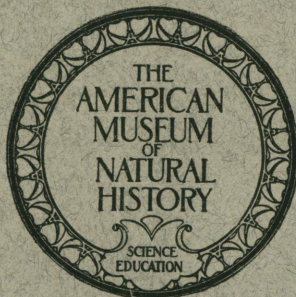


ANTHROPOLOGICAL PAPERS
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY

VOLUME XXXVIII, PART I

TEXTILE FIBERS USED IN EASTERN
ABORIGINAL NORTH AMERICA

By A. C. WHITFORD



By ORDER OF THE TRUSTEES
OF
THE AMERICAN MUSEUM OF NATURAL HISTORY
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INTRODUCTION

The author of this paper has studied the vegetable fibers used in fabricating objects in the ethnological and archaeological collections from the Indian tribes of the Mississippi drainage and eastward, now in the American Museum. The first task was to identify them and view them against the background of existing textile knowledge. The present paper reports these identifications and comments upon fiber samples from collections in other museums.

The writing of this paper would have been impossible without the generous and whole-hearted coöperation of many institutions and individuals. This assistance has ranged from the furnishing of specimens for determination, to advice as to methods, classifications, and the supplying of modern material for comparison. For specimens of classified plants to be used in the comparative work thanks are due to The New York Botanical Garden in Bronx Park, the Botanical Departments of the University of Wisconsin, the University of Oklahoma, and the University of Georgia.

The standard histological microscopic methods were used for the determination of the fiber. Slides were made of both cross-sections and longitudinal sections and these were compared with previously prepared and classified modern material.

When the specimen was too colored for microscopic examination it was bleached in a solution of Sodium perborate until clear enough for study. In charred material, when sufficient detail was preserved for identification the fiber sample was treated with Schultz Maceration solution, washed, dried, and fortified by saturating in a collodion solution. Occasionally, it was found necessary to stain the material and in this either Delafield's Haematoxylon or Methylene Blue was used. In the differentiation of certain species, it was found necessary to make microscopic measurements of the length and width of the cells, but generally the shape, distribution, medullation, and other constant characters were sufficient for the identifications.

In the text and tables the following abbreviations are used for the names of the coöperating institutions:—

American Museum of Natural History	AMNH
Museum of the American Indian, Heye Foundation	MAIHF
Milwaukee Public Museum	MPM
McGill University Archaeological Museum	McGU
Ohio State Historical and Archaeo- logical Museum	OSHAM
Peabody Museum, Harvard University	PMHU
Rochester Museum of Arts and Sci- ence	RMAS
University of Kentucky Museum	UKM
United States National Museum	USNM

MONOCOTYLEDONOUS SPECIES

The fibers from monocotyledonous plants, as identified, are listed here. Approximately five hundred objects were sampled, so the frequencies for the several species should be given that denominator.

ARECACEAE, Reichenb. (Palm Family)

The palmetto (*Sabal palmetto*, Walt.) seems to have been an article of commerce as it was used by the Winnebago and the Iroquois, north of its northern limit of distribution. It was also used by the Cherokee. The Winnebago used the fiber in the production of stiff cords for their bags. In three bags in the American Museum the stiff cords are made from this material (50-7531). For burden straps the Iroquois used this fiber to produce stiff strong cords which were covered with cotton or other soft fiber (AMNH 50.1-1954). The Cherokee used it in the manufacture of basketry (AMNH 50.1-2141).

BROMELIACEAE, J. St. Hil. (Pineapple Family)

This Florida moss (*Tillandsia usneoides*, L.) was found in specimens from the Southern States only. The Koasati and the people who built certain mounds in Florida used it frequently. A specimen in the United States National Museum from the Parish Mound, Number 2, in Florida, consisted of a bunch of loose material. The Koasati material is in the Museum of the American Indian, Heye Foundation, and is represented by fibers from a blanket and threads on a spindle (1-8551).

DRACAENACEAE, Link. (Yucca Family)

Yucca (*Yucca arkansana*, Trelease) was encountered in one specimen from the Arkansas Bluff culture in a bundle of loose fiber (MAIHF 11-7429).

Yucca (*Yucca filamentosa*, L.) was found once in a heavy cord made by the cave and shelter people of Ohio (OSHAM 332-42)

Nolina georgiana, Michx., was found in two specimens, a moccasin (OSHAM 332) and a bristle-like fiber from the Spiro Mound (2718-K, Trowbridge Collection).

It is possible that this plant may have been used very frequently in objects from caves and rock-shelters. It was not always convenient, however, to examine complete objects so that some occurrences of its use may have been overlooked, especially since these people commonly mixed several fibers. In the specimen in question for, example (OSHAM 332), *Nolina georgiana* and *Eryngium yuccaefolium* were identified. Similar combinations of fibers from widely different plants have also been noted; frequently, as in the example cited, a local plant was mixed with one found at a great distance.

JUNIPERACEAE, Horan (Juniper Family)

Red cedar (*Juniperus virginiana*, L.) was encountered in only one specimen, a bag made by the Potawatomi Indians (AMNH 50.1-7096).

POACACEAE, R. Br. (Grass Family)

The grass family was the most commonly and widely used of any of the monocotyledonous families.

