is denoted by the proximity of the rows to one another. Close twining rows have little to no space between each row and leave almost no warps exposed creating textiles that tend

Figure 5-1: S-twist twining showing paired, active wefts twisting around passive warps



to be denser and stiffer. Open twining rows have a varying amount of space between each row but the warp elements are visible creating textiles that are more airy and flexible.

The manipulation of the warps in Weft-twined textiles is an important aspect in the typing of twining. The warps in Weft-twined textiles have a variety of possible manipulations. In Simple twining, the warps are single; only one warp, or warp unit, is engaged by the active wefts. Multiple warps in Simple twining act as a consistent unit throughout the body of the textile (Adovasio 1977:16). In Diagonal twining (also known as Alternative-Paired Warp Twining), active wefts “enclose warp units in pairs and repeatedly form new pairs by splitting those in the previous row” (Emery 1966:202). The weft units are not directly below one another, as in Simple twining, but are offset by the split warp units and create a diagonal pattern when the textile is viewed from any distance. In Cross-warp twining, a single warp will pass or twist around the neighboring warp and return to its initial warp row before being engaged by the successive weft row (Adovasio 1977:16). This causes the warps to appear as a series of X’s between the weft rows and is also known as Transposed Interlaced Warp Twining, Zigzag Twining, and Octagonal Openwork. Oblique Twining is the manipulation of the warps and wefts such that “pairs of elements moving on an oblique course enclose elements moving on the opposite diagonal as they twine about each other” (Emery 1966:64). When oblique twined textiles are held vertically, the warp and weft rows are at 45° degree angles to the edges caused by the angle of the intersecting twining pairs. These warp manipulations can be combined within a given textile to produce a variety of patterns.

Plain Weave Textile Structures

Plain weave, or Interlacing, is considered one of the most straightforward of textile structures (Adovasio 1977, Emery 1966). The elements involved in the action of interlacing pass over and under each other. This causes both sets of elements to be considered active and creates a checker board-like pattern at its simplest configuration. However, as with all facets of textile

manufacture, the simplest of methods can produce the most diverse and complex of fabrics (Emery 1966).

Plain weave textiles are defined by the interval at which the elements engage one another (Adovasio 1977:99) or the interval at which the warps and wefts pass over and under each other. For example, Simple Plain weave, 1/1 interval, is defined as one weft passing over one warp and then under the next warp for the duration of the fabric. The passing of elements over or under two or more elements at a staggered interval creates a diagonal-like design and is known as Twill weave. The warp and weft elements in Plain weave typically intersect one another at a 90° angle. Oblique Interlacing is a variant of this type caused by an angle of intersection of approximately 45° and the warp and weft elements crossing at an oblique angle to each other and the side edges.

Textile Type Descriptions

Type I Simple Twining

As discussed earlier, Simple twining denotes plain twined structures in which a single warp or warp unit (multiple warps consistently grouped throughout the body of the fabric) are enclosed by active paired weft elements. Within the sample from Slack Farm, seven distinct subtypes of Simple twining were identified. These varieties were defined by the spacing of each weft row (Open or Close) and the grouping of weft rows (with or without gaps).

Subtype Ia Open Twining (n=24)

All specimens identified as this type were heavily worn and difficult to identify beyond the open space between each successive weft row (Figure 5-2). All warps appeared to be single but the wear prevented an absolute determination. The wear also prevented the absolute identification of the weft twist direction.

Figure 5-2: Example of subtype Ia Open Twining



Subtype Ib Close Twining (n=2)

This subtype is similar to Subtype Ia in that the heavy wear of all examples precluded absolute identification beyond the close space between each successive weft row.

Subtype Ic Open Simple S-twist Twining (n=525)

Examples in this subtype have plain twining engaging one warp with space between each weft row (Figure 5-3 and 5-4). The examples of paired warps appear to be of an accidental nature and not intentional or decorative. Nine specimens have laid-in weft splices and no splices were observed in the warp. Two specimens were mended using a wrapping or whipping stitch to repair small tears in the body of the fabric and two specimens were mended with overhand knots to repair torn warps. Four specimens exhibited additional weft twists to spread the warps varying distances along the horizontal axis creating a geometric pattern in the fabric. Decoration by additional objects was not observed. Wear of the fabric used in the impression varied from almost none to extremely heavy.

Subtype Id Close Simple S-twist Twining (n=4)

These specimens employ plain twining engaging one warp with little to no space between each weft row (Figure 5-5). The closeness of the weft rows is such that the warps are obscured for the majority of the body of the observed examples so that any pairing of warps cannot be described and will be assumed accidental in nature. Splices were not observed and there was no mending or decoration. Wear on the fabric used in the impressions was moderate.

Subtype Ie Open Simple S-twist Twining with Gaps (n=106)

These specimens are identical to subtype Ic in all ways except that the open weft rows are separated by larger gaps (Figure 5-6 and 5-7). The number of rows included in each group of wefts and the gap between the groups varied by FS number. No splices, mends, or decorations

Figure 5-3: Examples of subtype Ic twinning



Figure 5-4: Examples of subtype Ic twining with supplementary weft twists



Figure 5-5: Example of subtype Id Close Simple S-twist Twining



Figure 5-6: Example of subtype Ie twining



Figure 5-7: Example of subtype Ie twinning



were observed in these specimens. Wear on the fabric used in the impression varied from light to heavy with the majority being light.

Subtype If Close Simple S-twist Twining with Gaps (n=17)

These specimens are identical to subtype Id in all ways except that gaps in the weft rows create weft-free spaces in the body of the fabric. The number of weft rows included in each group and the gap between the groups varies by FS number. No splices, mends, or decoration were observed in these specimens. Wear on the fabric used in the impression varied from light to heavy with the majority being light.

Subtype Ig Open and Close Simple S-twist Twining (n=7)

Examples in this subtype have plain twining engaging one warp with groups of close and open wefts (Figure 5-8). Close weft rows are interspaced by one or more open weft rows that give the appearance of bands in the body of the fabric. No splices, mends, or decoration were observed in these specimens. Wear on the fabric used in the impression varied from light to heavy with the majority being light.

Type II Diagonal Twining

These specimens employ Diagonal twining in that paired warps are engaged by the active paired weft rows and each warp pair is split by the successive weft row. In all examples within this type the split warp units would return to their previous warp row with every other split and not migrate across the body of the fabric. Within the Slack Farm sample, 5 subtypes of Diagonal twining were identified. As with the Simple twining, the subtypes were identified by the spacing and grouping of weft rows.

Figure 5-8: Example of subtype Ig twinning



Subtype IIa Open Diagonal S-twist Twining (n=89)

Examples in this subtype employ Diagonal twining over paired warps with a space between each weft row exposing the warps (Figure 5-9). Weft splices are laid-in over the exhausted weft and no warp splices or mends were identified. This twining technique creates the appearance of diagonal lines across the body of these fabrics but no other decorations were observed. Wear of the fabric ranged from light to heavy with the majority showing light wear.

Subtype IIb Close Diagonal S-twist Twining (n=12)

These specimens have Diagonal twining over paired warps with little to no space between each weft row (Figure 5-10). The closeness of the weft rows is such that the warps are obscured for most of the body of the fabric. No splices or mends were observed for any examples in this subtype. The diagonal pattern created by the pairing and splitting of warps is subtle but visible. No other form of decoration was identified in these specimens. Wear on all examples was extremely light.

Subtype IIc Open Diagonal S-twist Twining with Gaps (n=12)

This subtype is identical to subtype IIa except that the open weft rows are grouped and separated by larger spaces (Figure 5-11). The number of weft rows included in each group and space between each group varies by FS number. No splices or mends were observed in these specimens. The diagonal appearance of the fabric created by this twining technique was the only decoration identified. Wear on these specimens was light.

Subtype IId Close Diagonal S-twist Twining with Gaps (n=7)

This subtype is identical to subtype IIb except that the close weft rows are grouped and separated by larger spaces (Figure 5-12). The number of weft rows included in each group and the space between each group varies by FS number. No splices or mends were observed in these

Figure 5-9: Examples of subtype IIa twining



Figure 5-10: Example of subtype IIb twinning



Figure 5-11: Examples of subtype IIc twinning



Figure 5-12: Example of subtype II_d twinning



specimens. The pairing and splitting of the warps created a subtle diagonal in the appearance of the fabric and was the only decoration observed. Wear on these specimens was light.

Subtype IIe Open and Close Diagonal S-twist Twining (n=1)

This specimen employs Diagonal twining over paired warps with both open and close weft rows (Figure 5-13). The close weft rows were grouped and split by sections of open weft rows. The space between groups and the number of weft rows included varied by weft row unit. No splices or mends were identified and the diagonal appearance of the fabric was the only decoration observed. Wear on this example was light.

Type III Simple and Diagonal Twining

This textile type denotes textiles that exhibit both Simple and Diagonal twining techniques in the body of the fabric. Within this type, two subtypes were observed: Open Simple and Diagonal S-twist twining, and Open Simple and Diagonal S-twist twining with Gaps.

Subtype IIIa Open Simple and Diagonal S-twist Twining (n=1)

The specimen in this subtype employs Simple twining over single warps and Diagonal twining over paired warps (Figure 5-14). All weft rows are open and the number of rows employing either Simple or Diagonal twining varies. No splices or mends were identified and the diagonal appearance of the diagonally twined sections of the impression was the only decoration observed. The wear exhibited by the textile used in the impression was light.

Subtype IIIb Open Simple and Diagonal S-twist Twining with Gaps (n=1)

The example of this type employs both Simple twining over single warps and Diagonal twining over paired warps. The weft rows are open and those rows that employ this technique are separated by a gap. The number of rows in each unit and the distance between each unit in the

Figure 5-13: Example of subtype IIe twinning



Figure 5-14: Example of subtype IIIa twinning



gap varies. No splices or mends were present and the diagonal appearance of the diagonally twined units was the only decoration. Wear exhibited in this example was light.

Type IV Cross-Warp Twining

In this textile type, Simple twining is used over single warps. In between the weft rows, adjacent warps twist around each other once (making a 180° turn) and return to their original position. This technique is not always used throughout the body of the textile but is mixed with plain warps in such a way that patterns and designs are created. In examples where a large enough portion of the impression was present to view a potential design, diagonal lines, zigzags, and chevron edges could be detected.

Subtype IVa Open Simple Cross-Warp S-twist Twining (n=54)

This textile subtype is denoted by the use of Simple twining over single warps and open weft rows with the warps twisting around each other (Figure 5-15). In examples of sufficient size geometric patterns and designs could be discerned. These include horizontal and diagonal lines, zigzags, and the edge of a chevron. There were no mends and splices, where present, were laid-in. The textiles used in the creation of these impressions showed little to no wear.

Type V Simple, Diagonal, and Cross-Warp Twining

Textiles in this type are denoted by the presence of all three of the earlier described major twining types.

Subtype Va Open Simple, Diagonal, and Cross-Warp S-twist Twining (n=2)

Textiles in this subtype exhibit Simple, Diagonal, and Simple Cross-Warp twining with open weft rows. Warps are single when used in the Simple and Simple Cross-Warp twining and paired in the Diagonal twining. The examples of this type were not of sufficient size to determine if any designs were created in the Cross-Warp twining. There was no additional decoration

Figure 5-15: Examples of subtype IVa twinning



Figure 5-15 (continued) Examples of subtype IVa twinning



present nor were there any mends or splices identified. The wear on these examples was light to medium.

Type VI Oblique Twining

This type is defined by pairs of elements moving on an oblique course enclosing elements moving on the opposite diagonal as they twine about each other (Emery 1966:64). Both sets of elements, warps and wefts, are active and twining. In a given course, the “weft” elements will twine around a set of “warps” and then in the next engagement be twined by the next set of “warps” and so forth. Without any starting borders or selvages, it is impossible to determine which are the warps and which are the wefts as both sets of elements are active.

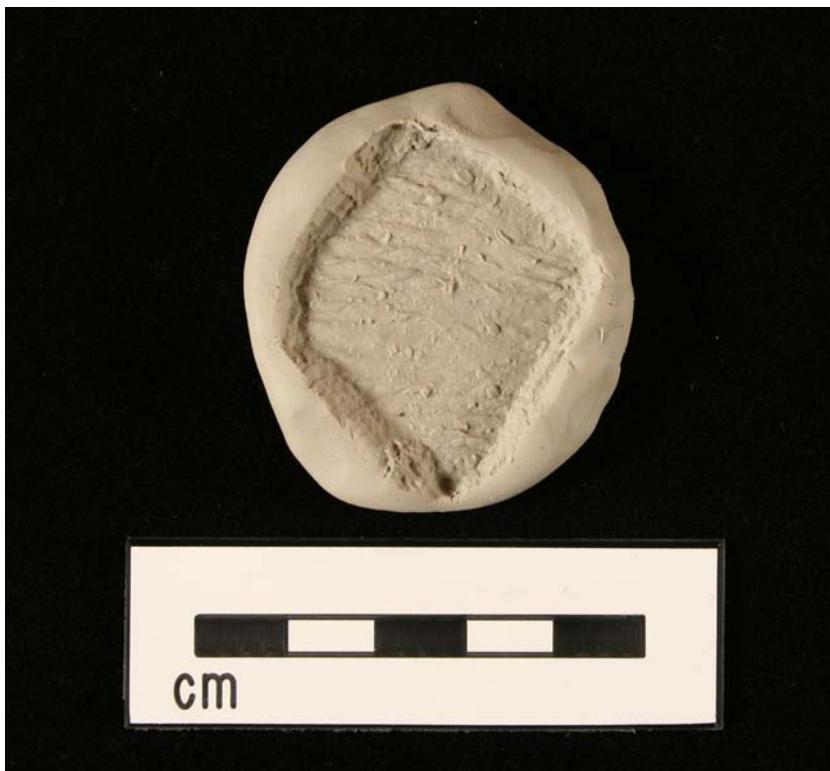
Subtype VIa Close Oblique S-twist Twining (n=3)

This subtype exhibits Oblique S-twist twining with closely placed rows with no space between each row (Figure 5-16). The examples of this subtype present in the sample twine at an oblique angle to early rows of what appear to be Close Simple S-twist Twining. The nature of the action of the twining made it difficult to discern warps and wefts; therefore all measurements were averaged and placed under the measurements for warps. No splices, mends or decoration were identified in the samples from this subtype. Wear to the textile used in the impressions appeared to be light.

Type VII Plain Weave

This type is defined as the passing of one element over and under another element and both sets are considered active. This interlacing action is the only engagement between the elements and differs from the type of engagement employed by most twined textiles in which the active elements twine about the passive elements. Only two types of Plain weave textiles were

Figure 5-16: Examples of subtype VIa twining



identified within this sample. Examples from both lacked selvages of any form and made description of the starting method difficult.

Subtype VIIa Oblique Interlacing (n=2)

Oblique Interlacing is defined as sets of elements without a clear warp or weft and a common starting point passing over and under each other in such a way that the course is oblique to the edges of the fabric (Figure 5-17 and 5-18). The best-known example of this type is the three-strand braid. As there were no starting or ending selvages identified in the examples of this type analyzed from the sample, the number of elements used in the interlacing is unknown. In one example, the Oblique Interlacing is combined with Open Simple S-twist Twining. This impression appears to be an Open Simple S-twist twined textile changing to Oblique Interlacing. The paired wefts stop twining around the individual warps and begin to only twist about themselves while beginning an over-under interlacing pattern with each warp. As the weft rows were twining at a 45° angle to the warps, the continued weft interlacing was at an oblique angle. The textiles used in the impression appeared to have little wear and there were no splices or mends identified.

Subtype VIIb Twill Weave, 3/2 Interval (n=1)

This subtype exhibits a twill weave in which a given element passes over three and then under two perpendicular elements (Figure 5-19). This interval is the same for both the warp and weft elements. As only one small and incomplete example of this type of Twill weave was identified, it cannot be determined if this twill was part of a larger design which is typical of Twill weaves with this interval pattern. No splices, mends, or additional decoration was identified in the example.

Figure 5-17: Example of subtype VIIa Oblique Interlacing



Figure 5-18: Example of subtype VIIa Oblique Interlacing and Simple twinning



Figure 5-19: Example of subtype VIIb twill weave



Summary of the Textile Types

Of the seventeen textile types recorded, Open Simple S-twist twining was the most common, representing 60.3% of the sample. This type was present in every cluster sampled in this study and constituted from 50% to 65% of the impressions from each residential/mortuary context (with one exception, Cluster 9). The sample from Cluster 9 was 85% Open Simple S-twist twining; however, only 20 sherds were analyzed from this cluster. Open Simple S-twist twining with gaps was the next most common type at 12%. Open Diagonal S-twist twining represented 10.3% of the sample and Open Cross Warp twining represented 6.2%. Each remaining type represented 2% or less of the sample.

While there was a great deal of structural variation within this sample, there were some consistent features. All twining types recorded within this sample had wefts twisting together from right-to-left, or S-twisted. The majority of the threads used in these textiles were made of two elements, or 2-ply, spun from left-to-right, or Z-spun, and then twisted right-to-left, or S-twisted. Z-twisted examples were heavily worn and resembled cords missing an element. These examples were most probably 2-ply, Z-spun, S-twisted cords in which one element had been worn away. However, the small size of the examples prevented this being established with certainty and were therefore labeled as Z-twisted. Since no fabric was recovered from the excavations at Slack Farm, the actual raw material of the textiles from the impressions is unknown but appears to be a well-processed bast (stem) fiber in most examples. Only four starting/end selvages were identified within the sample but all appear to be of the same type-- close twining over warps that had been folded at a 180° angle and reinserted into the final weft rows of the textile (Figure 5-20, 5-21, 5-22, and 5-23). One side selvage was identified within the sample, a continuous side selvage with denser-packed warps at the edge. Where splices could be identified they were laid-in and mending appeared to be dependent upon the kind of damage with the most common being a running or whipping stitch used to re-join rows that had been pulled apart or warps knotted together from where they had torn (Figure 5-24 and 5-25). One example

Figure 5-20: Example of a starting/end selvage on a subtype Ic textile



Figure 5-21: Example of a starting/end selvage on a subtype IIa textile



Figure 5-22: Example of a starting/end selvage on a subtype Ie textile



Figure 5-23: Example of side selvage on a subtype IIa textile



Figure 5-24: Example of possible mend or wrapped warp on subtype Ic textile



Figure 5-25: Example of possible knotted warp mend on a subtype IIIa textile



of mending may actually represent a wrapped warp. Five examples (0.57%) of mending were identified within the sample.

The overall condition of the textiles used to impress the ceramics was quite good. Of the 870 fabric-impressed sherds that were analyzed, 27 examples, or 3.1%, showed heavy wear (Figure 5-26). The remaining impressions were of fabric that showed little to no wear and there were very few mends. The textiles used for impressions were of generally good quality and condition. Also not identified in any of the textile-impressed sherds was the addition of decorative objects such as beads or feathers. These objects may have been used on other fabrics, but they were not observed in the impressions.

