A Comparative Study of the Swennes Woven Nettle Bag and Weaving Techniques

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ABSTRACT

During recent years, the Mississippi Valley Archaeology Center (MVAC) has acquired permission to look at a beautifully preserved bag from 47Lc84, a rockshelter located in La Crosse County, Wisconsin. The bag is tentatively dated to the Oneota cultural tradition (A.D. 1250-1650) based on pottery sherds associated with it. Nothing of its kind has been found archaeologically in this region before, owing mostly to poor preservation conditions. Due to its uniqueness, there is nothing to compare it to within the Oneota tradition. Therefore, to gain a better understanding of this bag, a cross-cultural study was undertaken. This paper examines separate sites in the American Midwest, as well as textile impressions that are preserved on pottery, the ethnohistoric and early historic record, and modern hand-weaving techniques to determine the textile tradition from which the bag may have emerged as well as how it was constructed.

INTRODUCTION

Textiles in the archaeological record are poorly preserved in the American Midwest. Only in very few sites are they actually found, and in even fewer are the fragments large enough to be studied in depth. Detailed studies conducted on textiles are not numerous. Lacking in these studies is a cross-cultural comparison of types and materials from sites that do have better preserved textiles to try and determine similarities and differences in textile manufacture. These can provide a basis for the interpretation of the fragments that exist in Wisconsin.

The unique form of textiles makes them the perfect material to assess culture change. They have a greater antiquity than ceramics and can be used to study the transfer of cultural styles in pre-ceramic societies in a much more sensitive way than stone tools (Drooker and Webster 2000:2). Because of poor preservation, they are not recovered from all sites. Their correlates, including impressions in pottery and pseudomorphs (tangible trace remains, are easier to observe (Good 2001:215). Due to the limited resources available for an individual site, it is necessary to study textiles across multiple cultures to combine the body of knowledge to synthesize a more in depth understanding of textiles as a whole. The purpose of this study was to determine the textile and weaving tradition of the Swennes Woven Nettle Bag, recovered from 47Lc84, might have come from. This particular textile was recovered on the surface of a rockshelter that contains diagnostic remains from the Woodland and the Oneota periods, therefore the context and culture of the bag is unknown. I looked at sites from the Archaic, Woodland, Mississippian, Oneota, and historic periods. Figure 1 shows a timeline of these periods in Wisconsin, and Figure 2 shows a map of the individual sites investigated.

The Archaic Tradition in the upper Midwest lasted from roughly 7,000 B.C. to 500 B.C. It was characterized by hunting and gathering as a means of resource procurement. The Archaic Tradition appears to be marked by a relatively egalitarian society. Included in this period was the Old Copper Culture, marked by a widespread use of native Wisconsin copper (Stoltman 1997, Theler and Boszhardt 2003). The Riverside Site in Menominee County, Michigan dates to roughly 1000 B.C., and is placed in the Archaic period (Hruska 1967:147). The site contains red ocher with the burials, as well as a large amount of copper, suggesting it might be a transitional site from Old Copper to Red Ocher. In total, more than 75 burials were found. The presence of copper facilitated in the preservation of textiles (Hruska 1967).

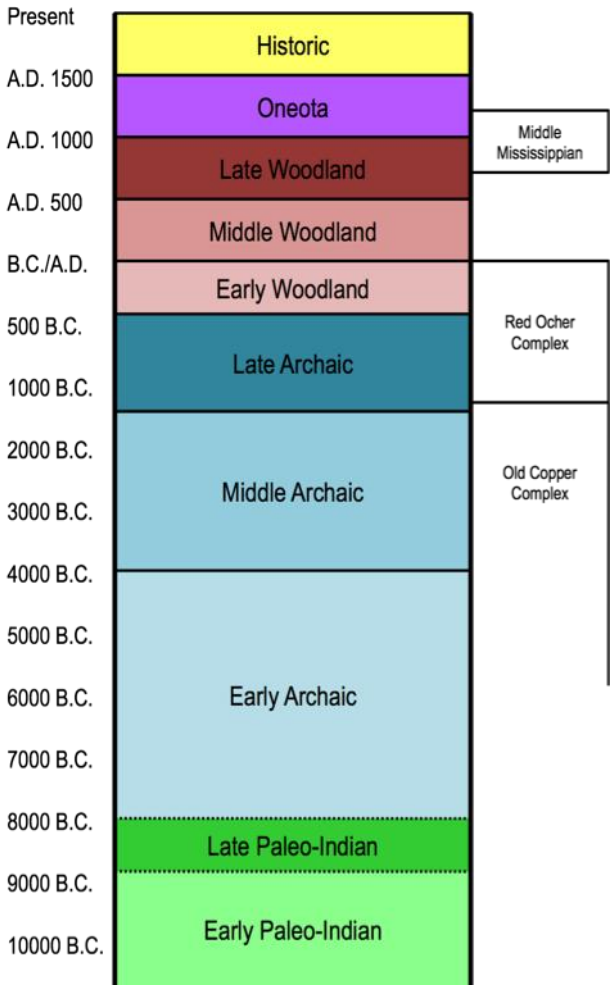

Figure 1. Time Line of cultural periods in Wisconsin (Adapted from Stevenson et al. 1997 with reference to Green 1997, C. Mason 1997, R. Mason 1997, Overstreet 1997, Stevenson et al. 1997, Stoltman 1997)

The Woodland Tradition spanned from 500 B.C. to A.D. 1150. This cultural tradition is marked by the introduction of pottery, the most intricate of which were decorated with cord or fabric impressions. Another prevalent emergence during this time period was the great earthen mounds. One such set of mounds was Hopewell in origin characterized large earthen mounds and the use of exotic materials like copper and obsidian. Nicholls Mound, located in Trempealeau County, is an example of Hopewell in Wisconsin. This is an elite burial mound excavated in the 1920s with textiles preserved on copper plates. Populations increased, and by the Late Woodland period year-round settlements emerged (Stevenson et al. 1997, Theler and Boszhardt 2003).

The emergence of the Mississippian is a bit of a mystery. The largest Mississippian site, Cahokia, emerged in the American Bottom, across the river from St. Louis, Missouri in Illinois. Most of the dominant sites centered on the Mississippian cultural tradition emerged along the major rivers of the American southeast, including Moundville, Etowah, and Spiro (Cobb 2003:67). Increased population due to an intensification of agriculture, an extensive trade network, established hierarchy to the social, political, and religious structure and permanent towns and ceremonial centers typify Middle Mississippian cultures (Green 1997). I looked at three sites contained within this time period: Aztalan, Wickliffe Mounds Site, and Spiro Mound Group.

Aztalan in Jefferson County, Wisconsin was originally thought to be the ancient northern home of the Aztec; it was later shown to be a northern expansion of the Middle Mississippians centered in Cahokia, Illinois. It appears to have been occupied between A.D. 800 and 1200. A stockade encloses this well fortified village and its three platform mounds. I was able to look at cord-impressed pottery and some textile remains recovered from Aztalan at the Milwaukee Public Museum (Barrett 1933, Goldstein and Freeman 1997).

Wickliffe Mounds Site in Ballard County, Kentucky, a Mississippian village, was examined through the literature. The site was first discovered in the 1880s, and excavated during the 1930s and 1980s. Few fabric fragments were found at this site, and even fewer in good condition. Instead, the fabric impressions left on saltpans was considered. Multiple forms of weaving were identified at this site, but twining is the dominant form identified on the saltpans (Drooker 1992).

The Spiro Mound group is located in La Flore County, Oklahoma. The site was occupied from around A.D. 950 to 1450 and represents a large ceremonial and settlement center of the Mississippians. As well as a literature review, I was able to view examples of the textiles recovered from this site at the Milwaukee Public Museum (Brown 1996).

The Oneota Tradition lasted from A.D. 1250 to right before European contact, roughly A.D. 1700. It appears to have emerged from a confluence of the Late Woodland and the Mississippian cultural traditions. A very characteristic feature of the Oneota is their use of ridged field agriculture, which they would form using bison scapula hoes (Overstreet 1997, Theler and Boszhardt 2003). The one site I examined dated to this period was 47Lc84, the location from which the Swennes Woven Nettle Bag and the focus of this study came from. This is a small rockshelter located in La Crosse County, Wisconsin and also contains evidence of occupation from the Early and Middle Woodland, as well as from the Oneota. John and Otto Swennes, who graciously allowed me to study it, own the Swennes Woven Nettle Bag.

The historic period of Wisconsin began once Europeans landed on the shores of Green Bay in the mid-17th century. Two ethnographically studied cultures are pertinent to this paper: the Ioway and the Menomini, both of whom were studied by Alanson Skinner in the 1920s. The ethnographic collections are held at the Milwaukee Public Museum (C. Mason 1997, Skinner 1921, 1926, Theler and Boszhardt 2003).

