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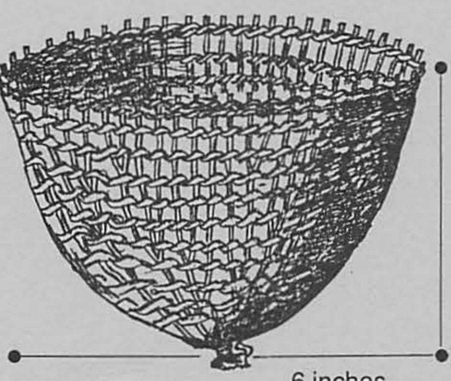
Curatorial Report Number 76

Construction and reconstruction of a Mi'kmaq sixteenth-century cedar-bark bag

Nova Scotia Museum
1747 Summer Street
Halifax, Nova Scotia, Canada
B3H 3A6

By Joleen Gordon
Research Associate, Museum Services
June 1993



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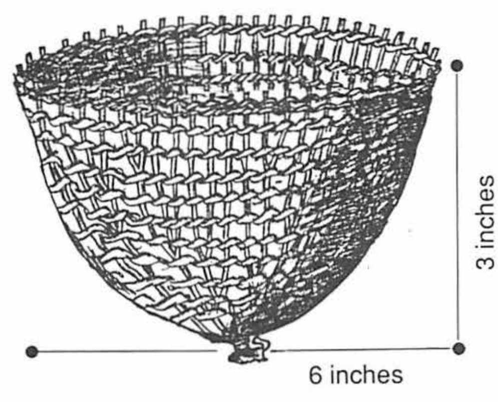

Nova Scotia Museum *Curatorial Reports*

The Curatorial Reports of the Nova Scotia Museum make technical information on Museum programs, procedures and research, accessible to specialist audiences.

This report contains the preliminary results of an ongoing research program of the Museum. It may be cited in publications, but its manuscript status should be clearly indicated.

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Introduction

In 1955, a small woven basket/bag was found among the grave goods in a sixteenth-century burial near the present town of Pictou, on the Northumberland Shore of Nova Scotia. The site is believed to be Mi'kmaq, dating from about 1570-1590 (Whitehead, in press). The material used to make the bag is cedar, which is intriguing, for the tree is not common in Nova Scotia today. The bag is the sole surviving example of a twined cedar-bark container not only from this site, but also from the whole Atlantic region.

The Pictou find is one of five archaeological sites in the Maritime Provinces from which fragments of woven plant textiles have been recovered: the Portland Point, Red Bank and Augustine Mound sites in New Brunswick, and the Pictou and Northport sites in Nova Scotia.

The material from Pictou is by far the most important, for it contains the largest number of woven plant-fibre fragments attributed to the Mi'kmaq people. The presence in the site of seventeen large copper pots and a number of copper fragments sterilized the soil with copper salts, resulting in good preservation of the organic material. This site included a wide range of plant material—cattail leaves (*Typha latifolia*), rush (*Scirpus lacustris*), cedar (*Thuja occidentalis*), as well as possible reed (*Juncus effusus*), possible Indian hemp (*Apocynum cannabinum*), and the inner bark of basswood (*Tilia americana*) and the inner bark from an as yet unidentified species of conifer. The discovery of a variety of weaving techniques within the collection is also important. Most of the fibres are twine-woven, with the warps woven both singly and doubly. In some of the rush-woven fragments, the paired warps are split between each row creating a diamond pattern.

The twining technique is employed in the small cedar-bark bag, the only one known from the eastern coast of Canada. The collection also contains this area's only evidence of the "pierced warp technique" described by O.T. Mason (1904), in a fragment of cattail matting using a sewn construction. As well as the woven fragments, there are several pieces of cordage using the technique of plying, and two varieties of braiding.

Many of these artifacts are now in fragments, leaving one to speculate on the original form and use. None of the plants mentioned above is used today by Mi'kmaq basketweavers. However, both they and other basketmakers in the province continue to utilize some of the same weaving techniques as found in the region's archaeological sites, but using other materials. For example, the twine-woven withe baskets and eel traps of the fisherman of European descent (Gordon, 1984), and the twill- and checker-woven splint baskets of ash, maple and poplar made by the Mi'kmaq people (Whitehead, 1980; Gordon, 1990).

This report examines one artifact from the Pictou site, the small twine-woven cedar-bark bag, Nova Scotia Museum 84.22.553 (Figure 1). One of the most exciting pieces in the collection, it has survived the intervening 400 years remarkably well. Small, hemispherical in shape, measuring approximately 750mm deep and 150mm in circumference, the bag is almost complete, save for being split open on one side. Its original use is unknown.

Mary Lou Florian, conservation scientist with the Royal British Columbia Museum, and a fibre specialist, has identified the material used to weave the bag as the inner bark, or secondary phloem tissue, of the Eastern White Cedar, *Thuja occidentalis* L.

Many Haida cedar-bark baskets from the Pacific coast of Canada are closely twined (Figure 2); few are woven with open spacing between the rows (Figure 3) as is the Mi'kmaq cedar-bark bag. In the Haida bags, the start is made by overlapping several long strips radiating in a circle. In the Mi'kmaq artifact, a bundle of shorter strips is bound and then spread into a circle prior to weaving. Researchers and archaeologists in British Columbia who were consulted were unfamiliar with the start method used in this Mi'kmaq cedar-bark bag.

Weave pattern terminology

The weave patterns examined here are those referred to as checker, twill, and twine. The terminology can be a little confusing because these weaves are used both in baskets and in cloth, but basketry and textile researchers often describe the same structures with different terms.

J.D. Adovasio classifies basketry techniques as plaiting (further subdivided into checker-plaiting and twill-plaiting), twining, coiling, braiding and sewing. In checker-plaiting, the warps/standards/uprights and the wefts/woofs/weavers are interlaced at right angles, in a single over-one, under-one weave. In twill-plaiting, the warp and weft are at right angles, but the wefts pass over and under the warps in staggered intervals of 2/2, 2/3, or 3/3 and so forth, producing a diagonal pattern in the weave. In twining, the "movement of the horizontal elements, called wefts, around the stationary vertical elements, called warps" creates a pattern in which "the wefts are active while the warps are passive" (Adovasio, 1977:15). In their movement, the wefts are twisted/twined in either an S- or a Z-twist (Figure 4).

Irene Kent in her definition of weft-twining is more explicit regarding the nature of the twist: the "two weft strands make a half-turn about each other enclosing a warp" (Kent, 1983:105). In the half-turn, the movement of the two strands is either with an S (left to right) or a Z (right to left) twist. These same two letters are also used to designate the ply of yarn and cordage. "When the yarn is held in a vertical position, the elements will tend in the direction of the slanted centre portion of the letter S (\) or Z (/)" (Kent, 1983:23).

The weave structure found in the cedar-bark bag from Pictou would be defined by the Adovasio classification as "open simple twining, with Z-twist". In the Kent terminology, it is "plain two-strand weft-twining with Z-twist".

Cedar and the ethnographic and archaeologic records

Cedar, *Thuja occidentalis* L., also known as Eastern White Cedar and Northern White Cedar, is a tree rare in Nova Scotia today. According to Ralph S. Johnson, a retired forester with the Nova Scotia Department of Lands and Forests, cedar was more common in Nova Scotia before the time of European contact (Johnson, 1986:341). Gordon S. Ringius summarized the records for cedar in Nova Scotia, noting that it was found in a few localized stands in the western and northern counties of the province—Cumberland, Kings, Digby and Yarmouth (Ringius, 1979:328). Johnson reported that cedar was also found in a few isolated stands in Annapolis County (Op. cit.).

In 1534, the French explorer Jacques Cartier noted that the native people steeped the cedar twigs to make a potion for preventing scurvy; he was so impressed that he took samples of the tree back to France. The King of France named the cedar "l'arbre de vie", "the tree of life", which we have come to know as either "arbor vitae" or "arborvitae".

At the time of early European settlement in Nova Scotia, several writers recorded the variety of trees here and their use by the Mi'kmaq. A seventeenth-century French fisherman and fur trader, Nicolas Denys, wrote a description of areas now known as Cape Breton Island, Prince Edward Island and the mainland coast from Canso, Nova Scotia, north to the Gaspé Peninsula of Québec. He explored the area extensively from the time of his arrival in 1633 until his death in 1688. Denys reported finding cedar stands at Havre Boucher and at Pictou in Nova Scotia. He also wrote of the Mi'kmaq use of cedar wood to make arrows:

> *Their arrows were of Cedar, which splits straight; they were nearly half a fathom in length. They feathered them with Eagle's quills. In place of iron they tipped them with bone.* (Denys, 1672/1908:419)

He also noted the Mi'kmaq use of cedar ribs and linings of cedar wood slats to strengthen their bark canoes:

> [Slats were] *the length of the canoe and some four inches broad, lessening towards the ends in order that they might match together. On the inside, the canoe was lined with them completely, as well as all along it from one end to the other. These slats were made of Cedar*

> *which is light, and which they split in as great lengths as they wished, and also as thin as they pleased. They also made from the same wood half-circles to form ribs, and gave them their form in the fire.* (Denys, 1672/1908:419)

When Titus Smith 'Junior' was commissioned by Governor John Wentworth in 1801 to survey the least frequented regions of Nova Scotia, to locate land suitable for raising hemp to produce rope for the British Navy, he found very few stands of white cedar (Smith, 1857; Clark, 1954). Johnson comments that most of the Nova Scotian cedar "must have been eliminated by disease and insects as there would certainly have been very little utilization before 1802 in the remote areas traversed by Smith" (Johnson, 1986:60). He concludes that with fewer diseases and pests prior to 1600, the size of many of the trees, including cedar, would have been much greater for "many of the forest pests here now have been accidentally introduced from other parts of the world" (Ibid:28).

The single twentieth-century reference to cedar-bark usage states that "cedar bark cordage was used by the Micmac people up into the twentieth-century in the manufacture of pack straps and other items, in one case for a complete set of harness" (Wallis and Wallis, 1955:77-78). There is no mention of the "other items", nor how widespread was this use. To my knowledge, cedar bark is no longer woven by the Mi'kmaq people in eastern Canada. However, cedar continues to be an important medium for many Native weavers living on the West Coast of Canada.

The archaeological record for the Maritime Provinces includes three sites from which cedar bark has been recovered: one specimen each from the Nova Scotian sites at Pictou (BkCp-1; a twine-woven bag) and Northport (BlCx-1; twill-woven matting), and two fragments (checker-woven and twill-woven matting) from the Red Bank site in New Brunswick. All but the Northport fragment have been microscopically identified as cedar, *Thuja occidentalis* L. This is most fortunate, as many fibre identifications of archaeological artifacts are lacking.