While there were no additional decorative embellishments applied to the fabric used in the impressions, some showed decorative geometric patterns (Figure 5-27, 5-28, and 5-29). This is most evident in the Open Cross-warp S-twist twining impressions. Most examples appeared to represent a portion of a geometric design, usually a diagonal or horizontal line, and a few of the larger sherds showed evidence of possible chevrons. However, none of the impressions were large enough to fully depict the design woven into the fabric. What is of note is the similarity between the geometric patterns in the fabric and designs incised on Caborn-Welborn decorated ceramics. Patterns are also present in the impressions with grouped weft rows and in the combining of Simple and Diagonal twining.

Within the textile types, Open Cross-warp S-twist twining appeared visually to have finer and more tightly spun threads overall than the other fabric types. However, within each textile type, there appeared to be examples that were finer or coarser than the norm (Figures 5-30 and 5-31). Also, within each cluster sampled there was a wide range of coarseness. In general, the Diagonal twining appeared to be finer than the Simple twining and the Open Cross-warp twining appeared to be finer than the Diagonal twining. This may point to differences in the original use of the textile, however the small size of the sherds analyzed has made this difficult to discern.

Figure 5-26: Example of subtype IIa twining showing heavy use-wear



Figure 5-27: Example of diagonal lines in subtype IVa textile



Figure 5-28: Example of diagonal lines and possible chevron edge in subtype IVa textile



Figure 5-29: Example of zigzags or chevrons on subtype IVa textile

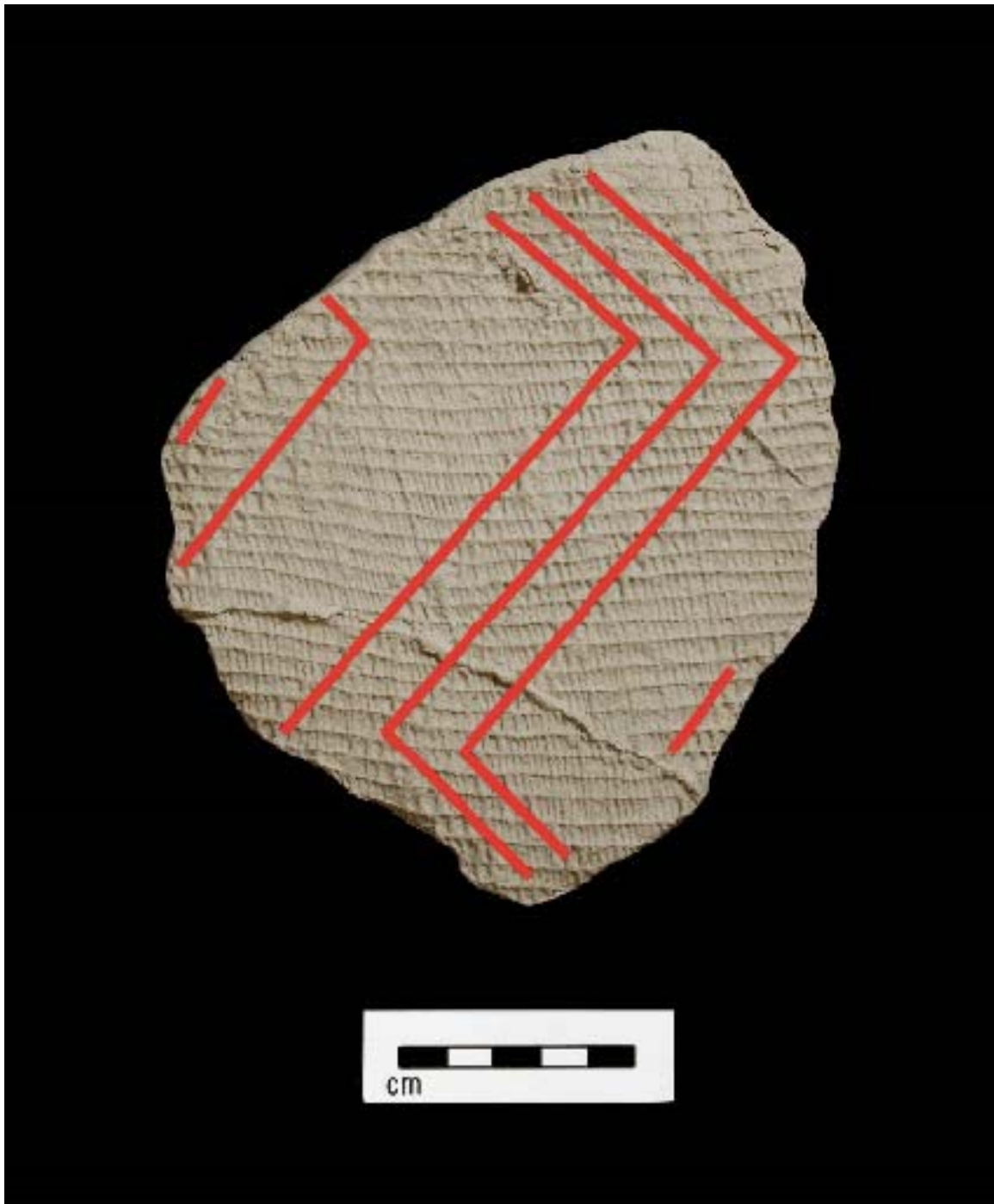


Figure 5-30: Examples of subtype Ic twining showing a fine and coarse textile recovered from the same context



Figure 5-31: Examples of subtype IIa twining showing a fine and coarse textile recovered from the same context



For example, a fine-gauged, lace-like fabric, very similar to the Open Cross-warp twining, would have been ill-suited for use as a bag or sack, but much more appropriate for a shawl.

The variety of textile types present in this sample and the variations of their structural attributes have demonstrated a rich textile tradition at Slack Farm. Visually, there appear to be differences in the structural characteristics between clusters and textile types, and this possible variation is explored in the next chapter. Statistical analysis of the structural attributes of the textile-impressed will help to identify and provide an explanation of what, if any, variation exists in the sample.

6. Chapter 6: Statistical Analysis of the Textile-impressed Sample

Introduction

This chapter presents the results of a statistical analysis of the textile-impressed ceramics from Slack Farm. The structural characteristics of the textile impressions, including textile type and their metric attributes, were examined for variation that relates to Caborn-Welborn social organization at the site. These are the functional attributes of textiles and maybe used for this purpose because of the link between the technological choices made during production and the object's place within its technological system (Lemonnier 1989). The textile's technological system articulates the functional attributes with its symbolic properties and the social system in which the textile was created and used. This variation in structural characteristics was caused by differences in the sample size between the residential clusters. This data set was then compared to other textile-impressed ceramic assemblages to contextualize the textile tradition at Slack Farm.

The Contexts Sampled

The contexts sampled (Table 6-1) in this study could be classified as one of two categories, pits or houses (see Figure 2-11 for an example of pit and house features at Slack Farm). Pits were typically large storage pits and often included a variety of artifacts such as pottery, flaked stone tools, and shell, and were not directly associated with a house. The houses were defined by the presence of a house basin and wall-trenches.

Pit Contexts

There were seventeen pits included in this study (Table 6-2). These pits were associated with Clusters 1-6 and Cluster 9, and encompassed a variety of features. As with the other areas sampled for this study, the number of sherds chosen for analysis reflects the intensity of the 1988

excavations within these clusters and should not necessarily be taken as reflection of the potential amount of fabric-impressed sherds present in these areas.

Table 6-1: Textile types by Cluster

Textile Type	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 9	Total
Ia		2	11	2		3	5	1	24
Ib	1			1					2
Ic	6	35	131	103	20	113	101	16	525
Id	3			1					4
Ie		4	23	15	11	25	28		106
If			8	2		1	5	1	17
Ig		3	1			1	2		7
IIa	2	4	27	24	1	13	18		89
IIb		1	3	4	1	2	1		12
IIc			2	3	1		6		12
IId						4	3		7
IIe							1		1
IIIa			1						1
IIIb					1				1
IVa		4	12	10	2	13	11	2	54
Va						2			2
VIa			1			1	1		3
VIIa			2						2
VIIb							1		1
	n=12	n=53	n=222	n=165	n=37	n=178	n=183	n=20	n=870

Table 6-2: Textile types present by cluster and pit feature

Textile Type	Cluster 1	Cluster 2		Cluster 3				Cluster 4		Cluster 5	Cluster 6						Cluster 9	Total
	Pit 382	Pit 15	Pit 29	Pit 57	Pit 78	Pit 87	Pit 94	Pit 96	Pit 211	Pit 260	Pit 282	Pit 285	Pit 302	Pit 305	Pit 313	Pit 354	Pit 272	
Ia			2	2								3					1	8
Ib	1																	1
Ic	6	3	18	22	2		2	4	5	14	2	16	1	3	3	11	13	125
Id	3																	3
Ie			3	2		1	1	1		8		2				4		18
If				1				2									1	4
Ig		1	1															2
IIa	2	2	1		2							3			1	1		12
IIb										1								1
IIc																		0
IId																		0
IIe																		0
IIIa				1														1
IIIb																		0
IVa		2		1				1	1	1		1		4			2	13
Va																		0
VIa																1		1
VIIa				2														2
VIIb																		0
	n=12	n=8	n=25	n=31	n=4	n=1	n=3	n=8	n=6	n=24	n=2	n=25	n=1	n=7	n=4	n=27	n=17	n=191

The Houses

Within Clusters 3, 4, 5, 6, and 7, nine houses were sampled in this research project (Table 6-3). The distribution of textile types among the houses is similar to that of the clusters. As Clusters 3, 4, 6, and 7 were more intensively tested in the 1988 excavations, they represent a greater variety and number of textile-impressed ceramics. The metric traits of the textile-impressed sherds from the houses are consistent for all contexts; no one house appears to have a greater number of finer or coarser textile impressions than the others.

Statistical Evidence

Textile type diversity observed in the fabric-impressed ceramics at Slack Farm is caused by the technological choices of the weavers who resided at the site during the Caborn-Welborn phase. Previous research on Slack Farm and Caborn-Welborn phase sites (Pollack 1998, 2004, 2006) has shown that the sociopolitical organization within these sites was changing as local populations responded to the collapse of nearby Mississippian chiefdoms and re-configured their society with expanding social networks. The goal of this research is to analyze a sample of the textile-impressed ceramics to provide an additional understanding of these activities. The fabric used in the impressions may have been a reflection of ethnicity, status, wealth, or kinship. Because these textiles were produced within a technological system (Lemonnier 1989) where choices pertaining to the structural attributes were related to the symbolic qualities of the final product, questions about social organization maybe examined from analysis of these traits. These textiles were produced in the household and used for the manufacture of large ceramic vessels. The ceramic manufacturing process caused the impression of the textile on to the surface of the vessel and it is through the analysis of these impressions that this data set was generated. Statistical analysis can explain the variation seen in the textile types.

The interpretation of the data for this project begins with an examination of its diversity. That information will allow for a characterization of the variability of textile impressions on

Table 6-3: Textile types found in clusters by house

Textile Type	Cluster 3	Cluster 4		Cluster 5	Cluster 6		Cluster 7			Total
	House 1	House 2	House 6	House 7	House 9	House 10	House 3	House 4	House 5	
Ia	9	1					2		3	15
Ib			1							1
Ic	98	43	29	5	61	13	14	10	77	350
Id		1								1
Ie	17	8	3	3	17	2	5	1	22	78
If	5	2			1		1	1	3	13
Ig	1								2	3
IIa	25	11	5	1	6	1	1		17	67
IIb	3	2			2				1	8
IIc	1	1							6	8
IId					4		1		2	7
IIe									1	1
IIIa										0
IIIb				1						1
IVa	10	4	5	1	7		3	2	6	38
Va					2					2
VIa	1						1			2
VIIa										0
VIIb									1	1
	n=170	n=73	n=43	n=11	n=100	n=16	n=28	n=14	n=141	n=596

ceramics within clusters and if differences in the numbers of textile types found in the clusters are significant. This information will be used to discuss how the inhabitants of Slack Farm used the textiles and what that use says about the social organization of the site.

Diversity is a measure of variation, “a referent for the structural properties of a population or sample made up of distinct categories” (Jones and Leonard 1988:2). Using measures of diversity allows for the understanding of how data varies, in this case, across a site. This information can be extremely useful for seeing differences in the distribution of artifacts and here will be used to help identify and perhaps explain patterns seen in the data. As the previous sections demonstrated, some of the clusters and houses sampled for this project had a greater variety and number of textile types observed. Diversity is used here to determine if the observed variation is due to chance alone. The addition of a measure of diversity helps provide a quantitative counterpart for the qualitative interpretation of the data.

Diversity comprises two indices, richness and evenness (Jones and Leonard 1988, Kintigh 1988). Richness is determined by the number of categories present in a collection (Kintigh 1988:26, Krebs 1999:412). Evenness measures whether all categories are equally abundant or if certain categories are more abundant than others (Bobrowsky and Ball 1988:6). Some researchers (such as Bobrowsky and Ball 1988, Krebs 1999) also include an index of heterogeneity when considering diversity. Heterogeneity combines richness and evenness into one measure (Krebs 1999:412) and can be defined as the variability in both the number of categories (richness) and the abundance of examples within a category (evenness) (Bobrowsky and Ball 1988:5). It is an attempt to simplify the complex relationship between the number of categories present and their individual frequencies (Bobrowsky and Ball 1988:7-8). An examination of the diversity of the data from the sample of textile-impressed sherds from Slack Farm is useful for understanding how the textile types are distributed across the site.

Differences in the diversity, and specifically richness and evenness, can provide information on the social organization at Slack Farm. For example, in attempting to determine if

higher status individuals at the site had differential access to and use of textiles, an expected pattern would be that not all textile types would be evenly distributed between the clusters. Some textile types, especially those that were more complex and required a great expenditure of labor to produce, would be primarily found in only one or two clusters, those of the higher status individuals. This pattern would also be present in the metric data for these textile impressions. Those impressions that were created from fabric of a higher quality and finer weave would be common in only a few clusters or houses. If this pattern is present, then textiles with more complex structures or multiple structures woven with warp and weft elements that were highly processed and spun with smaller average thread diameters would only be common in some clusters and would show an uneven distribution across the site. These clusters, with a higher frequency of high quality, complex textiles used in impressions would also have a richer sample of textile types. Increased richness would be caused by the greater variety of textile types available to the higher status individuals. Similar trends have been previously identified in Mississippian period elite contexts (Kuttruff 1988, Schreffler 1988).

Richness

There are many different ways to assess richness within a sample; the simplest is a count of the different types of artifacts and how many are present in each class in a given sample that is then compared to other samples (Bobrowsky and Ball 1988:5, Krebs 1999:412). However, problems arise when the sizes of the samples used for comparison vary, since sample size limits the number of types that can be represented (Bobrowsky and Ball 1988:5, Kintigh 1988:26). A common type in a larger sample may only appear as a rare type in the smaller (Krebs 1999:413). Richness cannot be directly compared between samples of varying sizes but must be used in combination with a process to control for the effects of these differences.

To assess the richness of each cluster sampled at Slack Farm, Odum's logarithmic species-diversity index (Odum et al. 1960) is used and the results are compared between clusters

using Kaufman's (1998) procedure for a Jackknife Technique (see Baxter 2003, Kaufman 1998, and Krebs 1999 for additional information and examples). The logarithmic species-diversity index (Odum et al. 1960:396) allows comparison between different samples and collections attained with different sampling methodologies. This is especially important for this research since the sample sizes from each cluster vary due to the differing intensities of excavation. If the relationship between the number of types (or species) and objects (or individuals) is assumed to be constant (Bobrowsky and Ball 1988:5), then the value produced by the logarithmic species-diversity index is suitable for assessing the richness of the sample in this research. The richness estimates for each cluster are then compared through a jackknife technique that will control for differences in the sample size between each cluster.

The formula for the logarithmic species-diversity index is:

$$R = \frac{k}{\log N}$$

where

R = logarithmic species-diversity index for richness

k = number of categories

N = sample size

The logarithmic species-diversity index was calculated for each cluster and the resulting R-values are displayed in Table 6-4. As this table shows, R-values vary from 3.074 to 5.746 where increasing R-value is an indication of increasing richness within a given cluster. As can be seen from the R-values, there are differences in richness among the clusters. However, the sample size varies and may not accurately represent the richness of each cluster. By jackknifing

Table 6-4: R-values for clusters at Slack Farm computed using Odum's logarithmic species-diversity index to assess richness

Cluster	<i>R</i> -value	<i>k</i>	N
1	3.707	4	12
2	4.060	7	53
3	5.114	12	222
4	4.510	10	165
5	4.464	7	37
6	4.888	11	178
7	5.746	13	183
9	3.074	4	20

this statistic, a measure of richness will be attained that controls further for the effects of sample size.

The Jackknife Technique requires repeatedly recalculating a statistic of interest and with each recalculation, deleting one of the original data points (Kaufman 1998:75). The result is a series of jackknifed estimates that are then used to generate a set of corresponding pseudovalues. The mean of the pseudovalues provides the best estimate of the statistic of interest. What is perhaps most attractive about this technique is that it does not assume a theoretical sampling model, no assumptions regarding the underlying distribution are required, and jackknifing reduces bias that may be caused by differing sample sizes (Kaufman 1998:75, Baxter 2001:721).

In order to calculate the jackknifed estimate of richness for the clusters sampled at Slack Farm, a set of subsamples was generated for each cluster with one category removed from each subsample (Kaufman 1998). The new jackknifed R-value and pseudovalue was then calculated for the subsamples and the mean of these pseudovalues is the jackknifed estimate of richness for each cluster.

The formula for the pseudovalues is:

$$\Phi_i = k\hat{\Theta}_T - (k-1)\hat{\Theta}_i$$

where

Φ_i = pseudovalue for the *i*th subsample

k = number of categories

$\hat{\Theta}_T$ = estimate from the total sample

$\hat{\Theta}_i$ = jackknifed estimate for the *i*th subsample

The mean of pseudovalues is:

$$\bar{\Phi} = \frac{\sum \Phi_i}{k}$$

where

$$\bar{\Phi} = \text{mean of } \Phi_i$$

Φ_i = pseudovalue for the i th subsample

k = number of categories

The data set used to compute the jackknifed estimate of richness for Cluster 4 is presented in Table 6-5 as an example of this technique. The resultant jackknifed estimates of richness for the clusters at Slack Farm are listed in Table 6-6.

