PERISHABLE TECHNOLOGY FROM THE HISCOCK SITE

J. M. Adovasio, 1 Richard S. Laub, 2 Jeffrey S. Illingworth, 1 John H. McAndrews 3 and David C. Hyland 1

1 Mercyhurst Archaeological Institute, Mercyhurst College, Erie, Pennsylvania 16546
2 Geology Division, Buffalo Museum of Science, Buffalo, New York 14211
3 Department of Botany, University of Toronto, Toronto, Ontario, Canada M5S 3B2

ABSTRACT—The 1996 excavations at the Hiscock Site yielded a remarkably well preserved impression and, possibly, actual minute pieces of a twined textile or basket. It was recovered from the site's Fibrous Gravelly Clay, within 5 cm of the overlying Older Woody Layer, and may be of late Pleistocene age. The impression represents a segment of a very well made close diagonal twined textile or basket with paired Z-twist wefts, a continuous weft side selvage, and is part of a fully flexible cloth construction of indeterminate configuration. The specimen was in loose stratigraphic association with a concentration of white-tailed deer (Odocoileus virginianus) bones. Whatever its exact chronological ascription, the specimen is potentially one of the earliest examples of textile or basketry technology in the Northeast and is, hence, highly informative of local perishable technology at or near the Pleistocene/Holocene transition. The technology, context, association and possible age(s) of this specimen are discussed in detail and this unique item is placed in the larger framework of perishable developments in the New World.

INTRODUCTION

A single positive impression of a basketry or textile fragment and possible minute fragments of this construction were recovered during the 1996 excavations at the Hiscock Site in Genesee County, New York (Fig. 1). Technically, basketry is usually treated as a subclass or variety of textile which, in turn, is usually defined as a larger, all-encompassing class of woven materials. In terms of process and product, however, both textiles and basketry can be regarded as belonging to or representing two distinct, albeit closely interrelated, perishable industries and, thus, these two categories can be defined at an equivalent classificatory level.

Specifically, basketry consists of those items including containers, bags and matting which, as recognized by many researchers (e.g., Mason, 1904; Balfet, 1952; Adovasio, 1977; Drooker, 1992), are usually not fully pliable and, as Driver (1961, p. 159) points out, are manually woven without the support of any frame or loom. Textiles represent generally infinitely flexible materials, such as cloth or fabric, produced with the aid of a frame or loom. The difference between basketry and textiles, then, is customarily determined by the degree of flexibility of the specimen, the form of the item, and whether the item was made with some variety of hanging or horizontal heddle or non-heddle frame. Since these three features—and thus the distinction between basketry and textiles—can usually be determined only by examination of actual specimens, as is discussed further below (see Discussion, Internal Correlations), no final determination can be definitively made as to whether the Hiscock Site impression and possible related fragments represent loom- or non-loom woven materials. As is also detailed below, however, regardless of whether a supportive frame was used, the manufacturing process can usually be distinguished from an impression. Of the three major and generally mutually exclusive manufacturing processes (cf. Adovasio, 1977)—twining, coiling and plaiting—only twining is represented at the Hiscock Site.

METHODS AND MATERIALS

CONSERVATION PROCEDURES

Upon its discovery on 28 July 1996, the specimen (Fig. 2; Hiscock Site field no. E9SW215) and its adhering matrix were treated with glycerin procured from a local drugstore, wrapped in plastic, stored on an aluminum foil “boat” and then kept refrigerated. The specimen was then transferred to Mercyhurst Archaeological Institute (MAI) by R. Laub on 27 August 1996, and initially examined by J. M. Adovasio and Richard B. Davis. A small amount (ca. 1 cm³) of what appeared to be mold was observed on the opposite side of the specimen from the textile/basketry impression. Samples of the mold were taken for analysis by Larry Gauriloff, Department of Biology, Mercyhurst College, and the specimen was placed in a translucent Tupperware container and stored in an environmentally controlled chamber. Temperature in the chamber is maintained at
34–36°F (1–2°C), and humidity is maintained at 54–56%.

