Figure 1: Multicultural iconography: proper right prow, bow end. (after treatment)

Up a Creek Without a Paddle: The History and Conservation of an 1870s Birch Bark Canoe

by Daniel Kurtz

Introduction

IN THE FALL OF 1996 THE OHIO HISTORICal Society contracted Midwest Conservation Services, Inc. to undertake the treatment of a truly unique object—a 24 foot Chippewa birch bark canoe, of the fur trade variety, with a well documented provenance.

Built in a variety of sizes and for numerous uses, the bark canoes of the North American Indians have been called "the most highly developed of manually-propelled primitive watercraft, the superior qualities of which are indicated by the white man's unqualified adoption of the craft" *(Adney 1964)*. Despite the importance of these canoes, few examples currently exist. In the 1964 publication *The Bark Canoes and Skin Boats of North America* which is based on the writings of Edwin Tappan Adney, Howard Chapelle, then the Curator of Transportation of the Smithsonian Institution, commented on the importance of the existing examples of such canoes, writing, "Once lost, the information on primitive watercraft cannot be recovered." Unfortunately, the delicate nature of the canoe's materials and construction has resulted in the loss of nearly all full-sized examples. This inherent fragility was recorded in 1684 by Baron de LaHontan, one of Rene Cavalier de La Salle's officers, who wrote "The canoes were convenient because of their great lightness and shallow draft, but they were easily damaged. Hence they had to be loaded and unloaded afloat and usually required repairs to the bark covers at the end of the day" *(Adney 1964)*. Regarding the long term preservation Chapelle wrote "It is difficult to preserve bark canoes in museums for as they age and the bark becomes brittle, they are easily damaged in moving and handling."

The versatility of canoes allowed for variations of size and shape according to the intended use. Even within a single tribe, differences in shape, size, and decoration could be found. However, the feature which is typically indicative of tribal origin is the profile of the ends, although in some cases other features such as gunwale shape, lashing styles, and bottom shape must be considered.

The Chippewa (called the Ojibway by the French) were a powerful tribal group made up of many bands around the Great Lakes, particularly Lake Superior. At the arrival of the Europeans, the Chippewa, in alliance with the Western Cree, were taking over much of the Great Lakes region, pushing aside the Sioux. It is believed that the oldest Chippewa tribal models were high-ended, a form which was adopted for use in the fur trade *(Adney 1964)*.

Built in the 1870's for Jay Cooke, a banker, railroad magnate, and Civil War financier, this canoe was used recreationally by the Cooke family in Put-In-Bay, Ohio, which was adjacent to the family home on Gibraltar Island in Lake Erie. During this time many repairs, necessitated by the inherent fragility of these boats, were made on the canoe.

In 1930 a member of the Ohio Historical Society purchased Gibraltar Island and the "Cooke Castle" which was to be converted into a laboratory and donated to the Ohio State University. The canoe was found "carefully stored away and preserved" *(Galbreath 1930)* and was donated to the Ohio Historical Society, where, according to the July-August 1930 *Bulletin of the Society* it was to "furnish an imposing centerpiece in the hall of American Indian Ethnology." Eventually the canoe was moved off-site to the Piqua Historical Area in Western Ohio where it remained on view until coming to MCS for treatment.

An interesting note as to the prevalent attitude towards Native Americans in the 1930's can be found in the same Ohio Historical Society Bulletin announcing the canoe's acquisition. It reads:
"Visitors to the Museum are finding something new to admire. Two remarkable boats, each of which has a story to tell aside from its intrinsic interest…One of these is typical of the handiwork of

the 'first Americans,' the Indians, while the other represents the tangible evidence of an outstanding accomplishment of the white man who replaced him as the dominant race." It then goes on to describe the Cooke canoe and its provenance. What is the other boat? "The second conveyance is a historic row boat and its equipment…"

This canoe is decorated with paintings that combine Western and Native American iconography. There is an interesting juxtaposition of cultural designs. Images of a woman with a parasol *(fig. 1)*, an American flag, stylized flowers and stars, a hand, a bird (all reminiscent of Pennsylvania Dutch iconography), a peace pipe, a fish, and Indians hunting with bows and rifles can be found on the prows of this canoe.