Big blue stem grass (*Andropogon furcatus*, Muhl.) was one of the major fibrous plants used by the cave and rock-shelter peoples of Ohio in the construction of coarsely woven articles, such as rope and moccasins. It was commonly used without preliminary treatment, but was simply twisted or braided into strands. The specimens examined were from the Ohio State Historical and Archaeological Museum. A typical example of the use of this fiber is in a woven moccasin (OSHAM 898-1).

Sweet grass (*Hierochloe odorata*, L.), to be distinguished from sweet vernal grass, was encountered only once in a bag made by the Michigan Ottawa Indians (MAIHF 19-7125).

Canebrake (*Arundinaria tecta*, Muhl.) was a common source of fiber for moccasins and rope. It seems to have been utilized by most of the prehistoric cave and rock-shelter peoples within its range (OSHAM 332-27).

TYPHACEAE, J. St. Hil. (Cat-tail Family)

The cat-tail (*Typha latifolia*, L.) was observed in a mat found in the caves of Tennessee (USNM 132252).

ZEA MAYS, L. (Indian Corn)

Indian corn occurred only once. This single occurrence has no real significance as to the frequency of its use, for all specimens in which it was obvious that corn was the material used were not sampled. The sample noted here was found in a knife made by the Micmac Indians (McGU H76). The material was a cornstalk which had been subjected to considerable pressure to force out the juice and pith to bring the hardy flinty layers into juxtaposition. It was then used as a wedge to fasten the knife handle. It was extremely hard and durable.

The above are the monocotyledons en-

countered in this survey, in all some twenty-four objects using this material. It should be noted that these materials are readily adaptable to use since they need very little preparation and are frequently used entire. Sometimes the fiber is removed from the surrounding materials by simply letting them ret. *Yucca* and *Tillandsia* are ordinarily used entire. The grasses were used as they were gathered, simply twisted or braided. *Tillandsia* is the only plant of this group which was used for the manufacture of fabrics as in the blanket above noted (p. 7). The specimen of cornstalk was an exception and its preparation was evidently for a specific purpose.

Palmetto fiber is especially adaptable. At the base of the leaves, where they join the main stem is a large mass of more or less loose or loosely interwoven fibrous material which needs only straightening to be ready for use.

DIOCOTYLEDONOUS SPECIES

ANONACEAE, D. C. (Custard-Apple Family)

The pawpaw (*Asimina triloba*, L.) seems to have been universally used by all the tribes who lived where it flourished. Its use was apparently limited only by its distribution, for it was encountered sixteen times in the prehistoric material examined from Kentucky, Arkansas, and Ohio, as well as in historic objects made by the Menomini and Wisconsin Potawatomi. In the University of Wisconsin Museum is a bunch of prepared fiber (16422) from the caves of Kentucky. This fiber was commonly used by the cave and rock-shelter peoples of Arkansas for cords, mats, rope, and in all coarsely woven materials. A woven mat from Bushwick Cave is a fair example (MAIHF 11-6243). The Ohio cave and rock-shelter dwellers used the pawpaw for coarse bags and fabrics, for example, in a split bark bag (OSHAM 332-22). In the Milwaukee Public Museum are two bags in which this fiber was identified, one, from the Menomini (4570) in which only the weft is of pawpaw, and another (23287) from the Wisconsin Potawatomi, entirely composed of it.

APOCYNACEAE, Lindl. (Dog-bane Family)

The genera *Apocynum* is represented by both the species indigenous to the territory surveyed, but as Indian hemp is one of them, it was rather surprising how infrequently they were encountered. Only ten examples of its use were found.

This plant (*Apocynum androsaemifolium*, L.) which is called dog-bane is so similar in appearance and properties that it might well have been and was used indiscriminately with Indian hemp (*Apocynum cannabinum*, L.). The species was found three times in material examined. Its use by the Nanticoke in the manufacture of fish nets is demonstrated by a net (50.2-600) in the American Museum. A burden strap (50-7221) made from this fiber by the Iroquois is also in the Museum collections.

Apocynum cannabinum L., the so-called

Indian hemp, was found seven times and of these is represented four times in the archaeological cave and rock-shelter materials examined. The Museum of the American Indian, Heye Foundation, has a bundle of prepared fibers (11-7384) found at Allards Bluff, Arkansas. A dark colored piece of fabric, attributed to the Hope-well culture of Ohio, made in part from this material (957) is in the collections of the Ohio State Historical and Archaeological Museum. Another piece of cloth (1200) in the same museum is an Adena culture example of the use of this fiber. The Museum of the American Indian, Heye Foundation, has a Sauk and Fox bag (2-4694) made from this fiber. In the American Museum a fish net (50.2-601) made by the Nanticoke and an Iroquois burden strap (50-7401) complete the catalogue of objects in which this fiber occurs. In many of the older specimens examined, the fiber was crudely prepared before twisting, but in the more recent Indian material it is well broken down and fine, so as to make small counts and even threads or cords.