The mold was identified as penicillin (*Penicillium* sp.). Gauriloff recommended treatment of the affected areas with a mixture of isopropyl alcohol and deionized water (DI H2O). Treatment was delayed until 21 October 1996, while researchers at MAI contacted Ervin Taylor at the Radiocarbon Laboratory, University of California, Riverside, to determine the potential effects of isopropyl alcohol on radiometric dating. Taylor concluded that there would be no detrimental effects and the penicillin was subsequently excised. The affected area was then spot-treated with reagent-grade isopropyl alcohol. There is no longer any detectable microbial activity on the specimen.

Since its initial treatment, the specimen has remained stable, receiving only periodic misting with DI H2O. Currently, the specimen shows no signs of degradation, and all indications are that it will remain stable for an indefinite period of time. Plans for final stabilization are being prepared by the Canadian Conservation Institute (CCI), Ottawa, Ontario (cf. Logan *et al.*, this volume).

### Analytical Methods

The specimen was analyzed in its wet state with the aid of a Leica Wild M-10 stereoscopic microscope. Data were recorded on standardized analysis forms. The specimen's degree of flexibility, the degree of attrition wear, possible form and function, as well as raw material and method of preparation were noted. Measurements were recorded in the metric system with a Helios needle-nosed dial caliper. The specimen was photographed before, during and after analysis using both black-and-white and color 35-mm film. Digital photographs were also taken using a Panasonic WV-CP410 digital camera and the Snappy Video Snapshot computer program. Additionally, prior to analysis, the specimen was submitted by R. S. Laub to the Canadian Conservation Institute (CCI), Ottawa, Ontario, to be documented by three-dimensional laser scanning.

The twined impression from the Hiscock Site was assigned to a single structural type based on the number and sequence of warps engaged at each weft crossing and the spacing of the weft rows. Twining denotes a subclass of basketry/textile weaves manufactured by passing moving (active) horizontal elements, called wefts, around stationary (passive) vertical elements, called warps. Twining techniques may be used to produce containers, mats and bags, as well as fish traps, cradles, hats or fabrics of a wide variety of configurations. The specimen was also examined...
for selvage, method of starting, work direction, and type(s) of decorative mechanics and mending. Classificatory protocols and descriptive terminology follow Emery (1966), Adovasio (1977) and Hurley (1979).

RESULTS

The single basketry/textile fragment from the Hiscock Site is allocated to one structural type, described below.

Type I: Close Diagonal Twining, Z-Twist Weft (see Fig. 2).

Number of Specimens.—1 (Specimen E9SW-215).

Type of Specimen.—Fragment with selvage, 1.

Number of Individual Forms Represented.—1.

Type of Form Represented.—Bag or cloth, exact configuration unknown.

Technique and Comments.—This specimen employs diagonal twined weaving over paired warp elements. Wefts are paired and closely spaced to partially conceal the warps. Both warps and wefts are composed of two-ply, S-spun, Z-twist cordage (Figs. 3 and 4) produced from retted plant stems or bast fibers from an as yet unidentified plant. There are no apparent warp splices, though the specimen does exhibit laid-in weft splices. The specimen exhibits a simple, continuous weft side selvage (Fig. 5) on one margin. The specimen is undecorated, unmended, and exhibits no diagnostic attrition wear. The specimen is not pitched, nor does it show predepositional residues. The specimen probably represents a fragment of cloth or, somewhat less likely, a fragment of a bag.

Measurements.—See Table 1.

DISCUSSION

INTERNAL CORRELATIONS

Genesis of the Specimen.—The Hiscock Site twining impression represents one of the rarest types of basketry or textile pseudomorphs encountered in the archaeological record. Specifically, it is a natural positive cast of a portion of a larger item as opposed to a negative impression of an item produced by impressing the original into a compliant medium or matrix.