The variation in the jackknifed estimates of richness for the clusters ranged from 9.708 in Cluster 7 to 3.249 in Cluster 9 (Table 6-6). The $\bar{\Phi}_{\text{Rich}}$ -values of the clusters demonstrates that there is a difference in the relative richness, or variety, of the textile types between the clusters. When the jackknifed estimates of richness are plotted against the sample size of the clusters, as shown in Figure 6-1, a trend becomes apparent. The “richness” of the clusters, or those clusters with a greater variety of textile types, increases as the sample size increases. Clusters 7, 3, 6, and 4 have the highest $\bar{\Phi}_{\text{Rich}}$ -values, as well as the largest sample size, but the highest $\bar{\Phi}_{\text{Rich}}$ -value is associated with the second largest sample, Cluster 7, and the smallest $\bar{\Phi}_{\text{Rich}}$ -value is from the second smallest sample, Cluster 9. Also, there appeared to be two different groups of clusters by richness. Clusters 3, 4, 6, and 7 had a higher richness value than clusters 1, 2, 5, and 9. Having controlled for sample size, this data suggests that the clusters with more textile-impressed sherds also were utilizing a greater variety of textile types. The use of a one-way analysis of variance (ANOVA) can help provide further information on the differences between the two groups of clusters.

Table 6-5: Data used to compute jackknifed estimate of richness and evenness for Cluster 4

Textile Type	S_T	S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9	S_{10}
Ia	2	0	2	2	2	2	2	2	2	2	2
Ib	1	1	0	1	1	1	1	1	1	1	1
Ic	103	103	103	0	103	103	103	103	103	103	103
Id	1	1	1	1	0	1	1	1	1	1	1
Ie	15	15	15	15	15	0	15	15	15	15	15
If	2	2	2	2	2	2	0	2	2	2	2
IIa	24	24	24	24	24	24	24	0	24	24	24
IIb	4	4	4	4	4	4	4	4	0	4	4
IIc	3	3	3	3	3	3	3	3	3	0	3
IVa	10	10	10	10	10	10	10	10	10	10	0
N	165	163	164	62	164	150	163	141	161	162	155
k	10	9	9	9	9	9	9	9	9	9	9
Richness											
Θ_T, Θ_i	4.510	4.068	4.063	5.021	4.063	4.136	4.068	4.188	4.078	4.073	4.109
Φ_i		8.481	8.525	-0.095	8.525	7.873	8.841	7.408	8.392	8.437	8.115
$\overline{\Phi}_{Rich}$	7.414										
Evenness											
Θ_T, Θ_i	1.898	1.809	1.795	1.158	1.795	1.992	1.809	2.112	1.838	1.824	1.923
Φ_i		2.639	2.824	8.556	2.824	1.045	2.693	-0.034	2.433	2.563	1.667
$\overline{\Phi}_{Even}$	2.726										

Note: Each of the S_i sets has one of the groups deleted in turn. Θ_T is the estimate of richness or evenness for each of the total assemblages, Θ_i is the Jackknifed estimate of richness or evenness for each of the subsamples, and Φ_i is the pseudovalue for each sample. The k for each S_i is $k-1$.

Table 6-6: Jackknifed estimates of richness for the clusters

Cluster		k	N
1	5.166	4	12
2	6.157	7	53
3	8.607	12	222
4	7.414	10	165
5	6.883	7	37
6	8.053	11	178
7	9.708	13	183
9	3.249	4	20

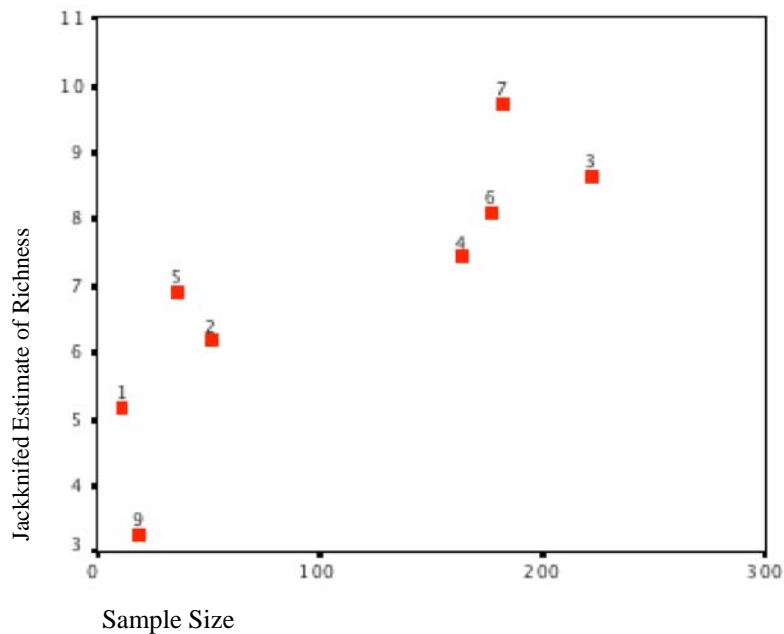
The results of the ANOVA (Table 6-7) showed that there is a significant difference in the richness values computed for the clusters at Slack Farm ($F = 25.333$, $p = 0.000$). Seeing that there is a difference in the richness values between the clusters, further examination is needed to see if this difference is between all the clusters or if any of the clusters are similar. Figure 6-1 showed that Clusters 3, 4, 6, and 7, and Clusters 1, 2, 5, and 9, formed two groups of clusters. Multiple comparisons were done using the Least Squares Difference (LSD) to see where the clusters differed and a two-tailed t-test was used to verify that difference. The LSD multiple comparisons showed that each cluster was only similar to the next richest cluster from itself. The exception is Cluster 7, whose richness score was not similar to any other cluster. The grouping in these figures is not reflected in the LSD multiple comparisons very clearly. The clusters that comprise each group are only similar to one other cluster with the group, and the groups do not have any clusters that are similar to one another. While there is a difference between the groups, there is not much similarity within. There appears to be two different groups of households at Slack Farm utilizing textiles differently and within those groups, there are differences in individual household utilization. The LSD multiple comparisons show that there is some difference in the variety of textile types identified from the clusters and that there are some clusters with a greater variety than others. When the two groups were looked at individually, the ANOVA showed that each group was homogenous within itself. When the groups were each considered as a single unit and compared to one another with a t-test, it showed that there was a difference in the means between the clusters with low richness and the clusters with high richness ($t=3.727$, $df =66$, $p=0.00$). What this shows is that there is a difference between the richness values for these groups of residential clusters.

Even though sample size was controlled for through use of the jackknife procedure, it is not known if these richness values are higher or lower than the expected average. To assess these differences, a model was created of the expected distribution of textiles types. This method

Table 6-7: ANOVA table for the Jackknifed Estimates of Richness

		Sum of Squares	df	Mean Square	F	Sig.
Jackknifed Estimate of Richness	Between Groups	33.449	7	4.778	25.333	.000
	Within Groups	11.317	60	.189		
	Total	44.767	67			
Clusters with Low Richness Values	Between Groups	36.405	3	12.135	1.655	.212
	Within Groups	132.010	18	7.334	5.664	
	Total	168.416	21			
Clusters with High Richness Values	Between Groups	33.065	3	11.022	1.244	.306
	Within Groups	371.997	42	8.857		
	Total	405.062	45			

Figure 6-1: Jackknifed estimates of richness plotted against sample size



Note: Points are labeled by cluster

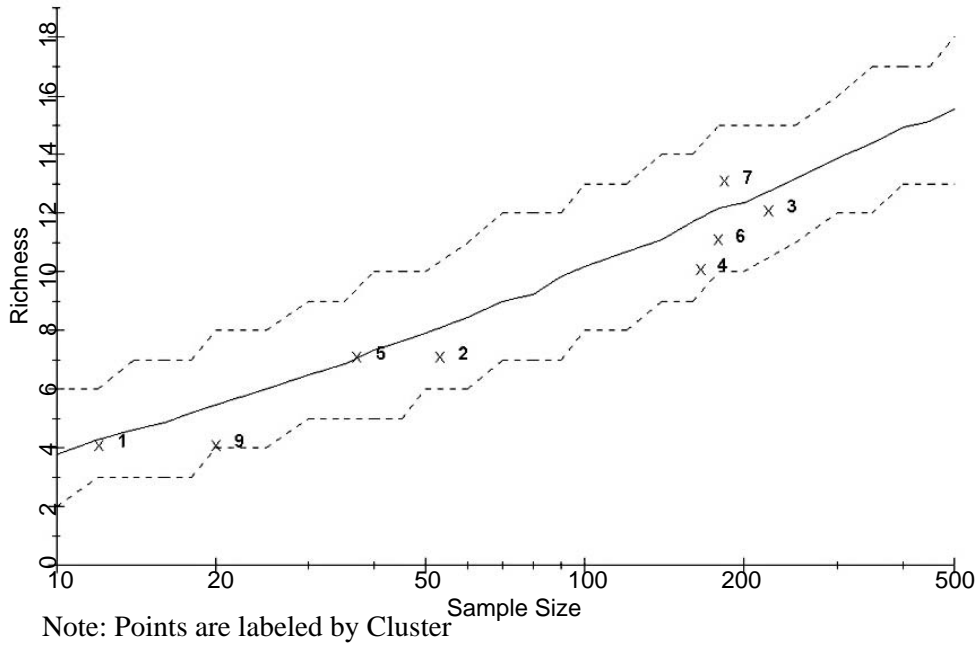
differs from the jackknife procedure in that this model was created through sampling with replacement and the richness values used were the number of textile types present in each cluster (Kintigh 1984, 1988). This model distribution was then plotted with the actual richness values to see how they differed from the expected distribution. A benefit of using a model distribution to assess richness is that an expected mean may be generated as well as a confidence interval. The resultant graph, Figure 6-2, plots richness values against sample size on a logarithmic scale. The cluster richness values, with the exception of Clusters 5 and 7, fall just below the expected richness value at that sample size, however, Cluster 5 is at the expected richness for its sample while Cluster 7 is just above its expected value. Moreover, all the richness values fall within the confidence interval for this distribution. While these graphs (Figures 6-1 and 6-2) show two groups of clusters based on the richness values, neither group has values that are significantly above or below what is expected at that sample size. Therefore, although Cluster 7 is above its expected richness value and has the most textile types present in its sample, this appears to be mainly an effect of sample size.

Evenness

As was defined earlier, measures of evenness are used to assess whether all categories are equally abundant in a sample or if certain categories are more abundant than others (Bobrowsky and Ball 1988:6). An uneven distribution would suggest that a household utilized certain textile types to a greater extent than others, while an even distribution would suggest a household had similar levels of access to a variety of textile types, or the ceramics made with them. Similar indices of evenness among the clusters would suggest similar patterns of utilization of different textile types, though the specific types favored might vary.

There are several potential statistics that may be used to measure evenness; one of the more common is based on the Shannon-Weaver information function (also known as the Shannon-Wiener index [Krebs 1999:444]) (see Kintigh 1988:25-36 for an example). While

Figure 6-2: Graph of Expected Richness and Actual Richness



statistics such as this can be good measures of evenness, they are limited by a dependence upon sample size, richness, and how diversity is assessed (Bobrowsky and Ball 1988:7; Rindos 1988:15). A measure based on the sample's variance, such as the coefficient of variation (CV), is independent of the effects of richness and diversity assessment and will be used here. The CV can be used to examine evenness because it assesses sample homogeneity without effect from the sample mean (Thomas 1986:84). As the CV relates to the variance of a sample, a smaller CV will indicate greater evenness or a more even distribution of textile types. However, because the sample sizes vary between clusters, the CV will be jackknifed using Kaufman's procedure (1998) to control for these effects during comparison. This jackknife process is the same as that used in comparing the richness statistics.

The formula for the CV used is:

$$CV = \frac{\sqrt{\frac{\sum_{i=1}^k (X_i - \bar{X})^2}{(k-1)}}}{\bar{X}}$$

where

CV = coefficient of variation

k = number of categories

X_i = size of the ith category in the sample

\bar{X} = mean of the sample

Table 6-8 shows the calculated CV for the clusters at Slack Farm (Table 6-1 shows the original sample used to compute the values in Table 6-8). A smaller CV is an indication of greater evenness; typically a value of 0.3 or less is an indication of an even distribution. As can be seen, the clusters do not show an even distribution of textile types.

Table 6-8: Coefficients of Variation in clusters at Slack Farm

Cluster	CV	k	N
1	0.720	4	12
2	1.605	7	53
3	1.973	12	222
4	1.898	10	165
5	1.410	7	37
6	2.039	11	178
7	1.941	13	183
9	1.470	4	20

As can be seen from Table 6-9, the jackknifed estimates of the CV show an uneven distribution of textile types between the clusters at Slack Farm. Cluster 1 and Cluster 5, having the smallest coefficients, have the most even distribution of textile types within their respective clusters. However, that these numbers are so large is an indication that the clusters with the most even distribution for this sample still have a very uneven distribution of textile types. As can be seen from Figure 6-3, as the sample size increases, evenness begins to remain somewhat consistent.

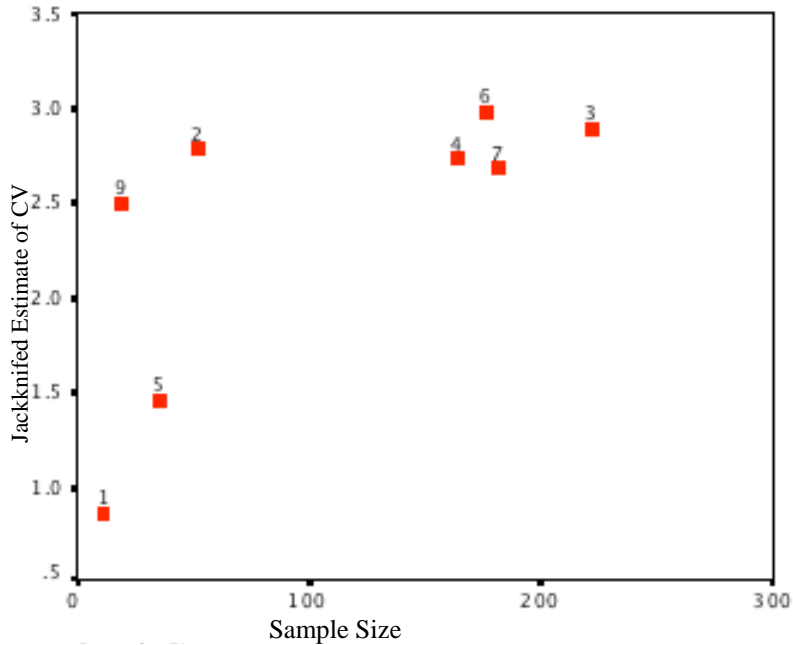
The use of the Jackknife Technique on the measures of richness and evenness for the clusters at Slack Farm allowed for the effects of the differing sample sizes between clusters to be controlled. Clusters 3, 4, 6, and 7 grouped together in both analyses and appear to be different and set apart from the other clusters. These clusters have shown not only larger sample sizes, but also a greater variety of textile types that are not equally represented within each cluster. However, when the actual richness values were compared against a model distribution, it was shown that these values were within the expected range for each sample size. While the evenness values begin to remain somewhat consistent as the sample size increases, there are differences in the values at similar sample sizes (see Figure 6-3). Clusters 1, 2, 5, and 9 do not differ greatly in sample size but have very different evenness values. This is also true of Clusters 3, 4, 6, and 7, although the differences in evenness between these clusters are not as great. An ANOVA was used to see there were differences in the evenness between these clusters.

The ANOVA (Table 6-10) showed that there is not a significant difference in the evenness values computed for the clusters ($F = 0.611$, $p = 0.745$); the textile types within the clusters are similarly distributed and no cluster exhibits a more uneven distribution than any other. The differences in the evenness values between the clusters with similar sample sizes are not significant. What this has shown is that while not all the textile types identified in the sample from Slack Farm were utilized within all of the clusters, none of the textile types appear to have been restricted to specific households. A question that this then poses is were any of the clusters

Table 6-9: Jackknifed estimates of the Coefficients of Variation for the clusters at Slack Farm

Cluster	$\overline{\Phi}_{\text{Even}}$	k	N
1	0.852	4	12
2	2.773	7	53
3	2.883	12	222
4	2.726	10	165
5	1.445	7	37
6	2.974	11	178
7	2.672	13	183
9	2.485	4	20

Figure 6-3: Jackknifed Estimates of Evenness for the clusters at Slack Farm



Note: Points are labeled by cluster

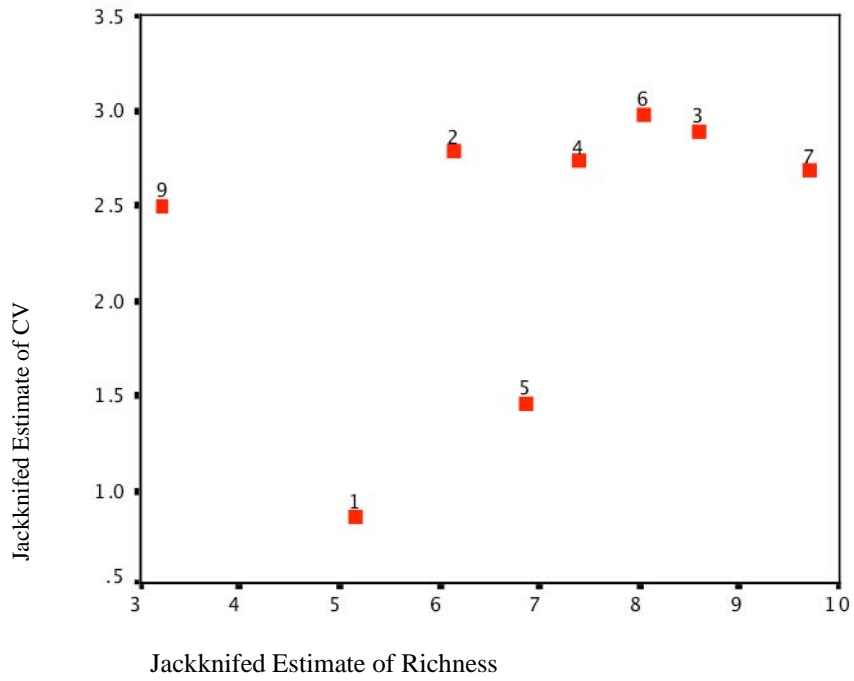
Table 6-10: ANOVA table for the Jackknifed Estimates of Evenness

		Sum of Squares	df	Mean Square	F	Sig.
Jackknifed Estimate of Evenness	Between Groups	24.224	7	3.461	.611	.745
	Within Groups	339.843	60	5.664		
	Total	364.068	67			

using the textile types differently, or did any one cluster have a more diverse utilization of the textile types at Slack Farm. As diversity is composed of both richness and evenness, plotting them against each other will provide a graphical representation of the diversity of the clusters at Slack Farm. As can be seen from Figures 6-1 and 6-2, the clusters with the highest richness values are grouped together while the clusters with lower richness values are more divergent from each other, but as Figure 6-2 demonstrated, these differences are not unusual at that sample size. When the evenness values were plotted against sample size, the values appeared to remain somewhat consistent as sample size increased, but still represented a very uneven distribution within each cluster. A “diverse” cluster would display high richness and high evenness (low CV), meaning a diverse cluster would have a high variety of categories equally present. As can be seen from Figure 6-4, none of the clusters at Slack Farm can be considered very diverse. The clusters show a trend of either having a high richness and being very uneven or being even and having a low richness.