Construction

Building sites for canoes were carefully chosen to provide a smooth surface, firm soil, shade, and a camp site, as the project typically involved an entire family and an extended period of time. Different stages of the production relied on the different skills of the family members. The woodwork—peeling the bark and splitting the wood for ribs and sheathing—was done by the men while all the sewing and lashing was done by the women. Waterproofing and decorating was often done by the entire family.

As few as four materials were used in the construction of a canoe. The Cooke canoe was made in a region where these materials typically were bark from the paper birch; white cedar (used for the ribs, sheathing, gunwales, thwarts, and end caps); split black spruce root for the lashings; and tempered spruce gum for waterproofing. The tempering process for the spruce gum consisted of melting the gum and adding animal fat and finely powdered charcoal. There were many variations of this process, however, including the melting and remelting of the gum many times, making it darker and harder.

The process of manufacture was very complicated and a detailed account is beyond the scope of this paper. However, in order to understand the conservation of the canoe a brief description of the construction is necessary.

There are eight main parts of a canoe: the skin, the ribs, the sheathing, the gunwales, the thwarts, the end caps, the lashings, and the waterproofing.

The process began with the staking out of the shape and size of the canoe. A building frame or the gunwales could be used for this purpose. The stakes were then removed and the bark was rolled out on the site with the white side (inner side of the bark) face up. The gunwales were then laid in place and the assembly was weighed down with stones.

The bark was cut into gores to allow it to be shaped without crimping. After softening with hot water, the bark was raised up, and staked in place. Once the bark was raised the gunwale assembly was lifted to sheer height and temporarily held in place with sticks. The thwarts, which were mortised into the gunwale, were then put in place and the bark cover was then sewn to the gunwales.

After sewing, the gunwale cap was put on to secure the assembly. In early canoes the gunwale cap was pegged in place but in the later canoes, such as the Historical Society's canoe, it was nailed in place. After putting on the gunwale cap the stones were removed and the canoe was turned upside down to allow for the finishing of the ends.

The prow was formed by splitting a single board into laminates to allow for bending. It was then bent into shape and lashed with the spruce root to lock in the bend. In the case of the Cooke canoe an interesting substitution was made. Rather than wrapping the stem with root it was wrapped with twine. This proved to be a significant factor in the condition of the canoe as I will discuss later. After manufacture, the stem was fit into place and the bark was shaped and sewn. Once the ends were sewn, the canoe was righted and the sheathing was put in place followed by the ribs which are mortised into the gunwale. The ribs hold the sheathing in place with tension.

The final step was the finishing of the end assembly which was held together by tension using a tenon and the wrapping material. The end cap was notched at the bottom to allow it to fit over the end of the stem. The tenon then fit through an opening in the middle of the end cap. The wrap-

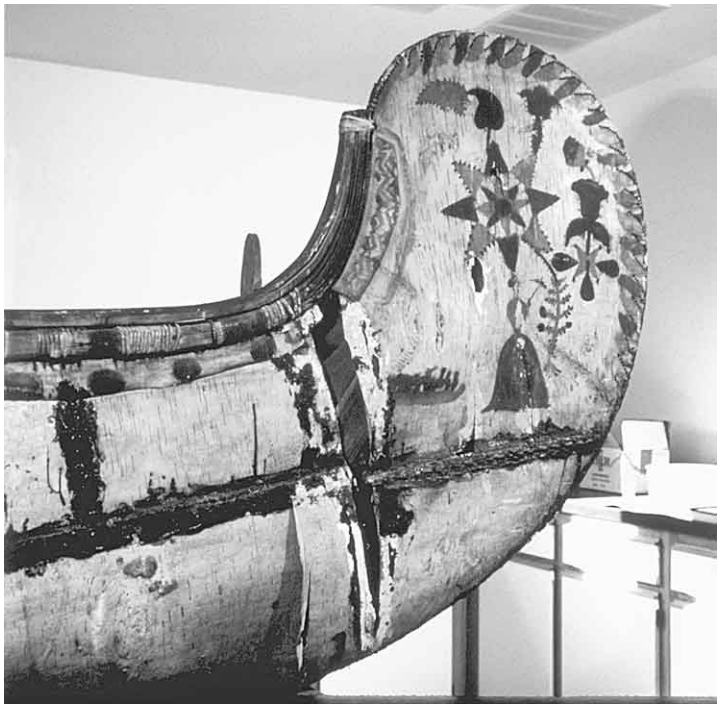

Figure 2: Structural damages: proper right prow, bow end. (before treatment)

ping material was pulled through two holes next to the tenon opening and the lashings and the tenon were pegged.