To our knowledge, the only way that a positive cast like the Hiscock Site example can be formed is via the complete encasement and subsequent disintegration of the original within an essentially undeformed matrix. Once all or most of the original is gone, the “mold” or negative space is infilled with fine silt or clay-sized sediment, thus producing the natural equivalent of a ciré perdue or lost wax cast (similar to fossilization). This interpretation is strongly supported by the fine-grained composition of the body of the Hiscock Site specimen as well as its remarkable integrity. Interestingly, the decomposition of the original may not have been complete, as some microscopic strands of plant material within the impression
may represent minute fragments of the original construction. It should be noted that there is no way such a positive cast could have been created by any of the excavators or other contemporary users of the site.

Provenience, Context and Association.—The Hiscock Site twining impression was not recovered or documented in situ. Rather—and remarkably, considering its fragility—it was retrieved from the screens. The matrix containing the specimen was hand-excavated from grid square E9SW, the southern half of which (E9SW[S½]) was excavated in 1996. This matrix was recovered 77-82 cm (30.3-32.3 in) below modern ground surface within the upper portion of the Fibrous Gravelly Clay Layer near the upper interface of that unit with the overlying Woody Layer (Fig. 6).

The impression is considered by the excavators to be “loosely” associated with faunal elements, most of which are assignable to a single whitetailed deer (*Odocoileus virginianus*). The majority of these elements clustered in the lower part of the overlying Woody Layer and intruded down into the Fibrous Gravelly Layer. (These bones were analyzed by Madrigal, this volume.) Put most simply, the exact provenience of the impression is somewhat ambiguous. It may have originated within the Fibrous Gravelly Clay, or it may have intruded into it from the base of the overlying Woody Layer. Interestingly, and perhaps tellingly, pollen analysis of sediment from the matrix directly around the impression (Table 2) is consistent with an origin within the Fibrous Gravelly Clay rather than the overlying Woody Layer.

Chronology.—Given the uncertainties of the exact provenience of the Hiscock Site twining impression, a precise age for this item cannot be established on purely stratigraphic or contextual grounds. Unfortunately, neither can radiometric determinations resolve the matter. Accelerator mass spectrometry (AMS) assays run on a twig fragment of unidentifiable wood from the matrix of the specimen produced an uncorrected date of 10,180 ± 50 radiocarbon years B.P. (CAMS-75232), while a piece of unidentifiable plant tissue from the matrix yielded an uncorrected date of 7,950 ± 50 radiocarbon years B.P. (CAMS-75233). Obviously, the earlier assay is consistent with an origin in the Fibrous Gravelly Clay, which is of demonstrated late Pleistocene age, while the later date is consistent with an origin in the Older Woody Layer, which is of early Holocene ascription (Laub *et al.*, 1988; this volume).

It should be noted that neither date was run on fibers thought to be part of the original specimen.

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**Table 1**—Measurements recorded for Type I: Close Diagonal Twinning, Z-Twist Weft, from the Hiscock Site.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Measurement</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range in Warp Element Diameter</td>
<td>0.12-0.19</td>
<td>—</td>
</tr>
<tr>
<td>Mean Warp Element Diameter</td>
<td>0.17</td>
<td>—</td>
</tr>
<tr>
<td>Warp Unit Diameter</td>
<td>0.32</td>
<td>—</td>
</tr>
<tr>
<td>Warp Units per cm</td>
<td>—</td>
<td>16a</td>
</tr>
<tr>
<td>Welt Element Diameter</td>
<td>0.10</td>
<td>—</td>
</tr>
<tr>
<td>Range in Welt Unit Diameter</td>
<td>0.16-0.28</td>
<td>—</td>
</tr>
<tr>
<td>Mean Welt Unit Diameter</td>
<td>0.20</td>
<td>—</td>
</tr>
<tr>
<td>Welt Units per cm</td>
<td>—</td>
<td>14a</td>
</tr>
<tr>
<td>Welt Gap</td>
<td>0</td>
<td>—</td>
</tr>
</tbody>
</table>

*Number of units extrapolated from a measurable area of 0.5 cm.*
The few surviving crumbs provided an insufficient volume for dating by currently available means, and have been archived to await the development of adequate technology. At that time, the age of the twining specimen may be established with greater certitude.