The one set of sites I looked at that does not fit neatly into one time period were the Ozark bluffs. The Ozark Plateau covers some 40,000 square miles in portions of Missouri, Arkansas, Oklahoma, and extreme southeastern Kansas. In some cases, the rockshelters inhabited by the Archaic through the Mississippian were dry and contained perfect conditions for preservation of perishable materials. In particular, the Bushwhack Bluff Rockshelter contained a large number of textile remains, including a twined bag. Because I was unable to look personally at the textiles, a literature review was crucial. I also looked at textiles preserved in other bluffshelters in the Ozarks (Baerreis 1959, Harrington 1924, 1960, Scholtz 1975).

Figure 2. Map of sites studied

BACKGROUND ON TEXTILES

There are multiple approaches to the study of textiles. These can include the study of the manufacture of textiles, the history of the technology, ancient artistic traditions, palaeoeconomic studies, gender studies, the division of labor, and fiber source acquirements (Good 2001:210). The anthropology of dress and clothing in general can also be studied by focusing on the social, economic, and political roles of that textile and linking the production, usage, and exchange to ideological systems (Drooker and Webster 2000:16-17).

Multiple areas of the globe are studied for their extraordinary preservation conditions. Egypt is one such place, where the arid desert conditions preserve the material (McCorriston 1997:520). Contained here is one of the largest bodies of cloth preserved from the ancient world, spanning for several millennia (Barber 1991:145). Peru in the New World is another such area. "The finest examples of prehistoric textiles come from Peru, where art had reached a very high stage of development" (Stirling 1936:72). Here, textiles were a form of wealth and a marker of social status within the Andean political system (Costin 1993:4). The American Southwest also contains arid conditions perfect for the preservation of textiles. I did not delve too in depth into the above textiles, for they were outside the scope of study.

Although textiles may not be present at a site, multiple proxy indicators may be present to indicate textile production. Proxy indicators, such as pottery (Douglass 1946, Gerend 1904, Kuttruff and Kuttruff 1996, Quimby 1961), spindle whorls (Costin 1993, Follensbee 2008, Keith 1998), and looms (Amsden 1932, Ellis 1976), are good indicators of textile production. Spindle whorls are made out of a variety of materials, including many perishables like wood, gourds, wax, and bone, as well as more permanent materials like clay and stone (Keith 1998:501). In many cases where preservation is poor, the primary evidence for the presence of a textile industry or technology is the occurrence of spindle whorls (Costin 1993:9, Follensbee 2008:92, Keith 1998:500). The weight and shape of a whorl indicates the fiber being spun, for each fiber requires a different degree of weight and tension to produce a viable, working piece to later weave or use (Keith 1998:502). The presence of preserved looms and loom weights also indicates textile technology present at a particular site. In particular, three loom types were used in the ancient Mediterranean and Near East. These include: the ground loom, where a warp was stretched horizontally between two structures that were pegged to the ground; a second type where a warp was stretched vertically between two structures; and a vertical loom, where the loom was rested at an angle against a wall and the warp element is attached to a beam at the top with a series of weights holding them at the bottom (Ellis 1976:76).

Of particular interest to this study is cord and textile impressed pottery. Impressions contained on pottery fall into three general categories: chance impressions, impressions that occur during the production of the potter and are allowed to remain, and impressions that are purposely imprinted as decoration (Hurcombe 2008:94). In the Mississippi Valley region of Wisconsin, this includes the imprints left behind by the Woodland population. Woodland pottery does not appear in Wisconsin until about 600BC and lasts until around the time of the Oneota. Although found in abundance and commented upon, it is difficult to identify the raw material of the fibers and the exact weaving type beyond simple identification on negative impressions (Petersen 1996:2).

BACKGROUND ON TIME PERIODS AND SITES

Cultures evolve, change, and are even replaced over time. In different areas of the world, these changes manifest in different ways at different times. In America, the earliest group of cultures to leave behind an archaeological record was the Paleo-Indian. Characterized by fluted points, most famous being Clovis and Folsom, the Paleo-Indian period is characterized by nomadic, big game hunting during the Ice Ages (R. Mason 1997).

The Archaic period began around 8000 B.C. — marked by hunting and gathering of modern flora and fauna, a lack of pottery manufacturing, and the manufacture of various diagnostic chipped stone spear points and knives. Although these three traits are diagnostic of the Archaic period, they did not emerge all at once, and emerged at different times in different places. Also, there are other features common to this period, but they are not as widespread and common as the above three. For example, there was the manufacture and use of pecked and ground stone tools, as well as use of native copper, but these are not ubiquitous for the Archaic in all places. This period is split into three distinct stages: the Early, Middle, and Late Archaic (Stoltman 1997, Theler and Boszhardt 2003).

The Early Archaic stage dates to 8000 B.C. until 4000 B.C. and was marked by rapid and significant changes in the environment that was followed by the retreat of the glacial ice sheets of the Paleo-Indian period. Although the evidence for the beginning of this stage, and for the stage in general, is scant there are some diagnostics associated with it. Diagnostic stemmed and notched points and knives are associated with this stage, mostly accumulated through surface collections in Wisconsin. One reason for the scarce evidence of the Archaic lies in the changing levels of Lake Michigan and other bodies of water during this period. The water levels were much lower, and if people settled along the shores of Lake Michigan, their settlements are now under feet of water.

The Middle Archaic stage dates from around 4000 B.C. until 1500 B.C. Large, side-notched projectile point and knives are characteristic lithics for this stage. There are multiple types of these lithics, in varying sizes and

styles. The Old Copper complex is placed within this stage. Native Wisconsin copper was mined and manufactured into multiple forms, the most common being utilitarian. Cold hammering formed these tools, and copper processing sites are marked by the presence of copper flakes.

The site examined from this time period was the Riverside Site in Menominee, Michigan. The main feature of this site is the recovery of a minimum of 63 individuals, with 52 burial pits (Hruska 1967:151). The presence of copper artifacts associated with the burials facilitated in the preservation of perishable remains at the site, including some textiles. Some of the burial packets were wrapped in fabric prior to burial. The site contains burials with Old Copper artifacts, as well as some transitional burials between the Old Copper and Red Ocher complexes (Hruska 1967).

The Late Archaic stage dates from around 1500 B.C. until around 500 B.C. A sudden appearance of a new, smaller projectile point marks the emergence of this stage. The use of native copper for utilitarian purposes decreases significantly. Not many Late Archaic sites are known, most of them rockshelters. After this, a new archaeological tradition emerged in the Woodland Tradition. The transition between the two is not greatly understood, although the difference in material culture is rather stark.

Like the Archaic period, there are certain characteristics that distinguish the Woodland period from others. The emergence of pottery manufacturing, the construction of earthen mounds for the burial of the dead, and a change in subsistence, from relying completely on hunting and gathering to incorporating the cultivation of domesticated plants are markers of this period. Also like the Archaic, these traits did not emerge at the same time in all places (Stevenson et al. 1997, Theler and Boszhardt 2003).

One of the most easily recognized characteristics of this period is the pottery. Grit tempered and formed by assembling individual coils, these vessels are distinguishable from later periods. After the vessel was coiled, they were kneaded together, often with a cord wrapped paddle. This would leave cord impressions on the pottery itself. Also, some of the more ornate forms of Woodland pottery would have complicated fabric impressions pressed into the still soft clay.

The Woodland period is divided into three stages: the Early, Middle, and Late Woodland. The Early Woodland stage lasted from around 500 B.C. until A.D. 100. Communities of this period, at least in the Upper Mississippi River Valley, were composed of rather egalitarian bands that used a range of resources, from upland and riverine resources and an increased utilization of cultivated items. It appears that Early Woodland people moved around throughout the year, but the evidence for winter habitations is scarce.

The Middle Woodland stage dates from 200 B.C. until A.D. 500. Again, there is no stark dividing line between the Early and Middle Woodland, nor did it emerge in all places at one time. There are three important traits that are indicative of the Middle Woodland. They include: the construction of conical burial mounds, more intense plant cultivation, and pottery decoration that includes notched bone or cord-wrapped sticks onto wet clay. The largest and most obvious of these traits was the set of mortuary practices, including the mounds, that was called Hopewell. Most of these mounds were commonly circular and conical. The Hopewell came from Illinois and southern Ohio and had a net of influence throughout areas of the central and eastern United States. Although common in some areas in Wisconsin, especially along major river valleys, other portions of the state appear to have little or no influence of Hopewell culture. Exotic materials, like obsidian, copper, and marine shell, were traded and manufactured into items during this time period. Many distinctive mortuary artifacts from the Hopewell have been recovered from mounds in Wisconsin, including copper ornamental breastplates, bear teeth, silver items, and large chipped knives. The end of the Middle Woodland stage corresponds with the disappearance of the Hopewell Tradition.

Nicholls Mound, a large, oval mound dated to the Hopewell, is located in Trempealeau County, Wisconsin. It was excavated by, cutting a trench 23 feet in width, straight through the mound. A number of burials were uncovered in the mound, most appearing to be elite. Textile fragments, made from nettle fiber, were found in association with copper artifacts, specifically three copper celts and two copper plates recovered from Nicholls Mound and Mound 18, both of the Schwert Group. It is possible that the textile pieces are the remains of clothing worn by the dead, and preserved by their locality to the copper (McKern 1929, 1931).