The Northport site, discovered after eroding from a cliff-face in 1971, contained a small (40x31mm) fragment, thought to be cedar-bark strips (4mm wide) because of physical appearance, texture and the twill-weaving technique employed. The Northport fragment is dated to 1570-1590 (Whitehead and Preston, in Whitehead, 1987:68-69; and Whitehead, 1990).

The Red Bank site in New Brunswick revealed two fragments microscopically identified by Dr. W. Steckbeck of the Botany Department of the University of Pennsylvania as "the bark of a Gymnosperm, probably Red Cedar, *Juniperus virginiana* L., or Aber [sic] Vitae (white cedar) *Thuja occidentalis* L." (Hadlock, 1947:62).

One of these fragments was twill-woven (Figure 5), like the one found at Northport. The other was checker-woven (Figure 6). Both pieces have been described by Hadlock (1947), Turnbull (1984:15-16), Harper (1956:49-51) and Whitehead (1980:52). They are thought to be remnants of matting. These textiles are of particular interest to ethnologists and archaeologists studying the early cultures of this region. Prior to discovery of this burial, there was no archaeological material supporting historical references to mats and their manufacture among the tribes of Northern Maine and the Maritime Provinces (Hadlock, 1947:60).

In his description of the twill-woven matting, Harper noted that the strips measured 6mm wide:

> *Ends of the strands are rolled into cords and left loose as a fringe. No evidence remains as to the method employed to prevent fraying on the mat's edges.* (Harper, 1956:51)

The Pictou site in Nova Scotia yielded the small cedar-bark bag which is the main focus of this discussion. At the time of the accidental uncovering of the site in 1955, Harper noted that "a soft basket of hemispherical form with a diameter 6 inches, depth 3 inches, and made from coarse sedge grass came from Grave Pit No. 2" (Harper, 1957:26 and figure 7). He also mentions that "portions of two other baskets with a similar weaving technique but differing in material came from the same burial pit; they are made from a two-ply twisted twine made by the Indians from fine grass" (Harper, 1957:26). When the collection was acquired by the Nova Scotia Museum, it contained only one bag-like container, the cedar-bark bag. It is interesting to examine Harper's drawing and to read his description of the "coarse sedge basket":

> *The specimen was sufficiently complete to allow a complete analysis of its construction. The first two stems of fibrous grass went from rim to rim across the bottom of the basket; they thus formed four warp*

> *threads or spines of the basket. To these stems six additional warp threads or stems were bound at the bottom so that the first circle of weft twining at the bottom of the basket was carried around ten warp threads or spines. As further circles of weft twining encircled the basket, more warp threads were added by binding the lower end of each in the same loop as the warp thread which already existed, but on the next round of weft twining, it was bound separately. The proper flare to the sides was thus obtained. A total of thirteen rows of weft threads completed the basket but with the last two rows on the rim being very close together to give a very firm finish.* (Harper, 1957:26-27; and Harper, n.d.:17)

Although the alleged sedge basket and the cedar bark bag have similarities—overall dimensions, weft-twining technique, and possibly the same rim construction—there are differences. Not only does the method of starting the two baskets differ, but there are additional warps in the grass basket while the cedar-bark basket appears to have none. Harper's text and illustration must represent a bag lost before the collection came to the Nova Scotia Museum. It is possible that the cedar-bark bag may very well be one of "the two other baskets... in differing materials" (Harper, 1957:26).

Harper noted that "one of these baskets was lined with a very fine pelt, possibly that of a squirrel" (Ibid.). The soft nature of both the grass and the cedar bark, along with the observation that one of them was lined with fur, suggest to me that the bags may have been used to carry something small and precious.

The Mi'kmaq cedar-bark bag

The cedar-bark bag from the Pictou site has a very simple construction (Figures 8 and 9). Because of its flattened state, the brittle nature of the material, and the break in the side of the bag, it is a little difficult to determine the precise method of the start. It would appear that the warp of 60 to 70 cedar strips, each approximately 1.5-3.0mm wide and 120-150mm long, was bound together by two cedar strips, each 1.5-2.0mm wide and of unknown length. From the presence of two short ends on the inside of the basket (Figure 10), it would appear that the two binding strips were inserted into the centre of the warp-bundle. The remaining lengths were then wrapped together around the warp-bundle two or three times, about 10mm from the end, before separating them into two separate strands for two-strand twining.

There are 12 rows of weaving in the bag. In the first row, the warp threads are divided into large groups (probably 12 groups of 5). In the following rows, each group of warps is split in half with the warp threads woven singly in rows 4 through 12. In this particular artifact, there do not appear to be any warp strips added to the weave as mentioned by Harper in his description of a similar grass bag (1957:26-27; Figure 7). All rows are 4 to 5mm apart, with the exception of a double row of weaving at the top (Figure 11).

The warp threads in the basket may have been divided in the 12 rows as follows:

Start	60 warps gathered together
Row 1	12 groups of 5 warps each
Row 2	24 groups of 2-3 warps each
Row 3	48 groups of 1-2 warps each
Row 4	60 x 1 warp each

A Z-twist is used in the weft-twining. This would indicate the bag was probably woven upside-down, a very common way of making this style of basket; the upward motion of the twisting makes it easier to control both the motion and the placement of the twist to produce a firm fabric. There is no intricately woven rim; the warp strands are cut off flush with the last two rows of weaving. Although it is the tightness of the weaving pattern which prevents the fabric from unravelling, this method of finish suggests to me that the bag was not intended to be roughly used.

Preparation of cedar bark

Because cedar is no longer woven in Nova Scotia, I have relied on Hilary Stewart's knowledge of Native methods of handling the bark on the West Coast (Stewart, 1984; personal communication, 1988). The prominent species of cedar on the west coast of Canada are the Red Cedar, *Thuja plicata*, and the Yellow Cedar, *Chamaecyparis nootkatensis*. Stewart examined my samples of Eastern White Cedar, and in her experience, they seem to resemble the Yellow Cedar more than the Red.

Yellow Cedar bark is gathered in the spring, during a short two-week period when the sap is rising and the wood is very wet. The Native women of the West Coast offer a prayer to the tree before making a horizontal cut in the bark, cutting through both outer and inner barks to the sapwood. The bark is never cut all the way around the tree, for the tree would die. Gently prying up the layers of bark, the strip is pulled from side to side, or back and forth, as the woman walks away from the tree. The strip thus gradually travels up the length of the tree, tapering in width until it breaks free. The outer and inner barks are then separated. The rough outer bark is discarded.

The leathery inner bark is hung in the sun and wind to dry for six to eight days. It is then bundled and stored for future use. There are many ways of preparing bark for weaving. In most cases, the bundle is soaked in water for about two weeks. Once it is pliable, it can be separated into long continuous layers and then cut to the desired width. If the bark is pitchy, the Tlingit women on the West Coast "boiled the bark for at least a day, rinsed it in clean water and softened it by twisting and working the fibres in their hands, as they did for red cedar bark, without the aid of an implement" (Stewart, 1984:125). Some women work the bark with their hands drenched in oil in an attempt to soften the bark. Animal oil, such as whale or seal oil, was preferred to plant oil, for it increased the flexibility of the bark and preserved it as well (Stewart, personal communication, 1988).

Some women prefer to work with the bark dry. To separate it into thinner layers, they place the dry bark between their front teeth which they have carefully dried, and gently bite the end of the bark. Beginning at the end, they gradually bite their way in for about a centimetre, breaking down the fibers. The bark is then removed from the mouth and separated into two layers by pulling apart with the hands, exerting equal pressure on the two halves, centimetre by centimetre, down the full length of the strip of bark. Depending on the resulting thickness, this process may be repeated. This process is much the same as the method used by Mi'kmaq women in their basketry and by Nova Scotian Black basketmakers (Gordon, 1977).

To make a narrow strip for weaving, a small cut is made into the end of the bark with the thumbnail at the desired width. The strip is gently bent up and down, pulling backwards and forwards, in a rocking motion down the length of the bark. This action produces a straighter cut than pulling only in one direction (Stewart, personal communication, 1988).

We have no record of how the Mi'kmaq prepared cedar-bark fibres for making their type of bag. However, Mason recorded the process by which another Algonkian-speaking group of native people, the Menominee Indians in northern Wisconsin, softened a similar material, the inner bark of basswood (*Tilia americana*), in preparation for weaving "finer kinds of bagging". Sheets of bark from the young sprouts of basswood were boiled in water with a quantity of lye.

> *This softens the fiber and prepares for the next process, which consists of pulling bunches of boiled bark forward and backward through a hole in the shoulder blade of the deer. The fiber is twisted into yarn and made into a cord or twine by winding on the thigh with the palm of the hand. This advance in the preparation of the textile elements paves the way for twined weaving.* (Mason, 1904:376)

Field gathering notes—Spring 1989

When I collected cedar bark on April 13, I found the sap was not running well enough to allow easy removal of the bark. On May 20, the bark was very easily removed from a tree 7.5cm in diameter. It was very wet, and not at all sticky. The bark was thinner (about 1mm) than that I had gathered in British Columbia from the larger Yellow Cedar trees. On May 29, I tested another tree, approximately 30cm diameter, and found that the inner bark was thicker (approximately 2mm). This was still a good collecting time, with the bark coming off the tree easily, very wet and not too sticky.

To collect the bark, I made a horizontal cut 5-8cm long into the bark near the base of the tree, slicing through both the outer and inner layers to the wood. From each end of this cut a vertical cut was made up the tree, to prevent the bark strip from tapering inwards too quickly. The outer and inner barks together were pulled off the tree to the desired length. I found it easiest to work with pieces no wider than 5-8cm and about 12cm long for the warps, and the same width but half a metre long for the wefts.

To separate the outer and inner layers of bark, I inserted a knife blade between them while holding the rough side towards me. The layers were separated either with a gentle knife-prying action down their length, or by bending them away from each other with the fingers. The rough outer layer was discarded, while the inner layer was saved.

The next step was to subdivide the inner bark into a series of narrow strips in preparation for weaving. I tried to make the width of both the warp and weft strips coincide with those in the Mi'kmaq bag. Instead of using a knife or a pair of scissors, I used the West Coast method shown to me by Hilary Stewart. With my thumbnail, I made cuts 1.5-3.0mm wide for the warp strips in one end of a piece of bark 12cm long. For the wefts, I used longer pieces of bark, approximately half a metre, and made the cuts 1.5-2.0mm wide. Gently bending each new strip up and down in the manner described earlier, I guided it down the length of the bark (Figure 12). In all, 60 to 70 warps strips and approximately 6 to 8 weft strips were made.

The strips were wrapped in a damp towel to keep them pliable, and stored in a plastic bag in the refrigerator to prevent mould, until needed. If the strips are not to be used right away, I would suggest freezing them.