After completing the construction the canoe was waterproofed, particularly at the seams and any knots.

Condition

The main concerns with this canoe were the various structural problems. The twine which was used to wrap the prow on both the bow and stern ends had become extremely brittle and had failed in several places. The lack of support for the bow had caused it to sag as much as five inches, resulting in the failure of the bark seams nearest the bow end on both sides. The bow was found to be loose and at risk of becoming wholly detached. *(fig. 2)* At the stern, the twine was still connected to the end cap at one point but was not affording much support overall. Small splits had begun to form at the bark seams though they had not opened up enough to cause the end to sag.

There was a 9 1/2″ wide, 3/4″ thick, pine board which ran the length of the canoe attached to the ribs with modern wood screws. This board was restricting the natural movement of the ribs, potentially causing additional structural damage.

The bark had become dry and brittle in many areas (as predicted by Chapelle) and had suffered many splits, cracks, and losses. A large area of bark on the port side of the stern end was missing. Additionally, in many areas where the bark had cracked it had become significantly warped out of plane. There were also many areas of scratches and abrasion to the bark as well as many small holes. Many of the breaks had been repaired using a variety of different methods. Pitch similar to the original waterproofing was found in several areas, applied over small splits not consistent with original seams. These repairs were generally stable. There were repairs which appear to have been made by soaking fabric strips in hide glue and then adhering them to the bark over the openings. A tar-like material was then applied over top of these areas. In one case the fabric began to peel back and was readhered with foam double-stick tape. In the middle of the starboard side there was a large patch, approximately 6″ x 12″, made of burlap covered in a tar-like material. There were numerous large, flat-headed nails used to repair this area as well. Additionally, there were areas where a tar-like material was used to cover holes and losses in the bark. In some areas the previous repairs to the bark using the tar-like material covered areas of design and decoration.

The waterproofing on the seams was generally sound. There were some areas of loss as well as areas where the gum had become brittle and was actively flaking off.

The majority of the lashings which held the bark to the gunwales were missing. An estimated 40% of the lashings, made up of as many as three different materials, remained. The original spruce root lashings had become significantly embrittled to the point that fewer than 10% of the original were extant. Those areas which did have original root lashings were insecure as the lashings no longer had the strength or flexibility to support the bark. Several additional materials were used to replace the lost lashings. These included a dif-

ferent variety of root and wicker caning. *(fig. 3)* Only the caning, which was different in color and texture than the original remained strong enough to lend adequate structural support. These cane lashings were found to be stable in all areas where they held the thwarts in place.

The canoe was dusty and dirty overall. There were many broken pieces of the lashings inside the canoe. There was also a significant amount of white fur inside the canoe resulting from a dugout canoe filled with and furs hanging above this bark canoe in the previous installation.

Treatment Decisions

The first, and possibly most difficult, step in the conservation of this canoe was to decide on the goal of the treatment. Serious consideration had to be given to the potential uses of the canoe at the Historical Society. Should this canoe provide a specific historical document of the construction and materials of Chippewa birch bark canoes of the 1870's? Should it be used to represent the interaction between the races—a Native American canoe built for and used by a white family combining decoration representative of both cultures? Or should it be exhibited as a historical document of the life of Jay Cooke? Is it even possible to consider these aspects of the object separately or are these factors part of the intrinsic nature of the object? The answers to these questions would affect numerous treatment decisions. Which of the previous repairs should be preserved and which reversed? How much compensation for losses should be done and what materials, traditional or modern, should be used?

These issues were discussed with the Society's curators. A major factor was that there are no other birch bark canoes in the collection of the Ohio Historical Society. This meant that the canoe could conceivably play all these roles at one time or another. In the context of the intended installation, the canoe was to represent a Native American artifact, although its provenance would be indicated on the label. This required the reversal of many of the historic repairs. However, keeping in mind the permanence of such a treatment, only repairs which were no longer structurally sound and those which obscured decorations were removed, after careful documentation. Repairs which remained stable were left intact.

After determining what period of its history the canoe would represent, a decision was made regarding the amount of compensation and what

Figure 3: Missing and previously replaced lashings.