If the types of textiles being utilized in the different clusters at Slack Farm were limited by some reason other than personal preference, it can be assumed that there would be restrictions in the location of those types. To see if there is a statistically significant association between textile type and context within the site, a Fisher’s Exact Test was computed. The use of the Fisher’s Exact Test is preferred to using a Chi-squared test in this instance because the number of objects classified under several textile types is less than 5. The under-represented textile types may skew a Chi-squared test. The Fisher’s Exact Test treats the sample as if it were a population and generates the statistic of interest based on the exact nature of the sample as opposed to the approximations of a Chi-squared test (Blalock 1979:279). The Fisher’s Exact Test value was 10.780 ($p = 0.525$) and shows that there is no relationship between textile type and cluster at Slack Farm. The textile types were then grouped together by twining type (Simple twining, Diagonal twining, Cross-warp twining) to see if any of these types were associated with cluster location. The Chi-squared Test was used for this calculation because no twining type had less

Figure 6-4: Jackknifed Estimates of Richness and Evenness



Note: Points are labeled by cluster

than 5 examples. The Chi-squared value was 11.661 ($p=0.634$) and shows that there is no significant relationship between twining type and cluster at Slack Farm.

The data from the sample of textile-impressed sherds from Slack Farm has suggested that some of the clusters (Clusters 3, 4, 6, and 7) may have had a greater variety of textile types than other clusters, but this variety is not greater than expected for the sample sizes present. Furthermore, there is no association between textile type and cluster. Based on the statistical data, the textile types identified from the sample from Slack Farm were available to all individuals; but now the question becomes whether the quality of the textiles used in the impressions differed between the clusters.

The Metric Data from the Textile Impressions

Differences in the quality of thread that is produced for textile manufacture can provide information not just on the probable use of the finished object, but also differences in status. Production of finer thread for textile manufacture would necessitate a much greater expenditure of energy and resources. Those clusters with a higher concentration of such textile types would have expended more energy on those textiles and this may be an indicator of different economic capabilities. Technological choices in textile production are a part of a technological system where an object's symbolic and functional qualities are informed by the same set of social patterns (Lemonnier 1989, Lechtman 1977). Ideas that inform textile manufacture to create a fabric that is capable of signifying wealth or status therefore also inform the structural characteristics, such as thread quality, and vice versa. The resultant textiles are both symbolic and functional objects that can signify social messages, such as status, but also be used in household tasks, such as ceramic manufacture. Because the process of ceramic manufacture captures the textile's structural information, textile impressions maybe used to access the technological choices made during production.

During the analysis of the textile-impressed sherds, there appeared to be some visual differences in the impressions (see Table 6-11 and 6-12 for a summary of the metric attributes of the textile types and descriptions of those measurements). Sherds that had been impressed with textiles that had more structural variations and would have required a higher investment of labor appeared to have been constructed with finer threads. Simple twining appeared to be coarser than Diagonal twining while both appeared coarser than Cross-warp twining. Qualities of a finer thread would include a smaller thread diameter, smaller angle of twist, and a greater average number of twists per centimeter.

ANOVA was used to examine the difference in the characteristics of the warp and weft threads between the different textile types. Since the question of interest here was if there was a relationship between increases in twining complexity expressed on an ordinal scale (from Simple twining to Diagonal twining to Cross-warp twining) and a corresponding change in the quality of the thread (increasing fineness), the textile types were grouped together by twining type. The ANOVA (Table 6-13) showed a difference between twining type and thread diameter ($F = 12.137$, $p = 0.000$ for the warps and $F = 22.167$, $p = 0.000$), angle of twist ($F = 20.378$, $p = 0.000$ for the warps and $F = 13.370$, $p = 0.000$ for the wefts), and twists per centimeter ($F = 58.871$, $p = 0.000$ for the warps and $F = 60.155$, $p = 0.000$ for the wefts). LSD multiple comparisons further showed that between the twining types, the thread characteristics are different from each other with two exceptions: for weft angle of twist, Diagonal and Cross-warp twining are similar to one another but different from Simple twining and for the diameter of the warp threads, Simple twining and Diagonal twining are the same but different from Cross-warp twining. The differences in the metric characteristics reinforce the idea that the different twining types were produced with different qualities of thread. This supports the idea that technological choice informed the structural characteristics of the textiles during production.

While the specific textile types are not restricted in use by cluster, the quality of the fabric utilized may not have been equal across the site. A combination of a more complex twining type with a

Table 6-11: Summary of metric attributes of textile-impressions analyzed

Textile Type	Ia	Ib	Ic	Id	Ie	If	Ig	IIa	IIb
Count	24	2	525	1	109	17	7	89	12
Range WarpDia	0.60-1.75	NA	0.07-2.05	NA	0.10-1.75	0.55-1.90	0.95-1.45	0.55-2.75	0.70-1.10
Mean WarpDia	1.22	NA	1.03	1.05	1.11	1.12	1.15	1.16	0.91
Range WarpCM	3.0-5.0	NA	3.0-10.0	NA	3.0-9.5	3.0-6.5	3.0-6.0	0.5-6.0	3.5-5.0
Mean WarpCM	3.83	NA	4.86	5	4.68	4.69	4.36	3.3	4.08
Range WarpANG	44-86	NA	28-89	NA	39-87	36-79	48-88	35-66	48-62
Mean WarpANG	63.3	NA	64.3	34	62.4	62.2	67.3	51.1	55
Range WeftDia	0.70-1.85	NA	0.07-2.55	NA	0.07-1.90	0.80-2.0	0.95-2.0	0.65-3.05	0.70-1.60
Mean WeftDia	1.25	NA	1.09	1.1	1.05	1.25	1.29	1.3	1.2
Range WeftCM	1.0-3.0	NA	1.0-5.0	NA	1.0-5.0	NA	2.0-3.0	1.0-6.0	3.0-9.0
Mean WeftCM	1.67	NA	2	2	2.25	2	2.43	2.76	4.83
Range WeftGap	0.7-9.15	NA	0.22-18.2	NA	0.30-10.0	NA	6.65-9.80	0.55-12.0	NA
Mean WeftGap	4.11	NA	5.42	NA	2.13	NA	8.2	3.15	NA
Range WeftANG	32-46	NA	26-78	NA	30-74	34-69	40-67	22-58	31-63
Mean WeftANG	39	NA	52.7	33	51.4	48.1	55.7	43.1	45.3

Table 6-11 (continued): Summary of metric attributes of textile-impressions analyzed

Textile Type	IIC	IId	IIE	IIIa	IIIb	IVa	Va	VIa	VIIa	VIIIb
Count	12	7	1	1	1	54	2	3	2	1
Range WarpDia	0.80-1.70	0.75-1.30	NA	NA	NA	0.40-1.35	1.30-1.50	1.10-1.20	1.05-1.20	NA
Mean WarpDia	1.22	1.03	1.15	1.55	1.15	0.78	1.4	1.15	1.13	1.7
Range WarpCM	2.5-4.0	3.0-3.5	NA	NA	NA	4.0-12	2.5-3.0	2.0-3.0	4.5-5	NA
Mean WarpCM	3	3.14	3	4.5	5.5	7.25	2.75	2.5	4.75	5
Range WarpANG	46-69	38-68	NA	NA	NA	45-69	49-53	33-35	NA	NA
Mean WarpANG	36.4	51.8	44	44	58	56.2	51	34	NA	51
Range WeftDia	0.90-2.15	0.95-1.95	NA	NA	NA	0.40-1.25	0.90-1.20	NA	1.05-1.45	NA
Mean WeftDia	1.48	1.51	1.6	1.45	1.15	0.77	1.05	NA	1.25	1.9
Range WeftCM	2.0-3.0	2.0-6.0	NA	NA	NA	1.0-5.0	1.0-2.0	NA	4.0-5.0	NA
Mean WeftCM	2.08	2.86	3	2	2	2.88	1.5	NA	4.5	5
Range WeftGap	1.70-4.35	NA	NA	NA	NA	1.10-6.45	4.75-8.15	NA	0.80-1.20	NA
Mean WeftGap	2.85	NA	1.4	5.9	5.3	3.14	6.45	NA	1	NA
Range WeftANG	39-52	35-53	NA	NA	NA	30-62	53-56	NA	NA	NA
Mean WeftANG	44.4	41.7	38	38	47	46.5	54.5	NA	NA	NA

Table 6-12: Description of measurements in Table 6-11

Abbreviation	Measurement	Description
Range WarpDia	Range in diameter of Warp elements	Smallest and largest value observed for Warp element diameter as measured in millimeters (mm)
Mean WarpDia	Mean of diameter of Warp elements	Mean of the diameter of the Warp element as measured in millimeters (mm)
Range WarpCM	Range in number of Warp elements per Centimeter	Smallest and largest value observed for the number of Warp elements present in the span of one centimeter
Mean WarpCM	Mean of number of Warp elements per Centimeter	Mean of the number of Warp elements present in the span of one centimeter
Range WarpANG	Range in the Angle of Twist of Warp elements	Smallest and largest value observed for the angle created by the Warp element plies twisting together as measured in degrees (°)
Mean WarpANG	Mean of the Angle of Twist of Warp elements	Mean of the angle created by the Warp element plies twisting together as measured in degrees (°)
Range WeftDia	Range in diameter of Weft elements	Smallest and largest value observed for Weft element diameter as measured in millimeters (mm)
Mean WeftDia	Mean of diameter of Weft elements	Mean of the diameter of the Weft element as measured in millimeters (mm)
Range WeftCM	Range in number of Weft elements per Centimeter	Smallest and largest value observed for the number of Weft elements present in the span of one centimeter
Mean WeftCM	Mean of number of Weft elements per Centimeter	Mean of the number of Warp elements present in the span of one centimeter
Range WeftGap	Range in the gap between rows of Weft elements	Smallest and largest value observed for the space between two consecutive rows of Weft twining as measured in millimeters (mm)
Mean WeftGap	Mean of the gap between rows of Weft elements	Mean of the space between two consecutive rows of Weft twining as measured in millimeters (mm)
Range WeftANG	Range in the Angle of Twist of Weft elements	Smallest and largest value observed for the angle created by the Weft element plies twisting together as measured in degrees (°)
Mean WeftANG	Mean of the Angle of Twist of Weft elements	Mean of the angle created by the Weft element plies twisting together as measured in degrees (°)

Table 6-13: ANOVA of Twining Type and Metric Attributes

		Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Weft Diameter	Between Groups	12.011	4	3.003	22.167	.000
	Within Groups	93.872	693	.135		
	Total	105.883	697			
Warp Diameter	Between Groups	5.409	4	1.352	12.137	.000
	Within Groups	74.529	669	.111		
	Total	79.938	673			
Weft Angle of Twist	Between Groups	7806.004	4	1951.501	13.370	.000
	Within Groups	93418.226	640	145.966		
	Total	101224.230	644			
Warp Angle of Twist	Between Groups	11041.900	4	2760.475	20.378	.000
	Within Groups	80057.785	591	135.462		
	Total	91099.685	595			
Weft Twists per CM	Between Groups	520.297	4	130.074	60.155	.000
	Within Groups	1399.014	647	2.162		
	Total	1919.311	651			
Warp Twists per CM	Between Groups	387.536	4	96.884	58.871	.000
	Within Groups	870.578	529	1.646		
	Total	1258.114	533			

higher quality thread would necessitate a greater input of labor in production. The initial examination of richness of textile types suggested that fabric may have been utilized differently by Clusters 3, 4, 6, and 7 but the model distribution showed this may have been an effect of sample size and the Fisher's Exact Test showed that no textile types were restricted to any specific cluster. However, the metric attributes can indicate if high quality fabric was limited in its use at the site.

Kendall's τ_b was calculated to see if there is a relationship between thread diameter, angle of twist, twists per centimeter and twining type when expressed on an ordinal scale (Table 6-14). A weak negative relationship was found to exist between the twining type and the thread diameter for the warps ($\tau_b = -0.066$, $p = 0.034$) and the angle of twist ($\tau_b = -0.160$, $p = 0.000$ for the wefts; $\tau_b = -0.254$, $p = 0.000$ for the warps) while there exists a positive relationship between twining type and twists per centimeter for the warps ($\tau_b = 0.388$, $p = 0.000$). A weak negative relationship exists between twining type and twists per centimeter for the wefts ($\tau_b = -0.125$, $p = 0.000$). These negative relationships, although very weak, are significant and an indication that as the twining type progresses from Simple twining to Cross-warp twining, the average diameter of the warp threads decrease and the threads for both the warps and the wefts are twisted tighter. The somewhat strong positive relationship between warps and twining type is an indication that with this progression, the warps are twisted together at a closer interval. As twining type increases in complexity, the warps are more tightly spun. A weak negative relationship between weft twists per centimeter and twining type may be caused by how the thread is manipulated during the twining process. Movements of the wefts and warps caused by the additional technical considerations for more complex twining types may be causing some of the thread to untwist slightly. This is a common occurrence in other textile techniques, such as knitting. Additional manipulations to achieve more complex effects will cause the thread or yarn to untwist slightly and may ultimately lead to a weaker fabric. The use of a tighter spun warp and weft would be

Table 6-14: Kendall's τ_b Results of Textile Attribute and Twining Type

Metric Attribute x Twining Type	τ_b -value	p-value
Weft Diameter	0.017	0.596
Warp Diameter	-0.066	0.000
Weft Angle of Twist	-0.160	0.000
Warp Angle of Twist	-0.254	0.000
Weft Twists per CM	-0.125	0.001
Warp Twists per CM	0.388	0.000

one way to help counter this problem. These tightly spun elements would be more resilient to stress during textile production and contribute to a durable and strong fabric. The additional time, effort, and skill needed to produce this thread also would increase its value. While a significant relationship does exist between these traits and twining type, these relationships are weak. The absence of a significant relationship between twining type and weft diameter is surprising given the negative relationship with warp diameter. This may be an indication of a general preference for a consistent weft on the part of the weavers.

Although a strong link between twining type and thread quality cannot be established, the metric traits of the textiles may be examined to see if any cluster, or group of clusters, possess a greater average of finer quality textiles or if these traits may indicate clusters of related textile producers and consumers. Specifically, was any one cluster or group of clusters utilizing generally finer or coarser textiles for impressing pottery? An ANOVA was used to examine thread characteristics of the textiles to see if the quality of the textiles was different between the clusters (Table 6-15). The ANOVA showed that no difference exists between cluster and the metric characteristics of thread diameter ($F = 2.014$, $p = 0.051$ for the warps and $F = 1.258$, $p = 0.104$), twists per centimeter ($F = 1.356$, $p = 0.222$ for the warps and $F = 1.778$, $p = 0.089$ for the wefts), and warp angle of twist ($F = 1.710$, $p = 0.104$). The ANOVA showed that there exists a difference between cluster and weft angle of twist ($F = 3.892$, $p = 0.000$). LSD multiple comparisons between cluster and weft angle of twist showed that Clusters 5 and 6 differed from Clusters 2, 3, and 7; Cluster 4 differed from Clusters 3 and 7; and Cluster 9 differed from Cluster 5. Given that none of the other metric traits were different by cluster, the means of the weft angle of twist were closely examined and showed that the average difference between each cluster was only 6° . Also, Kendall's τ_b showed there was no significant relationship between weft angle of twist and cluster ($\tau_b = 0.036$, $p = 0.212$). There may be some difference between the weft angle of twist and cluster, but it is very subtle in this sample and does not appear to be an indication of

different qualities of textile utilization. There appears to be no difference between cluster and the

Table 6-15: ANOVA between cluster and the metric attributes

		Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Weft Diameter	Between Groups	1.338	7	.191	1.258	.269
	Within Groups	105.295	693	.152		
	Total	106.633	700			
Warp Diameter	Between Groups	1.659	7	.237	2.014	.051
	Within Groups	78.724	669	.118		
	Total	80.383	676			
Weft Angle of Twist	Between Groups	4151.738	7	593.105	3.892	.000
	Within Groups	97072.492	637	152.390		
	Total	101224.230	644			
Warp Angle of Twist	Between Groups	1816.726	7	259.532	1.710	.104
	Within Groups	89394.473	589	151.773		
	Total	91211.199	596			
Weft Twists per CM	Between Groups	36.388	7	5.198	1.778	.089
	Within Groups	1882.923	644	2.924		
	Total	1919.311	651			
Warp Twists per CM	Between Groups	22.296	7	3.185	1.356	.222
	Within Groups	1235.818	526	2.349		
	Total	1258.114	533			

quality of the textile used in impressions at the site and no one cluster is utilizing a greater quantity of either coarse or fine fabric. A larger, more inclusive sample from Slack Farm may be better suited to show if there is a correlation between the metric characteristics and cluster.

Summary of the Data

Based on the above description of the data from the textile-impressed sherds analyzed in this sample, some conclusions may be drawn. First is the relatively similar distribution of the textile types identified across the site. As the jackknifed estimates of evenness have shown, the textile types are unevenly distributed within the clusters. However, when those values were compared using the ANOVA, it was shown that their distributions are not different from each other. No one cluster has a more unequal distribution of textile types. The variants of twining identified within the sample were not restricted to specific contexts at the site at a statistically significant level. Although the twining variations were not found in all contexts, their use does not appear to be restricted to any one location. As was shown with the ANOVA of the jackknifed estimates for richness, some clusters did possess a greater variety of textile types than others; Clusters 3, 4, 6, and 7 had a greater richness. However, when the richness values were compared against the model richness distribution, the values were within their expected range for the given sample sizes and suggests that the higher richness values may have been a consequence of the greater sample sizes.

A second conclusion was while differences in the metric data could be seen between textile types, no differences could be seen between the data and cluster. This is an indication that no one cluster was producing or utilizing textiles of a different quality from the other clusters. The difference between the twining types based on the characteristics of the warp and weft threads indicates there was some difference in quality between textile types. The ANOVA showed that the thread diameter, angle of twist, and twists per centimeter were different between the textile types. While a visual inspection of examples from different types would appear to

indicate a change from coarse to fine with a progression from Simple to Cross-warp twining, statistical analysis showed that this relationship was very weak. Within each textile type, the thread quality varies considerably and the variation appears to be obscuring any trends. There was some difference in quality between the types of fabric but the use of these objects was not restricted by context in this sample.