**Technology, Form and Function.**—Whatever its precise age, the Hiscock Site twining specimen represents a technically sophisticated and well-executed example of close diagonal twining. The standardization (i.e., consistent gauge and diameter) of the warp and weft elements, the regularity and even spacing of weft row engagement, and the consistency of the side selvage treatment collectively mark or signal a mature perishable technology rather than any sort of initial essay in the craft.

Unfortunately, despite these insights, the relatively small size of the specimen precludes specification of finished form or presumed function(s). While it is virtually certain that the original construction was fully flexible, it is not possible to determine whether the fragment is an item of clothing or a bag fragment. The presence of a side selvage suggests that the specimen is most likely a segment of a twined cloth or fabric of indeterminate shape. It is possible, however, that this specimen is a fragment of an envelope-like bag, made by folding and then sewing rectanguloid lengths of twined textiles. As such, the bag may exhibit side selvages unlike the far more common radially twined form.

Regardless of the specific form represented by the specimen, it is noteworthy that Judith Logan (personal communication, 2001) suggests the item may have been used to transport raw clay which, in turn, could have been used in wattle-and-daub construction. Interestingly, such a function has also been suggested for some of the much earlier textile fragments recovered from Gravettian contexts in central Moravia (Adovasio et al., 1997; Soffer et al., 2000; Adovasio, Hyland, Soffer & Klima, 2001).

**EXTERNAL CORRELATIONS**

Despite the ambiguities of its age, as well as the uncertainties surrounding its exact form or function, the Hiscock Site specimen is nonetheless one of the oldest evidences of perishable fiber technology in eastern North America. Indeed, if the earlier AMS date is correct, the Hiscock Site specimen is the oldest example of twining from anywhere east of the Mississippi River. Even if the younger AMS date is accepted as a minimum age, the Hiscock Site specimen is the oldest example of twining within the Northeast and one
of only a handful of Early Holocene examples of this technology in eastern North America. Perishable remains of any kind are extremely rare in Paleoindian contexts east of the Rocky Mountains. The oldest, reliably dated, unequivocal specimen analyzed to date derives from middle Stratum IIa at Meadowcroft Rockshelter, Washington County, Pennsylvania (see Fig. 1). The item is a wall fragment of 1/1 interval simple plaiting (Stile, 1982, p. 133) and single elements, which is bracketed by uncalibrated radiocarbon dates of 12,800 ± 870 radiocarbon years B.P. and 11,300 ± 700 radiocarbon years B.P. The specimen lacks selvage, shifts, splices and decoration. While the “finished” form of the plaiting fragment cannot be ascertained, it was manufactured (as with all of the Meadowcroft basketry) of a cut, birch-like (Betula sp.) bark (Stile, 1982, p. 133).

A far older but more tentatively classified perishable from Meadowcroft Rockshelter is of lowest Stratum IIa provenience, and is directly dated to 19,600 ± 2,400 radiocarbon years B.P. The specimen again consists of a single element of cut, birch-like (Betula sp.) bark which is not dissimilar in overall configuration to the strips employed in all of the later Meadowcroft simple plaiting. If the specimen is a portion of a plaited construction, it is at once the oldest actual basket (as opposed to impression) in eastern North America, the rest of the continent, and the world.

By the onset of essentially modern climatic conditions, which is concomitant with the initiation of the Early Archaic period (ca. 8,000 B.C.), perishables are somewhat better represented in widely separated portions of eastern North America. A single specimen from Level 6 (Zone IV) at Graham Cave in Montgomery County, Missouri (see Fig. 1) ranges from 9,700 ± 500 radiocarbon years B.P. to 9,290 ± 300 radiocarbon years B.P. in age, and may be assigned to the very beginning of this period (Logan, 1952, p. 74; Klippel, 1971, p. 22). This fired clay impression, erroneously identified as “coiled” (Logan, 1952, p. 58), is—with the possible exception of the Hiscock Site impression—the oldest evidence of twining in eastern North America. Examination of a clay positive made directly from the impression indicates that the specimen is composed of close simple twining with S-twist wefts. The paired wefts appear to be single elements of loosely Z- “spun” fibers, while the composition of the warps is not discernible. If the warps were rigid, the specimen probably represents a container of some sort, and if they were flexible, it may be a bag fragment. The condition of the impression precludes the determination of splicing techniques or any other detail of construction, save to note that the specimen is not structurally decorated. Similarly, the raw material employed in construction cannot be ascertained.