ASCLEPIADACEAE, Lindl. (Milkweed Family)

The milkweed family is represented by four species of *Asclepias*, namely, *tuberosa*, *pulchra*, *incarnata*, and *syriaca*. These fibers were used in the manufacture of fine threads and cords. In both archaeological and recent Indian material the fibers were well prepared before use. In the archaeological objects it is possible that the fibers were collected in the spring, after retting by the weather; in any event, they all show that they have been freed to a large extent of their cementitious materials and epidermis.

The highland milkweed (*Asclepias tuberosa*, L.) was encountered twelve times from all parts of its geographical range. The cave dwellers of Arkansas used it, as is exemplified by a bundle of knotted fibers in the Museum of the American Indian, Heye Foundation (11-6179). In the Peabody Museum of Harvard Univer-

sity is some textile material which accompanied a knife found in an Ohio mound (28328). The protohistoric Indians of Massachusetts used the fiber to manufacture textiles as may be seen in a piece of plain cloth (A4127) and in a specimen of twined cloth (A5478) in the same museum. The Iroquois Indians employed it to make fine threads for stringing wampum belts as is shown by one (M1905) in the Archaeological Museum of McGill University. As stated above, all this material was broken down to make comparatively fine, smooth threads and cords.

The species, *Asclepias pulchra*, Ehrh., or swamp milkweed, is closely related to *A. incarnata*, L. It was found in ten specimens examined, but from only two states, Ohio and Kentucky. In the University of Kentucky Museum is a rope (Bh 15/V4), made of this fiber. In the Ohio State Historical and Archaeological Museum are specimens of fabrics made from it which are attributed to the Hopewell culture. One of these, a piece of cloth wrapped around a copper plate (283), also contains *Urtica gracilis*.

The milkweed (*Asclepias incarnata*, L.) was noted four times in Ohio archaeological objects. In the Ohio State Historical and Archaeological Museum is a two-strand rope (899-20), one strand of which is made from this fiber. This is a typical cave and rock-shelter sample. Wrapped around a Hopewell culture copper plate in the same museum is a piece of fabric containing five different fibers, among them *Asclepias incarnata* (957).

The species *Asclepias syriaca*, L., seems to be the most widely distributed geographically of any used by the Indians surveyed in this paper. It was found seventeen times in material from all sections and many tribes.

In this Museum were observed the following objects in which this fiber was used in whole or in combination with other fiber: a Sauk and Fox bag (50-4886); a Delaware drum string (50.1-1609); a Delaware burden strap (50-7244); a Matchapunga fish net (50.1-9911); and a cord used for wrapping on a spear (50.1-7475), Micmac. In the Museum of the American

Indian, Heye Foundation, is a Kickapoo ball of string (2-5294) made of this fiber. In an Iroquois wampum belt (M1913) in the Archaeological Museum of McGill University, the beads are strung on cords made from this fiber. An Iroquois burden strap (AE 360) in the Rochester Museum of Arts and Sciences is composed of this fiber. Fiber of this species was also used by the prehistoric cave and rock-shelter people of Ohio as is shown by a fish net (OSHAM 332-23) in the Ohio State Historical and Archaeological Museum.

BETULACEAE, Agardh. (Birch Family)

The paper birch (*Betula papyrifera*, Marsh.) was encountered in one specimen (AMNH 50.2-1792). The bark was untreated, simply twisted into a cord. In a specimen of Iroquois horsehair embroidery (McGU H49) the bark had received no preliminary treatment, but was used in the raw state.

CANNABINACEAE, Lindl. (Hop Family)

This introduced plant, hemp (*Cannabis sativa*, L.), was found in four specimens, evidently made in post-Columbian times as the plant is not indigenous to the Western Hemisphere, but was introduced by the colonists at a very early date. It was found in a bag (MPM 28116) made by the Wisconsin Potawatomi Indians. A bow-string on an Algonkin bow (AMNH 50.2-4221A) is made from this fiber as are also portions of an Oneida burden strap (AMNH 50.1-1800).

DAPHNACEAE (Mezereon Family)

This moose or leatherwood fiber (*Dirca palustris*, L.) was encountered eleven times in as widely separated states as Arkansas and Wisconsin. It was used both in the raw state, as strips twisted into cord, and as treated fiber in finer cords and threads. A prehistoric mat made by the inhabitants of Bushwick Cave, Arkansas, is composed of this material (MAIHF 19-4635). Cloth of the Adena culture made, in part, from this bast fiber (1200) is in the Ohio State Historical and Archaeological Museum. In the Milwaukee Public Museum is a Wisconsin Potawatomi bag (23447) in

which the weft is nicely prepared fiber from this plant. In the collections of this Museum is a Winnebago bag (50-784D) woven with two kinds of cord; light colored cord of *Dirca palustris* and dark colored cord of *Tilia americana*.

JUGLANDACEAE, Lindl. (Walnut Family)

The bast from the black walnut (*Juglans nigra*, L.) was encountered twice in burden straps from the Iroquois (Museum of the American Indian, Heye Foundation). These fibers had apparently been previously treated, both chemically and mechanically. They were probably boiled in ashes, pounded, and then straightened so as to make them usable in twisting cord and thread. One such specimen in the above Museum carries the catalogue number 16-5208.