The over-arching research question in this project was to see if data from textile-impressed ceramics from Slack Farm could be used to contribute to the understanding of the social organization of the site. The data concerning the distribution of the textile types and their metric characteristics among the clusters have shown that no type or set of types is limited by context and no one cluster or group of clusters is in possession of textiles of differing quality. What may be considered next is how these textile types compare to earlier Mississippian assemblages and contemporaneous Caborn-Welborn assemblages and what these comparisons can contribute to understanding Caborn-Welborn social organization at Slack Farm.

Textile Traditions at Slack Farm and Mississippian Polities

When the textile-impressed ceramics from Slack Farm are compared to earlier Mississippian polities, the assemblage from Slack Farm stands out in its increase in structural variation. The best-studied assemblage of Mississippian textile-impressed ceramics to-date is Drooker's analysis from Wickliffe Mounds (1992). Both assemblages can be characterized as being impressed with utilitarian fabrics, such as mantles, shawls, bags, skirts, and other items, but the assemblage from Slack Farm shows less use-wear. Very little of the textiles used to create the impressions at Slack Farm were categorized as having more than light wear (n=27, 3.1% of the sample) with Wickliffe having a higher proportion (21% of the sample). The textiles from Slack Farm also exhibited a lower average diameter for the warp and weft elements. The average warp diameter from Slack Farm was 1.11 mm and from Wickliffe was 1.66 mm; the average weft diameter from Slack Farm was 1.05 mm and from Wickliffe was 1.53 mm. Also, the raw

material used in textile production from Slack Farm appeared to be more consistently processed from Slack Farm than from Wickliffe. Overall, the quality of the fabric utilized at Slack Farm seems to have been higher than at Wickliffe. This may be an indication of the growing refinement of textile traditions over generations or of a more pronounced focus on textile manufacture at Slack Farm.

The most noticeable difference between the two assemblages is the increase in the use of structural variation from Wickliffe to Slack Farm. Of the twining types with structural variation, such as those that use cross-warps and gaps, that would have created designs within the fabric, only 6% of the Wickliffe assemblage was composed of such types as compared to 20% in the Slack Farm assemblage. This difference is most acute between the assemblages of Open Simple twining with Crossed-warps with only 0.89% present at Wickliffe and 6.2% present at Slack Farm. This increase in structural variation is observable from other Mississippian polities. For example, at the Angel site, only 4% of the textile-impressed ceramics exhibited structural variation (see Table 6-16 for a comparison of textile types from Slack Farm, Wickliffe, and Angel). This increase in structural variation may be a function of the increased signaling resulting from intra- and interregional interaction. It also may reflect changes in ideas about what type of fabric is suitable for pottery manufacture. However, even this change may be related to the increased need for signaling within and between communities.

Overall, the textile assemblage from Slack Farm, and other Caborn-Welborn sites, is composed of textile types that were common across the Southeastern United States, some of which had been used since the Woodland period. This shows a fairly consistent textile tradition that became increasingly complex over time. By the Caborn-Welborn phase and Slack Farm, the textile tradition had become very diverse in the types of fabric produced and used in ceramic manufacture. Increases in structural variation appear to be related to an increase in the signaling purposes of such items.

Table 6-16: Comparison of Textile Types from Slack Farm, Wickliffe and Angel sites

Type Number	Textile Type	Slack Farm		Angel Site		Wickliffe	
		Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)
Ia	Open Twining	24	2.8	0	0	6	.38
Ib	Close Twining	2	0.2	0	0	0	0
Ic	Open Simple S-twist Twining	525	60.3	7646	75.1	833	52.9
Id	Close Simple S-twist Twining	4	0.5	188	1.8	15	0.95
Ie	Open Simple S-twist Twining with Gaps	106	12.2	113	1.1	32	2.03
If	Close Simple S-twist Twining with Gaps	17	2	0	0	0	0
Ig	Open and Close Simple S-twist Twining	7	0.8	0	0	0	0
IIa	Open Diagonal S-twist Twining	89	10.2	1428	14	453	28.78
IIb	Close Diagonal S-twist Twining	12	1.4	242	2.4	0	0
Iic	Open Diagonal S-twist Twining with Gaps	12	1.4	159	1.6	5	0.32
Iid	Close Diagonal S-twist Twining with Gaps	7	0.8	0	0	0	0
Iie	Open and Close Diagonal S-twist Twining	1	0.1	0	0	0	0
IIIa	Open Simple and Diagonal S-twist Twining	1	0.1	0	0	23	1.46
IIIb	Open Simple and Diagonal S-twist Twining with Gaps	1	0.1	0	0	0	0
IVa	Open Simple Cross-warp S-twist Twining	54	6.2	163	1.6	14	0.89
Va	Open Simple, Diagonal, and Cross-warp S-twist Twining	2	0.2	0	0	1	0.06
Via	Close Oblique	3	0.3	0	0	0	0

Type Number	Textile Type	Slack Farm		Angel Site		Wickliffe	
		Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)
	S-twist Twining						
VIIa	Oblique Interlacing	2	0.2	0	0	2	0.13
VIIIb	Twill Weave, 3/2 Interval	1	0.1	0	0	0	0

n=870 n=100% n=9939 97.6% n=1384 87.9%
 Original n=10184 Original n=1574

Note: The published reports on these assemblages (Drooker 1992 and Black 1967) included other textile types not present within this sample (but present within the entire Slack Farm assemblage) or type names that could not be matched to those in this analysis without visual comparison.

Textile Traditions at Slack Farm and Other Caborn-Welborn Phase Sites

Comparisons between the textile-impressed ceramics from Slack Farm and earlier Mississippian polities have shown that there is an increase in structural variation, or the use of multiple twining structures within one textile, present within the assemblages. When the Slack Farm assemblage is compared to other Caborn-Welborn phase sites, the amount of structural variation remains fairly consistent. Assemblages from Hovey Lake, Caborn (Henderson et al. 1996), and Bone Bank (Henderson 2003), were compared to the assemblage from Slack Farm based on published data (Table 6-17). Both Hovey Lake and Bone Bank are large villages, like Slack Farm, while Caborn is a hamlet. Similar types of textile structures were recovered from these four sites with Open Simple S-twist twining being the dominant type present in all assemblages. There was some variation in the percentage of different textile types present from site to site. The sample from Caborn had the highest proportion of Open Diagonal S-twist twining at 31.5% compared to 10.2% at Slack Farm, 7.9% at Hovey Lake, and 6% at Bone Bank. Caborn also had the smallest proportion of Open Simple Cross-warp S-twist twining at 1.9% compared to 6.2% from Slack Farm, 6.4% from Hovey Lake, and 6.6% from Bone Bank. Textile-impressed ceramics exhibiting structural variations from Hovey Lake and Bone Bank represented 24.5% and 23.1% of their respective samples, while Caborn exhibited 11.1% structural variation. While Hovey Lake and Bone Bank have slightly higher amounts of structural variation present within their samples than Slack Farm, with 20% of its sample exhibiting structural variation, these sites were occupied for a shorter duration during the Caborn-Welborn phase. The longer occupation history may be masking differences that would be visible if the contemporaneous contexts from Slack Farm were compared to these sites. However, there is still not much difference in the percentages of structural variation within textile types from these sites. As Caborn is a smaller site, the assemblage was also smaller as was the structural variation. This trend may be a function of the reduced need of individuals from this site to produce textiles capable of signaling complex messages.

Table 6-17: Comparison of textile types present at Slack Farm, Hovey Lake, Caborn, and Bone Bank

Type Number	Textile Type	Slack Farm		Hovey Lake*		Caborn*		Bone Bank+	
		Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)
Ia	Open Twining	24	2.8	0	0	0	0	43	6.9
Ib	Close Twining	2	0.2	0	0	0	0	0	0
Ic	Open Simple S-twist Twining	525	60.3	224	51.4	24	44.4	303	49
Id	Close Simple S-twist Twining	4	0.5	5	1.2	0	0	3	0.5
Ie	Open Simple S-twist Twining with Gaps	106	12.2	60	14.1	3	5.6	99	16
If	Close Simple S-twist Twining with Gaps	17	2	0	0	0	0	0	0
Ig	Open and Close Simple S-twist Twining	7	0.8	0	0	0	0	0	0
IIa	Open Diagonal S-twist Twining	89	10.2	34	7.9	17	31.5	37	6
IIb	Close Diagonal S-twist Twining	12	1.4	0	0	0	0	0	0
IIc	Open Diagonal S-twist Twining with Gaps	12	1.4	16	3.7	2	3.7	3	0.5
IId	Close Diagonal S-twist Twining with Gaps	7	0.8	0	0	0	0	0	0
IIe	Open and Close Diagonal S-twist Twining	1	0.1	0	0	0	0	0	0
IIIa	Open Simple and Diagonal S-twist Twining	1	0.1	2	0.5	0	0	4	0.7
IIIb	Open Simple and Diagonal S-twist Twining with Gaps	1	0.1	0	0	0	0	0	0
IVa	Open Simple Cross-warp S-twist Twining	54	6.2	27	6.4	1	1.9	41	6.6
Va	Open Simple, Diagonal,	2	0.2	0	0	0	0	0	0

Type Number	Textile Type	Slack Farm		Hovey Lake*		Caborn*		Bone Bank+	
		Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)	Count	Percent Total (%)
	and Cross-warp S-twist Twining								
VIa	Close Oblique S-twist Twining	3	0.3	0	0	0	0	0	0
VIIa	Oblique Interlacing	2	0.2	0	0	0	0	0	0
VIIb	Twill Weave, 3/2 Interval	1	0.1	0	0	0	0	0	0
		n=870	n=100%	n=368	85.2%	n=47	87.1%	n=533	86.2%
				Original n=429		Original n=54		Original n=618	

*From Henderson et al. 1996; +From Henderson 2003.

Overall, the data from Hovey Lake, Caborn, Bone Bank, and Slack Farm, shows a consistent trend from earlier Mississippian textile traditions of increasing structural variation. While Caborn had the least variation of the Caborn-Welborn phase sites discussed, it still exhibited more variation than earlier Mississippian assemblages. Further study and comparison is needed of Caborn-Welborn textile traditions. The difference in the amount of structural variation between the village sites and the hamlet raises questions about the types of textiles used and the contexts they were used in. A more comprehensive survey of the textile-impressed ceramics from Caborn-Welborn hamlets with a comparison to contemporaneous village sites will help explain these differences.

Twining Types and Interaction with the Oneota

Previous research on Caborn-Welborn textile-impressed ceramics has shown continuity with earlier Mississippian weaving traditions (Drooker 1992, Henderson et al. 1996) and is further supported by this project. However, one twining type identified in this sample had not been recorded previously in Mississippian textile assemblages. Close Oblique S-twist twining was identified as being impressed on three sherds within this sample (Figure 6-5). Other examples of this twining type were sought outside the Southeast and were identified in Effigy Mound Complexes in Wisconsin (Hurley 1975) as well as in association with Hopewellian elite burials (Drooker 1992:200, Hinkle 1984). Effigy Mound Complexes have been shown to have some continuity with Oneota tribal groups (Benn 1995). Given the extraregional interaction between Caborn-Welborn and Oneota populations, it was felt that the entire textile-impressed assemblage from Slack Farm should be re-examined for additional examples of Close Oblique S-twist twining as well as other twining types that are not typically associated with earlier Mississippian textile traditions. Identifying additional twining types that could be associated with the Oneota would provide further information on the nature of their interaction with Slack Farm and support the idea of Oneota women residing at the site.

Figure 6-5: Example of Oblique twining found at Slack Farm



The re-examination of the textile-impressed ceramics identified three additional examples of Close Oblique S-twist twining as well as two additional twining variants (Warp twining and Crossed warps) that also reflect interaction with Oneota groups (Pappas and Pollack 2007). Variants of Warp twining and twining with Crossed warps are not common at earlier Mississippian sites in the Southeast or the Midwest. However, all three of these types are present in assemblages from non-Mississippian sites to the north of the Ohio Valley. Seven examples of Open Simple S-twist twining with Z-twist Warp twining were identified at Slack Farm (Figure 6-6) (Drooker 1992:185, Henderson n.d.). This type was not present in the sample used in this study, and is therefore not described in the textile type descriptions, but is instead described here. This twining type is defined as paired, spaced, active wefts S-twisting around single, stationary warps with periodic occurrences of the wefts twisting together to be a stationary element with active, paired warps Z-twisting around them over one or more weft rows (Emery 1966, Adovasio 1977). The frequency and duration of the Z-twisted Warp twining varies by example. To date, this variant of Warp twining has been identified at two Caborn-Welborn phase sites, Slack Farm and Bone Bank (Henderson 2003), but has not been documented at any Mississippian site (Drooker 1992). Examples of Z-twist Warp twining, however, have been identified at Effigy Mound Complexes in Wisconsin that pre-date the Oneota (Hurley 1975).

Thirteen examples of Open Simple S-twist twining with Crossed Warps and Open Diagonal S-twist twining with Crossed Warps were identified at Slack Farm (Figure 6-7) (Henderson 1999, n.d.). This type also is not present in the sample selected for this study, and is therefore not described in the textile type descriptions, but is instead described here. Single warps will cross each other to form Xs and be engaged by the S-twisting wefts at each other's point of intersection (Adovasio 1977:16) and may or may not return to its original warp position in the next weft row. The frequency and duration of the Crossed Warps varies by example. Twining with Crossed Warps has been identified at two Caborn-Welborn sites, Slack Farm (Henderson 1999) and Bone Bank (Henderson 2003) and at three Mississippian sites, the Saline

Figure 6-6: Examples of Z-twist Warp twining from Slack Farm

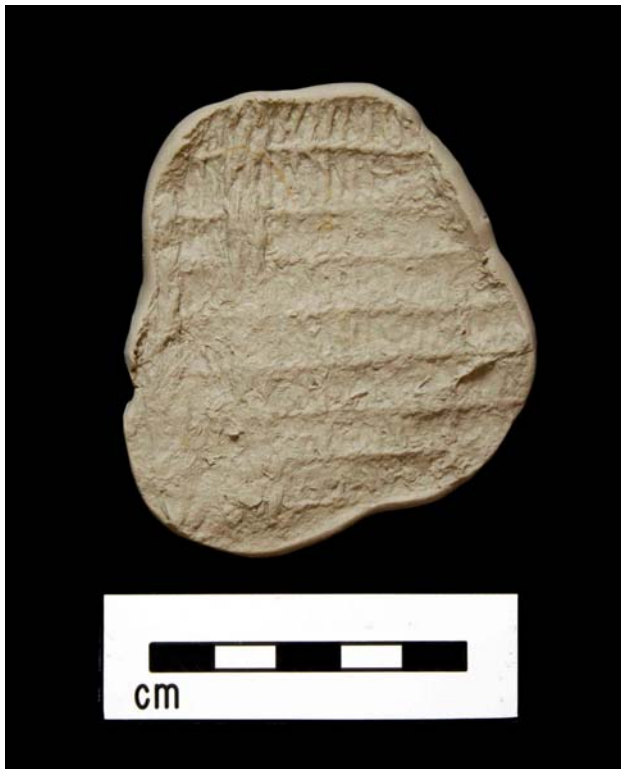


Figure 6-6 (continued) Examples of Z-twist Warp twining from Slack Farm

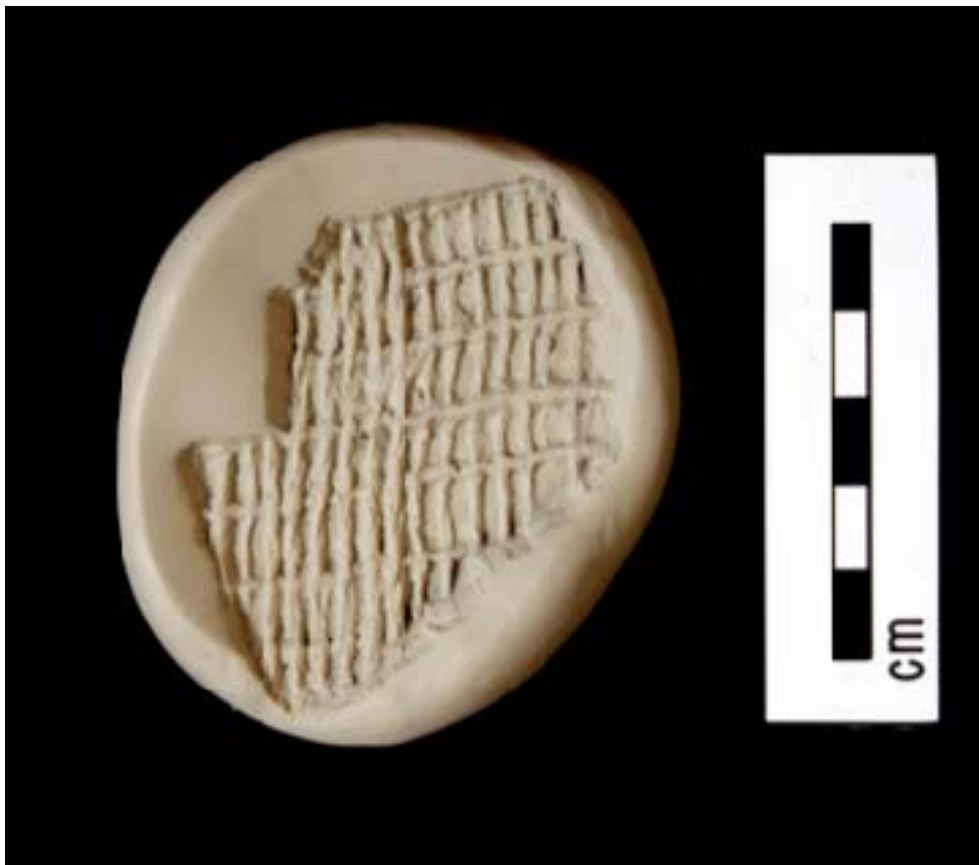


Figure 6-7: Examples of Crossed Warp twining from Slack Farm



Figure 6-7 (continued) Examples of Crossed Warp twining from Slack Farm



River site in Missouri, Wickliffe in Kentucky, and the Stone Mound in Tennessee (Bushnell 1914, Drooker 1992). Textiles that employ Crossed Warps were common in corn-washing and corn-hulling bags from historic Native Americans, such as the Winnebago, that post-date the Oneota north of the Ohio Valley (Drooker 1992:69, Fraser 1989:26, Whiteford 1977).