The Late Woodland stage began around A.D. 400 and ended A.D. 1250. The trade of raw exotic materials ceased. Also, mounds were no longer restricted to their former conical shape. Instead, mound forms included effigies, in the shapes of birds, mammals, and humans. Many of these mounds did contain burials, although that is not a requisite. The pottery associated with this stage is more elaborately and intricately designed than previously. Woven fabrics and twisted cords were pressed into the wet clay, prior to firing, to form an array of designs and patterns.

The next phase in the chronology of Wisconsin archaeology came in the form of an invasion. The Middle Mississippian people of the American Bottom, centralized in Cahokia, Illinois, moved northward, displacing and

incorporating the local populations. Middle Mississippian societies included agricultural intensification accompanied by an increase in population, planned permanent settlements and ceremonial centers, hierarchical societal structures, and a large trade system. The pottery is distinct, with painted and polished fine-ware. An introduction of shell tempering for the pottery is a significant technological innovation. There are cord impressed pottery types, although they are different from the previous Woodland pottery. These impressions are wedge-like in appearance and are around the neck of the pots. Although the great majority of the Middle Mississippian sites are located in the southeastern United States, there are some centers further north (Cobb 2003, Green 1997, Theler and Boszhardt 2003).

The major expression of Middle Mississippian society in Wisconsin can be found at Aztalan in Jefferson County. This is a large, fortified village and ceremonial center that was occupied around A.D. 800-1200. It was originally thought to be the northern home of the Aztecs in central Mexico, hence the name Aztalan. The about 21-acre site is enclosed by a stockade and contains three platform structures and a number of other, smaller mounds. A number of artifact types have been found at the site, including Aztalan "brick," chipped and ground stone tools, bone tools, shells, Woodland pottery, Middle Mississippian pottery, copper, and textiles. Mats, cordage, and finer textiles were noted from the site, most of them charred and hard to recover (Barrett 1933, Goldstein and Freeman 1997, Green 1997).

A major ceremonial center of the Middle Mississippi period is the Spiro Mound Group, located approximately nine miles southwest of Fort Smith, Arkansas and six miles northeast of Spiro, Oklahoma. The site contains around 33 hectares with eleven earthworks. It dates from around A.D. 950-1450 with continuous deposits throughout these times. The major earthwork, Craig mound, dominates the site and is a large, saddle-shaped mound. A number of exotic goods points towards a long-range trade network, stretching from the Gulf Coast to the High Plains. Multiple burials were found, many of them including textiles (Brown 1996).

Another Middle Mississippian site, Wickliffe Mounds Site, is located 5 km south of where the Ohio and Mississippi Rivers meet in Ballard County, Kentucky. The site was occupied from around A.D. 1000-1300, with a population of no more than 250 people at any given time. A number of mounds were found at the site, varying in age. A plethora of saltpans were found, many of them with textile imprints on them. It is hypothesized that the textile imprints were made by fabrics that were past their use…used to separate the wet clay from a mold (Drooker 1992:96). Saltpans are large, rather shallow vessels, usually of a coarse shell temper, used in the production of salt (Drooker 1992).

The Oneota period, the last of the prehistoric periods in Wisconsin (A.D. 1250-1650), is a mystery. Where these people came from and where they went right before the European incursion is debated. This mystery is particularly odd because the remains of Oneota settlements are distinct and easily recognized. The pottery is also different from previous times, with its shell temper and smoothed or trailed line decorations. Other distinctive artifact types include fish lures, end scrapers, bison scapula hoes, catlinite disk pipes, sandstone abraders, and copper ornaments. Typically, the Oneota settled in village farming communities, establishing semi-sedentary villages. In about A.D. 1300 Oneota complexes changed, coinciding with the fall of the Middle Mississippian center of Cahokia. The final phase of Oneota culture in La Crosse, Wisconsin emerged in around A.D. 1500, in the form of the highly fortified Valley View Site. This site is located on a defensible peninsula located away from the Mississippi River, suggesting rising tensions just prior to the abandonment of the area by these people. The Oneota disappeared in much the same vacuum as they emerged. In Wisconsin, the Oneota period rapidly declined and the sites were abandoned by A.D. 1650, just prior to European contact (Overstreet 1997, Theler and Boszhardt 2003, 2006).

The final period in Wisconsin is the Historic period. This period began with the presence of the first Europeans, who arrived in Wisconsin in the mid-17th century. The early Historic period, spanning for about fifty years after contact, was less intense as far as foreign incursion goes than later periods. Shortly after, native people were subject to rapid and fast changes, encroaching into every aspect of their lives. Ancient lifeways were shifted in an almost frenzied manner, breaking down in a matter of years what had remained relatively constant for millennia. Hunting for trade replaced subsistence hunting, people were relocated, and the natural environment was drastically changed as agriculture became more intense. The accessibility of European trade items greatly changed artifact assemblages, disrupting stone tool and pottery manufacturing, working of shells and bones, and influencing every aspect of life. Many of the former artifacts, previously so important to life, were greatly changed or abandoned (C. Mason 1997, Theler and Boszhardt 1997). Two such cultures that changed, and studied ethnographically later on, were the Menomini and the Ioway. Alanson Skinner studied both cultures in the 1920s, which also collected examples of their material culture for the Milwaukee Public Museum.

The Menomini are an Algonquian group. The tribe studied by Skinner resided in north-central Wisconsin and had a rather diverse material culture, including metal working, pottery, wooden articles, weapons, ceremonial packages, and weaving. A number of woven artifacts were identified, including woven bags of vegetal fibers as

well as of yarn, and utilizing a variety of weaving techniques, including both open and closed twining, as well as simple and alternate pair twining (Skinner 1921).

The Ioway Indians are thought by some to be the proto-historic manifestation of the Oneota culture (Blaine 1979:7). They are a Siouan group, relocated to Oklahoma, Kansas, and Nebraska, where Skinner studied them. Social class was highly emphasized within the society, ranking based on birth and, secondarily, on achievement (Skinner 1926:190). Also containing a wide array of artifact types, weaving is also prominent. Reed mats, sashes, leather pouches, and woven bags were recovered. The woven bag were made out of a variety of materials, including basswood, nettle, modern yarn, beads, buffalo hair, and a mixture of all of these (Blaine 1979, Skinner 1926).

Two other cultures were also examined, but not as intensely: the Sauk Indians (Skinner 1923) and the Ojibwa (Lyford 1943). I was unable to look at these collections personally, although I did observe the Sauk yarn bags on display at the Milwaukee Public Museum. Both of these cultures were studied in depth, with some attention paid to the textile remains that were recovered and observed ethnographically.

The Ozark Bluffshelters do not fit nicely into one of the above time periods. The Ozark Plateau covers some 40,000 square miles in portions of Arkansas, Oklahoma, Kansas, and Missouri and is composed of sedimentary rock, formerly marine beds. This rock formation is prone to produce bluff and rockshelters that were used by a variety of people over a long period of time, spanning from the Archaic to the Mississippian (Scholtz 1975:4). Many of these shelters were damp when excavated, therefore only a few types of artifacts could be recovered. In the rare case when the shelter was entirely dry, large varieties and quantities of perishable materials, including wood, basketry, fabric, and even feather, were recovered. Although some of these bluffshelters may have been permanent settlements, there is some evidence of other settlements outside of these shelters (Baerreis 1959, Harrington 1924, 1960, Scholtz 1975).

METHODOLOGY

The Swennes Woven Nettle Bag was recovered from 47Lc84, a rockshelter in La Crosse County, Wisconsin by the property owners and archaeology enthusiasts, John and Otto Swennes. It was found in relatively pristine condition and brought to the attention of MVAC in 2003. The Swennes brothers also claim to have found Oneota pottery in proximity to the textile; therefore it was initially dated tentatively to either the Oneota or early historic period. Also, a previous study at the University of Arizona by Dr. Richard Ford identified the material used for the fibers as nettle.

The textile sample was measured and photographed prior to identifying the structural type. I also reconstructed the bag out of yarn on a makeshift frame in order to better understand the manufacturing process (See Appendix B for a full description of this experiment). The twist used in producing the fibers was ascertained, as was the twist utilized in the weft-twining element. I counted the number of weft and warp elements, as well as measuring the width of those elements. I also measured the space between wefts on the bag and the size of the bottom "seam" (see Figure 3). I use the term seam with reservation because it does not appear to be a finishing edge, closing the bag at the bottom, but rather a beginning edge. But for lack of a better term, I will use seam.

Figure 3. Swennes Woven Nettle Bag, location of measured aspects

Due to the uniqueness of the Swennes Woven Nettle Bag, there was little to compare it to in the Oneota cultural tradition. Therefore, I found a literature review imperative. I studied textiles at a global level (Barber 1991, Burnham 1965, Follensbee 2008, Helbaek 1963, Kemp and Vogelsang-Eastwood 2001, Ryder 1965), because much of the original literature and terminology came from outside the United States, especially outside the Midwest. Then I narrowed the focus, concentrating on textiles of the Ozark Bluff Shelters (Scholtz 1975, Harrington 1960, Lasiter 1946), Woodland sites (McKern 1929, 1931) Mississippian sites (Brown 1996, Drooker 1992, Trowbridge 1938, Willoughby 1952), and ethnographic accounts (Blaine 1979, Carter 1933, Lyford 1943, Skinner 1921, 1923, 1926). I also investigated proxy indicators of textile production, specifically cord and textile impressed pottery (Douglass 1946, Gerend 1904, Hurley 1979, Kuttruff and Kuttruff 1996, Quimby 1961).