Reconstruction notes

To begin weaving a reconstruction of this cedar-bark bag, align the bundle of 60 to 70 warp strips so they are even at one end (Figure 13). Insert the ends of the two longer weft strips approximately 20mm deep into the centre of this bundle (Figure 14). Bring these two wefts to the outside of the warp-bundle, and wrap them tightly around the bundle of warps two or three times (Figure 15). This wrap is made about 10mm from the end of the warp-bundle. The place where the two wefts were brought out from the centre of the warp-bundle marks the beginning of the first row of weaving. The bag is woven upside down, with the free ends of unwoven warp hanging below, and the two wefts lying horizontally. Begin Row 1 by slipping one of the wefts under a group of 5 warps while allowing the other weft to lie on top (Figure 16). Pull both wefts tightly while giving them a half-twist. Then, slip the weft which had passed over the first warp group under the next group of 5 warps, while placing the other weft over. In so doing, the two wefts will twist in a Z direction. This is 2-strand weft-twining.

It is important to keep the groups of 5 or 6 warps as close together as possible, which means the twists have to be made very tightly. However, the twists should be made in such a way that the wefts do not twist into a roll. In the original artifact, the wefts appear to lie flat, on top of each warp. To achieve this, weave each weft separately as described, slipping each one in place and then pulling both wefts evenly, rather than twisting both wefts together in one motion around each warp as is done in some forms of twining.

To make the separation of the warps easier, fan them out in a circle, being careful to keep the short ends of the two wefts free on the underside. This first row of weaving is approximately 4mm distant from the wrapped area. When Row 1 is complete, begin the second row opposite the place where the two wefts emerged from the warp-bundle. In Row 2, the warps are separated into groups of 2 or 3 strips (Figure 17). This row is 4mm from the previous one. In this way, the warps are woven in ever-decreasing groups and eventually separated into single warps by the fourth row (Figure 18).

At this point, the shaping begins to change from a radiating circle to a straight-sided cylinder. It is important to align the warps beside one another, with rows 4mm apart and the whole fabric even.

The last two, Rows 11 and 12, are woven close together (Figure 19). To finish off, insert each weft down through a loop in the previous row to hold it firm. To make the rim, cut the warps just beyond the last row of weaving (Figure 20). The completed reconstruction is shown in Figures 21 and 22.

I found that the wefts dried out quickly; they needed to be wetted with water from time to time to keep them pliable. When a weft was used up, another was added by overlapping the end with a new beginning for about two twists (Figure 23). I also found it very hard to get the warps as close together as they were in the original artifact, perhaps because the original was 400 years old and had been crushed in the gravesite all that time. Or perhaps the Mi'kmaq had some way of softening the cedar bark prior to weaving, as did the Menominee in Wisconsin (Mason, 1904:376).

Summary

Cedar inner bark can be separated into thin narrow strips suitable for weaving techniques known as plaiting and twining. The archaeological record for the Maritime Provinces shows that the Mi'kmaq knew how to prepare this material, separating the leathery inner bark into longitudinal strips and peeling those strips into thin layers suitable for weaving. The artifacts found reveal two methods of plaiting: a plain checker-weave and a more complicated twill-weave.

However, a third method is used in the Pictou bag, which is twine-woven. This is the only known Mi'kmaq example to use twining with cedar bark. Twining is thought to be one of the earliest methods of constructing fabrics with two different sets of elements. It is very difficult to maintain an ordered shape with such a technique where both the warps and wefts are flexible. The construction of this bag appears to be unique not only to this area, but also to the rest of Canada. This little basket/bag is indeed a treasured testimonial to the skills of the early Mi'kmaq weavers.

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Note

A possible commercial source of cedar bark is Gilks Lumber Limited, RR# 2, Doaktown, New Brunswick, E0C 1G0. Their telephone number is (506) 365-4532. This lumberyard is a source of cedar wood for canoe makers. Because they cut their own timber, it might be possible to obtain bark when they are cutting during the spring sap run.

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Appendix 1: Cordage

The Pictou Site (BkCp-1) contains numerous pieces of cordage. All samples examined appeared to be made of two lengths twisted with S-twists and plyed together with a Z-twist. Although none of these samples has yet been identified as being made of cedar bark, Eastern White Cedar, *Thuja occidentalis* L., I experimented making cordage with the inner cedar bark.

I took two moistened pieces of bark about 1mm wide and 1mm thick, of varying lengths. The ends were tied together with a knotted piece of string and secured to the wall. Holding one piece of bark between each forefinger and thumb about 3cm away from the knot, and rolling both thumbs simultaneously to the left across the forefingers, the pieces were turned tightly in the same direction in an S-twist (Figure 24). Releasing only a small amount of tension on the bark, the two pieces were then twisted around each other in a Z-twist (Figure 25). I then moved my fingers 2 to 3cm down the length of the bark. The two pieces were again rolled independently before being allowed to twist around each other. In this way, a length of cord was produced. When a piece of bark got too short to use, another was added to the length by rolling the new and old ends together.

The 2-ply cedar-bark cordage is very strong and would have been very useful in the everyday life of the Mi'kmaq people. It could easily be made of varying thicknesses depending on the width and thickness of the pieces of bark.

The native people on the West Coast of Canada make cordage from the inner bark of cedar trees for an amazing multitude of purposes. Fine cord was used for fishing lines and dipnets, while heavier cord was used for whale harpoon lines, anchor lines, and rope for tending canoe sails. Still heavier cord was used for raising poles, roof beams and rafters in making their homes, as well as supporting the planking on canyon-spanning bridges! According to Hilary Stewart, "Cedar bark is naturally strong, with a tensile strength of around 27 MPa (400 lbs. p.s.i.)" (Stewart, 1984: 148).

Appendix 2: Braid

The Pictou site (BkCp-1) contains several pieces of braid. Most of the pieces are fingerwoven in the three-strand pattern using cattail leaves (*Typha latifolia*). However, there is one short piece of braid (NSM 84.22.554), measuring 1.0 x 5.0cm, woven in a seven-strand pattern (over-one, under-one, over-one) with an unidentified material (Figure 26).

This pattern is classified as a flat symmetrical braid by Jack Lenor Larsen (1986:81). It can be found world-wide, woven of a variety of plant materials—rushes, straws, wood strips, etc. A similar pattern continues to be used for straw- and rush-hat making in Lunenburg County, Nova Scotia (Gordon, 1981).

On the West Coast of Canada, strips of inner cedar bark have been fingerwoven into a variety of braided bands used as tumplines for carrying baskets, shoulder straps for quivers, rope lashings and ceremonial neckbands (Stewart, 1984).

It is possible the Pictou braid is made of cedar bark. With this in mind, I experimented braiding with White Cedar inner bark. Using 7 strips 2.0-2.5mm wide, I bound the ends with another piece of bark to hold the strips together. Fanning them out, I divided them into 2 groups, one of 3 strips, the other of 4. Keeping them in order, I bent the outer strip in the group of 4 and wove it across the others in that group (over-one, under-one, over-one) to lie alongside the group of 3. In this pattern the same step is repeated for the length of the braid (Figure 27). When a strip is almost completely woven, the end of a new one is overlapped to increase its length.

Strips of the inner bark of White Cedar can be braided very easily into what might have been used as a carrying band.

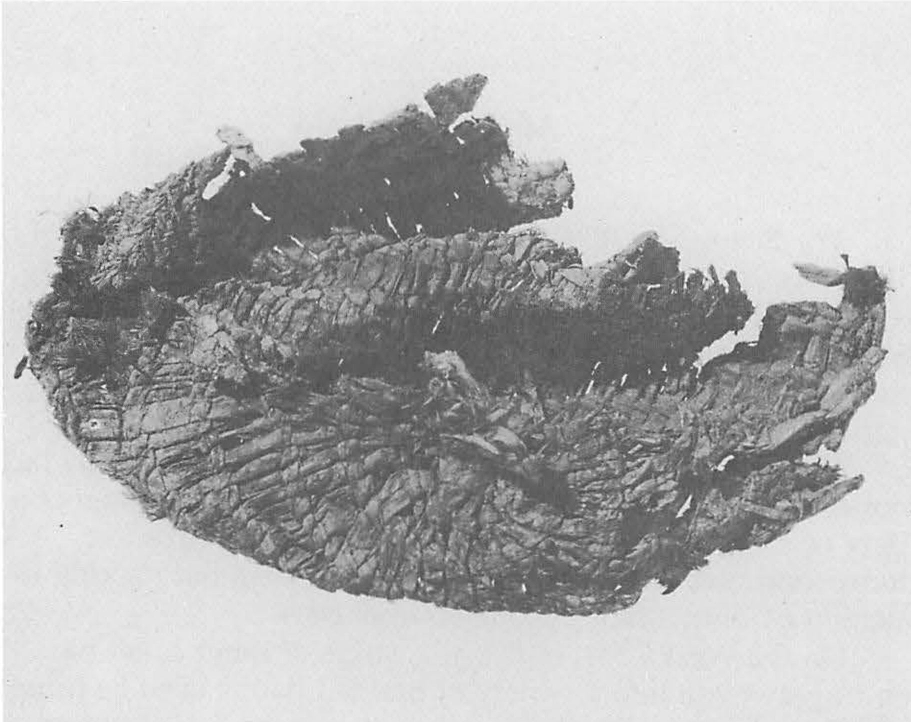

Figure 1. Sixteenth-century Micmac cedar-bark bag. Nova Scotia Museum collection 84.22.553 (photograph by R.E. Merrick, Education Media Services).

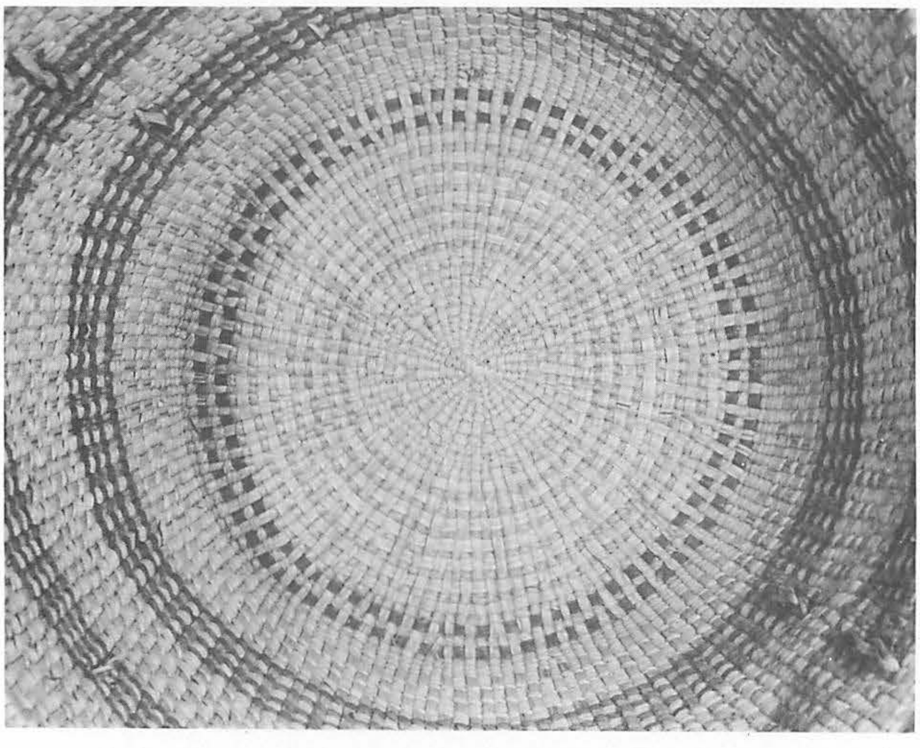

Figure 2. Haida cedar-bark basket, showing circular base with warps radiating from a central point and woven closely in a Z-twist plain twining; from the Queen Charlotte Islands, B.C. University of British Columbia Museum of Anthropology #1253/56.