These three variants of twining are unknown or very uncommon within Mississippian contexts. However, there are archaeological examples from non-Mississippian sites to the north of the Ohio Valley in Illinois, Iowa, Minnesota, and Wisconsin (Hurley 1975, Benn 1995) in addition to historic examples from the same area (Drooker 1992). This region is also home to the prehistoric Oneota tribal groups with whom the Caborn-Welborn population maintained exchange relationships. Research has shown that there exists enough similarity between the textiles used in the Effigy Mound Complex to Oneota tribal groups to historic native populations, such as the Winnebago and Menomini, to infer a relatively continuous textile tradition (Benn 1995:94). What this means is that the textile structures used by Oneota weavers were probably very similar to those used by the weavers in the Effigy Mound Complexes and historic populations.

When other evidence of Caborn-Welborn phase interaction with Oneota tribal groups is considered, the presence of these twining types can be accounted for. Artifacts made from raw material originating in the Oneota region, such as catlinite disk pipes, have been identified at Slack Farm and other Caborn-Welborn phase sites (Pollack 1998, 2004, 2006; Pollack and Munson 1998) and it has been suggested that the Oneota-like ceramics found at Slack Farm were manufactured by resident Oneota women (Pollack 2004; Shergur et al. 2003). As with ceramic production, textile production is a learned behavior that is passed down from one generation to another. If Oneota women were manufacturing ceramic vessels at Slack Farm then it is also quite likely that the anomalous twining types represent fabrics that were woven by Oneota women who were residing at Slack Farm (Pappas and Pollack 2007).

If Oneota weavers produced these three twining types, then their use in the manufacturing of ceramics raises some interesting questions. These textiles were impressed on Kimmswick Fabric-impressed pans, a vessel form which is common in Mississippian assemblages but rare in Oneota. Since the textiles used to manufacture these pans are believed to have been utilitarian items that originated from a potter's household, it is assumed that the potters were also the weavers (Drooker 1992). When these assumptions are combined with this data, additional questions may be raised about the behavior and role of Oneota women in Caborn-Welborn villages. The degree to which they adopted Caborn-Welborn material culture, the amount of time it took for this adoption to occur, and how much of the mother's Oneota practices were passed on to successive generations are just a few avenues of future research.

Associating these three twining types with the presence of Oneota women at Slack Farm is only possible because of the additional evidence from other classes of material culture, such as ceramic decoration and lithic tools (Hyland 1997, Adovasio 1986). Using textile types as ethnic markers is difficult, but may be achieved when used in conjunction with other lines of evidence. Currently, there is a need for more research on Oneota textiles and weaving traditions. The textile types commonly used by Oneota women require more thorough examination and description, as does the use of the resultant fabric. This research would provide additional support for using these twining types as cultural markers.

7. Chapter 7: Textiles and the Caborn-Welborn Phase

Introduction

The goal of this research was to conduct an exploratory analysis of a sample of textile-impressed ceramics from Slack Farm. In addition to characterizing the types of textiles manufactured and used at this site, an attempt was made to determine if intrasite differences could be identified that reflected aspect of Caborn-Welborn social organization. This study showed Caborn-Welborn textiles exhibit an increase in the structural variation relative to earlier Mississippian groups while at the same time retaining a similar textile tradition. Little in the way of intra-site differences, however, were documented at Slack Farm. Also, textile types associated with Oneota women were identified and described. This research also draws attention to the need for consistent textile terminology in the Southeast and for the development of a textile typology and chronology. This chapter summarizes the results of this study and provides suggestions for future research.

Textile-Impressed Ceramics at Slack Farm

A question examined during this analysis was if a high status/elite residential area could be identified through an analysis of textile-impressed ceramics. Slack Farm and other Caborn-Welborn villages exhibit evidence for activities typically associated with earlier Mississippian elites, specifically the organization of public rituals, such as feasting, and long distance trade for exotic resources (Pollack 1998, 2004). There is also a settlement hierarchy consisting of farmsteads, hamlets, small villages, and large villages. Slack Farm, based on its size, location, and density of artifacts, seems to have been one of the most prominent Caborn-Welborn villages. However, other correlates of elite status are absent Slack Farm and other Caborn-Welborn villages. These sites lack platform mounds and access to exotic trade goods was not restricted. Also, while there is little known about Caborn-Welborn burial practices, there does not appear to

be elite status-based differences in grave treatment. While individuals responsible for feasting and trade may not have been traditional Mississippian elites, they may have been competing with others to accumulate prestige and status.

Textiles are highly sensitive to culture (Schneider and Weiner 1989) and are produced within a technological system affected by culture change (Lemonnier 1989). Textiles produced in this system would have reflected differences in status because of the technological choices made during their manufacture. Textiles were tools as well as symbols and available for use in the household's ceramic manufacture. It is assumed that the textiles were produced in the same household that they were discarded in because as a tool and resource for ceramic manufacture, the household textiles were the most expedient and cost-effective choice. Analyzing the textile-impressed ceramics from household contexts can provide information on textile utilization as well as social organization.

If the textiles impressed on ceramics were the same as those utilized in the households where the ceramic sherds were found, an elite residential area should have textile impressions from fabric that, when compared to the other residential areas, had smaller diameter threads that were tightly spun, had more threads per centimeter, multiple textile structures, and more decoration and embellishment. While sherds impressed with fabric possessing these characteristics may have been found throughout the site, an elite residential area would be expected to have had a significantly higher proportion of such objects. This pattern would have been possible because elites would have been in a better position to expend more energy and resources in the production of higher quality textiles. Their status would have impacted the technological choices they made during textile production. These objects would have been a symbol of their status and their functional choices would have reflected this. However, no such status patterns were detected during this research.

The 870 textile-impressed sherds analyzed as part of this study were recovered from clearly defined household contexts at Slack Farm. Each sherd was impressed with clay to obtain

a cast of the fabric used in its manufacture and each cast was then examined, measured and described in the same way. The data this process produced was examined for any trends relating to status and a pattern of high-quality textile use in only limited contexts was not found. It was thought that complex textile types and structures would not be found in all contexts and that some clusters, specifically the elite residential clusters, would have greater diversity. The three main types of twining identified in this sample, Simple twining, Diagonal twining, and Cross-warp twining, were found in all clusters at Slack Farm. There were differences in the frequencies of the structural variations of these types. While the distribution of textile structures among the clusters was not even, no one cluster was found to have a significantly more uneven distribution. Some clusters, notably Clusters 3, 4, 6, and 7, were initially thought to have a greater variety of textile types in their samples. These clusters were found to be “richer” and had more examples of more textile types with Cluster 7 having the highest richness score. However, a model distribution showed that these differences in variety were caused by sample size and not different textile utilization. The distribution of textile types and structures does not appear to reflect an elite residential pattern.

The metric data from the structural traits of the impressions, the thread diameter, angle of twist, and other characteristics, did not meet the expectations of an elite residential pattern. If these metric attributes reflected higher status, then the impressions would have had smaller average thread diameter, higher average threads per centimeter, and a tighter thread twist. However, no cluster, or group of clusters, had finer or coarser textiles than the rest of the site. The pattern that was detected in the metric data was from the different textile types. As the textile types became more complex, the threads associated with their production became finer. Finer thread is more time-consuming to produce and is only suitable for some fabric. This is also true for more complex textile structures. The textile producers at Slack Farm used raw materials that would correspond in delicacy to their desired final product. Although there are differences in the quality of the fabric between textile types, there are no differences in textile use between

residential clusters. The expected pattern of finer textile impressions at only some households has not been met.

Overall, evidence of a high status residential area was not detected at Slack Farm as a result of the textile analysis. No textile type appears to have been restricted in use and no one cluster utilized higher quality fabric. There is evidence for feasting and other aggrandizing activities at Slack Farm but the data presented here has been unable to clearly identify any high status residential clusters. The traditional hallmarks of Mississippian elite status—platform mound construction, status-based burials, and a concentration of objects made of exotic raw materials at a regional center, are not present at Slack Farm or other Caborn-Welborn sites. An analysis of the textile-impressed pottery did not reveal any trends that may be associated with status but did suggest that the increase in textile types used in textile production may have been the result of expanded extraregional trade.

Changes to social organization following the collapse of the Angel chiefdom and other nearby Mississippian polities, combined with changes from interaction with new trade partners, however, may have affected the technological choices used in textile production. These changes affected choices about the use of textile structures as well as the structural characteristics of the fabric. Increased use of a variety of textile structures allowed for the production of more fabric capable of expressing social organization. Weavers at Slack Farm were participating in the reconfiguration of Caborn-Welborn social organization and would have needed additional venues for expression. Geometric patterns and images could be created in the fabric without the use of dye, paint, or additional objects such as feathers and beads. Creating a fabric that was capable of signaling an idea would have necessitated additional time, but not additional resources, and would have provided weavers with a wider range of options for expression. There is a need for more research on the Caborn-Welborn material culture to understand how expression in textiles relates to expression in other classes of objects.

Additional Observations and Suggestions for Future Research

The use of additional embellishment on textiles had been anticipated in the expected trends but was not found during the analysis. These embellishments would have included items such as beads and feathers, and their absence may be related to how status was understood at Slack Farm. However, and probably more likely, their absence in the textile-impressed ceramics may also reflect how unsuitable they were for that function. A textile embellished with beads and used in ceramic production would have created deep gouges in the clay. These gouges would have affected the structural integrity of the ceramics and decreased their usefulness. A fabric embellished with feathers would have experienced similar problems. If the feathers were stitched to the fabric, they would have created gouges in the vessel walls or made separating the clay from the fabric difficult. If the threads were wrapped with feathers, the resultant fabric would have also been difficult to remove from the clay. Both of these problems would result in ceramic vessels that were not durable and therefore not as useful in daily activities. Textiles with these characteristics would have been unsuitable for ceramic manufacture and expectations of their presence in assemblages of textile-impressed sherds should not be made.

There is a need for the development of a standard terminology for textile structures in the Southeast. For example, Open Simple S-twist twining with Cross-warps has been referred to as Twining with Transposed Interlinked warps, Octagonal Openwork, and Zigzag twining (Drooker 1992, Black 1967, Adovasio 1977). Not only is the variety of terms for one textile structure confusing, it makes comparison of different assemblages difficult. The terminology used in identifying different textile structures in this research is straight-forth, has been previously used in other studies, and is applicable for both fabric and basketry structures (both classes of textile). These terms were clearly defined and diagramed and it is hoped that they will act as a guide in future textile studies.

There is also a need for a more consistent application of analytical techniques. All textile studies use a data set that is based on a similar set of measurements. However, how those

measurements are generated is almost never described. This also makes comparison between assemblages difficult. If the average warp thread diameter was measured in different ways, or if the measurement was even taken, then the measurements may represent different characteristics and comparison may provide erroneous conclusions. The techniques used in this analysis are also clearly defined and diagramed and may act as a guide in future research.

The goal of this research was to see what trends, if any, would be present in the textile-impressed ceramics that related to Caborn-Welborn social organization. While no differences in the textile impressions based on status were identified, there were differences in the consumption of such items. Four residential clusters at Slack Farm were identified that utilized and consumed a greater variety of textile types than other areas within the site, however, the appearance of greater variety may be a function of sample size. If this is not an effect of sample size, this highlights the different activities and roles within the residential clusters. Previous textile research looking at status has drawn its sample from burial contexts, where social difference is expressed to its greatest degree, but little is known about how fabric would reflect day-to-day differences. There may have been little difference between individuals of different status on a daily basis, a trend that is seen in some smaller Mississippian mound sites (Hammerstedt 2005) where there is little difference between elites and non-elites in everyday utilitarian items. This trend may have extended to everyday fabric and textiles. The absence of status-based differences in the textile-impressed ceramics may not necessarily indicate that there were not status differences between individuals at Slack Farm. These differences may not have been expressed through textiles or the textiles used for this expression may not have been used in ceramic production. The assumptions used to see social difference between different status individuals using fabric needs to be reconsidered as well as account for the possibility that textile-impressed sherds discarded in household contexts may not represent textiles produced within the household. Ethnohistoric accounts have provided information on the role of women as both weaver and potter for her household (Espinosa 1746 [1942]), but it has also provided information on the use of textiles as

tribute and for trade (Clayton 1993). Further research into how textiles were used prehistorically, and how this use affected the characteristics of the textiles, must be conducted before using textile-impressed ceramics to provide additional information on ideas about status and ethnicity. There is a need for further research on the material culture and textile traditions of both Caborn-Welborn phase populations and Oneota tribal groups. Such research will provide additional information on the social process of these groups and how material culture reflects their actions.

Final Conclusions

An analysis of textile-impressed ceramics from the Caborn-Welborn phase site of Slack Farm was unable to detect any status-based differences. The data provided evidence for higher textile consumption patterns in clusters 3, 4, 6, and 7, which may be a function of sample size. This data cannot support the idea of status-based social organization, but it cannot completely disprove the idea. The data also provided additional evidence for the presence of Oneota women residing at the site. The use of Oneota fabric on Caborn-Welborn ceramic vessels raises several questions concerning the role of these women and requires further research before a conclusion may be reached. Further research is also needed before the Oneota-associated twining types may be used as cultural markers for these populations. It is hoped that the information generated from this analysis will provide a solid foundation for future studies of the material culture and textile traditions in the lower Ohio River valley.

Appendix 1: Twined Impression Analysis Sheet

Initials:

Date:

TWINING IMPRESSION
(present all metric data in millimeters unless otherwise stated)

GENERAL DATA

1. *Site Number*: _____ Type Name: _____
2. *Site Name*: _____
3. *Cultural Affiliation*: _____
4. *Specimen I.D. Number*: _____
5. *Provenience*: _____

ANALYTICAL DATA

(BODY)

6. *General Appearance*: Complete Flexible Decorated
 Incomplete Semi-flexible Undecorated
 Rigid Mended
 Unmended
7. *Textile Form*: Basket With rim With selvage
 Bowl Without rim Without selvage
 Bag With center
 Other: _____ Without center

DIMENSIONS AND SKETCH

*Indicate Warp and Weft
Direction in Relation to Sherd
Rim (where possible)*

Rigid Semi-flexible Flexible

b. Warp Shape and Preparation:

Whole Cortex intact Unspun
 Halved: flat side _____ Decorticated Spun: _____
 Quartered Rhettied Cordage: _____

c. Warp Diameter:

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

d. Warp Unit Diameter:

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

e. Warp per cm:

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

f. Warp Gaps

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

g. Twists per cm

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

h. Angle of Twist

_____ ; _____ ; _____ ; _____
Range: _____ to _____
Mean: _____
No. of Meas.: _____

13. *Specimen Dimensions*

a. Length of Sherd: _____ ; _____ ; _____ ; _____ ; _____ ; _____

Range: _____ to _____
Mean: _____
No. of Meas.: _____

b. Height of Sherd: _____ ; _____ ; _____ ; _____ ; _____ ; _____

Range: _____ to _____
Mean: _____
No. of Meas.: _____

b. Width of Sherd: _____ ; _____ ; _____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.: _____

14. *Warp Splices*

a. () New warps inserted into pre-existing weft crossings

() U-shaped warps encircle a weft row

() New warps formed by cloning

() Other (specify): _____

b. Width of New Element

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.: _____

c. Width of Warp Splice Unit

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.: _____

d. Differences in spliced element material, preparation, etc.: _____

15. *Weft Splices:*

a. () Laid in under exhausted wefts

() Bound to exhausted with _____ knots (number and type)

() Looped around warp elements

() Other (specify): _____

b. Differences in spliced element material, preparation, etc.: _____

16. *Wear Patterns, Stains, etc.:*

Surface	Outside Surface	Inside
Carbonized	()	()
Wear from Utilization	()	()
Sheen: _____	()	()
Stain: _____	()	()
Organic Residue: _____	()	()
Inorganic Residue: _____	()	()
Pitched: _____	()	()
Mending: _____	()	()

Other: _____ () ()

17. *Raw Material*

Weft/Warp

Genus/Species

Genus/Species

a. () Leaf

() Stem

() Root

() Twig

() Bark

() Seed Hair

() Animal Skin

() Animal Sinew

18. *Miscellaneous Attributes:*

Describe (where possible) straps, handles, etc. and measurements found on the specimen which are not covered in this form.

19. *Twined Basketry: Mends and Decoration*

a. Techniques of Mending: Describe below the techniques and materials used in mending the specimen. Note the location of the mend and any pertinent measurements.

b. Techniques of Decoration

a. () False Embroidery

b. () Decorative

Wrapped Twining

c. () Plain Twined Overlay

() Single Strand

() No Twist

() Double Strand

() Half Twist

d. () Other (specify):

Twined Centers

(Append to Main Analysis Form where necessary)

1. CENTER WARPS

a. Number of warp elements functioning as a unit:___ b. Number of warp units in center:___

c. Arrangement of warp units in center

d. Width of Warp Element

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.:_____

e. Width of Warp Unit

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.:_____

f. Number of warps per centimeter: _____

g. Compared to warps in wall, center warps differ in:

() Material:_____

() Composition:_____

() Preparation:_____

() Width:_____

() Texture:_____

() Other:_____

2. CENTER WEFTS

a. Number of weft elements functioning as a unit:_____

b. Twining type and weft row slant:_____

c. Width of Weft Element

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.:_____

d. Width of Weft Unit

_____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.:_____

e. Compared to wefts in wall, center wefts differ in:

() Material:_____

() Composition:_____

() Preparation:_____

() Width:_____

() Texture:_____

() Other:_____

f. Method of initiating weft rows in center:

() Knot (specify type):_____

() Weft looped around warps

Twined Selvages

(Append to Main Analysis Form where necessary)

1. END SELVAGE

a. () Truncated beyond final weft row

Angle of Truncation: _____

Extension of warps beyond final weft row: _____ ; _____ ; _____ ; _____

Range: _____ to _____

Mean: _____

No. of Meas.: _____

b. () Warps knotted

() on themselves with _____ knot

() on adjacent warp rows with _____ knot

c. () Warps twisted or braided

Specify twist: _____

Length of twist beyond final weft row: _____

No. of elements in braid: _____

Length of braid beyond final weft row: _____

2. SIDE SELVAGE

a. Both ends of weft row knotted with _____ knot

b. Self selvage (specify knot type): _____

c. Continuous side selvage

Terminated with _____ knot

Number of twists between weft rows: _____

Number of twists per centimeter: _____

3. COMPOSITE SELVAGE

a. () Produced by addition of _____ weft elements to form _____ strand braid

b. () Pseudo-coiled

c. () Employs running stitches

d. () Other (specify): _____

Appendix 2: Data Table

This Appendix contains the raw data collected in this research project. The following list describes the definitions of the column headings and data codes in the database, which is provided as a Microsoft Excel file. Data collection and analytical procedures are described in detail in Chapters 4 and 6.