LINACEAE, Dumort. (Flax Family)

Common flax (*Linum usitatissimum*, L.) is another example of introduced fibers used by the Indians in post-Columbian times. The fiber was probably secured in trade. It was found in five specimens made by the Winnebago, Potawatomi, Michigan Ottawa, and Delaware Indians. In the Milwaukee Public Museum is a bag (14619), made by the Winnebago and composed entirely of flax cords. In a Delaware burden strap (50-7191) in this Museum the fine cords are linen, but the coarse cords are milkweed, *Asclepias syriaca*. In the Archaeological Museum of McGill University is a wampum belt (M5932), the beads of which are strung on a commercial linen thread.

MALVACEAE, Neck. (Mallow Family)

As was to be expected, cotton (*Gossypium herbaceum*, L.) became the most commonly and universally used of any of the fibers after it was introduced east of the Mississippi River. No specimen was encountered in the prehistoric material, but after its introduction and sale by traders it was the most commonly used fiber. It does not seem advisable to discuss these uses in detail, suffice it to say that it served all purposes for which string and thread are utilized.

SALICACEAE, Lindl. (Willow Family)

Black willow (*Salix nigra*, Marsh.). This species of black willow was used by the Menomini, Winnebago, Michigan Ottawa, and Ojibway Indians in the manufacture of bags, pouches, fish nets, and cord. A Menomini bag (MAIHF 8-1136) and a similar Winnebago bag (AMNH 50.1-903) contain black willow fiber. A Micmac fish spear (AMNH 50-4754) is wrapped with black willow twine. In the preparation of black willow fiber the bark was obviously stripped from the tree. Then the inner white bast tissue was removed and boiled in wood ashes; finally, this bast was pounded and rubbed to remove all the cementitious materials and loosen the fibers so they could be arranged more or less parallel to each other for twisting or spinning. In none of the specimens examined were crude strips of the inner bark used without preliminary treatment.

TILIACEAE, Juss. (Basswood Family)

The bast layer from the basswood (*Tilia americana*, L.) seems to have been the fiber most commonly and universally used by the Eastern Indians, for it was encountered fifty-two times, in all areas from which specimens were obtained, with the exception of the extreme south. It was utilized for nearly all purposes, from the manufacture of bags to textiles. In the Milwaukee Public Museum is a Menomini bag (4586) made from the *Tilia* bast, carefully and thoroughly prepared to remove the gums and render the fibers parallel and capable of being spun into good yarn. A Potawatomi bag in this Museum (50.1-7091) is made from the same material. In the Museum of the American Indian, Heye Foundation, is a bag made by the Sauk and Fox (2-4966). In the Peabody Museum of Harvard University is a twilled woven garment (A5479B) made by the protohistoric Indians of Massachusetts. An Iroquois burden strap (AE 2963) in the Rochester Museum of Arts and Sciences is woven of threads from prepared fibers from this tree. In the Ohio State Historical and Archaeological Museum is a prehistoric fabric (957) containing *Tilia* and three

other species of fiber. Hopewell mound and rock-shelter specimens in the same museum show the use of *Tilia*.

The above gives a general picture of bass-wood fiber usage. It was found in an untreated state, merely cut into strips, as well as thoroughly treated and spun into comparatively fine threads.

ULMACEAE, Mirbel. (Elm Family)

The slippery elm (*Ulmus fulva*, Michx.) was found three times. Once, in a burden strap made by the Iroquois Indians (AMNH 50-6680) in which the fibers had received some preliminary treatment to soften them and remove much of the natural gum. Two other specimens, both rather coarsely woven fabrics from mounds of the Hopewell culture (OSHAM 283 and 125) were in the Ohio State Historical and Archaeological Museum.

The American elm (*Ulmus americana*, L.) was encountered only once in an Iroquois burden strap (MAIHF 19-4550). The fiber had received some preliminary treatment and differed decidedly from *Ulmus fulva* in the shape of the cells, in cross-section, and the residual amount of amorphous material.

UMBELLIFERAE

The *eryngium* (*Eryngium yuccaefolium*, Michx.) was commonly used by the prehistoric tribes of the area in which it occurs. It was found fifty-five times in material from the caves and rock-shelters of Arkansas, Kentucky, Tennessee, and Ohio. Its parallel veined long leaves lend themselves to all uses as readily as the yuccas of the south and west. It is easily shredded or it can be used entire with equal facility. The stem contains a very strong bast fiber which was also utilized. It does not seem to have been utilized by the historic Indians, as it was not encountered outside of the above cultures. Whatever, if any, treatment it received before usage was very slight and consisted apparently of shredding, with no chemical treatment, as no fine threads or cords were found. A sandal from the Kentucky cave culture is made from this plant by utilizing the leaf, as in the Southwest. A cord from a reed mat

found in the Tennessee caves (USNM 132252) is made from this material. The cord was used for tying reeds (*Typha latifolia*, L.) together. The Museum of the American Indian, Heye Foundation, contains many specimens taken from the caves and rock-shelters of Arkansas. Among these is a bag (11-7315) from Allards Bluff, made of this material.

This plant was frequently encountered in collections from the Hopewell and the rock-shelter cultures of Ohio, in the State Museum at Columbus; as, braided work (957), and cloth from a burial (854). These objects are believed to be typical, but the same plant was used in all classes of cordage and textiles found in collections representing these cultures.