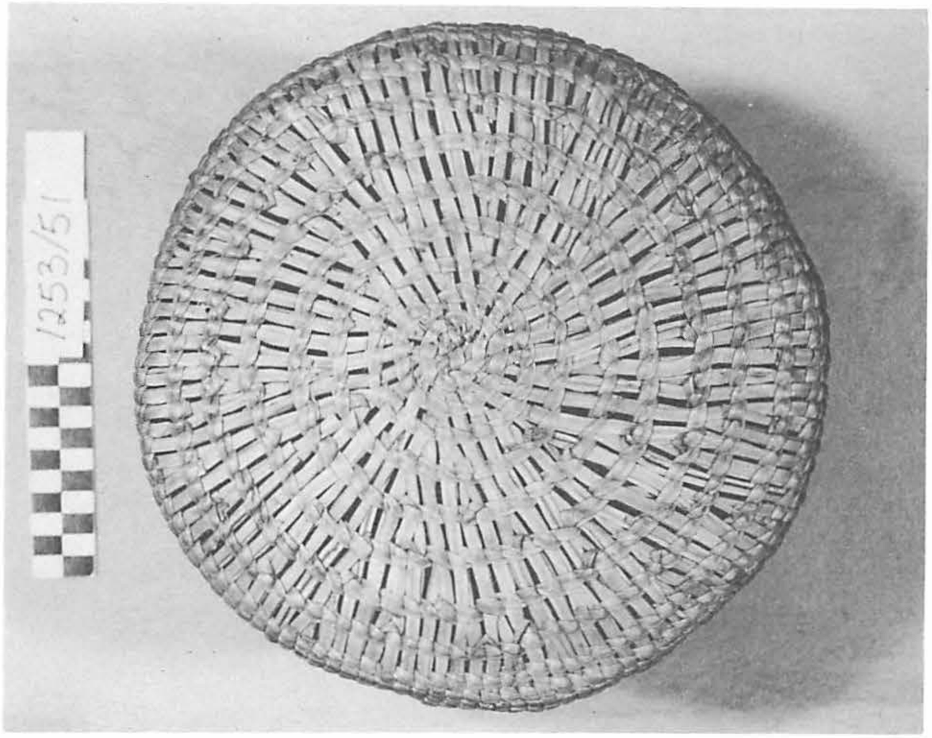

Figure 3. Haida cedar-bark basket, showing circular base with paired warps radiating from a central point and woven widely spaced in a Z-twist plain twining; from the Queen Charlotte Islands, B.C. University of British Columbia Museum of Anthropology #1253/51.

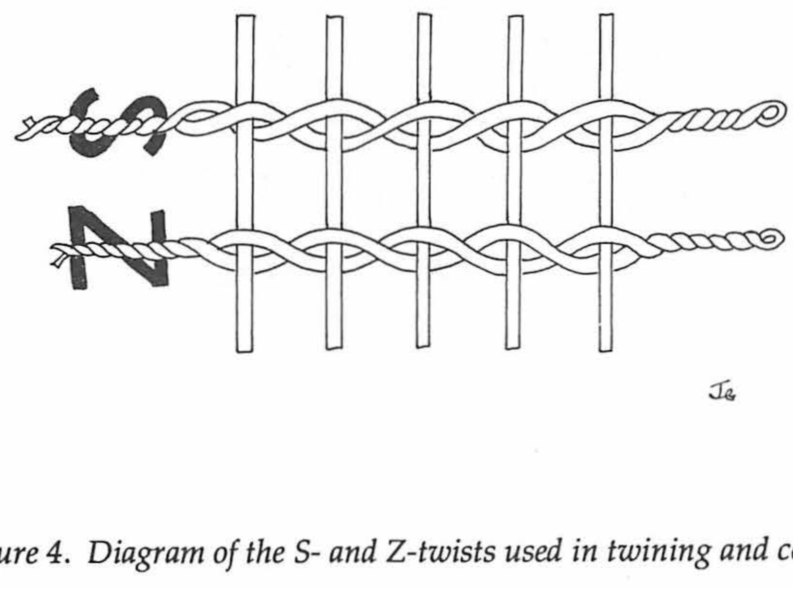

Figure 4. Diagram of the S- and Z-twists used in twining and cordage.

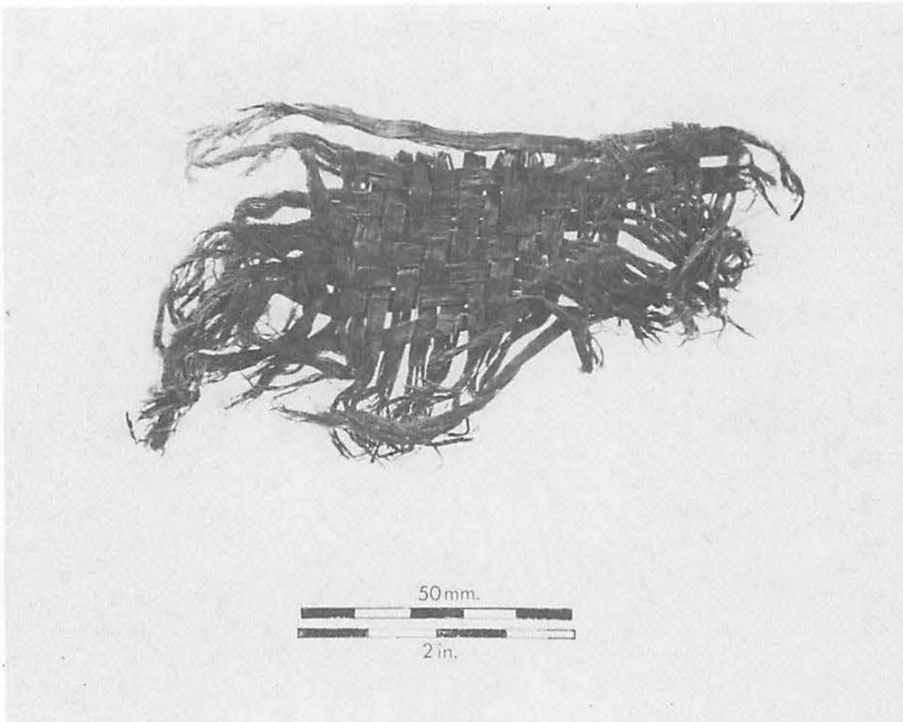

Figure 5. Fragment of twill-woven cedar bark from the Red Bank site in New Brunswick. Raymond Paul Gorham Collection, New Brunswick Archaeological Service.

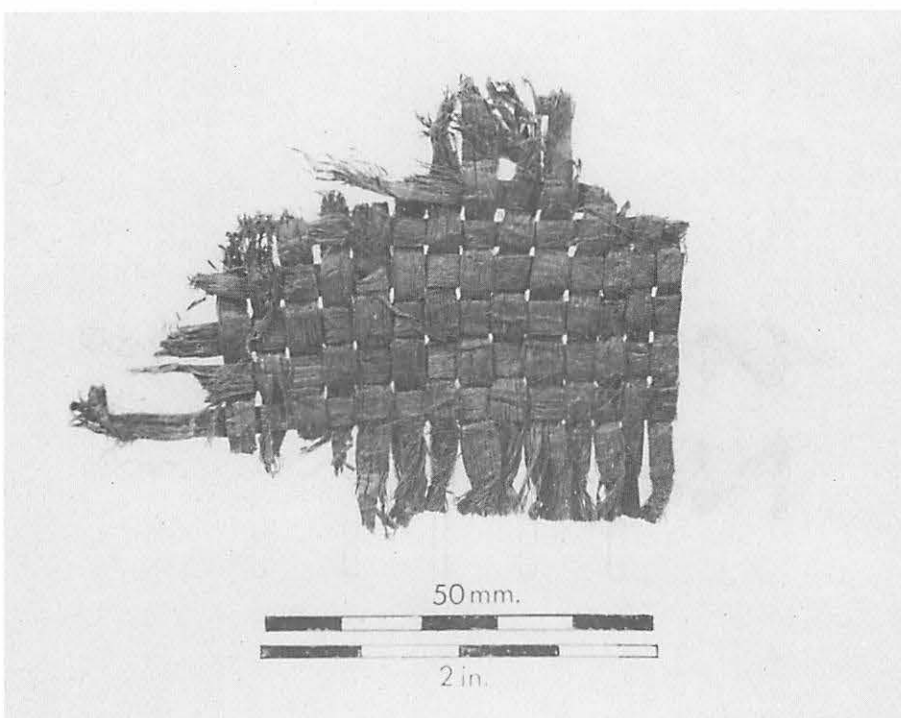

Figure 6. Fragment of checker-woven cedar bark from the Red Bank site in New Brunswick. Raymond Paul Gorham Collection, New Brunswick Archaeological Service.

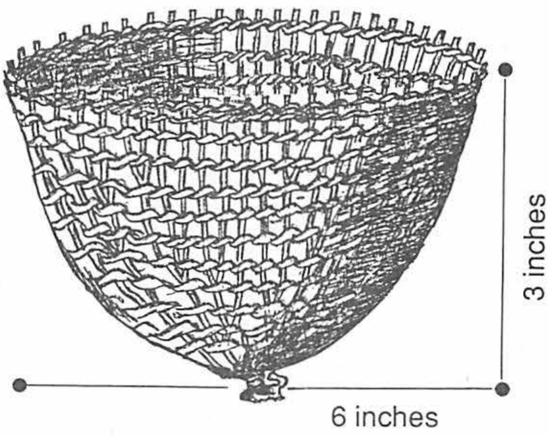

Figure 7. Drawing of the twine-woven grass bag from the Pictou site (from Harper, 1957).