The vocabulary used in describing and analyzing textiles is distinct and complicated. I generated a list of textile terminology necessary to adequately study the Swennes Woven Nettle Bag so that I had a set of uniform terms for this paper. A copy of that glossary can be found in Appendix A.

In addition to descriptions and pictures of textiles found in literature, I also studied textile and textile impressed pottery from Aztalan in Jefferson County, Wisconsin, Spiro Mound in LeFlore County, Oklahoma, and ethnographic bags of the Ioway and Menomini at the Milwaukee Public Museum. Woodland cord impressed pottery located at MVAC was also considered.

RESULTS

Swennes Woven Nettle Bag

Prior to investigating the culture that the Swennes Woven Nettle Bag may have emerged from, identifying all the structural elements and type of the bag was imperative in order to have a body of information for comparative purposes. I began with the twist of the fibers of the bag, and then identified the weaving type, the number of warps and wefts, the distance between wefts, the thickness of the fiber, and the nature of the bottom seam.

The easiest to identify was the twist of the fiber (Figure 4). The initial twist of the cord was a Z-spin, which means that if the hank of nettle was held in the left hand, the right hand rolled the fiber up the thigh. The final spin of the cord was S-twist. That means if the two original Z-spin cords were held in the left hand, the right hand rolled the cords down the thigh. For an example of twisting directions, see Figure 5.

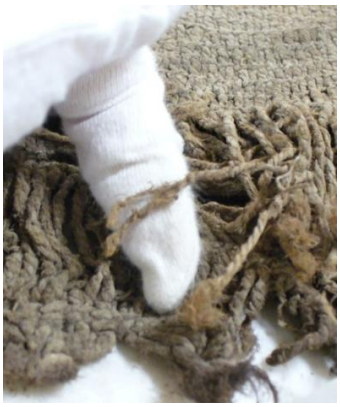

Figure 4. Damaged fiber with twist

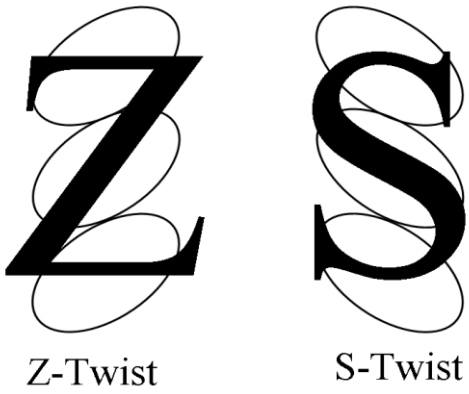

Figure 5. Z-Twist and S-Twist cords

The next element identified was the weaving type. This type can be classified as an "Open 2 Strand S-twist Alternate Pair Weft-Twining." The basic definitions of each of these terms are available in Appendix A. In essence, though, it means that the bag was constructed using a twining method, where two weft elements continuously turn about one another in an S-twist, enclosing alternate pairs creating an almost zigzag pattern. There was space left between the wefts, exposing portions of the warp.

In order to count the number of warps and wefts, I arbitrarily divided the bag into halves. The "front" outward facing side of the bag was the one on display when I received the bag for study. The "back" outward facing side was the one lying down. The seam on the bottom of the bag was of such a nature that it naturally divided the bag into two. There were no side seams to the bag, so the warps were counted all the way around the bag. The wefts were counted for each side, more due to the fact that each side had differential damage. In total, there were 438 warp elements on the bag. The front of the bag had 27 wefts, while the back had 28. It is possible these numbers are off by a couple because in certain places the bag was damaged and it was difficult to count the warps and wefts in these areas.

The distance between the wefts on the back was measured with sliding calipers. I picked a portion on both the front and back outward facing sides of the bag where the damage was less and allowed for the most measurements. On the front, the top portion of the bag was frayed. Therefore, the back had more weft space measurements than the front. The two were similar, and there was an average of 7.18 mm for the weft spaces with a minimum of 4.5 mm and a maximum of 9.9 mm for the whole bag. For a complete list of measurements, see Appendix C.

I also measured the width of the fiber, again with sliding calipers. I selected random elements, both warp and weft. The warp elements had an average width of 2.4 mm, while the wefts had an average width of 2.1 mm. For a complete list of measurements, also see Appendix C.

The nature of the bottom seam was much harder to ascertain (Figure 6). The bottom corners of the bag are badly damaged, and therefore how the seam was started is lost. There is a possible knot in the bottom left if you

look at the back of the bag, but I have no evidence to indicate if this is the beginning or the end of the bag, or potentially both. The warps were wrapped around a single, foundational string that runs through the middle of the seam, forming the bottom element of the bag. The two ethnographic accounts I encountered that explained the process of making bags (Holmes 1896 and Lyford 1943) state that bags were made upside down on a stand or hanging from a branch, with the top forming the bottom seam and the bottom hanging loose, eventually to form the top. This does not appear to be how the Swennes Woven Nettle Bag was made. It very well may have been made upside down, but these accounts show the warps looped around a top weft, and then hanging with cut edges at the bottom. The Swennes Woven Nettle Bag has looped warps at the top of the bag. If the seam really is the foundational element of the bag, and the warps are looped at the top, then the entirety of the warps contain a single, long fiber.

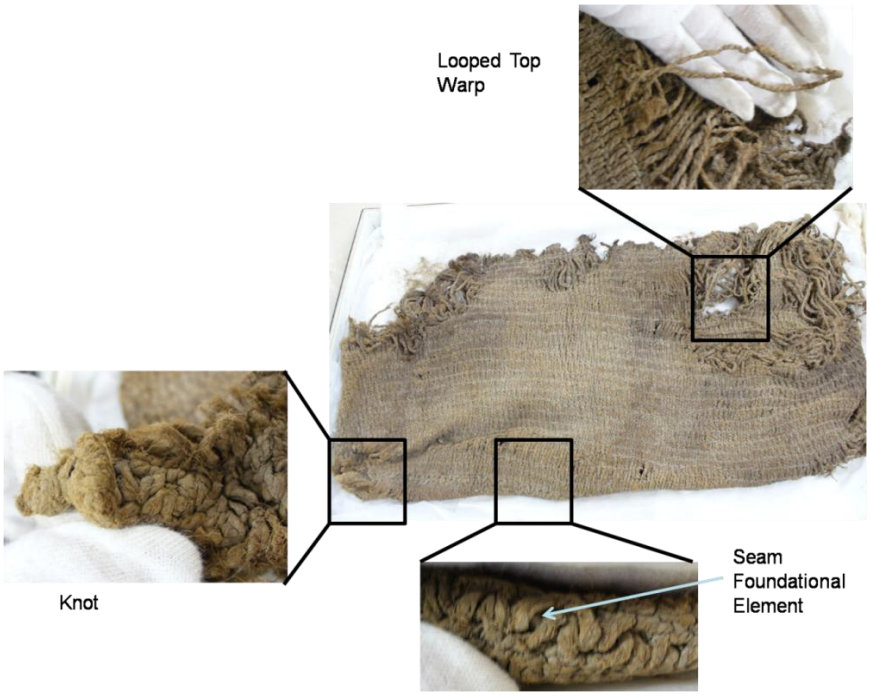

Figure 6. Elements of the seam and warps

The top element of the bag consists of six looped warps, or 12 individual warps, tied together with a knot (Figure 7). Then, a second piece of fiber was passed through the joining knots, forming the top of the bag. This part of the bag is damaged, and there are very few top knots that survive.

I found that the two most identifying features of the bag were the top and the bottom. The top, with its folded over warps and knots, and the bottom seam, that is actually a foundational element, were atypical and potentially diagnostic. Therefore, when I considered the other collections and artifacts, those were the two elements I focused on, if possible.

Top Knots: Top two from front, bottom two from back

Figure 7. Top Knots, finishing elements

Archaic Period

I did not examine many textile remains from the Archaic period. In the literature, they were mentioned in passing. In most cases, they were preserved on copper artifacts, often associated with burials. The one site I did consider, in depth, from this period was the Riverside Site.

The Riverside Site textiles are poorly preserved and damaged. Those available to study at the Milwaukee Public Museum were associated with burial bundles in the collection and were very fragile. I did not study them in depth due to this reason. Reports on the site indicate that fabric was preserved due to the presence of copper (Hruska 1967:151), and I did confirm that personally with the collections.

Although the collections did not aid in the discovery of the cultural origins of the bag, what they did do is attest to the antiquity of the use of nettle. Many of the textile and fabric remains preserved in the burials were composed of nettles. Dating to the Old Copper Complex in the Middle Archaic, these were the oldest nettle artifacts I looked at.