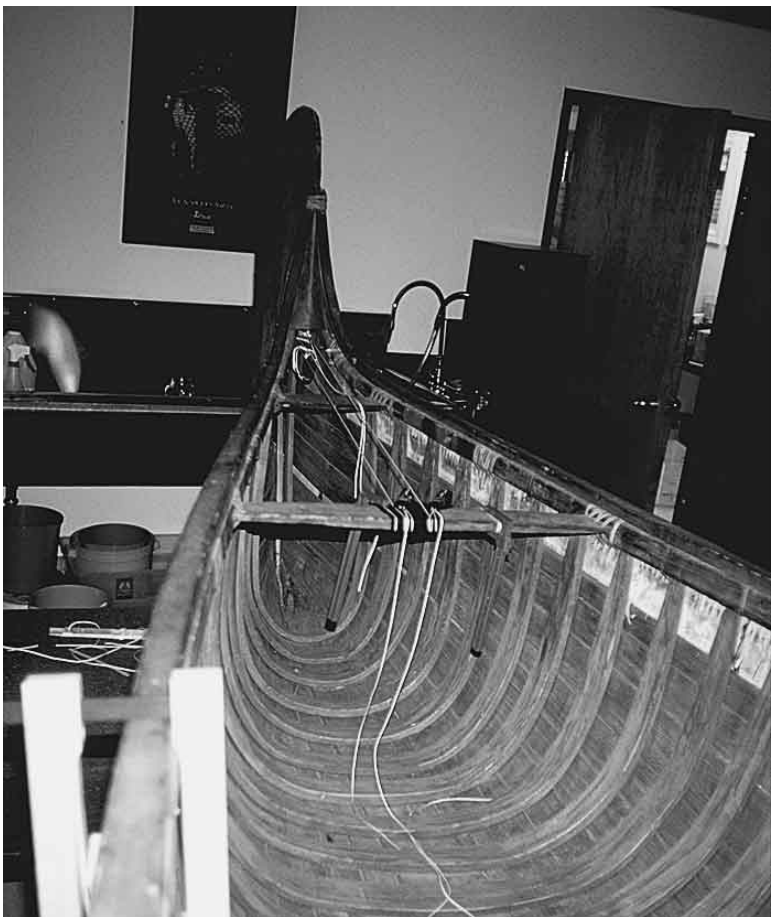

Figure 4: Tying up bow during structural repairs.

materials to use. Visual reintegration was the goal; however, due to the importance of the canoe as a rare example of the materials and techniques of the Chippewa canoe builders, materials were chosen which would best simulate the original but would be more stable long-term as well as easily distinguishable from the original materials upon close examination.

Treatment

The first step was dry cleaning and removing the loose debris from the interior. The canoe was then vacuumed using soft bristled brushes to push dust into the hose of a portable vacuum.

Next, a method was needed to reverse the old tar-like repairs and fabric patches. The material proved to be sensitive to a variety of solvents but was too thickly applied to be readily removed using this method. Experimentation revealed that it was possible to soften the material with direct heat applied for approximately 30 seconds to a localized area. The next question was how to safely apply the heat in a localized enough manner so as not to dry out the nearby bark. Adapting a 1400 watt hair dryer using aluminum flashing to reduce the aperture size to approximately 1/2″ allowed for control of the amount of heat and the size of the area to which the heat was applied. When making such an adjustment to the hair dryer it is important to vent the cone enough so that the hair dryer does not overheat. Once the method was determined, the previous repairs using the tar-like material were removed by heating an area and using various wooden spatulas and scrapers to peel off the replacement pitch. An attempt was made to remove the pitch from an area on the stern, port side where an inscription was located after cleaning. The bark underneath was found to be too disrupted and brittle to safely remove all the tar. As much of the inscription as possible was recovered and the area was photographed. Interestingly, the inscription seems to be written backwards and remains indecipherable at this time.

The long wooden board at the bottom, which was believed to have been added at the Historical Society, was removed after appropriate photo documentation.