Later levels (zones) at Graham Cave produced additional basketry impressions, again on fired clay (Logan, 1952, p. 58). A minimum of two types of twining were recovered (Logan, 1952, Plate XXI) from Level 5 (Zone IV/III), Level 4 (Zone III) and Level 2 (Zone II). Collectively, these specimens date between 8,830 ± 500 radiocarbon years B.P. and 7,630 ± 120 radiocarbon years B.P. One of these types (Logan, 1952, Plate XXIc) is an impression of open simple S-twist twining over what appears to be two-ply Z-spun S-twist cordage warps, while the other (Logan, 1952, Plate XXIb) is either a representative of the same type (except with Z-twist warps) or it is open diagonal twining, again with Z-twist warps. As the “fibrous nature” of the warps and wefts may indicate, these two wall fragments probably represent portions of flexible containers such as bags. The specimens lack selvages, splices or decoration and are composed of indeterminate raw materials.

Southeast of Graham Cave, Icehouse Bottom in Monroe County, Tennessee (see Fig. 1) also yielded an assemblage of impressions of Early Archaic vintage (Chapman & Adovasio, 1977, p. 620). Twenty-seven of the site’s 30 specimens originate from Strata M-O, the Lower Kirk horizon, and span a period of 9,450–9,250 radiocarbon years B.P. (Chapman & Adovasio, 1977, p. 623). The remaining three fragments derive from Strata L and J, the Upper Kirk horizon, and may be ascribed to a 9,250–8,850 radiocarbon years B.P. time interval.

Twenty-nine specimens represent impressions of open simple twining with Z-twist wefts. Warps and wefts consist of two-ply, S-spun, Z-twist cordage. These specimens lack selvages and were probably originally flexible; thus, they probably represent impressions of the undecorated “walls” of matting or bags. Further, some of these items appear to be radially twined, although splice type and raw material cannot be determined.

Stratum O of the Lower Kirk horizon also produced the oldest netting fragment from eastern North America (Chapman & Adovasio, 1977, p. 622). It is a portion of a single element fragment built up of a series of knotted loops of single-ply, S-spun cordage forming an open diamond mesh.
The knot employed in the looping process is a sheetbend or weaver’s knot. The specimen is unmodified, undecorated, and lacks selvages and splices. The raw material is again unknown.

Of broadly contemporaneous age is the earliest sandal from Arnold Research Cave in Missouri (see Fig. 1 [Kuttruff et al., 1998, p. 72–75]). Directly dated by two AMS assays to ca. 8,325–7,675 radiocarbon years B.P., this specimen contains a simple-plaited sole dominated by longitudinal “pseudo warps” with an elaborate tie system. A slightly later specimen is also plaited with accessory rows of simple twining and some form of looping.

From the same general area (see Fig. 1), two twined basketry impressions were documented within the early deposits at Modoc Rockshelter, Illinois (Fowler, 1959; Styles et al., 1983). The oldest specimen, which derives from the Stratum 20–23 interface, is open simple twining, with Z-twist warps. Both warps and wefts are apparently two-ply, S-twist fiber with a ca. 8.5 mm gap between weft rows. The texture appears flexible and the specimen—or more accurately, the surface from which it derives—is not directly dated, but it underlies the second Modoc specimen, which is dated to ca. 8,350 ± 100 radiocarbon years B.P. The younger impression from Modoc Rockshelter was recovered from Feature 252 in Stratum 26 and appears to be an open simple twined fragment of indeterminate weft slant. Unfortunately, the impression is not well delineated and the composition and flexibility of the warps and wefts cannot be determined with certainty. It may be another mat fragment.