Woodland Period

The majority of evidence for Woodland textile and cord production comes from pottery impressions. In total, I studied six pieces of Woodland pottery recovered in southeastern Wisconsin and Iowa. There were other pieces from the same time periods and decoration type that I did not look at in depth because they were similar to other sherds I already studied. They represent the Eastman phase, Madison Cord Impressed, Maple Mills/Minotts Cord Impressed, and Point Sauble/Grant Collard types. None of these appears to be fabric impressed, although two sherds (47Ju357 93.2478.391 and 47Lc447 91.1043.01) had knots on the sherd that appeared to have other cords attached to it, but there was no further structure. Five of the six sherds, as well as the other sherds I did not study in depth, contained Z-twist cords, unlike the S-twist cords of the Swennes Woven Nettle Bag. Only one, from the Terminal Late Woodland, was S-twist (Figure 8).

Figure 8. 47Ju351, Pottery sherd with S-twist cords

Also from the Woodland Period is Nicholls Mound of the Hopewell tradition and dating to the Middle Woodland. The textiles contain S-twist cords and are preserved due their association with copper (Figure 9). Two weaving techniques are present on three copper celts and two large copper plaques. These are plain open twining and alternate pair open twining, both S-twines. The wefts have a spacing of 1.3 cm (McKern 1931:221) compared

to the Swennes Woven Nettle Bags average of 7.18 mm, making the textiles from Nicholls Mound slightly coarser. The fabric on the large copper plate, in Figure 9, is more closely woven than the other textiles from the mound, but McKern does not specify the spacing between the wefts. These textiles do not appear to be bags, but rather the remains of clothing preserved due to their contact with copper plaques. No seams or finishing elements were discussed concerning the textiles.

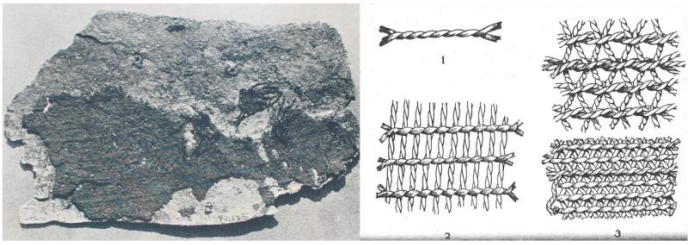

Figure 9. Nicholls Mound (McKern 1931:222, 313)

Middle Mississippian

Middle Mississippian textiles range in size, form, and function; from the very fine prestige items found in ceremonial mounds, to common, industrial items. In Mississippian societies, textiles could serve as prestige items, linked to status of individuals in some burials (Jakes and Ericksen 1997:281). The three sites examined for this period were Aztalan, the Spiro Mound Group, and Wickliffe Mounds.

The Aztalan collections at the Milwaukee Public Museum did not contain sufficient numbers of textiles. They were noted during excavations, although they were "so fragile that preservation was impossible" (Barrett 1933:347).

I did look at the proxy indicators of textile and cord presence at this site, specifically through cord-impressed pottery. Again, this was no overly helpful. The cord-impressed pottery was of the Woodland Tradition, rather than Middle Mississippian, and greatly resembled samples available for study at MVAC. The pottery available for study was impressed with individual cords, not textiles or fabric, and did not help to elucidate the origin of the Swennes Woven Nettle Bag.

The textiles from the Spiro Mound Group were constructed using a variety of techniques, including wet twining, plain weaving, and oblique interlacing (Brown 1996:619). The first spin of the fiber appears to be an S-spin, so if two such cords were twisted together it would a Z-twist cord (Willoughby 1952:108). I also looked at a ten specimens of fabric and cordage recovered from the Spiro Mound Group at the Milwaukee Public Museum: two carbonized, five preserved due to copper, and three preserved without the aid of the above two factors.

The first two examples had the same catalog number (48188/14535), although they were two different pieces of fabric. The first piece was about 60 mm and was too damaged to determine the weaving type or original function. It was two sided, one black and the other red, and had both S-twist and Z-twist cords. The other piece (Figure 10) appeared to be, on first inspection, a piece of Z-twist fiber folded over itself with no discernable connections. On second look, it appears to be a weft with the warps removed. Because both sides of the weft are still intact, it appears that the fabric this came from was not very wide. It also looks to have originally been a Z-twine.

Figure 10. Spiro Mound, 48188/14535, Z-Twine Wefts

Five specimens were preserved either on copper, or due to a close association with copper. The first was two cords looped about one another, both of them Z-twist. The second piece (Figure 11) was very finely twined in a straight, closed, S-twine. It had a piece of copper preserved on the other side of the fabric with the pseudomorph of a plait weave on it, although the piece of weaving that would leave that mark was no longer present. The next piece was a plait, basket weave, also preserved on copper that was of the exact same make and style of that preserved on the previous piece of copper. The fourth and fifth copperized pieces had multiple components to it. Both pieces had both wide cordage preserved, as well as twined fabric. One piece also had the plait pattern preserved on it, while the other was absent.

Figure 11. Spiro Mound, 48192/14535, copper associated with fabric

The two carbonized pieces were damaged and hard to handle. They were fairly large pieces, each around 20 cm. I was able to gain little information about these for this project. They both were braided cords, and the weaving technique was either never present or lost through time.

The final sample of the textiles recovered from this site was in a box and contained about 29 individual specimens, which can be seen in Figure 12. They ranged in size (from very small pieces to comparatively large) and color (including red, black, and natural). They also had a variety of geometric patterns. They were S-twined, and some of the pieces were also missing their warps.

Figure 12. Spiro Mound, 43712/12122

The final Middle Mississippian site examined was Wickliffe Mounds in Kentucky. I did this as a literature review of Penelope Drooker's *Mississippian Village Textiles at Wickliffe* that looked at the impressions left on saltpans. Although there were textiles recovered from this site, they were small in number and size (Drooker 1992:32). Therefore, to gain an understanding of the possible textiles present at the site Drooker examined the imprints of textiles left on the saltpans during the process of making them. The theory she used was that old, used textiles that were past their prime were used to line molds during the production of saltpans to separate the molds from the wet clay (Drooker 1992:96). In this manner, multiple forms and styles of textiles were preserved as imprints on the pottery. Approximately 89% of the textiles examined were twined, with a scattering of knotting, interlacing, and unknown weaving types. Predominately, they were S-twines and plain twined (around 53% of the

entire collection), although there were a number of alternate pair twinings (around 29%) (Drooker 1992:100). An example of alternate pair twining preserved on the saltpans can be seen in Figure 13. Some of these alternate pair twining techniques involved open spacing, while others were closed. Of particular importance were the preservation of some edges and seams on the pottery. They were very few (less than 1% of the assemblage) of these discovered on the saltpan sherds (Figure 13). In these cases, the bag that was the original fabric was made in a tube, and then the starting edges were sewn or laced together (Drooker 1992:134). This is not how the Swennes Woven Nettle Bag was constructed, although the weaving and twining types are comparable.

Figure 13. Left, examples of alternate pair twining. Right, examples of starting edge and seam of textiles (Drooker 1992:103 and 135)

Ozark Bluffshelters

A multitude of weaving types and forms were discovered in the Ozark bluffshelters (Figure 14). Two types were the most common: a coil basket weave and twining (Lasiter 1946:276). The basketry was usually made of cane and in four forms: flat, dish-like; a similar form but with an open weave on the bottom; a deep basket in a variety of sizes; and an oblong shaped basket (Harrington 1960:164). All of the textile artifacts studied by Amy Henning in "Fabrics and Related Materials From Arnold-Research Cave" had Z-twist cords (Henning 1966).

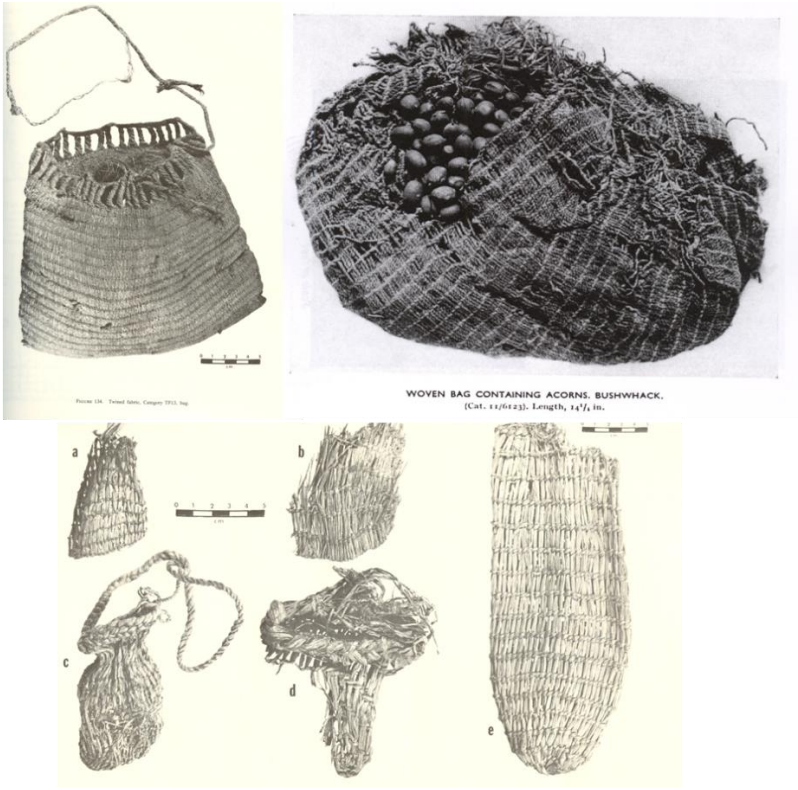

Figure 14. Ozark Textiles, (Harrington 1960:Plate 12, Scholtz 1975:117,127)

There were multiple pictures available in the literature of fabrics – many of them twined bags. These collections contain both S- and Z-twines, open and closed, straight and alternate pair. The textiles I looked at in the literature varied greatly in form and function, and in manufacturing processes. That was probably due to the long range in time periods for the textiles, but the literature did not do a good job at specifying what weave types, if any, where indicative or more common in certain time periods. Instead, the time periods were mixed together. Although these bags looked similar as far as weaving techniques go, the top elements do not (Harrington 1960, Scholtz 1975).