Structural repairs to the bow involved removing the end cap, and tying thin nylon cord around the structural wooden elements to replace the degraded twine. Two pieces were used in each of three areas: along the top, at the bottom, and in the center of the prow. All the cords were pulled taut and clamped to one of the thwarts to achieve the best possible positioning of the bow end. *(fig. 4)* The top two cords were then fished under the ribs just under the gunwales to the first thwart where they were tied off using extant holes from the original lashing of the bark to the gunwales. The bottom two cords were run under the ribs along the bottom center of the canoe and tied off to a small board tacked to the side of the third rib. The center two cords were used to simulate the original construction of the canoe by pulling them taut through the holes in the end cap and pegging them in place. The stern, which had not split off as

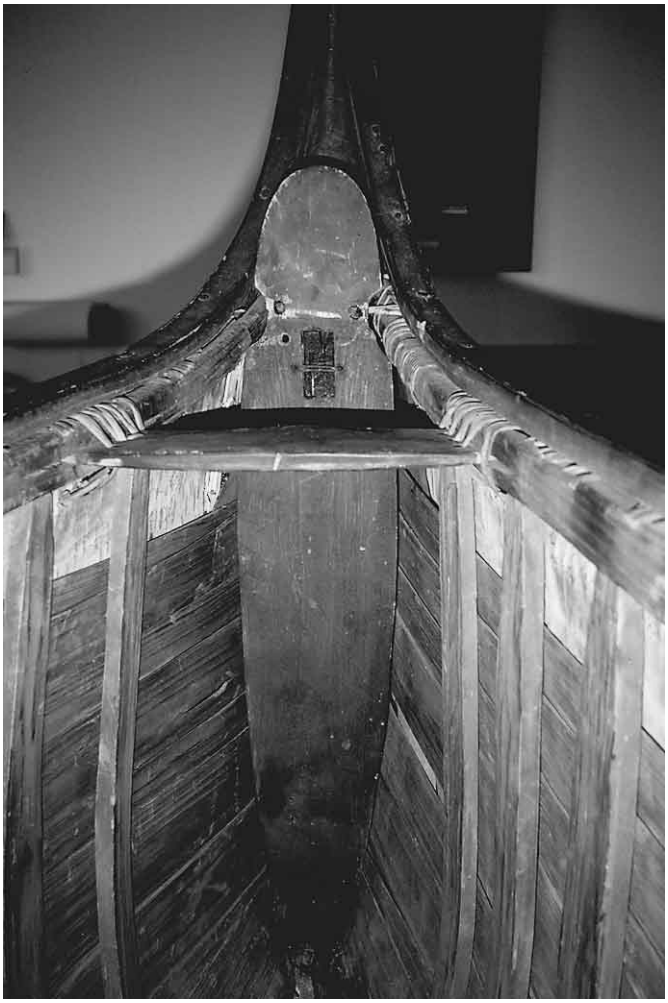

Figure 5: Bow end after treatment.

had the bow, was structurally reinforced by tying two cords around the structural elements of the prow in the center. This was possible as the large loss allowed access to the prow. The cords were then pulled taut and fed through the end cap holes and pegged, again in simulation of the original construction. The cords were then toned to look like twine, using Liquitex acrylic paints. *(fig. 5)*

The next step was to repair the cracks in the birch bark. Reduction of the planar deformation proved to be a difficult process. Various methods were tried to humidify and soften the bark but there was one major obstacle—the outside of the bark was waterproofed and the inside was inaccessible. The solution to the problem was found in the kitchen: a pressure cooker. By connecting a length of tubing to the steam release valve on the top, steam could be applied to the bark. The bark could be softened in a matter of minutes and repositioned into the appropriate orientation. Japanese tissue backings were then adhered with Rhoplex AC-234, an aqueous acrylic emulsion, to support the join which was clamped together to allow the adhesive to set and the bark to dry out in the correct position. All cracks which could be aligned were repaired in this manner. However, there were some areas where a significant amount of shrinkage to the bark had occurred, and the cracks could not be aligned. In these areas the bark was faced with toned Japanese tissue to cover the split.