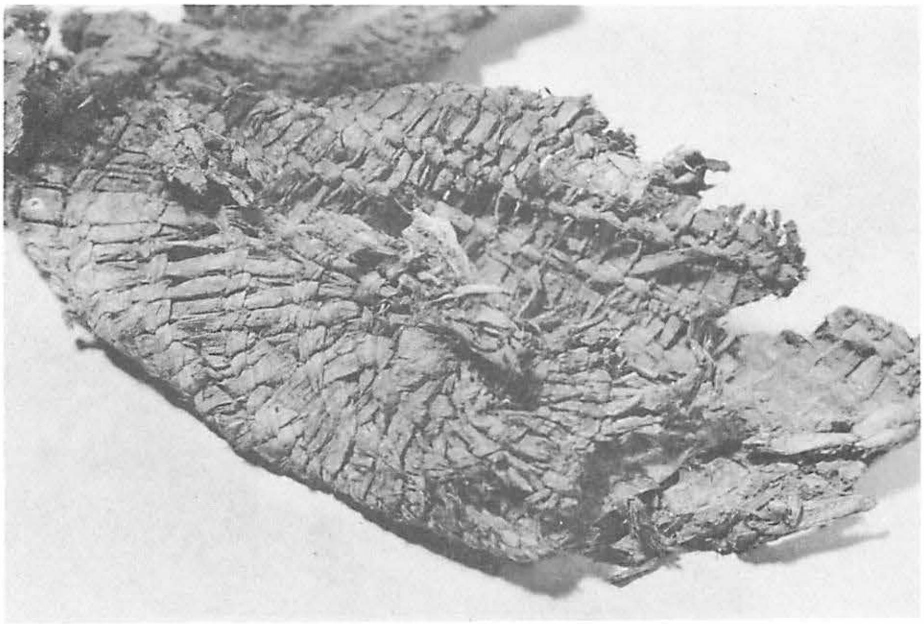

Figure 8. Sixteenth-century Micmac cedar-bark bag showing the circular start, a detail of Figure 1 (photograph by Scott Robson, Nova Scotia Museum).

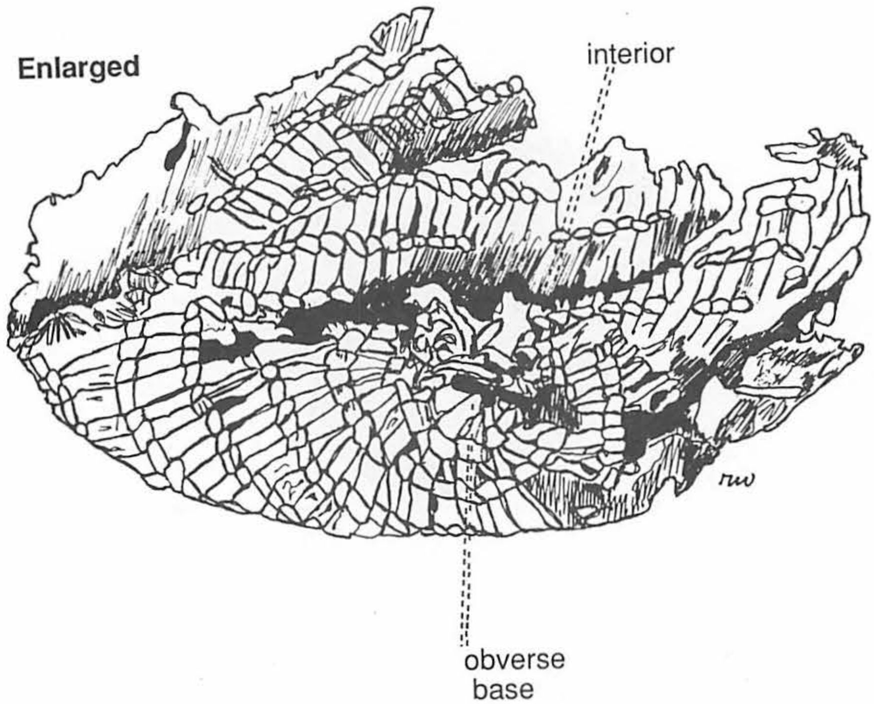

Figure 9. Drawing of the sixteenth-century Micmac cedar-bark bag (from Whitehead, 1987).

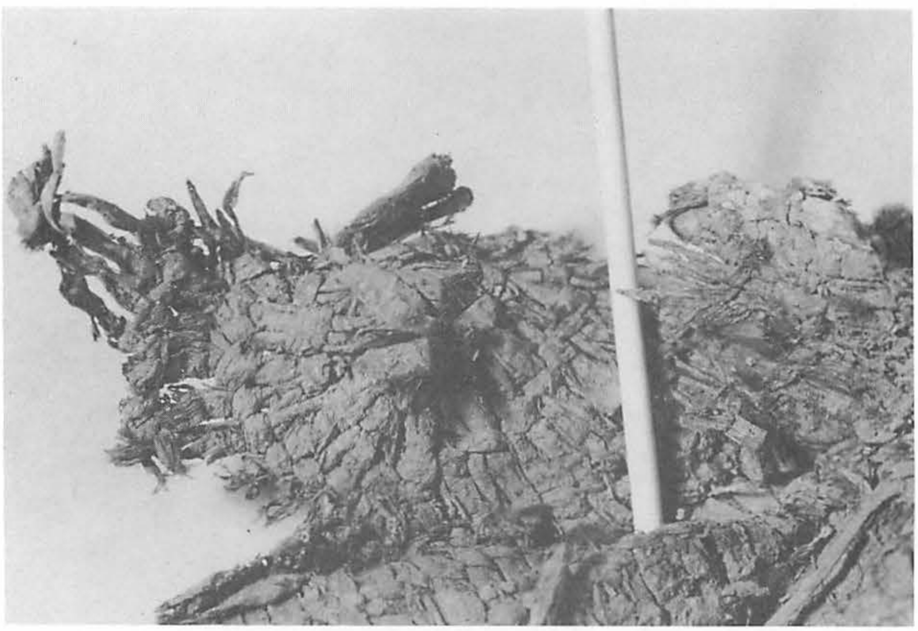

Figure 10. Inside of the sixteenth-century Micmac cedar-bark bag showing the two strips in the centre of the start, possibly the ends of two wefts (photograph by Scott Robson, Nova Scotia Museum).

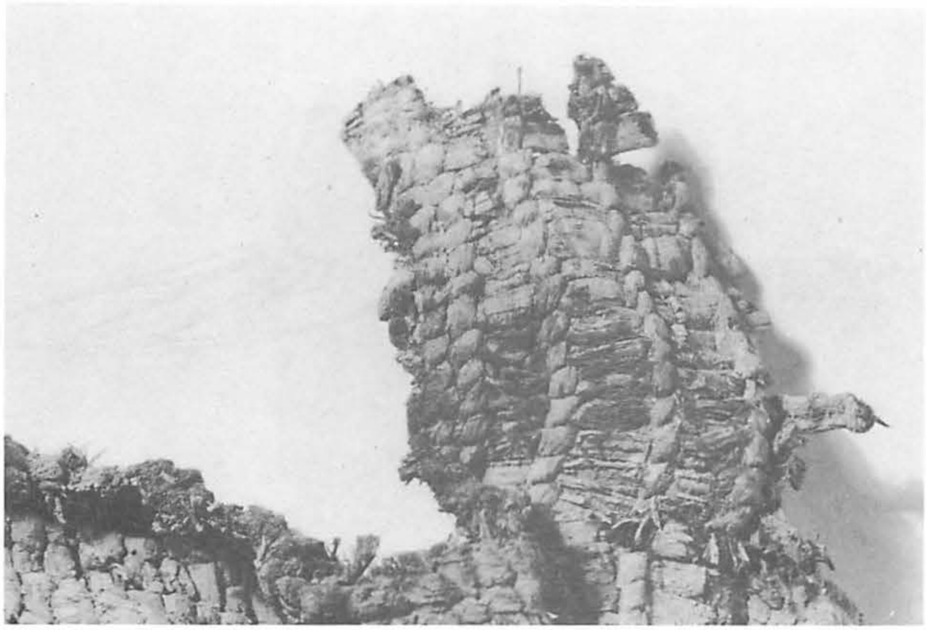

Figure 11. Outside of the sixteenth-century Micmac cedar-bark bag showing the spaced rows of 2-strand weft-twining, as well as the last two rows of compact weaving and the cut warps at the rim (photograph by Scott Robson, Nova Scotia Museum).

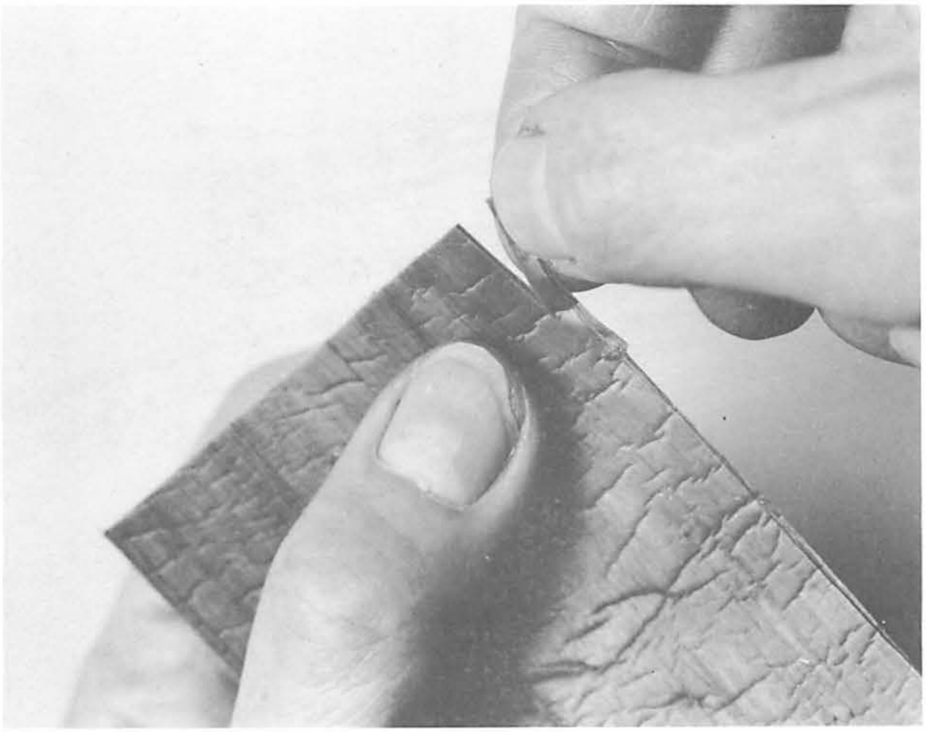

Figure 12. Making the cedar-bark strips (photograph by Roger Lloyd, Education Media Services).