Historic Periods

The ethnographic collections examined in depth came from the Menomini and the Ioway. All the ethnographic textiles I examined came from the Milwaukee Public Museum, and catalog numbers I refer to will be for that institution. In total, I looked at eight examples, three from the Menomini and five from the Ioway. Whereas there were only five Ioway bags available for study, there were multiple more Menomini bags to study. I looked at all, but chose the three that represented the varying sizes and styles the best due to time constraints.

All of the bags that I examined were twined. Some were simple twines (4572/2207, 4582/2207, 30589/7322, 30590/7322), alternate twines (30157/7287), open twines (4572/2207, 4582/2207, 30589/7322, 30590/7322, 30157/7287), and two were stitched leather bags (30587/7322, 30588/7322). There were no closed twines examined. One bag (4585/2207) was harder to classify, pictured in Figure 15. Although it is similar to a simple twine, with each weft twist engaging a single warp, a set of two warps twist about one another, so that a single set of wefts do not engage the same warp the entire time. Therefore, based on definitions of simple and alternate-pair twining, it is a cross between the two.

Figure 15. Menomini Bag, 4585/2207

Two of the Ioway bags had rather interesting patterns, as well, in the twining. On 30589/7322, a set of warps moved across the bag, engaging different wefts each time, creating a diamond pattern on the bag Figure 16). These warps were also dyed green and red, making a contrast against the natural color of the base of the bag.

Figure 16. Ioway Bag, 30589/7332

The other Ioway bag, 30157/7287 (Figure 17), was the only one with an obvious pattern and used alternate pair twining for the entirety of the bag. The weaving on this bag is a little intricate. Although it is alternate pair twining, it appears that there are four warps engaging with a set of wefts. When the main color of the bag is to be natural, those warps are engaged on the outside of the bag. When the main color of the bag is to be black, those warps are engaged with the wefts on the outside of the bag while the other warps are concealed on the inside of the bag. The two faces of the bag were also different, one face with a "panther" (Skinner 1926:Plate XLIX, Figure 3), the other with a human figure.

Figure 17. Ioway Bag, 30157/7287

The weaving patterns of the ethnographic bags were not similar to the Swennes Woven Nettle Bag. The only bag I examined that was both alternate pair and open twining was the little panther bag. Only one of the bags was completely natural in color and not dyed, although there were a couple more examples in the Menomini collections unexamined. Based on a comparison of weaving types, these bags are not related to the Swennes Woven Nettle Bag.

I next compared the top elements and the seams. The top elements of the bags were very similar between the Menomini and the Ioway. The warps were braided at the top, forming one cohesive element. Anywhere between two and six warps were twisted together, and then braided together at the top. The one exception to this was the small Ioway bag, 30157/7287. A set of warps was twisted about one another, than attached with a separate piece of fiber. This is similar to the Swennes Woven Nettle Bag, with the exception of the twisting about of the warps.

The top elements of the ethnographic bags did not correlate adequately with the Swennes Woven Nettle Bag (Figure 18). The top knots of the Swennes Woven Nettle Bag were not reflected in the ethnographic bags, nor were the manner of gathering the warps to form these knots.

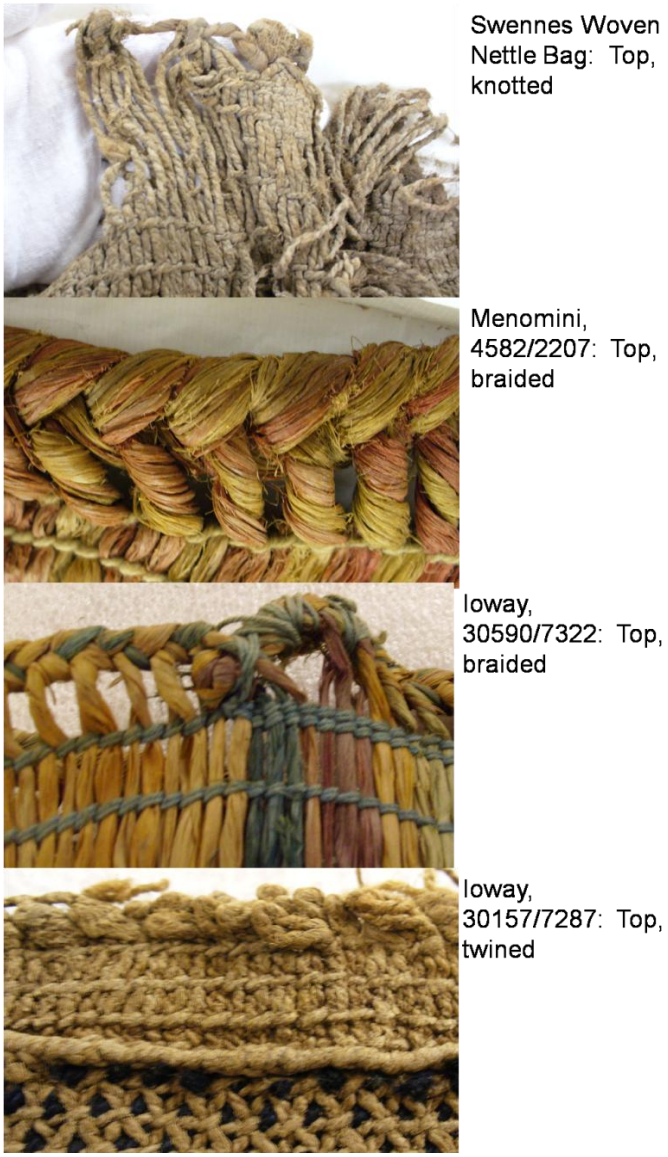

Figure 18. Comparison of the top elements of Swennes Woven Nettle Bag and ethnographic bags.

A problem emerged when comparing the seams between the Swennes Woven Nettle Bag and a number of the ethnographic bags. Namely, that five of the bags did not have a seam, leaving only one woven and the two leather bags with two seams on the sides.

The bags without seams, including examples from both the Menomini and the Ioway, appear to lose warps as it proceeds down from the top. The best example I found was an Ioway bag, seen in Figure 19. On the side of the bag, the number of warps decreases. The warps are folded over at the bottom and looped back around on the other side. The lost warps fold over earlier than the bottom, making the bags more trapezoidal rather than rectangular, larger at the top than at the bottom.

Figure 19. Ioway Bag, 30590/7322

The three bags with seams are attached on both sides. The two leather bags are stitched together with quills. The woven bag is the little Ioway bag, 30157/7287. This bag appears to be an anomaly on all scales from the other ethnographic bags. Attached on the sides, the two seams do not appear to be a foundational element, rather simply stitched together after a flat piece of fabric was folded in half. A comparison of this seam and that of the Swennes Woven Nettle bag can be seen in Figure 20.

Figure 20. Comparison of Seams

None of the seams, or lack of seams, matches the Swennes Woven Nettle Bag. None of these are a foundational, structural element of the bag, nor do they represent the one seam of the Swennes Woven Nettle Bag. It is interesting to note that the both the Menomini and the Ioway bags are similar, each containing, for the most part, no seams on the woven bags. Yet this does not correspond to the Swennes Woven Nettle Bag.

I did a literature review and cursory study of two other cultures, both also studied ethnographically: the Sauk and the Ojibwa. The Sauk bags that were collected were made of yarn. The two faces of these textiles commonly bear separate patterns. Although I did not study these in depth, mainly because they are currently on display at the Milwaukee Public Museum, I did look at them at the exhibit and the seam types are not the same as those of the Swennes Woven Nettle Bag. The seams are sewn together, rather than the foundational element of the bag.

I did not personally look at any of the Ojibwa bags, although there is a detailed description of the manufacturing process of these bags (Lyford 1943). First, the fiber had to be prepared. Nettle stalks were cut in October, tied together, and dried hanging. When they were needed, the stalks were rotted and then beaten with sticks to loosen the fibers. Two strands were rolled and twisted into a cord, with more fiber being added as needed. This fiber could then be used to create woven articles (Lyford 1943:44-45). When this fiber was to be used in the construction of a bag, or if yarn was used in the more modern era, two strong but springy rods, about 36 inches long and one half inch in diameter, were set in the ground slightly further apart than the intended width of the bag (Figure 21). Although this is a plausible way to create woven and twined bags, this is not how the Swennes Woven Nettle Bag was created.