URTICACEAE, Reichemb. (Nettle Family)

The nettle family is represented by three genera, *Boehmeria*, *Urtica*, and *Laportea*. Specimens of these three were encountered forty-eight times, so it seems to have been one of the most important families as a source of fibrous materials. The tissues were, almost without exception, treated before use.

The stingless nettle (*Boehmeria cylindrica*, L.) was used by practically all the Indian tribes covered by this survey. It was invariably more or less treated, with the possible exception of some twisted strands from the Bushwick Cave of Arkansas (MAIHF 19-4632). This cord appears to have been made by simply peeling the bark from the plant and twisting it. The Delaware used the same fiber in a wampum string (AMNH 50.1-1579), also in a burden strap (AMNH 50.1-1592). A Cherokee string used in a feather charm occurs in the collection of the Museum of the American Indian, Heye Foundation. The handle of a Micmac curved knife (MCGU H76) is fastened to the blade by wrapping with cord of this fiber. In the same museum there are two Iroquois wampum belts in which the strings for the beads are made from *Boehmeria* fiber. In the American Museum are two specimens of cord, one on a Micmac fish spear (50.1-7475) and the other the string to an Ojibway bow (50-6874A).

It is evident that raw *Boehmeria* fiber, properly treated, produces especially fine, soft, and strong material. It is easily distinguished from the fibers of the other members of the family by its smaller size, the shape of the cells, and their distribution when seen in cross-section. Both the *Urtica* and *Laportea* fibers are coarser and the ratio of length to width of the fiber is much greater. The lumen in all three is longer one way than the other, but is much more open in *Boehmeria cylindrica* than the other species.

The slender nettle (*Urtica gracilis*, Ait.) seems to have been a favorite source for all peoples from prehistoric to modern Indians. Its use extended from New England to Wisconsin. It was usually processed before use, except among some of the prehistoric peoples where it was merely twisted into cord. A bag from the caves of Tennessee (USNM 132255) is made from this fiber which has had some preliminary treatment. A modern Sauk and Fox bag (MAIHF 2-7911) shows complete preliminary processing. Some string in the Peabody Museum of Harvard University (A4109), is made from this plant; this is protohistoric material. The Hopewell culture of Ohio is represented by twelve specimens using this fiber, all of which show some preliminary treatment. A sample of cloth from a copper plate is representative (OSHAM 283). The cave and rock-shelter cultures of Ohio are represented, but here the fiber

seems to have received little, if any, preliminary treatment prior to use (OSHAM 332-42).

The woods nettle (*Laportea canadensis*, L.) was most widely used of all of the *Urticaceae*, both before and after treatment. It was used by the Sauk and Fox for bags, after it had received thorough treatment. In the Milwaukee Public Museum is a bag (30260) made of this material, thoroughly treated before being twisted into fine cord. A string used for tying a spear point to a shaft is in the Ojibway collection of the American Museum (50-4748). The Iroquois used it to make burden straps (MAIHF 19-8895). Braided cloth from prehistoric Kentucky is represented by a specimen (56795) in the Peabody Museum of Harvard University. The cave culture of Tennessee is represented in the United States National Museum by a shirt (132254) made from this fiber. The Hopewell culture of Ohio is well represented by fabrics in the Ohio State Historical and Archaeological Museum (957, is an example). The cave and rock-shelter culture of the same state employed this fiber to make twined cords as is exemplified by a cord (OSHAM 332-34). The cave and rock-shelter cultures of Arkansas used it for the manufacture of twisted cords as may be seen in a specimen (19-4630) in the Museum of the American Indian, Heye Foundation.

OBJECTS FROM SPIRO MOUND, OKLAHOMA

The well-known Spiro Mound, clearly prehistoric, furnished some examples of basketry, matting, cord, and cloth. The samples were sent to the writer by Mr. H. M. Trowbridge, Bethel, Kansas.

2716-C	Twisted fibers covered with feathers	<i>Arundinaria tecta</i>
2716-H	Twisted fibers covered with feathers	<i>Asimina triloba</i>
2717-C	Twisted fibers covered with feathers	<i>Asimina triloba</i>
2717-G	Woody material with feathers attached	<i>Asimina triloba</i>
2717-I&E	Twisted fiber mass	<i>Asimina triloba</i>
2718-E	Twisted fiber mass	<i>Asimina triloba</i>
2718-K	Bristle-like vegetable fiber	<i>Nolina georgiana</i>
2719-J	Twisted vegetable fiber	<i>Asimina triloba</i>
2721-A	Mat	<i>Arundinaria tecta</i>
2721-S	Fragment of basketry	<i>Arundinaria tecta</i>
2722-D	Twisted fiber	<i>Arundinaria tecta</i>
2722-I	Twisted fiber covered with feathers	<i>Arundinaria tecta</i>
2724-A	Twisted fiber covered with feathers	<i>Arundinaria tecta</i>
2724-K	Fawn colored string	<i>Arundinaria tecta</i>
2731	Mat	<i>Arundinaria tecta</i>
2782	Copper stained rope	<i>Asimina triloba</i>
2781	Charred basket	<i>Arundinaria tecta</i>
2783	Fibers adhering to copper sheet	<i>Arundinaria tecta</i>

A comparison of materials in prehistoric collections reveals an excess of animal materials in the artifacts from Spiro Mound. One gets the impression that in Spiro textiles strings of vegetable fiber are usually surfaced with hair or other animal materials to increase the softness of the product. This may account for the

almost exclusive use of canebrake and pawpaw, both relatively coarse fibers used without preliminary treatment. A striking contrast is between the slipshod way of making string and the highly precise fine techniques of covering it with hair and feathers.

