Canadian Heritage
Canadian Conservation Institute

Patrimoine canadien
Institut canadien de conservation

CCI Newsletter

ISSN 1180-3223

No. 17, March 1996

Louis IX: Saint and King of France

A portrait by Eustache Le Sueur (1617–1655)

by Peter Vogel, Senior Conservator, Fine Arts and Paper Section

There are many rewards associated with the conservation treatment of a work of art. The primary reward, of course, is the satisfaction of having restored the work to its original health and condition, preserving its beauty and giving it another lease on life. Another, equally satisfying reward is the dialogue the conservator establishes with the work of art. At the beginning of the treatment this is simply the collecting of readily available data, but it quickly and continuously evolves into a quest for more remote and less accessible data, relying on the close cooperation of curatorial, scientific and archival staff. The result is a window into the work itself, through which one can see and appreciate the artwork in its entirety—its physical condition, history, context, content, and message. Thus, a lifelong and very personal relationship between the conservator and the work of art is formed.

One such memorable project recently carried out by the Fine Arts Laboratory of CCI was the restoration of a portrait depicting Louis IX, saint and king of France.

History and Provenance

Louis IX, king of France from 1226 to 1270, was the most popular of the Capetian monarchs. He was a man of arts and literature, a splendid knight, an initiator of reforms, an administrator of justice, and a negotiator for peace—his crowning achievement was the treaty he signed in 1258 with King Henry III of England, ending the long struggle between the Capetian dynasty and the Plantagenets.

Contents

The painting obscured by grime, varnish and overpaints (left). The painting after restoration (right).

An overall view of the painting after complete removal of all later additions.

As a protector of the church, Louis IX enjoyed immense prestige throughout Western Christendom, so much so that the Venetians put into his care the crown of thorns believed to have been worn by Christ. He led the seventh crusade into the Holy Land (1248–1250) and died during another crusade in Tunisia. He was canonized by Pope Boniface VIII in 1297, the only king of France to be numbered by the Roman Catholic church among its saints.

King Louis IX is shown in this painting at the height of his political and religious life, wearing the garb, armour, and spiked crown of the Crusaders. The painting is attributed to Eustache Le Sueur (1617–1655), a painter of French history. Le Sueur was one of the few privileged painters who received his training from Simon Vouet, who soon discovered his student's talent and selected him to assist with various works.

Le Sueur was also very engaged with his own decorative works, in particular the decoration of the apartments of the king in the Louvre. Many of his historical and allegorical canvases are now hanging in major galleries throughout Europe. Given his short career and substantial oeuvre, Le Sueur probably worked with the assistance of his brothers. This unsigned portrait may well be one such example.

The painting presumably came to Canada in 1730 (along with three bells for the Louisbourg churches) when King Louis XV was building the Fortress of Louisbourg. During the siege of 1745, British forces bombed and set fire to the Citadel at Louisbourg. The painting, which hung in the king's chapel, suffered some scorching on the side of the subject's face, but was saved. It was sent to Halifax, Nova Scotia, and later to London, England.

After the First World War, the portrait was sold at a New York auction house to Mrs. E.N. Vanderpoel, an artist of Litchfield, Connecticut. The painting underwent extensive restoration. In 1955, it was bequeathed to the museum at the Fortress of Louisbourg, 210 years after its departure. Today it is in the custodial care of the University College of Cape Breton Art Gallery in Sydney, Nova Scotia.

Condition

The original hand-woven canvas had been glue-lined onto a commercially made linen canvas and the tacking margins had been trimmed. This process, which may have treated flaking and weaknesses in interlayer paint cleavage, appeared to be in the manner of 19th-century British glue-lining. Paper strips protected the edges of the painting. Adhesion of the two canvases had weakened and caused separation between the supports. Scattered paint and ground losses, which had been concisely luted and inpainted, appeared opaque with varying degrees of greenish fluorescence under ultraviolet light. This also suggested an early 19th-century treatment while the painting was in England.

Of much greater concern to the pending treatment concept were large overpaints covering the neck, face, and part of the king's head and reaching well into the background. These appeared under ultraviolet light as heavy dark patches and testified to the work of a painting restorer while the portrait was in the United States after the First World War.

Both treatments, although a century apart, conformed with the archival findings and set the stage for the treatment proper.

Treatment

Surface cleaning to remove embedded grime and resistant dirt deposits was done using a weak sodium hydroxide emulsion in mineral spirit. This treatment was done in areas of impasto and white painted areas where more grime appeared to have settled. The thick and slightly discoloured natural resin coating, which had apparently been applied during the last restoration with the purpose of concealing the large areas of overpaint, was readily soluble in a mixture of diacetone alcohol and acetone to which even parts of Shellsol were added.

Inconsistent overpaints in other areas of the composition where irregular cleaning campaigns had occurred at different periods were identified and safely removed following chemical analysis and testing with a variety of solvent mixtures. This condition is not unusual for old paintings that have frequently changed ownership and undergone several restorations using different materials. For example, it had been discovered that the entire background was overpainted with a wash containing

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Printed in Canada

dry pigment and a water-based medium such as tempera or gouache.

Attention was then focused on cleaning the large repainted areas in and around the face and neck. Initial varnish removal had left behind a rather matte film of old inpaint and overpaint, which was resistant to conventional solvent mixtures.