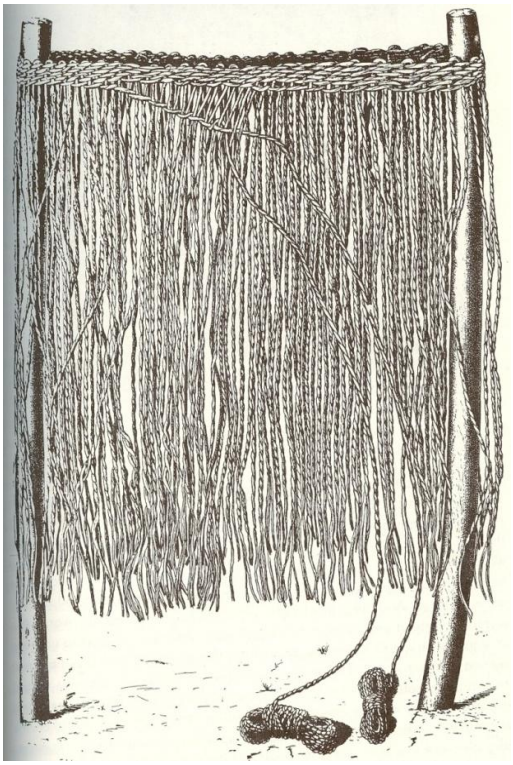

Figure 21. Ethnographic Ojibwa construction of a bag (Lynford 1943:Plate 40)

CONCLUSION AND DISCUSSION

In this study I attempted to ascertain the cultural and weaving tradition from which the Swennes Woven Nettle Bag emerged. Through the course of the study, I looked at the Archaic, Woodland, Oneota, Middle Mississippian, and early Historic periods in Wisconsin and throughout the Midwest. In doing so, I looked at collections from MVAC, the Milwaukee Public Museum, and available in literature. The Riverside Site from the Archaic period; Woodland pottery from the La Crosse area; Nicholls Mound from the Middle Woodland; the Swennes Woven Nettle Bag possibly from the Oneota; the Spiro Mound Group, Wickliffe Mounds, and Aztalan from the Middle Mississippian period; and ethnographic studies of the Ioway, Menomini, Sauk, and Ojibwa from the early Historic period were specifically looked at.

Upon inspection of the Swennes Woven Nettle Bag, I noticed that the seam and the top element of the bag were particularly distinctive. The "Open 2 Strand S-twist Alternate Pair Weft-Twining" of the bag itself was not as uncommon, although none of the bags that I studied matched this weaving type exactly (Table 1). Although multiple sites and cultures, including Spiro and Wickliffe of the Middle Mississippian, the Ioway, Nicholls Mound of the Woodland, and the Ozark Bluffshelters had examples of open, s-twine, and alternate-pair weft twining, only two bags (MPM 30157/7287, the Ioway Panther bag, and the Ozark bag recovered from Bushwhack Cave) and some of the textiles recovered from Nicholls Mound had all three. Based on the literature review on worldwide textiles done prior to investigating the Swennes Woven Nettle Bag, these weaving types are common across diverse cultures.

Therefore, the examination of the nature of the seam and the top elements were necessary. Based on the literature review and specific examples studied from the Ioway and Menomini, I was unable to match up the exact nature of these with another culture. Whole bags were available for study from the Ozarks, Ioway, and Menomini and seams and finishing edges were preserved on Mississippian Pottery from Wickliffe Mounds. The top edges of the Ozark, Ioway, and Menomini bags appear to have the warps twisted together then braided at the top. The majority of the Ioway and Menomini bags contain no seams. One bag from the Ioway, the little Panther bag, has two seams that appear to be sewn. The one impression of a Mississippian seam also appears to be two edges looped together. None of these bags and textiles has a seam that is the foundational, beginning edge of the bag. Nor do these bags appear to have looped warps at the top of the bag, when these elements can be observed. The impressions on the saltpan pottery from Wickliffe show top elements that are loose and unattached, with cut edges.

Table 1. Comparison of Weaving Types and Fiber Twist Direction Across Sites

	Swennes Woven Nettle Bag	**Woodland Pottery**	**Nicholls Mound**	**Spiro Mound Group**	**Wickliffe Mounds**	**Ozark Bluff Shelters**	**Ioway**	**Menomini**
Twining Type								
Alternate Pair	X		X		X	X	X	
Simple			X	X	X (Majority)	X	X	X
Open	X		X		X	X	X	X
Closed				X	X	X		
Z-Twine				X		X		X
S-Twine	X		X	X	X	X	X	X
Basket Weave				X		X		
Unknown Weave		X						
Cord Twist **Direction**								
Z-Twist		X		X	X	X		
S-Twist	X	(1)	X	X	X (Majority)		X	
Braid				X				
Number of **Seams**								
Zero							X	X
One	X							
Two							X	
Unknown		X	X	X	X	X		

Based on these comparisons, it appears that the Swennes Woven Nettle Bag does not match with any of the above cultures. Because the bag did not match the Archaic, Woodland, Middle Mississippian, or early Historic bag, the original claim that the Swennes Woven Nettle Bag was found with Oneota pottery sherds is supported. That would make this the first, and currently only, Oneota textile discovered in Wisconsin.

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APPENDIX A

Bag: Bags are the intermediary form between mats and baskets for they are two-dimensional or flat when empty and three-dimensional when full (Adovasio and Gunn 1977:137).
Basketry: Baskets are three-dimensional, woven containers, usually used for the transport or storage of items (Adovasio and Gunn 1977:137).
Bast Fiber: Bast fibers are the stem structures of dicotyledonous plants, notably flax, hemp, ramie, nettle, and others (Emery 1966:5).
Braiding: This is a flat over-and-under interworking of elements. Elements consistently link with adjacent or almost adjacent ones on either side and change their relative positions slightly throughout the fabric (Emery 1966:60).
Coil: Denotes a subclass of basket weaving that is manufactured by interworking the warp with the weft. This type of construction is often used in the manufacture of containers and hats (Andrews and Adovasio 1996:33).
Cordage: Refers to the cords or ropes used individually, or to refer to a collection of cords that do not serve as part of the fabric construction (Drooker and Webster 2000:268).
Element: A structural part of an interworked fabric (Drooker and Webster 2000:268).
Fiber: The elements that make up a textile. These can be constructed out of plant materials, animal hairs, animal sinews, and synthetic materials in today's societies. The fibers are often twisted in order to strengthen them (Emery 1966:5).
Matting: Mats are woven items that are two-dimensional or flat (Adovasio and Gunn 1977:137).
Plain Weave: Each weft element passes alternately over and under successive warp elements, each reversing the procedure of the one before it (Emery 1966:76).
Plait: Plaiting is a type of weave during which all elements pass over and under each other without any engagements. Essentially, there are no warps and wefts; all elements are active (Andrews and Adovasio 1996:33).
Plied Cord: This is a cord formed by twisting together two or more individual cords (Drooker and Webster 2000:272).

- **S-Spin:** An S-spin cord is formed by holding a hank of raw material in the left hand and rolling it down the thigh with the right. The final spin of the chord, when held vertically, slants like the horizontal element of the letter S.
- **S-Twist:** An S-twist cord is formed by twisting together two Z-spin cords, holding the cords in the left hand and rolling them down the thigh with the right. The final twist of the chord, when held vertically, slants like the horizontal element of the letter S.
- **Z-Spin:** A Z-spin cord is formed by holding a hank of raw material in the left hand and rolling it up the thigh with the right. The final spin of the chord, when held vertically, slants like the horizontal element of the letter Z.
- **Z-Twist:** A Z-twist cord is formed by twisting together two S-spin cords, holding the cords in the left hand and rolling them up the thigh with the right. The final twist of the chord, when held vertically, slants like the horizontal element of the letter Z.

Textile: Textiles refer to a wide array of interworked materials that includes bags, baskets, mats, fabrics, and clothing (Emery 1966:7).
Twill: A twill weave is characterized by a diagonal alignment of elements with a minimum of three warp groupings (Emery 1966:92).
Twine: Twining is the passing of wefts around warps that can produce containers, mats, bags, cradles, hats, clothing, and other forms (Andrews and Adovasio 1996:33).

- **Alternate Pair Twining:** A pair of warps is engaged alternately at each weft. The twining wefts enclose warp units in pairs and continuously create new pairs by slitting those in the previous row. This is also called "diagonal" or "twill" twining (Emery 1966:202).
- **Close Twining:** The weft rows conceal the warps entirely due to being tightly spaced (Adovasio 1977:16).
- **Cross Warp Twining:** This is a rather uncommon form of twine where a single warp is criss-crossed and engaged at the points of intersection by spaced weft rows (Adovasio 1977:16).

Open Twining: The weft rows leave portions of the warps exposed due to being spaced at intervals. This can also be called "Spaced" twining (Adovasio 1977:16).