SUMMARY

This survey makes no pretension of being complete, but it is an adequate sampling of the fibers utilized by the Eastern Indians and illustrates their resourcefulness in exploiting the raw materials at hand. It is noticeable that they used a great variety of plants and that one of the determining properties or qualifications was the local abundance of a plant. There seems to have been a tendency to use the monocotyledonous plants and the bast from the trees for coarser work and the dicotyledonous herbaceous plants for the manufacture of finer cords and threads.

Several general points of interest are apparent from the comparative study of these prehistoric and historic plant materials.

1. The plant fibers used by the prehistoric people were rarely if ever treated before utilization, while among the modern Indians a high degree of skill has been attained in the preparation of the fibers before spinning.

2. There seems to have been some commercial interchange between the Northern and the Southern tribes, both in historic and prehistoric times. The occurrence of palmetto fibers in modern Mohawk and Potawatomi collections and the use of *Nolina* by the cave and rock-shelter people of Ohio, shows commerce.

3. It seems that most, if not all, of the materials utilized were wild plants for there was no discoverable evidence of the cultivation of these plants. Such evidence

would be far from obvious since cultivation does not seem to improve the fibers in textile plants.

4. Among the prehistoric peoples the purposeful mixing of fibers was the rule. This is especially notable in the collections from Ohio and Arkansas. These mixtures of fibers occur both in the same strand and in the two-ply cords. It is not apparent why the fibers from different plants were mixed, but the combinations seem intentional, as nettle and milkweed, blue stem grass and pawpaw, nettle and yucca, basswood and nettle, and pawpaw and yucca. Yet, such intentional mixtures were rarely encountered in the historic collections examined.

5. It is apparent that the prehistoric peoples used such fibers as were adapted to their immediate purpose without previous treatment. They were stripped from the plant and twisted at once. This seems to account for the dominance of monocotyledonous fibers in prehistoric collections. The historic Indians, on the other hand, used a greater variety of species of fiber plants because they were able to prepare them properly before using. The determining factors seem to have been strength, fineness of fiber, and abundance of supply.

All the above observations are consistent with the assumption of a steady advance in textile skill and knowledge from prehistoric time to the present.

FIBER PLANTS AS IDENTIFIED

Andropogon furcatus
Apocynum cannabinum, *androsaemifolium*
Arundinaria tecta
Asclepias syriaca, *tuberosa*, *pulchra*, *incarnata*
Asimina triloba
Betula papyrifera
Boehmeria cylindrica
Cannabis sativa
Dirca palustris
Eryngium yuccaeifolium
Gossypium herbaceum
Hierochloa odorata
Juglans nigra
Juniperus virginiana
Laportea canadensis
Linum usitatissimum
Nolina georgiana

Blue stem grass
Indian hemp
Canebrake
Milkweed
Pawpaw
Paper birch
Stingless nettle
Hemp
Moosewood

Cotton
Sweet grass
Black walnut
Red cedar
Woods nettle
Flax
Yucca

FIBER PLANTS AS IDENTIFIED (*Continued.*)

Sabal palmetto
Salix nigra
Tilia americana
Tillandsia usneoides
Typha latifolia
Ulmus americana, fulva
Urtica gracilis
Yucca arkansana, filamentosa
Zea mays

Palmetto
Black willow
Basswood
Florida moss
Cat-tail
Elm
Slender nettle
Yucca
Indian corn

TABLE OF IDENTIFICATIONS

Selected objects in museum collections to show the range and frequencies in the use of vegetable fibers, including geographical and chronological distributions.

The objects from the Ohio State Historical and Archaeological Museum are all prehistoric. In other museums prehistoric objects are marked with an asterisk (*).