Losses in the birch bark were filled with 100% cotton rag four-ply mat board toned with Liquitex acrylic paints. After any cracks in the area were mended, the losses were backed with Japanese tissue bandages spanning horizontally across the loss, adhered with diluted Rhoplex. These bandages were made large enough to allow for the natural expansion and contraction of the bark. The mat board was then cut to fit and thinned with a scalpel to the appropriate thickness. The fill was then inserted and adhered to the Japanese tissue using the Rhoplex. In areas where the cracks remained evident after application of the fill, the join was covered using either toned Japanese tissue or thinned, toned mat board. The large loss to the stern, port side prow was filled using toned mat board cut to the shape of the loss. *(fig. 6)* It was then joined using strips of Japanese tissue to back the repair. The fill was then covered with toned Japanese tissue which was applied over the join and over the prow end to secure the fill in place. Texture was added to the mat board fills using a variety of tools such as spatulas, awls, and screwdrivers. All fills were inpainted to match the surrounding areas with Liquitex acrylic paints. *(fig. 7)*

The missing lashings and areas where the lashings were too brittle to provide sufficient support to the bark were replaced using a substitute material. Three sheets of plain white blotting paper were toned with Liquitex acrylic paints then laminated using the Rhoplex. Strips of the appropriate width were then cut and wrapped around the gunwale through the original lashing holes to simulate the original lashings. The replacement lashings were then toned with Liquitex to match the remnants of original lashings. This material proved to be quite flexible and surprisingly strong. It provided a good

Figure 6: Attaching mat board fill to proper left prow, stern end.

simulation of the original but can be easily distinguished upon close inspection. As much of the remaining original lashings as possible were kept intact and consolidated as needed using Rhoplex. The stable, earlier replacement lashings were also toned with the Liquitex. *(fig.8)*

Losses and damages to the pitch waterproofing material were consolidated with a simulated pitch made of Liquitex Matte Medium and Liquitex Ivory Black bulked with hydrophilic fumed silica. This material was layered to the appropriate thickness. The gloss of the original was matched using Liquitex gloss and matte media as needed.

Areas of damage such as abrasions and peeled bark were toned and inpainted using the Liquitex to visually reintegrate these areas.

Conclusion

The newly-conserved canoe is intended to serve as the "entrance icon" to the Historic Period Galleries of the reinstalled Native American Art and Artifacts at the Ohio Historical Society's Fort Ancient Historic Site. A didactic text and photo panel will be added to the installation to discuss the conservation of the canoe.

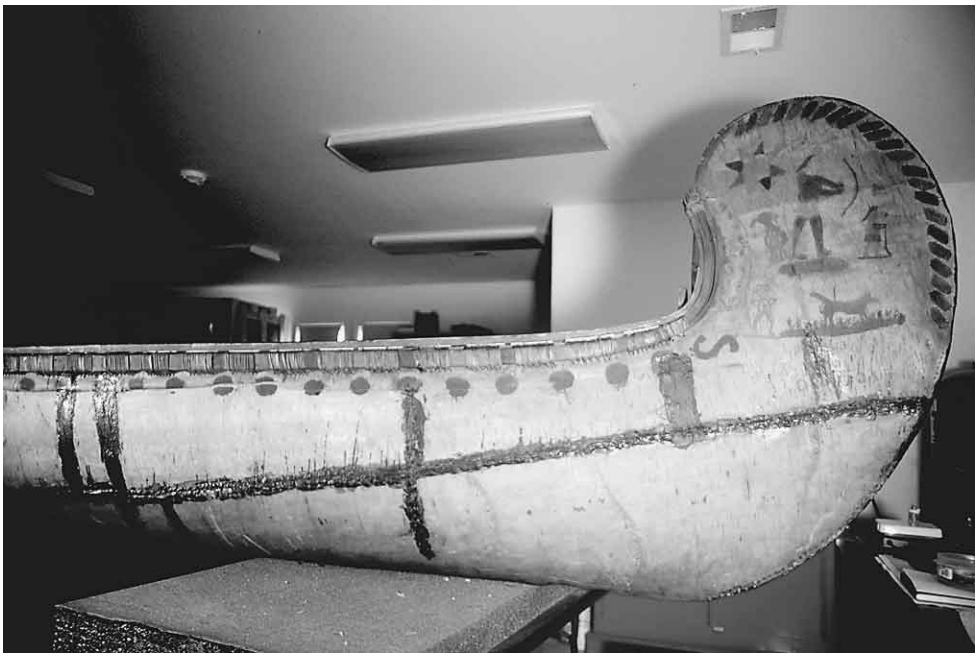

Figure 7: Proper left prow, stern end (after treatment).

Figure 8: Replaced and toned lashings, bark, and pitch.

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