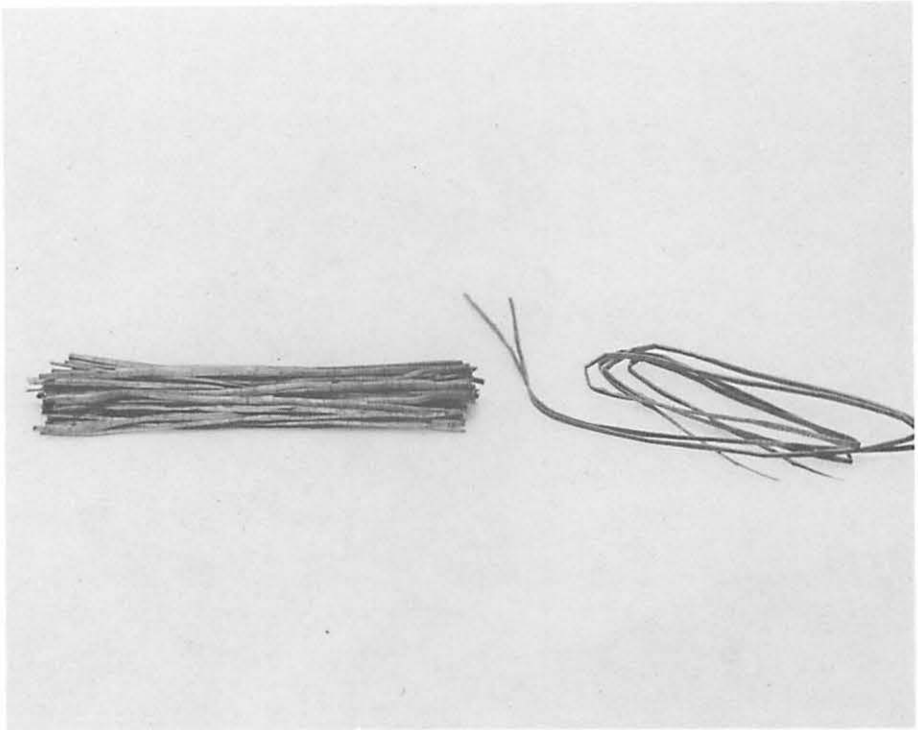

Figure 13. The bundle of cedar warps ready for weaving (photograph by Roger Lloyd, Education Media Services).

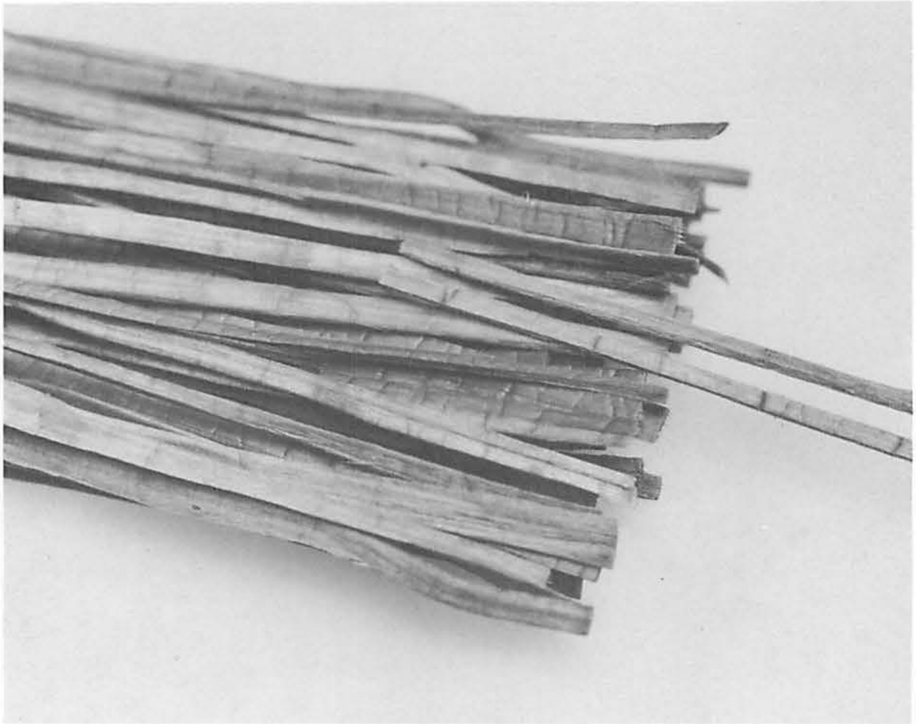

Figure 14. Inserting the two weft strips about 20mm into the warp-bundle (photograph by Roger Lloyd, Education Media Services).

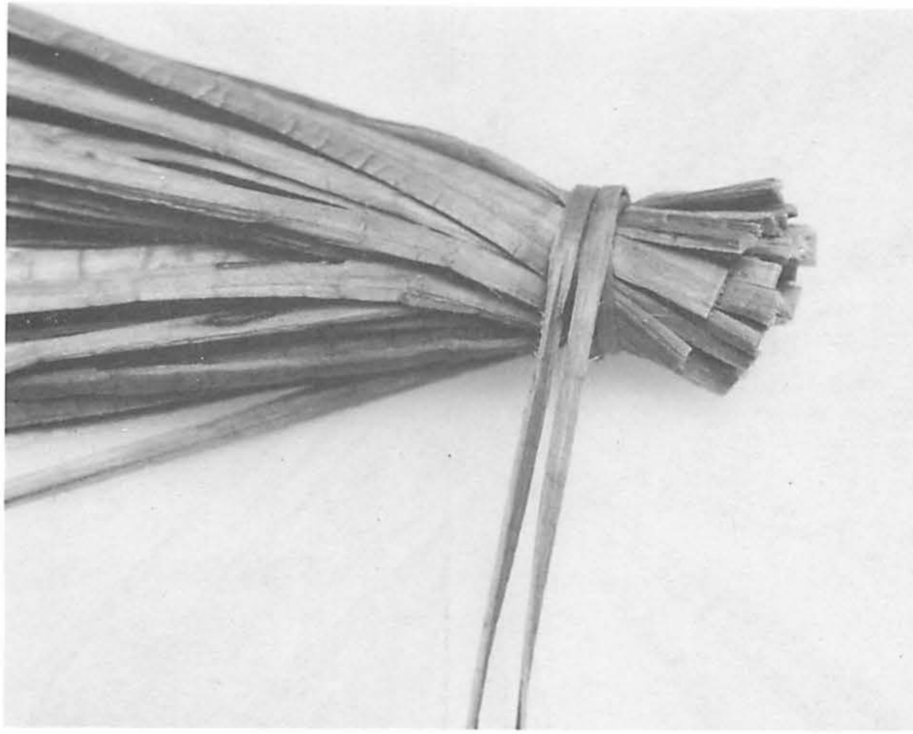

Figure 15. Wrapping the warp-bundle with two wefts about 10mm from the ends of the warp strips (photograph by Roger Lloyd, Education Media Services).

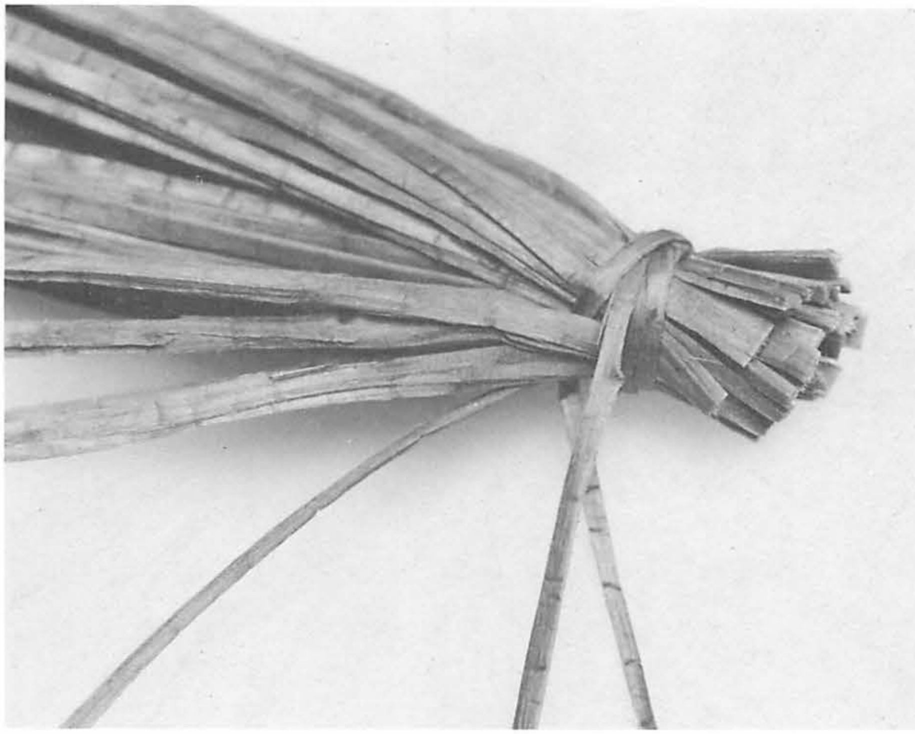

Figure 16. The beginning of Row 1 of the 2-strand weft-twining with the warps in bundles of 5 (photograph by Roger Lloyd, Education Media Services).

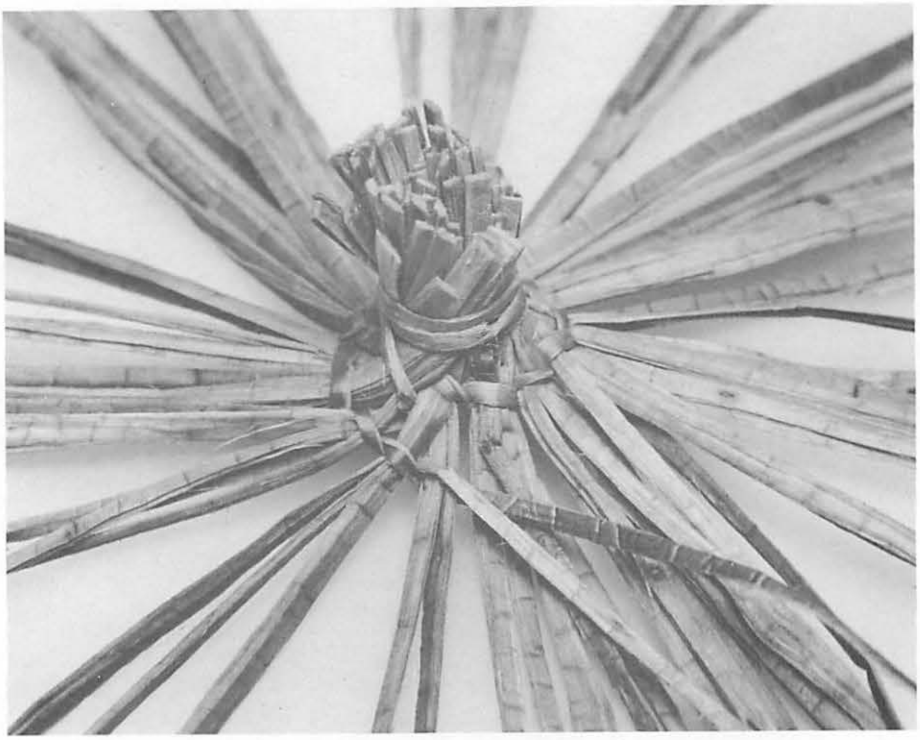

Figure 17. Weaving Row 2 with groups of 2 or 3 warps (photograph by Roger Lloyd, Education Media Services).