Number	AMERICAN MUSEUM OF NATURAL HISTORY Object	Fiber
ALGONKIN		
50.2-4221A	String from bow	<i>Cannabis sativa</i>
CHEROKEE		
50.1-2141	Basket	Coarse material, <i>Sabal palmetto</i> ; fine material, cotton
50.1-9911	Fish net	<i>Asclepias syriaca</i>
50.1-1901a	Moccasin	<i>Corchorus capsularis</i> , jute
DELAWARE		
50-7191	Burden strap	Fine cord, <i>Linum usitatissimum</i> ; coarse cord, <i>Asclepias syriaca</i>
50.1-1592	Burden strap	<i>Boehmeria cylindrica</i>
50-7244	Burden strap	<i>Asclepias syriaca</i>
50-7243	Burden strap	<i>Asclepias syriaca</i>
50-7203	Ceremonial wampum	<i>Tilia americana</i>
50.1-1609	Drum string	<i>Asclepias syriaca</i>
50.1-1621	Rope	<i>Tilia americana</i>
50.1-1579	Wampum string	<i>Boehmeria cylindrica</i>
IROQUOIS		
50-6683	Burden strap	Light-colored string, <i>Asclepias syriaca</i> ; dark-colored loose material, <i>Sabal palmetto</i> ; dark-colored string, <i>Tilia americana</i>
50-6682	Burden strap	Light-colored string, cotton; dark-colored string, <i>Tilia americana</i>
50-6680	Burden strap	<i>Ulmus fulva</i>
50-6681	Burden strap	Brown cord, cotton; light-colored material, <i>Laportea canadensis</i> ; dark-colored material, <i>Tilia americana</i>
50-7221	Burden strap	<i>Apocynum androsaemifolium</i>
50-7401	Burden strap	<i>Apocynum cannabinum</i>
50.1-1800	Burden strap	<i>Cannabis sativa</i> , hemp
50.1-1954	Pack frame	Cotton, <i>palmetto</i> , and <i>Tilia americana</i>
MATCHAPUNGA		
50.1-9911	Fish net	<i>Asclepias syriaca</i>
MENOMINI		
50-9885	Reed mat	<i>Tilia americana</i>
50.1-5880	Bag	Cotton
50-9864	Bag	Soft string, cotton; stiff cord, <i>Tilia americana</i>
50-9871	Bag	Cotton
50-9873	Bag	Cotton
50-9867	Bag	Cotton
50-9872	Bag	Cotton
50-9866	Bag	Cotton
50-4798	Bag	Cotton
50-9877	Bag	<i>Tilia americana</i>
50.1-6862	Bag	<i>Tilia americana</i>
50-9880	Bag	<i>Tilia americana</i>

AMERICAN MUSEUM OF NATURAL HISTORY (*Continued.*)

Number	Object	Fiber
MICMAC		
50.1-7475	Fish spear	Dark stiff cord, <i>Boehmeria cylindrica</i> ; gray cord, <i>Asclepias syriaca</i>
NANTICOKE		
50.2-601	Netting	<i>Apocynum cannabinum</i>
50.2-600	Netting	<i>Apocynum androsaemifolium</i>
OJIBWAY		
50-6874a	Bow	<i>Boehmeria cylindrica</i>
50-4754	Fish net	<i>Salix nigra</i>
50-4749	Fish hook wrapping	<i>Salix nigra</i>
50-4748	Spear wrapping	<i>Laportea canadensis</i>
50-5690	Woven bag	Cotton
50-4600	Woven bag	Yellow threads, animal; gray threads, cotton
PAMUNKEY		
50.1-9907	Net	Cotton
50.1-9906	Net	Cotton
50.1-9897	Net	Cotton
POTAWATOMI		
50.1-7098	Bag	<i>Tilia americana</i>
50.1-6895	Bag	White cord, cotton; dark loose fiber, <i>Tilia americana</i>
50.1-7091	Bag	<i>Tilia americana</i>
50.1-6899	Bag	Cotton
50.1-7096	Bag	Cotton and cedar
50.1-6897	Bag	Cotton and animal
50.1-7090	Bag	Cotton
50.1-7095	Bag	Cotton and animal
SAUK AND FOX		
50.1-2169	Bag	<i>Tilia americana</i>
50-4886	Bag	Light and dark, <i>Asclepias syriaca</i>
50-3558	Bag	Cotton
50-3550	Bag	Cotton
50-2219	Bag	Cotton
50.1-2168	Bag	Cotton
50-4885	Bag	Animal
50-3570	Fiber for making bags	<i>Laportea canadensis</i>
50-2204	String	<i>Asclepias tuberosa</i>
WINNEBAGO		
50.1-903	Bag	Red fiber, <i>Salix nigra</i>
50-7573	Bag	Blue and red yarn, animal; gray, cotton; stiff cord, <i>Tilia americana</i>
50-7531	Bag	Soft cord, cotton; hard cord and loose fiber, <i>Sabal palmetto</i>
50-7572	Bag	White cord, cotton; loose fibers, <i>Sabal palmetto</i>
50.1-906	Bag	<i>Tilia americana</i>
50.1-907	Bag	Cotton and animal (wool?)
50-7533	Bag	Cotton and animal
50-7759	Bag	Cotton and animal
50-784D	Bag	Light-colored cord, <i>Dirca palustris</i> ; dark-colored cord, <i>Tilia americana</i>
50-7532	Bag	Light cord, <i>Tilia americana</i> ; dark-colored cord, <i>Salix nigra</i>
50-7574	Bag	Stiff cords, <i>Tilia americana</i> ; soft cords, <i>Dirca palustris</i>
50.1-904	Bag	Cords, cotton; loose fibers, <i>Tilia americana</i>

AMERICAN MUSEUM OF NATURAL HISTORY (*Continued.*)

Number	Object	Fiber
WINNEBAGO (<i>Continued.</i>)		
50-7760	Bag	Cotton and animal
50-7763	Bag	Cotton and animal
50-7843	Bag	Cotton and animal
50.2-8024	Bag	Cotton
50-7762	Bag	Cotton
50.1-905	Bag	Soft cord, cotton; hard cord, Sabal palmetto