Open and Close Twining: The weft rows alternately conceal and expose the warps due to being tightly spaced and spaced at intervals (Adovasio 1977:16).

Simple Twining: A single warp is engaged at each weft crossing. The warps are parallel and each weft row engages the same number of warps (Adovasio 1977:16).

Wrapped Twining: This is very uncommon and involves a rigid and a flexible element in each weft row (Adovasio 1977:18).

Warp: Denotes the foundation element of a fabric, usually the vertical element. Warps are essentially parallel elements that run longitudinally in a loom or fabric (Emery 1966:55).

Warp Twining: Two warp sets twist continuously about each other, in the same direction, alternating faces of the fabric, and enclose a weft in each half-turn (Emery 1966:197).

Weft: Also occasionally called "woof," weft denotes the cross or interworking element of a fabric. Wefts are essentially parallel elements that run transversely in a loom or fabric and are at more or less right angles with the warp element (Emery 1966:74).

Weft Twining: A set of two wefts spiral about each other, always in the same direction, switching between the face of the fabric, as they enclose a warp in each half-turn. It is often classified as a basketry technique (Emery 1966:200).

APPENDIX B

In order to better understand how the Swennes Woven Nettle Bag was made, I performed an experiment in order to recreate the bag. I used completely modern material, because my goal was not to make a perfect replica, but rather to learn for myself some possible methods of construction. Ethnographic accounts of bag construction detail how the article was made upside down, either suspended from a branch or between "strong but springy smooth rods 36 inches long and one half inch in diameter [that] were secured firmly in a log or in the ground at a distance slightly wider than the width of the proposed bag" (Lyford 1943:81). Based on the bottom seam of the Swennes Woven Nettle Bag, this type of construction is not feasible. The bottom seam was closed during construction, not left open and later closed, unlike in ethnographic accounts. Because the bottom seam was the most distinctive point of the bag, and the hardest to visualize a reconstruction for, I began with it.

I used yarn obtained from a local craft store to try to recreate the seam. I began with two pieces of yarn: one representing the inside foundational element of the bag, the other the warp. I formed a few simple knots but these did not appear to be the same as the original. Instead, I decided to try to replicate the seam on a larger scale on a clipboard. I started by taping a single piece of black yarn lengthwise across the clipboard. I then took two pieces of pink yarn, acting as the warps, and loped them across the middle black yarn, the left piece going over then under the black yarn, the right going under than over. Those pieces were taped to the top of the reconstruction area. I then took two more pieces, repeated the process, and taped those to the bottom of the area. I continued with this with 12 pieces of pink yarn. The total clipboard area is in Figure 22 and the original seam with a close-up of the replica seam is in Figure 23.

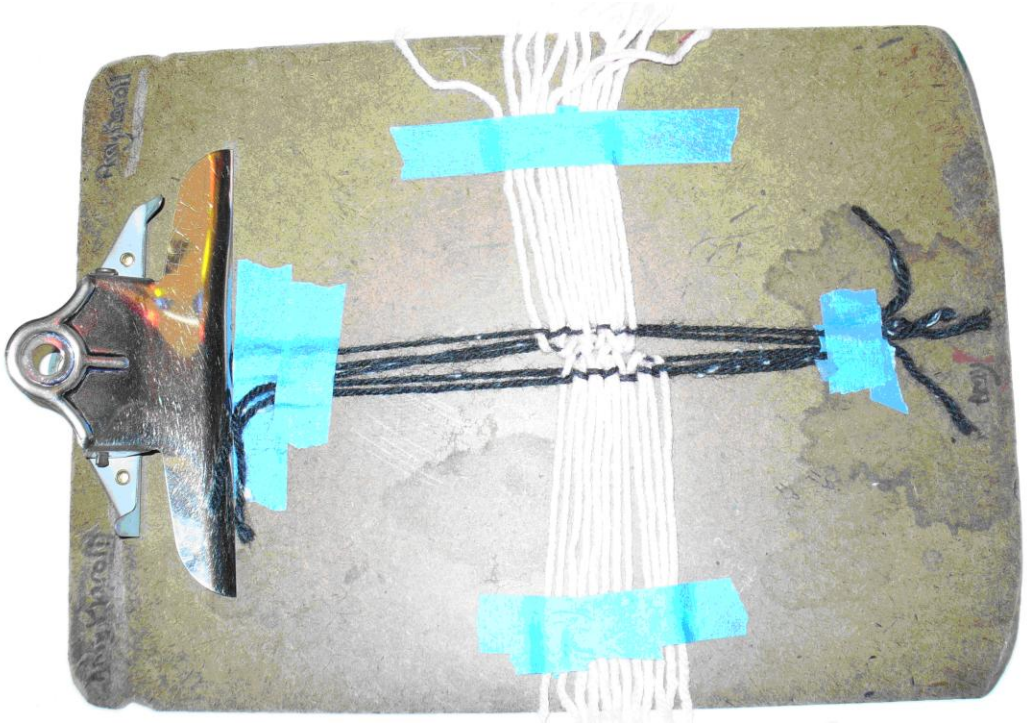

Figure 22. Seam replica

Figure 23. Original and replica seams

After I ascertained how the seam was made, I attempted to reconstruct the bag. I made a frame out of cardboard, wood pencils, and tape. I chose these materials because they were easy to procure and because I was more concerned with the manufacturing process of the bag itself, not the materials used to create the bag. Figure 24.1 shows the frame I constructed. I cut slits into the top of the cardboard part of the frame to loop the warps around. The bottom part of the frame had a string tied across it, to act as the middle foundational element of the seam. I wrapped the warps, starting at the top left corner of the frame, then down around the bottom yarn in the pattern I used to recreate the seam. The warp is just one, long piece of yarn. After the warps were set, I wrapped a weft right near the seam, like in the Swennes Woven Nettle Bag. I wrapped the wefts with an S-twist and alternate pairs. I folded a long piece of yarn in two, set the middle at the bottom of the bag, and then wrapped the two ends around each other to form the wefts. I sewed one end beneath two of the warps, set it down towards the top of the frame, placed the other end over those two warps, then sewed them beneath the next two, and continued on in that

pattern. An example of the weft twining in process can be seen in Figure 24.2. When I reached the top, I tied off the wefts and removed the bag from the frame (Figure 24.3.) Once off, I tied three warp pairs together, and knotted these around another piece of yarn to form the top portion of the bag. The finished bag is shown Figure 24.4. In total, the full process of recreating the bag took 7 hours. This only includes the making of the frame and the bag itself. A large portion of the labor required in making the Swennes Woven Nettle Bag, the procurement and manufacture of the fiber used, was skipped in recreating the bag.

Figure 24. Experimental recreation of bag

Although I tried to recreate the bottom seam on this larger scale, I was unsuccessful. It appears that the warps on one face of the bag were shifted one away from where they were supposed to be. This was because I had trouble visualizing exactly how the warps were supposed to interact on each side of the face. I wrapped the warps on one face completely, then the other. When I performed the experiment to recreate the seam, I would wrap four warps at a time, a set on each side of the "face." It was close to the actual bag, and I know what went wrong. I attempted to recreate the bag a second time, and again had trouble with the seam. One face of the bag had the seam inside out. The process was essentially the same; I just attempted to pair the warps differently when twining the wefts. I have problems visualizing how the seam was made in a 3-dimensional space.

APPENDIX C

	Front		**Back**	
Row (From Bottom)	Weft Cord Width	**Notes**	Weft Cord Width	**Notes**
1	2.3	Holding Bottom Element	2	Holding Bottom Element
2	2.1	Holding Bottom Element	2	Holding Bottom Element
3	2.4		2.4	
4	2.7		1.5	Missing both twining elements
5	2.3		2	
6	2.3		2	
7	2.2		1.9	
8	2.8		1.9	
9	2		2.4	
10	3.1		1.5	
11	2.5		2.1	
12	3		2.2	
13	2.9		2	
14	2.1		1.6	
15	2.8		2.7	
16	2.1	Missing both twining elements	2.1	
17	2.1		1.5	
18	2.7		1.5	
19	2.3		1.7	
20	1	Missing twisting element	1.7	
21	2.6		1	
22			1.6	
23			2	
24			2	
25			3	
26			1.5	
27			2.3	
	Frayed after 21		TOP	

	Front	**Back**
Row (From Bottom)	Weft Spacing Width	Weft Spacing Width
Stitch	9	9
1	6.7	7.1
2	4.6	6.3
3	7.4	6.9
4	6.5	7
5	7.2	5
6	7.9	7.5
7	6	9
8	8	5.9
9	7.5	7.6
10	8.5	6.1
11	8.8	8
12	8.1	7.2
13	7.4	7.9
14	9	7.4
15	8.4	6.2
16	7.7	7.9

17	9.9	5.6
18	6.3	8.4
19	7	7.6
20	6.9	8.9
21	5.9	6.2
22		7.6
23		7
24		6
25		4.5
	Frayed After 22	TOP

Random Warp Measurements
2.5
2.8
2.3
2.1
2.9
2.7
2
2.4
2.1
2.4