Data Table Column Headings

FS: Field Specimen number
CAT: Catalog number
HOLE: Specific hole sherd was excavated from
HOUSE: House feature number
PITHOUSE: Pit or House feature
FEATURE: Specific feature number
NORTH: Northing
EAST: Easting
CLUSTER: Residential/Mortuary cluster
SHERDTYP: Type of sherd
TYPE: Textile type
WETYPE: Spin and/or twist of weft
WEDIA: Diameter of weft
WEUNIDIA: Diameter of weft unit
WEFTCM: Number of wefts per centimeter
WEGAP: Distance between weft rows
WEUNIGAP: Distance between weft units
WETWSTCM: Number of weft twists per centimeter
WEANGTW: Angle of twist of weft
WATYPE: Spin and/or twist of warp
WADIA: Diameter of warp
WAUNIDIA: Diameter of warp units
WARPCM: Number of warps per centimeter
WAGAP: Distance between warps
WAUNIGAP: Distance between warp units
WATWSTCM: Number of warp twists per centimeter
WAANGTW: Angle of twist of warp
LENGTH: Length of sherd
WIDTH: Width of sherd
THICK: Thickness of body of sherd
RTHICK: Thickness of rim of sherd
INTERSEC: Angle of intersection between textile impression and sherd rim
OTHER: General comments and observations for each sherd

Data Table Codes

PITHOUSE
1- House feature
2- Pit feature

SHERDTYP

- 1- Body sherd
- 2- Rim sherd

TYPE

- 1- Open Twining
- 2- Close Twining
- 3- Open Simple S-twist Twining
- 4- Close Simple S-twist Twining
- 5- Open Simple S-twist Twining with Gaps
- 6- Open Diagonal S-twist Twining (Alternate Pair Twining)
- 7- Close and Open Simple S-twist Twining
- 8- Close Simple S-twist Twining with Gaps
- 9- Open Cross-Warp S-twist Twining (Transposed Interlaced Twining)
- 10- Open Simple and Diagonal S-twist Twining with Gaps
- 11- Open Simple and Diagonal S-twist Twining
- 12- Close Diagonal S-twist Twining
- 13- Open Diagonal S-twist Twining with Gaps
- 15- Close Diagonal S-twist Twining with Gaps
- 16- Open and Close Diagonal S-twist Twining
- 17- Open Simple, Diagonal, and Cross-Warp S-twist Twining
- 18- Close Oblique S-twist Twining

WETYPE

- 1- S
- 2- Z
- 3- S/Z, Z

WATYPE

- 1- S
- 2- Z
- 3- S/Z, Z

INTERSEC

- 1- Perpendicular Intersection
- 2- Parallel Intersection
- 3- 45° Intersection

The database is appended in the file:

[Pappas_MA_database.xlsx](#)

Bibliography

- Adair, J.
1775 *The History of the American Indians*. The Watauga Press, Tennessee.
- Adovasio, J.M.
1970 Origin and Development of Western Archaic Textiles and Basketry. *Tebiwa*. 13(2):1-40.
1971 Some Comments on the Relationship of Great Basin Textiles to Textiles from the Southwest. *University of Oregon Anthropological Papers*. 15(1):103-108.
1977 *Basketry Technology: A Guide to Identification and Analysis*. Aldine Publishing Company, Chicago.
1986 Artifacts and Ethnicity: Basketry as an Indicator of Territoriality and Population Movement in the Prehistoric Great Basin. *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings*. Edited by C. Stout and D.D. Fowler. University of Utah Press, Salt Lake City. Pp. 43-88.
- Adovasio, J.M. and R.L. Andrews with R. Carlisle
1980 Basketry, Cordage and Bark Impressions from the Northern Thorn Mound (46Mg78), Monongalia County, West Virginia. *West Virginia Archaeologist*. 30:33-72.
- Alt, S.M.
1999 Spindle Whorls and Fiber Production at Early Cahokian Settlements. *Southeastern Archaeology*. 18(2):124-134.
2006 The Power of Diversity: The Roles of Migration and Hybridity in Culture Change. *Leadership and Polity in Mississippian Society*. Edited by B.M. Butler and P.D. Welch. Center for Archaeological Investigations, Occasional Paper No. 33. Southern Illinois University, Carbondale. Pp. 289-308.
- Anderson, D.G.
1994 *The Savannah River Chiefdoms: Political Change in the Late Prehistoric Southeast*. The University of Alabama Press, Tuscaloosa.
1996 Fluctuations between Simple and Complex Chiefdoms: Cycling in the Late Prehistoric Southeast. *Political Structure and Change in the Prehistoric Southeastern United States*. Edited by J.F. Scarry. University of Florida Press, Gainesville. Pp. 231-252.
2002 Elites Among the Monongahela? Evidence for Emergent Social Complexity in the Late Prehistoric-Protohistoric Period of Southwestern Pennsylvania. *Archaeology of Eastern North America*. 30:121-136.
- Arnold, D.E.
1985 *Ceramic Theory and Cultural Process*. Cambridge University Press, Cambridge.
- Arnold, J.E.
1997 Understanding the Evolution of Intermediate Societies. *Emergent Complexity: The Evolution of Intermediate Societies*. Edited by J.E. Arnold. International Monographs in Prehistory, Archaeological Series 9, Ann Arbor.
- Barber, E.J.W.
1991 *Prehistoric Textiles*. Princeton University Press, Princeton.
- Baxter, M.
2003 *Statistics in Archaeology*. Arnold Publishing, London.
- Benn, D.W.
1995 Woodland People and the Roots of the Oneota. *Oneota Archaeology: Past, Present, and Future* edited by W. Green. Report 20, Office of the State Archaeologist, University of Iowa, Iowa City.
- Black, G.A.
1967 *Angel Site: An Archaeological, Historical, and Ethnological Study*. Volumes 1 and 2. Indiana Historical Society, Indianapolis.

- Blalock, H.M.
1979 *Social Statistics*. McGraw-Hill, New York.
- Bobrowsky, P.T. and B.F. Ball
1988 The theory and mechanics of ecological diversity in archaeology. *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 4-12.
- Bourdieu, P.
1979 Symbolic Power. *Critique of Anthropology*. 13/14(4):77-85.
- Braithwaite, M.
1982 Decoration as ritual symbol: a theoretical proposal and an ethnographic study in southern Sudan. *Symbolic and Structural Archaeology*. Edited by I. Hodder. Cambridge University Press, Cambridge.
- Brown, J.A.
1997 The Archaeology of Ancient Religion in the Eastern Woodlands. *Annual Review of Anthropology*.26:465-485.
2001 Human Figures and the Southeastern Ancestor Shrine. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28.Southern Illinois University, Carbondale. Pp. 76-93.
- Brumfiel, E.M.
1987 Elite and utilitarian crafts in the Aztec state. *Specialization, Exchange, and Complex Societies*. Edited by E.M. Brumfiel and T.K. Earle. Cambridge University Press, Cambridge. Pp. 102-118.
1994 Factional competition and political development in the New World: an introduction. *Factional Competition and Political Development in the New World*. Edited by E.M. Brumfiel and J.W. Fox. Cambridge University Press, Cambridge. Pp. 3-13.
1996 The Quality of Tribute Cloth: The Place of Evidence in Archaeological Argument. *American Antiquity*. 61(3):453-462.
1997 Tribute cloth production and compliance in Aztec and colonial Mexico. *Museum Anthropology*. 21(2):55-71.
- Brumfiel, E.M. and T.K. Earle
1987 Specialization, exchange, and complex societies: an introduction. *Specialization, Exchange, and Complex Societies*. Edited by E.M. Brumfiel and T.K. Earle. Cambridge University Press, Cambridge. Pp. 1-9.
- Bushnell, D.I., Jr.
1914 Archaeological Investigations in Ste. Genevieve County, Missouri. *Proceedings of the U.S. National Museum* 46:641-668.
- Carey, H.A.
1941 Primitive Textiles from the Morgan Stone Mound. *The Morgan Stone Mound, 15 Bath County, Kentucky*. Edited by W.S. Webb. Reports in Anthropology and Archaeology, University of Kentucky. 5(2):185-190.
- Carr, C. and R.F. Maslowski
1995 Cordage and Fabrics: Relating Form, Technology, and Social Processes. *Style, Society, and Person: Archaeological and Ethnological Perspectives*. Edited by C. Carr and J.E. Neitzel. Plenum Press, New York. Pp. 297-344.
- Carr, C. and J.E. Neitzel
1995 Integrating Approaches to Material Style in Theory and Philosophy. *Style, Society, and Person: Archaeological and Ethnological Perspectives*. Edited by C. Carr and J.E. Neitzel. Plenum Press, New York. Pp. 3-25.

- Clark, J.E. and M. Blake
 1994 The power of prestige: competitive generosity and the emergence of rank societies in lowland Mesoamerica. *Factional Competition and Political Development in the New World*. Edited by E.M. Brumfiel and J.W. Fox. Cambridge University Press, Cambridge. Pp. 17-30.
- Clayton, L.A.; V.J. Knight, Jr.; and E.C. Moore (Editors)
 1993 *The De Soto Chronicles: The Expedition of Hernando De Soto to North America in 1539-1543*. Volumes I and II. The University of Alabama Press, Tuscaloosa.
- Cobb, C.R. and B.M. Butler
 2002 The Vacant Quarter Revisited: Late Mississippian Abandonment of the Lower Ohio Valley. *American Antiquity*. 67(4):625-642.
 2006 Mississippian Migration and Emplacement in the Lower Ohio Valley. *Leadership and Polity in Mississippian Society*. Edited by B.M. Butler and P.D. Welch. Center for Archaeological Investigations, Occasional Paper No. 33. Southern Illinois University, Carbondale. Pp. 328-350.
- Conkey, M.W. and C.A. Hastorf
 1990 Introduction. *The Uses of Style in Archaeology*. Edited by M.W. Conkey and C.A. Hastorf. Cambridge University Press, Cambridge. Pp. 1-4.
- Cowgill, G.L.
 1988 The concept of diversity in archaeological theory. *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 131-141.
- DeMarrais, E., L.J. Castillo, and T. Earle
 1996 Ideology, Materialization, and Power Strategies. *Current Anthropology*. 17(1):15-31.
- Dietler, M. and B. Hayden
 2001 Digesting the Feast—Good to Eat, Good to Drink, Good to Think: An Introduction. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*. Edited by M. Dietler and B. Hayden. Smithsonian Institution Press, Washington D.C. Pp. 1-20.
- Dillehay, T.D.
 2001 Reflection on Material Culture and Identity. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 16-26.
- Drooker, P.B.
 1990 Textile Production and Use at Wickliffe Mounds (15Ba4), Kentucky. *Midcontinental Journal of Archaeology*. 15(2):163-213.
 1991 Mississippian Lace: A Complex Textile Impressed On Pottery from the Stone Site, Tennessee. *Southeastern Archaeology*. 10(2):79-97.
 1992 *Mississippian Village Textiles at Wickliffe*. University of Alabama Press, Tuscaloosa.
 2001a Material Culture and Perishability. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 3-15.
 2001b Leaving No Stone Unturned: Making the Most of Secondary Evidence for Perishable Material Culture. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 170-186.

- Dunnell, R.C.
 1988 Diversity in archaeology: a group of measures in search of application? *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 142-149.
- Earle, T.K.
 1987a Specialization and the production of wealth: Hawaiian chiefdoms and the Inka Empire. *Specialization, Exchange, and Complex Societies*. Edited by E.M. Brumfiel and T.K. Earle. Cambridge University Press, Cambridge. Pp. 64-75.
 1987b Chiefdoms in Archaeological and Ethnohistorical Perspective. *Annual Review of Anthropology*. 16:279-308.
 1990 Style and iconography as legitimation in complex chiefdoms. *The Uses of Style in Archaeology*. Edited by M.W. Conkey and C.A. Hastorf. Cambridge University Press, Cambridge. Pp. 73-81.
 1991a The evolution of chiefdoms. *Chiefdoms: Power, Economy, and Ideology*. Edited by T.K. Earle. Cambridge University Press, Cambridge. Pp. 1-15.
 1991b Property rights and the evolution of chiefdoms. *Chiefdoms: Power, Economy, and Ideology*. Edited by T.K. Earle. Cambridge University Press, Cambridge. Pp. 71-99.
 1997 *How Chiefs Come to Power: The Political Economy in Prehistory*. Stanford University Press, Stanford.
- Elliott, J.M. and J.T. Johansen
 1999 *Charles-Alexandre Lesueur: Premier Naturalist and Artist*. University of Southern Indiana, New Harmony.
- Emery, I.
 1966 *The Primary Structures of Fabrics: An Illustrated Classification*. Watson-Guptill Publications, New York.
- Ericksen, A.G., K.A. Jakes, and V.S. Wimberley
 2000 Prehistoric Textiles: Production, Function, Semiotics. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. Edited by P. Ballard Drooker and L.D. Webster. The University of Utah Press, Salt Lake City. Pp. 60-84.
- Espinosa, Isidro Felix de
 1746 [1942] Extracts from the Crónica de la Provincia Franciscana de los Apóstoles San Pedro de Michoacán. *Source Material on the History and Ethnology of the Caddo Indians*. By J. Swanton. Bureau of American Ethnology, Bulletin 132. Smithsonian Institution, Washington, D.C.
- Fagan, B.M.
 1995 *Ancient North America: The Archaeology of a Continent*. 2nd Edition. Thames and Hudson, London.
- Feinman, G.M., S. Upham, and K.G. Lightfoot
 1981 The Production Step Measure: An Ordinal Index of Labor Input in Ceramic Manufacture. *American Antiquity*. 46(4):871-884.
- Fraser, D.W.
 1989 *A Guide to Weft Twining and Related Structures with Interacting Wefts*. University of Pennsylvania Press, Philadelphia.
- Galloway, P.
 1994 Confederacy as a Solution to Chiefdom Dissolution: Historical Evidence in the Choctaw Case. *The Forgotten Centuries: Indians and Europeans in the American South, 1521-1704*. Edited by C. Hudson and C. Chaves Tesser. The University of Georgia Press, Athens. Pp. 393-420.

- Gilman, A.
 1987 Unequal development in Copper Age Iberia. *Specialization, Exchange, and Complex Societies*. Edited by E.M. Brumfiel and T.K. Earle. Cambridge University Press, Cambridge. Pp. 22-29.
- Goldstein, L.G.
 1980 *Mississippian Mortuary Practices: A Case Study of Two Cemeteries in the Lower Illinois Valley*. Scientific Papers No. 4. Northwestern University Archeological Program, Evanston, Illinois.
- Greene, C.
 1983 Southeastern Basketry: Tradition and Ecology. *Papers in Anthropology*. 24(2):131-144.
- Green, T.J. and C.A. Munson
 1978 Mississippian Settlement Pattern in Southwestern Indiana. *Mississippian Settlement Patterns*. Edited by B.D. Smith. Academic Press, New York Pp. 293-330.
- Griffin, J.B.
 1985 Changing Concepts of the Prehistoric Mississippian Cultures of the Eastern United States. *Alabama and the Borderlands: From Prehistory to Statehood*. Edited by R.R. Badger and L.A. Clayton. University of Alabama Press, Tuscaloosa. Pp. 40-63.
 1992 Fort Ancient Has No Class: The Absence of an Elite Group in Mississippian Societies in the Central Ohio Valley. *Lords of the Southeast: Social Inequality and Native Elites of Southeastern North America*. Edited by A.W. Barker and T.R. Pauketat. Archaeological Papers of the American Anthropological Association, No. 3. Pp. 53-59.
- Haag, W.G.
 1985 Federal Aid to Archaeology in the Southeast, 1933-1942. *American Antiquity*. 50(2):272-280.
- Hammerstedt, S.W.
 2005 Mississippian Status in Western Kentucky: Evidence from Annis Mound. *Southeastern Archaeology*. 24(1):11-27.
- Hayden, B.
 1995 Pathways to Power: Principles for Creating Socioeconomic Inequalities. *Foundations of Social Inequality*. Edited by T.D. Price and G.M. Feinman. Plenum Press, New York. Pp. 15-86.
 2001 Fabulous Feasts: A Prolegomenon to the Importance of Feasting. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*. Edited by M. Dietler and B. Hayden. Smithsonian Institution Press, Washington D.C. Pp. 23-64.
- Hayden, B. and R. Gargett
 1990 Big Man, Big Heart? A Mesoamerican view of the emergence of complex society. *Ancient Mesoamerica*. 1:3-20.
- Hegmon, M.
 1992 Archaeological Research on Style. *Annual Review of Anthropology*. 21:517-536.
 1998 Technology, Style, and Social Practices: Archaeological Approaches. *The Archaeology of Social Boundaries*. Edited by M. Stark. Smithsonian Institution Press, Washington, D.C. Pp. 264-278.
- Henderson, A.G.
 1999 Caborn-Welborn Decorated Textiles from Impressions of Pans. Paper presented at the 59th annual meeting for the Society of American Archaeology, Chicago.
 2003 Appendix III: Textile Structures in the Fabric-Imprinted and Net-Imprinted ceramic assemblage from the Bone Bank Site (12-Po-4). *Bone Bank: Archaeological Rescue Investigations at a Late Mississippian Site, Posey County, Indiana* by C.A. Munson. Prepared for the Wabash River Heritage Corridor Commission, on behalf of the Four Rivers Resource, Conservation, and Development Area, Inc., Department of Anthropology, Indiana University, Bloomington.

- Henderson, A.G.; L. Turner; D. Pollack and C.A. Munson
 1996 Lower Ohio Valley Caborn-Welborn Phase Mississippian Textiles: Impressions and Patterns. Poster presented at the 61st annual meeting of the Society for American Archaeology, New Orleans.
- Heckenberger, M.J., J.B. Petersen, and L.A. Basa
 1990 Early Woodland Period Ritual Use of Personal Adornment at the Boucher Site. *Annals of the Carnegie Museum*. 59(3):173:217.
- Hilgeman, S.L.
 2000 *Pottery and Chronology at Angel*. The University of Alabama Press, Tuscaloosa.
- Hinkle, K.A.
 1984 *Ohio Hopewell Textiles: A Medium for Exchange of Social and Stylistic Information*. Unpublished Master's thesis, University of Arkansas, Fayetteville.
- Holmes, W.H.
 1884 Prehistoric Textile Fabrics of the United States, Derived from Impressions on Pottery. *Third Annual Report of the Bureau of American Ethnology, 1881-2*. Pp.393-425.
- Hudson, C.
 1997 *Knights of Spain, Warriors of the Sun: Hernando de Soto and the South's Ancient Chiefdoms*. The University of Georgia Press: Athens.
- Hurley, W.M.
 1975 *An Analysis of Effigy Mound Complexes in Wisconsin*. Anthropological Papers No. 59. Museum of Anthropology, University of Michigan, Ann Arbor.
- 1979 *Prehistoric Cordage: Identification of Impressions on Pottery*. Aldine Publishing Company, Chicago.
- Hyland, D.C. and J.M. Adovasio
 2000 The Mexican Connection: A Study of Sociotechnical Change in Perishable Manufacture and Food Production in Prehistoric New Mexico. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. Edited by P. Ballard Drooker and L.D. Webster. The University of Utah Press, Salt Lake City. Pp. 141-160.
- Inwood, K. and P. Wagg
 1993 The Survival of Handloom Weaving in Rural Canada Circa 1870. *The Journal of Economic History*. 53(2):346-358.
- Johannessen, S.
 1993 Food, Dishes, and Society in the Mississippian Valley. *Foraging and Farming in the Eastern Woodlands*. Edited by C.M. Scarry. The University Press of Florida, Gainesville. Pp. 182-205.
- Johnson, J.K. (Editor)
 1993 *The Development of Southeastern Archaeology*. University of Alabama Press, Tuscaloosa.
- Jones, G.T. and R.D. Leonard
 1988 The concept of diversity: an introduction. *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 1-3.
- Kaufman, D.
 1998 Measuring Archaeological Diversity: An Application of the Jackknife Technique. *American Antiquity*. 63(1):73-85.
- King, M.E. and J.S. Gardner
 1981 The Analysis of Textiles from Spiro Mound, Oklahoma. *Annals of the New York Academy of Sciences*.376:123-139.
- Kintigh, K.W.
 1988 Sample size, significance, and measures of diversity. *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 25-36.