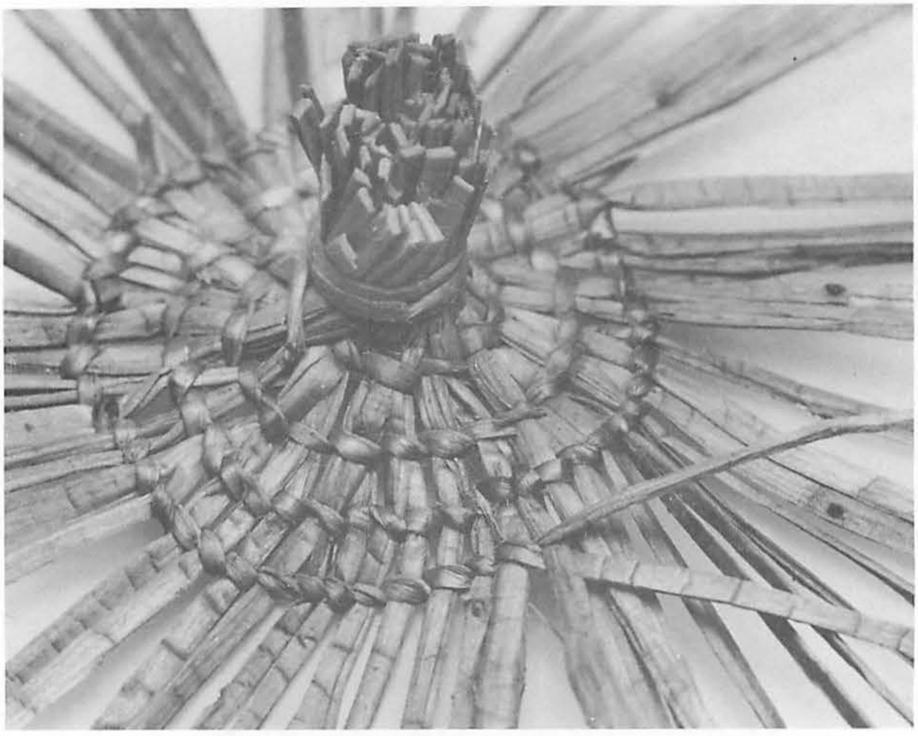

Figure 18. Weaving the warps singly in Row 4 (photograph by Roger Lloyd, Education Media Services).

Figure 19. The last two rows of weaving, Rows 11 and 12, woven close together (photograph by Roger Lloyd, Education Media Services).

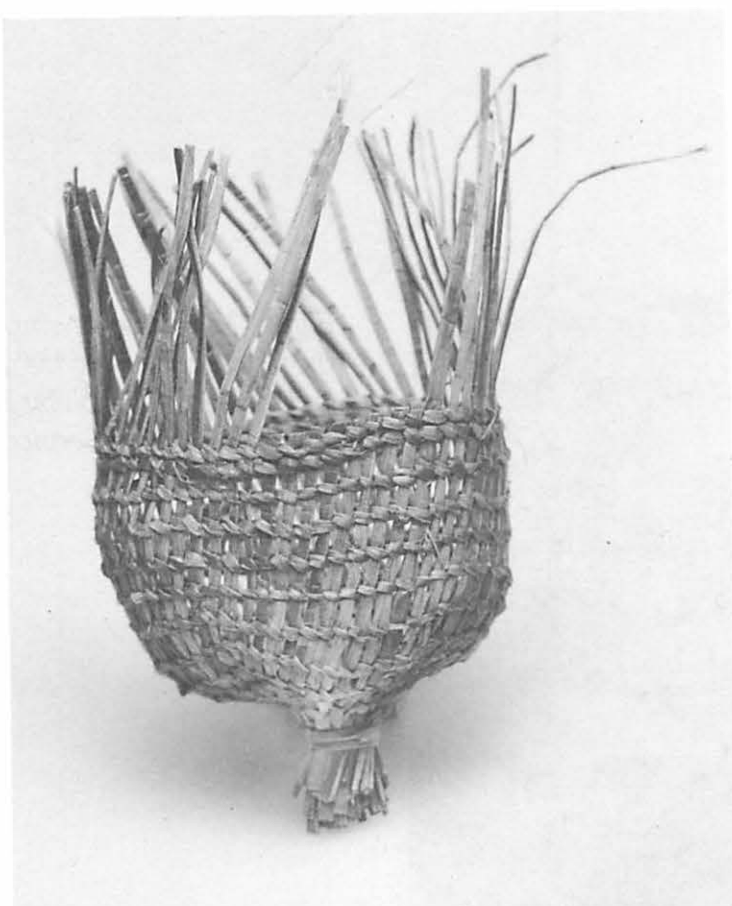

Figure 20. For the rim, the warps are cut just beyond the last two rows of weaving (photograph by Roger Lloyd, Education Media Services).

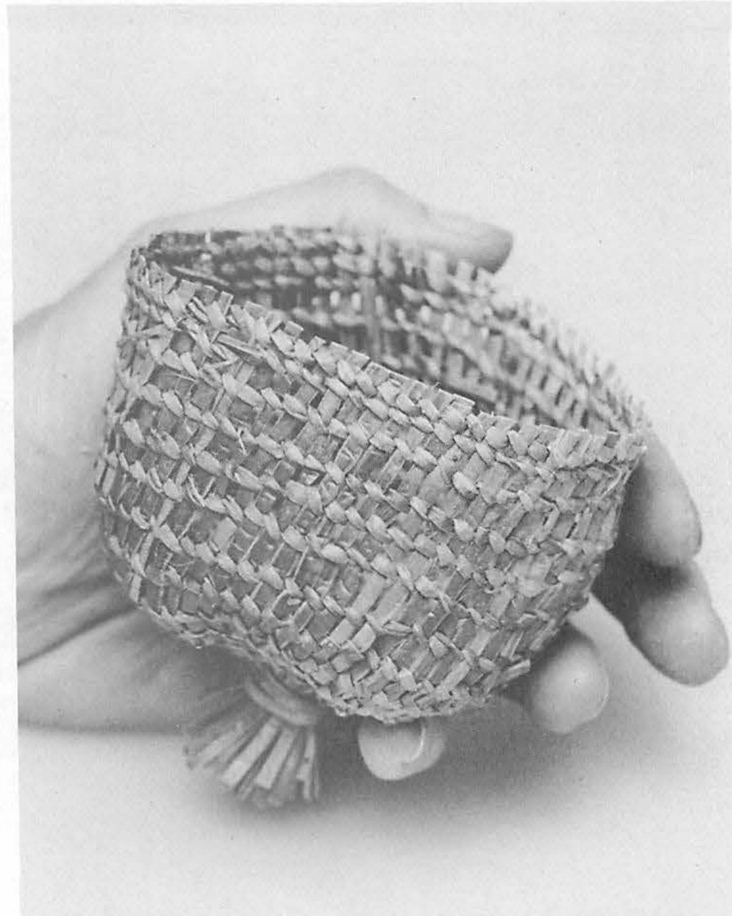

Figure 21. The completed reconstruction (photograph by Roger Lloyd, Education Media Services).

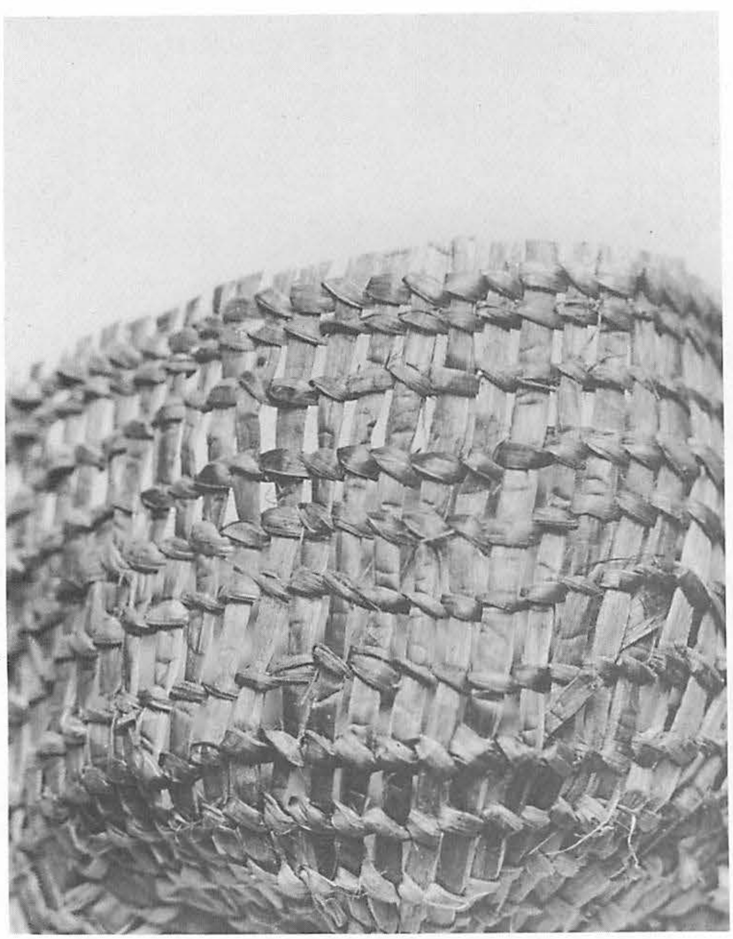

Figure 22. Close-up showing the weave pattern of the sides and rim (photograph by Roger Lloyd, Education Media Services).