While the Graham Cave, Icehouse Bottom, Arnold Research Cave and Modoc Rockshelter perishables are clearly of Early Archaic ascription, somewhat less certain is the placement of perishable specimens from Layer G at Russell Cave, located in northeastern Alabama (see Fig. 1). This “unit” is dated between 8,950 radiocarbon years B.P. and 6,950 radiocarbon years B.P., and has yielded four examples of what is alleged to be over-and-under lacing—that is, simple plaiting (Griffin, 1974, p. 62). While the single published photograph does not allow exact determination of actual construction techniques or any other details of manufacture, the specimen appears to be twined. Specifically, the illustrated item clearly seems to be functional wrapped twining with one semi-rigid fixed weft and one flexible “running weft.” Though rare in the extreme, this type is represented in the archaeological records of the Pacific Northwest and the Lower Pecos in Texas. The illustrated Russell Cave specimen apparently represents a (flexible?) wall fragment (without selvage) of a container of unspecified configuration and is unspliced, unmodified, and undecorated. Lamentably, the problematic identification and interpretation of the Layer G artifacts is compounded by the fact that these materials may be intrusive from later levels.

Whatever the type or age of the Russell Cave assemblage, the data from Icehouse Bottom, Graham Cave, Arnold Research Cave, Modoc Rockshelter, and now the Hiscock Site clearly indicate that well-made plant fiber-derived perishables were definitely in use in the East by the early Holocene at least. They also indicate that whatever their exact forms, the specimens from the sites noted above specifically demonstrate that the twining of plant fiber-derived products was well established in eastern North America no later than the early Holocene and, further, that twining lies at or near the base of basketry/textile developments in eastern North America just as it does in western North America (Adovasio, 1970, 1974; Andrews et al., 1986). The great antiquity of twining is also now supported by the Hiscock Site impression, especially if it is in fact of Pleistocene age.

It should be stressed in this regard that the earlier AMS assay for the Hiscock Site specimen is not inconsistent with either the known age of twining in western North America (cf. Adovasio, 1974; Andrews & Adovasio, 1980; Andrews et al., 1986) nor the demonstrated antiquity of this technology in the Old World (cf. Adovasio, Hyland, Soffer & Klíma, 2001; Adovasio, Soffer, Hyland, Illingworth, Klíma & Svoboda, 2001). Indeed, given the documented occurrence of twining in 29th millennium B.P. Gravettian contexts in Central Europe and slightly later elsewhere in the Old World, it is virtually certain that this basketry subclass, specifically, and related perishable fiber technology, generally, were part and parcel of the material culture suite brought to the New World by its first colonists (Adovasio, Hyland, Soffer & Illingworth, 2001).

What is unique about the Hiscock Site specimen is that, if it is indeed of late Pleistocene age, it represents the first time this technology has ever been recorded from an open fluted point locality in the entire New World. As such, it would conclusively demonstrate that perishable plant fiber-based textile or basketry technology was an integral part of the lifeway of groups
hitherto defined, described, and putatively explained almost entirely on the basis of their durable tool kits. In fact, if the recovery of twining from Old World Gravettian contexts may serve as an analogue, it may well prove that perishable fiber-based technology in the form of baskets, nets and textiles was far more important to the ultimate success of Clovis and related populations than any fluted point ever could be.

CONCLUSIONS

The following salient points can be made about perishable fiber technology at the Hiscock Site:

1. A positive cast of a close diagonal twined basket/textile with Z-twist wefts was recovered from the Hiscock Site.
2. Though the form and function(s) of the specimen are unknown, the cast reflects a mature and technically sophisticated textile/basketry technology, not an initial essay in these crafts.
3. The age of the specimen is ambiguous and may range from late Pleistocene to early Holocene based on two uncalibrated AMS determinations.
4. If the specimen is late Pleistocene in age, which is supported by pollen spectrum data, then it represents the first documented occurrence of twined textiles or basketry in an open Clovis-era site in all of the Americas.
5. Whatever its age, the Hiscock Site specimen is consistent with previous reconstructions of textile/basketry developments in eastern North America and greater North America.

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