- Knight, V.J. Jr.
 1986 The Institutional Organization of Mississippian Religion. *American Antiquity*. 51(4):675-687.
 1990 Social Organization and the Evolution of Hierarchy in Southeastern Chiefdoms. *Journal of Anthropological Research*. 46(1)1-23.
 1994 The Formation of the Creeks. *The Forgotten Centuries: Indians and Europeans in the American South, 1521-1704*. Edited by C. Hudson and C. Chaves Tesser. The University of Georgia Press, Athens. Pp. 373-392.
 2001 Feasting and the Emergence of Platform Mound Ceremonialism in Eastern North America. *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*. Edited by M. Dietler and B. Hayden. Smithsonian Institution Press, Washington D.C. Pp. 311-333.
- Kus, S.
 1982 Matters material and ideal. *Symbolic and Structural Archaeology*. Edited by I. Hodder. Cambridge University Press, Cambridge.
- Kuttruff, J.T.
 1991 The Interpretation of Textile Production and Use by High and Low Status Caddoan Groups. *Materials Research Society Symposia Proceedings: Materials Issues in Art and Archaeology*. 185:777-783.
 1992 Textile Production and Use as Revealed in Fabric Impressed Pottery from Mound Bottom (40Ch8), Tennessee. *Mississippi Archaeology*. 27(2)1-27.
 1993 Mississippian Period Status Differentiation Through Textile Analysis: A Caddoan Example. *American Antiquity*. 58(1):125-145.
- Kuttruff, J.T. and C. Kuttruff
 1996 Mississippian Textile Evidence on Fabric-Impressed Ceramics from Mound Bottom, Tennessee. *A Most Indispensable Art: Native Fiber Industries from Eastern North America*. Edited by J.B. Petersen. The University of Tennessee Press, Knoxville. Pp. 160-173.
- La Page du Pratz
 1774 [1975] *The History of Louisiana*. Louisiana State University Press, Baton Rouge
- Larson, L.H.
 1972 Functional Considerations of Warfare in the Southeast During the Mississippian Period. *American Antiquity*. 37(3):383-392.
- Lechtman, H.
 1977 Introduction. *Material culture : styles, organization, and dynamics of technology*. West Coast Publishing, St. Paul. Pp. 1-30.
- Lemonnier, P.
 1986 The Study of Material Culture Today: Toward and Anthropology of Technical Systems. *Journal of Anthropological Archaeology*.5:147-186.
 1989 Bark capes, arrowheads, and Concorde: on social representations of technology. *The Meaning of Things: Material Culture and Symbolic Expressions*. Edited by I. Hodder. Pp. 156-171.
 1993 Introduction. *Technological Choices: Transformation in Material Cultures Since the Neolithic*. Routledge Press, London.
- Macdonald, W.K.
 1990 Investigating style: an exploratory analysis of some Plains burials. *The Uses of Style in Archaeology*. Edited by M.W. Conkey and C.A. Hastorf. Cambridge University Press, Cambridge. Pp. 52-60.

- Maslowski, R.F.
 1996 Cordage Twist and Ethnicity. *A Most Indispensable Art: Native Fiber Industries from Eastern North America*. Edited by J.B. Petersen. The University of Tennessee Press, Knoxville. Pp. 88-99.
- May, R.M.
 1981 *Theoretical Ecology: Principles and Applications*. 2nd Edition. Sinauer Associates, Inc., Sunderland, Massachusetts.
- Minar, C.J.
 1999 *Impression Analysis of Cord-Marked Pottery, Learning Theory, and the Origins of the Alachua*. Ph.D. dissertation, Department of Anthropology, University of California, Riverside. University Microfilms, Inc., Ann Arbor, Michigan.
 2000 Spinning and Plying: Anthropological Directions. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. Edited by P. Ballard Drooker and L.D. Webster. The University of Utah Press, Salt Lake City. Pp. 85-100.
 2001 Material Culture and the Identification of Prehistoric Cultural Groups. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 94-113.
- Miner, H.
 1936 The Importance of Textiles in the Archaeology of the Eastern United States. *American Antiquity*. 1(3):181-192.
- Muller, J.
 1987 Salt, chert, and shell: Mississippian exchange and economy. *Specialization, Exchange, and Complex Societies*. Edited by E.M. Brumfiel and T.K. Earle. Cambridge University Press, Cambridge. Pp. 10-21.
 1997 *Mississippian Political Economy*. Plenum Press: New York.
- Munson, C.A. and D.C. Cook
 2001 Residential Mortuary Practices and Skeletal Biology at the Late Mississippian Hovey Lake Site, Posey County, Indiana. *Midcontinental Journal of Archaeology*. 26(1):1-52.
- Murra, J.V.
 1962 Cloth and Its Function in the Inca State. *American Anthropologist*. 64(4):710-728.
- Pappas, C.A. and D. Pollack
 2007 Caborn-Welborn Social Boundaries. Paper presented in the symposium, "A New Look at a Common Dilemma: Perishables and the Definition of Boundaries. A Session in Memory of James Petersen", organized by C.A. Pappas. 72nd Annual Meeting of the Society for American Archaeology, Austin, Texas.
- Pauketat, T.R. and T.E. Emerson
 1991 The Ideology of Authority and the Power of the Pot. *American Anthropologist*. 93:919-941.
- Peebles, C.S. and S.M. Kus
 1977 Some Archaeological Correlates of Ranked Societies. *American Antiquity*. 42(3):421-448.
- Petersen, J.B.
 1996a The Study of Native Fiber Industries from Eastern North America: Resume and Prospect. *A Most Indispensable Art: Native Fiber Industries from Eastern North America*. Edited by J.B. Petersen. The University of Tennessee Press, Knoxville. Pp. 1-29.
 1996b Fiber Industries from Northern New England: Ethnicity and Technological Traditions during the Woodland Period. *A Most Indispensable Art: Native Fiber Industries from Eastern North America*. Edited by J.B. Petersen. The University of Tennessee Press, Knoxville. Pp. 100-119.

- Petersen, J.B. and J.A. Wolford
 2000 Spin and Twist as Cultural Markers: A New England Perspective on Native Fiber Industries. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. Edited by P. Ballard Drooker and L.D. Webster. The University of Utah Press, Salt Lake City. Pp. 101-118.
- Petersen, J.B., M.J. Heckenberger, and J.A. Wolford
 2001 Spin, Twist, and Twine: An Ethnoarchaeological Examination of Group Identity in Native Fiber Industries from Greater Amazonia. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 226-253.
- Pluckhahn, T.J. and D.A. McKivergan
 2002 A Critical Appraisal of Middle Mississippian Settlement and Social Organization on the Georgia Coast. *Southeastern Archaeology*. 21(2):149-161.
- Pollack, D.
 1998 *Intraregional and Intersocietal Relationships of the Late Mississippian Caborn-Welborn Phase of the Lower Ohio River Valley*. Unpublished Ph.D. dissertation, Department of Anthropology, University of Kentucky, Lexington.
 2004 *Caborn-Welborn: Constructing a New Society After the Angel Chiefdom Collapse*. University of Alabama Press, Tuscaloosa.
 2006 Late Mississippian Caborn-Welborn Social and Political Relationships. *Leadership and Polity in Mississippian Society* edited by B.M. Butler and P.D. Welch. Occasional Paper No. 33, Center for Archaeological Investigations, Southern Illinois University, Carbondale.
- Pollack, D. and C.A. Munson
 1998 Caborn-Welborn Ceramics: Intersite Comparisons and Extraregional Interaction. *Current Archaeological Research in Kentucky, Volume Five* edited by C.D. Hockensmith, K.C. Carstens, C. Stout and S.J. Rivers. Kentucky Heritage Council, Frankfort.
- Potter, J.M.
 2000 Pots, Parties, and Politics: Communal Feasting in the American Southwest. *American Antiquity*. 65(3):471-492.
- Rindos, D.
 1988 Diversity, variation and selection. *Quantifying Diversity in Archaeology*. Edited by R.D. Leonard and G.T. Jones. Cambridge University Press, Cambridge. Pp. 13-24.
- Rogers, J.D.; C.J. Dove; M. Heacker; and G.R. Graves
 2002 Identification of Feathers in Textiles from the Craig Mound at Spiro, Oklahoma. *Southeastern Archaeology*. 21(2):245-251.
- Rowlands, M.
 1993 The Role of Memory in the Transmission of Culture. *World Archaeology*. 25(2):141-151.
- Sackett, J.R.
 1990 Style and ethnicity in archaeology: the case for isochrestism. *The Uses of Style in Archaeology*. Edited by M.W. Conkey and C.A. Hastorf. Cambridge University Press, Cambridge. Pp. 32-43.
- Schneider, J. and A.B. Weiner
 1986 Cloth and the Organization of Human Experience. *Current Anthropology*. 27(2):178-184.
 1989 Introduction. *Cloth and Human Experience*. Edited by J. Schneider and A.B. Weiner. Smithsonian Institution Press, Washington, D.C. Pp. 1-29.
- Schneider, J.
 1987 The Anthropology of Cloth. *Annual Review of Anthropology*. 16:409-448.

- Schurr, M.R.
 1992 Isotopic and Mortuary Variability in a Middle Mississippian Population. *American Antiquity*. 57(2):300-320.
- Shennan, S.
 2001 *Quantifying Archaeology*. 2nd Edition. Edinburgh University Press, Edinburgh.
- Shergur, J.; R.S. Popelka; J.D. Robertson; and D. Pollack
 2003 Distinct Chemical Patterns in Late Mississippian Caborn-Welborn Ceramics of the Lower Ohio River Valley. *North American Archaeologist* 24(3):221-243.
- Sibley, L.R. and K.A. Jakes
 1986 Characterization of Selected Prehistoric Fabrics of Southeastern North America. *Historical Textile and Paper Materials: Conservation and Characterization*. Edited by M.L. Needles and S.H. Zeronian. Advances in Chemistry Series 212:277-287. American Chemical Society, Washington, D.C.
- Sibley, L.R., K.A. Jakes, and L.H. Larson
 1996 Inferring Behavior and Function from an Etowah Fabric Incorporating Feathers. *A Most Indispensable Art: Native Fiber Industries from Eastern North America*. Edited by J.B. Petersen. The University of Tennessee Press, Knoxville. Pp. 73-87.
- Smith, B.D.
 1986 The Archaeology of the Southeastern United States: From Dalton to de Soto. *Annual Review of Anthropology*.3:385-413.
 1990 *The Mississippian Emergence*. Smithsonian Institution Press, Washington, D.C.
- Sonday, M.
 2001 A Group of Possibly Thirteenth-Century Velvets with Gold Disks in Offset Rows. *The Textile Museum Journal, 1999-2000*.39:101-143.
- Stark, M.T.
 1998 Technical Choices and Social Boundaries in Material Culture Patterning: An Introduction. *The Archaeology of Social Boundaries*. Edited by M.T. Stark. Smithsonian Institution Press, Washington, D.C. Pp. 1-11.
- Steponaitis, V.P.
 1986 Prehistoric Archaeology in the Southeastern United States, 1970-1985. *Annual Review of Anthropology*.15:363-404.
 1991 Contrasting patterns of Mississippian development. *Chiefdoms: Power, Economy, and Ideology*. Edited by T.K. Earle. Cambridge University Press, Cambridge. Pp. 193-228.
- Swanton, J.R.
 1942 *Source Material on the History and Ethnology of the Caddo Indians*. Bureau of American Ethnology, Bulletin 132.Smithsonian Institution, Washington, D.C.
 1946 *The Indians of the Southeastern United States*. Bureau of American Ethnology, Bulletin 137.Smithsonian Institution, Washington, D.C.
- Teague, L.S.
 1998 *Textiles in Southwestern Prehistory*. University of New Mexico Press, Albuquerque
- Tedlock, B. and D. Tedlock
 1985 Text and Textile: Language and Technology in the Arts of the Quiche Maya. *Journal of Anthropological Research*. 41(2):121-146.
- Terrell, J.E.
 2001 Archaeology, Material Culture, and the Complementary Forms of Social Life. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28.Southern Illinois University, Carbondale. Pp. 58-75.

- Tilley, C.
1982 Social formation, social structures and social change. *Symbolic and Structural Archaeology*. Edited by I. Hodder. Cambridge University Press, Cambridge.
- Thomas, D.H.
1986 *Refiguring Anthropology: First Principles of Probability and Statistics*. Waveland Press, Inc., Prospect Heights.
- Thompson, A.J. and K.A. Jakes
2002 Replication of Textile Dyeing with Sumac and Bedstraw. *Southeastern Archaeology*. 21(2):252-256.
- Vollmer, J.E.
2000 Clothed to Rule the Universe: Ming and Qing Dynasty Textiles at The Art Institute of Chicago. *Art Institute of Chicago Museum Studies*. 26(2):12-51, 99-105.
- Washburn, D.K. and A. Petitto
1993 An Ethnoarchaeological Perspective on Textile Categories of Identification and Function. *Journal of Anthropological Archaeology*. 12:150-172.
- Webb, W.M.S.
1952 *The Jonathan Creek Village, Site 4, Marshall County, Kentucky*. Reports on Anthropology, The University of Kentucky, Vol. III, No. 1.
- Webster, L.D. with P. Ballard Drooker
2000 Archaeological Textile Research in the Americas. *Beyond Cloth and Cordage: Archaeological Textile Research in the Americas*. Edited by P. Ballard Drooker and L.D. Webster. The University of Utah Press, Salt Lake City. Pp. 1-24.
- Weiner, A.B.
1985 Inalienable Wealth. *American Ethnologist*. 12(2):210-227.
- Whiteford, A.H.
1977 Fiber Bags of the Great Lakes Indians. *American Indian Art* 2(3):52-64; 3(1):40-47.
- Wiessner, P.
1990 Is there a unity to style? *The Uses of Style in Archaeology*. Edited by M.W. Conkey and C.A. Hastorf. Cambridge University Press, Cambridge. Pp. 105-112.
- Wilder, C.G.
1951 Kincaid Textiles. *Kincaid: A Prehistoric Illinois Metropolis*. Edited by F.C. Coe, R. Bell, J. Bennett, J. Caldwell, N. Emerson, R. MacNeish, K. Orr, and R. Willis. University of Chicago Press, Chicago. Pp. 366-376.
- Willoughby, C.C.
1938 Textile Fabrics from the Burial Mounds of the Great Earthwork Builders of Ohio. *Ohio Archaeological and Historical Quarterly*. 47:273-287.
- Wobst, H.M.
1977 Stylistic Behavior and Information Exchange. *For the Director: Essays in Honor of James B. Griffin* edited by C. Cleland. Anthropological Papers No. 61. University of Michigan, Ann Arbor. Pp. 317-342.
- 2001 Matter over Mind: Perishables and the Glorification of Materiality in Archaeology. *Fleeting Identities: Perishable Material Culture in Archaeological Research*. Edited by P.B. Drooker. Center for Archaeological Investigations, Occasional Paper No. 28. Southern Illinois University, Carbondale. Pp. 43-57.
- Wyckoff, D.G. and T.G. Baugh
1980 Early Historic Hasinai Elites: A Model for the Material Culture of Governing Elites. *Midcontinental Journal of Archaeology*. 5(2):225-287.

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-Field Technician, Mercyhurst Archaeological Institute, Mercyhurst College, Erie PA.

Publications

- 2003 Adovasio, J.M., R.L. Andrews, and J.S. Illingworth with C.A. Pappas and E.A. Oliver. Basketry Impressions and Weaving Accoutrements From the Town Site of Bâb edh-Dhrâ^c. *Bâb edh-Dhrâ^c: The Excavation of the Town Site (Reports of the Expedition to the Dead Sea Plain, Jordan, Volume 2)*. Edited by W.E. Raust and R.T. Schaub. Eisenbrauns, Indiana
- 2006 Pappas, C.A. Textile Evidence from the Frankfort Cemetery. *Excavations at the Frankfort Cemetery*. Edited by D. Pollack. Kentucky Archaeological Survey, Lexington.
- 2007 Farmer, A. and C.A. Pappas Textiles from the Vardamen Cemetery. *Excavations at the Vardamen Cemetery*. Edited by P. Trader. Program for Archaeological Research, Lexington.

Presentations at Professional Meetings

- 2005 Pappas, C.A. Textile-impressed Ceramics and the Caborn-Welborn in Kentucky. Paper presented at the 62nd Annual Southeastern Archaeology Conference, Columbia, South Carolina
- 2006 Pappas, C.A. Interesting Twists: Textile-impressed Ceramics and the Caborn-Welborn. Paper presented at the 71st Annual Society for American Archaeology Conference, San Juan, Puerto Rico
- 2007 Pappas, C.A. and D. Pollack Caborn-Welborn Social Organization. Paper presented at the 72nd Annual Society for American Archaeology Conference, Austin, Texas

Sessions Organized at Professional Meetings

- 2007 Pappas, C.A. - Chair and Organizer
A New Look at a Common Dilemma: Perishables and the Definition of Boundaries. A Session in Memory of James Petersen. Organized session for the 72nd Annual Society of American Archaeology Conference, Austin, Texas

Fellowships and Grants

- 2004 Graduate Student Support Grant, University of Kentucky, \$400
- 2006 Graduate Student Support Grant, University of Kentucky, \$400
- 2007 Graduate Student Support Grant, University of Kentucky, \$400

2008

Graduate Student Support Grant, University of Kentucky, \$800

Professional Memberships and Elected Offices

2002-Present

Member, Society for American Archaeology

2003-Present

Member, Southeastern Archaeology Conference

2006-2007

Chair, Fiber-Perishables Interest Group, Society for American Archaeology