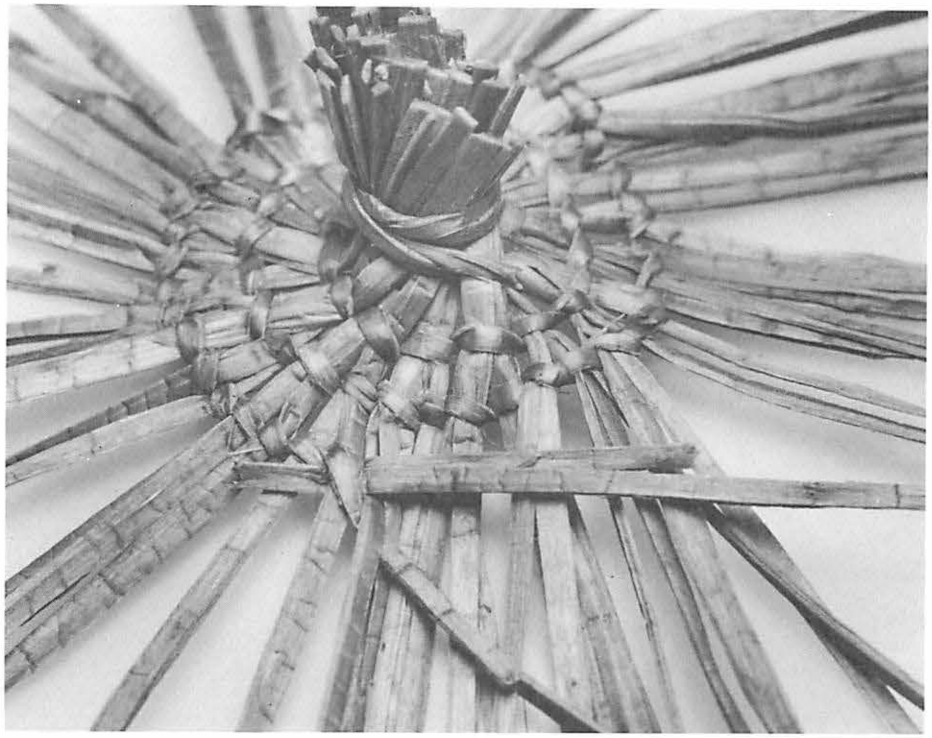

Figure 23. Adding a new weft by overlapping and twisting the new and the old wefts for at least two warps (photograph by Roger Lloyd, Education Media Services).

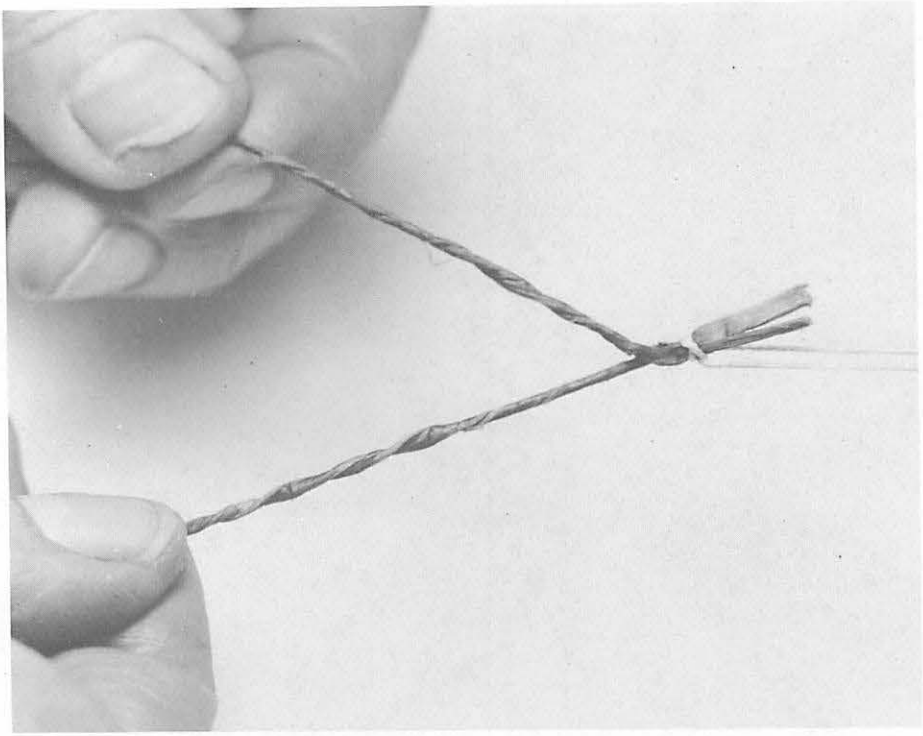

Figure 24. Twisting two cedar strips with an S-twist (photograph by Roger Lloyd, Education Media Services).

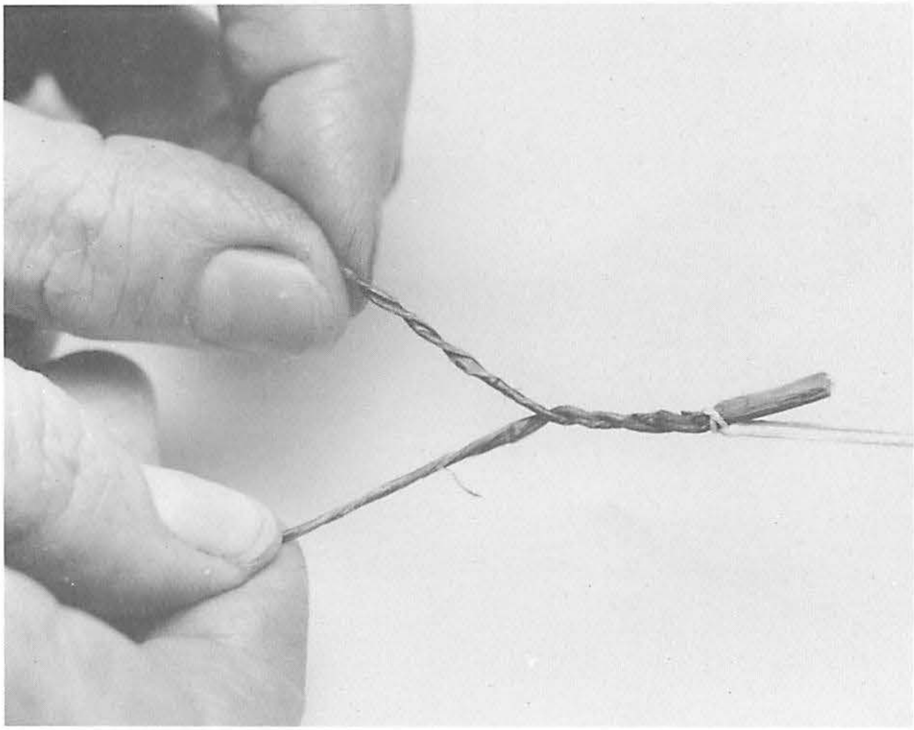

Figure 25. Plying the two twisted strips by twisting them with a Z-twist (photograph by Roger Lloyd, Education Media Services).

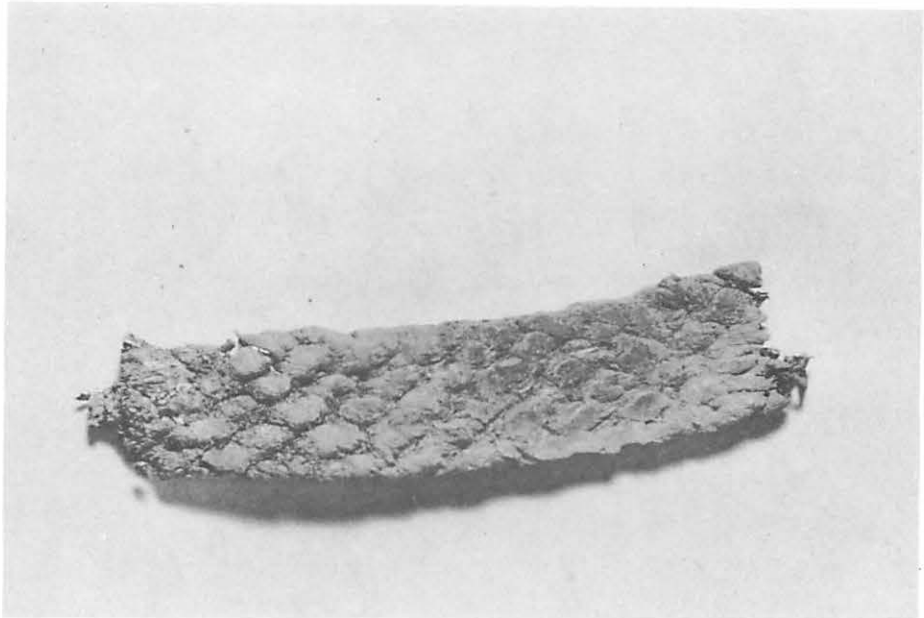

Figure 26. Braid (NSM 84.22.554) from the Pictou site, BkCp-1 (photograph by Scott Robson, Nova Scotia Museum).

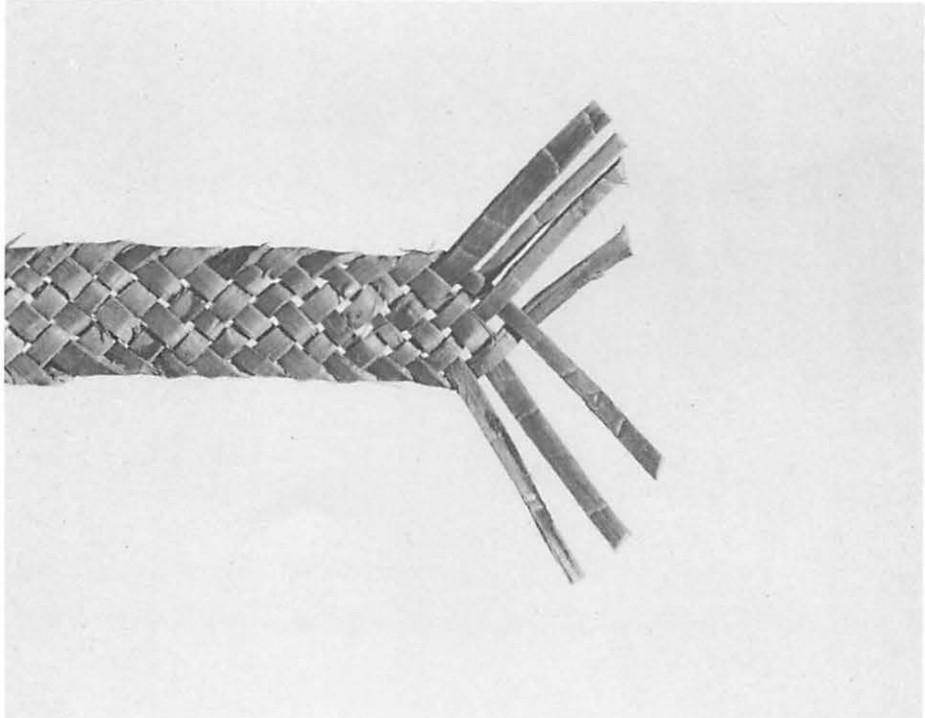

Figure 27. Reproduction of the 7-strand braid pattern, using the inner bark of White Cedar (photograph by Roger Lloyd, Education Media Services).