MUSEUM OF THE AMERICAN INDIAN, HEYE FOUNDATION

Number	Object	Fiber	Tribe or Location
2-4694	Bag	Apocynum cannabinum	Sauk and Fox
2-4966	Bag	Tilia americana	Sauk and Fox
2-7911	Bag	Urtica gracilis	Sauk and Fox
8-1136	Bag	Salix nigra	Menomini
11-6232*	Bag	Eryngium yuccaefolium	Arkansas
11-7315*	Bag	Eryngium yuccaefolium	Arkansas
19-7125	Bag	Hierochloa odorata	
16-5208	Burden strap	Juglans nigra	Mohawk
19-4550	Burden strap	Ulmus americana	Iroquois
2-5294	Cord	Asclepias syriaca	Kickapoo
19-4632*	Cord	Boehmeria cylindrica	Arkansas
11-6179*	Cord	Asclepias tuberosa	Arkansas
11-7384*	Cord	Apocynum cannabinum	Arkansas
11-7429*	Cord	Yucca arkansana and Asimina triloba	Arkansas
1-8551	Cord	Tillandsia usneoides	Koasati
11-8575*	Cord	Asimina triloba	Arkansas
19-4630*	Cord	Laportea canadensis	Arkansas
1-8672	Saddle blanket	Tillandsia usneoides	Koasati
19-8146	Cord on a kettle	Apocynum androsaemifolium	Iroquois
11-6243*	Mat	Asimina triloba	Arkansas
19-4635*	Mat	Dirca palustris	Arkansas

OHIO STATE HISTORICAL AND ARCHAEOLOGICAL MUSEUM

Number	Object	Fiber
332-22	Bag	Asimina triloba
332-34	Cord	Eryngium yuccaefolium; Laportea canadensis
332-42	Cord	Yucca filamentosa
898-1	Cord	Andropogon furcatus
899-20	Cord	Asclepias incarnata
7	Fabric	Asclepias pulchra
125	Fabric	Ulmus fulva
283	Fabric	Asclepias pulchra; Urtica gracilis; Ulmus fulva
332	Fabric	Andropogon furcatus; Asimina triloba; Arundinaria tecta
854	Fabric	Eryngium yuccaefolium
957	Fabric	Eryngium yuccaefolium; Tilia americana; Asclepias incarnata; Apocynum cannabinum; Laportea canadensis
1200	Fabric	Dirca palustris; Apocynum cannabinum
1175	Mat	Arundinaria tecta
332	Moccasin	Nolina georgiana
332-27	Moccasin	Arundinaria tecta
332-23	Net	Asclepias syriaca

MILWAUKEE PUBLIC MUSEUM

Number	Object	Fiber
4570	Bag	<i>Asimina triloba</i>
4586	Bag	<i>Tilia americana</i>
14619	Bag	<i>Linum usitatissimum</i>
23287	Bag	<i>Asimina triloba</i>
23447	Bag	<i>Dirca palustris</i>
28116	Bag	<i>Cannabis sativa</i>
30260	Bag	<i>Laportea canadensis</i>
33076	Fabric	<i>Urtica gracilis</i>

UNIVERSITY OF KENTUCKY MUSEUM

Le-5/V2*	Netting	<i>Asclepias pulchra</i>
Bh-15/V4	Netting	<i>Asclepias pulchra</i>

UNIVERSITY OF WISCONSIN MUSEUM

16422*	Fiber	<i>Asimina triloba</i>
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ROCHESTER MUSEUM OF ARTS AND SCIENCES

AE2963	Burden strap	<i>Tilia americana</i>
AE 360	Burden strap	<i>Asclepias syriaca</i>

MCGILL UNIVERSITY ARCHAEOLOGICAL MUSEUM

H76	Cord	<i>Zea mays</i> ; <i>Boehmeria cylindrica</i>
M1911	Cord	<i>Tilia americana</i>
11083	Cord	<i>Asclepias tuberosa</i>
M1905	Wampum belt	<i>Asclepias tuberosa</i>
M1908	Wampum belt	<i>Asclepias tuberosa</i>
M1912	Wampum belt	<i>Boehmeria cylindrica</i>
M1913	Wampum belt	<i>Asclepias syriaca</i>
M5932	Wampum belt	<i>Linum usitatissimum</i>

UNITED STATES NATIONAL MUSEUM

132255*	Bag	<i>Urtica gracilis</i>
132254*	Fabric	<i>Laportea canadensis</i>
132252*	Mat (reeds)	<i>Typha latifolia</i>
132252*	Cord	<i>Eryngium yuccaefolium</i>
132253*	Fabric	<i>Laportea canadensis</i>

PEABODY MUSEUM, HARVARD UNIVERSITY

A4109	Cord	<i>Urtica gracilis</i>
A4127*	Fabric	<i>Asclepias tuberosa</i>
A5478	Fabric	<i>Asclepias tuberosa</i>
A5479B	Fabric	<i>Tilia americana</i>
28328*	Fabric	<i>Asclepias tuberosa</i>
28390*	Fabric	<i>Eryngium yuccaefolium</i>
56795	Fabric	<i>Laportea canadensis</i>
8232	Moccasin	<i>Eryngium yuccaefolium</i>