It is likely that the same water-based medium was used for toning in the background, upon which oil glazes had been added. Preliminary tests using sodium hydroxide in water emulsified with Shellsol softened this old retouching to a degree where it could be removed mechanically with a blunt spatula.

In this manner the entire area of old retouching, which had also covered original paint around the periphery of the large loss, was successfully removed while viewing through a microscope. Although most of a pinkish imprimatura was preserved, there were no traces of an underdrawing design nor remnants of scorched paint. If they existed, they must have been removed during previous restoration treatments.

After the cleaning, the glue-lined canvas was mechanically removed and the original support cleaned of all remaining adhesive residues. A prestretched linen canvas of similar weave to the original was prepared and sized with a diluted Rhoplex 234 acrylic emulsion. Both canvases were sprayed with Beva 371 heat seal adhesive in toluene and subsequently lined on the hot table.

Efforts were then directed toward integrating the large missing areas on the king's face, head, and neck. As anticipated, repainting the lost areas could no longer be done satisfactorily without falsifying the original appearance of the painting. Forms and intonation as well as brush work would have to be invented, which would destroy the original character and spontaneity of the portrait.

Following consultation with Mr. Barry Gabriel, Director of the University College of Cape Breton Art Gallery, a pointillistic retouching method was chosen as an alternative to invisible inpainting. This method is generally accepted in cases where authentic reconstruction is no longer possible. It consists of using small dots of colour set closely to each other. Once outlines and shadows had been established (period drawings and engravings of similar subjects were used as guidance), the missing areas were gradually retouched using watercolours. A final natural resin varnish completed the treatment. The portrait appears an integrated whole when viewed at normal distance, yet the extent of the loss remains visible under close scrutiny as a record of the painting's history and the history of the Fortress of Louisbourg.

The conservation treatment of the portrait was completed in time for it to be included in an exhibition at the Fortress of Louisbourg commemorating the 275th anniversary of the founding of the French fortified town and the 250th anniversary of its siege.

CCI, through its treatment of and research into a painting that is so closely connected to the history of Louisbourg and Canada, is honoured to have been able to contribute to that commemoration.

Acknowledgements
The author is grateful for valuable information provided by the curatorial staff of the University College of Cape Breton Art Gallery as well as by his colleagues in the Analytical Research Services of CCI. ♦

The extent of damage becomes evident during overpaint removal.

Detail after retouching: The inpainted areas blend with their surroundings at normal viewing distance, but the losses remain visible under closer examination.

International Co-operation: Conservation in Latvia

by Michael Harrington, Senior Conservator, Furniture and Wooden Objects Section

In September, I travelled to Riga, Latvia, to support a Council of Europe initiative—European Heritage Days. CCI was asked to make an expert available to address the workshop "Wooden Heritage in Latvia" and to attend official Heritage Days functions. The workshop topics were wide-ranging, but focused on the challenge of conserving both heritage buildings and the collections of wooden objects that these buildings house.

The conservation community in Latvia faces problems that dwarf the difficulties we face in Canada. They have a magnificent historic resource, a well-educated and extremely motivated professional team, and extensive collections documentation dating back to the early 1920s. Yet major problems exist, including a lack of maintenance during the end of the Soviet period, the difficulties inherent in establishing a new system, and pressure from Western interests and newly wealthy Eastern companies to develop historically sensitive

Mr. José Marie Ballester (second from left), visiting the Abava Valley Project with invited experts.

buildings and landscapes. All these issues are dominated by the crushing financial burden of an emerging economy. A number of the conservation professionals receive payment for only one and a half days each week, but work full-time to advocate for their cultural heritage.

Wood holds a special and prominent place in the Latvian culture. This abundant, high-quality material was used for shelter, tools, furniture, and so on, but even the most practical of objects was infused with added value through elegant detail and refined design. Square-hewn timbered buildings dominate the landscape outside Riga. A sparkling example is the resort town of Yurmala. Built at the time of the Russian Empire and sited on a 20-km white sand beach on the Bay of Riga, Yurmala today boasts over 600 Jugendstil buildings, wooden hotels, restaurants, guesthouses and music gardens, decorated in the fanciful design detail of the art nouveau. Yurmala was the site of a cosmonaut training centre during the Soviet period, and the buildings occupied by training staff and administrators have remained in relatively good condition, but are under threat if the town is developed as a modern Baltic resort.

An ambitious program was undertaken for the formal workshop program of European Heritage Days. A broad range of speakers addressed traditional building techniques, registration, research, documentation, and conservation of wooden heritage. Technical talks dealt with topics ranging from the development of archaeological sites, through conservation, restoration and upkeep, to integrated pest management. The sessions broke into workgroups to develop resolutions intended to form a framework for future direction in the Latvian heritage community. A nationally telecast news conference emphasized the importance of heritage issues to the society at large.

The Abava Valley Project, a venture sponsored by the Council of Europe, has taken a truly inspired approach to heritage protection at the insistence of the State Inspection for Historic Protection. Initially, the Council favoured the preservation of a single building as a flagship example of heritage protection. The State Inspection disagreed with this approach, and eventually convinced Mr. José Marie Ballester, Head of the Cultural Heritage Division of the Council of Europe, that a holistic approach—treating an entire landscape with all its buildings and collections—would better demonstrate the long-term advantages of heritage preservation. The Abava Valley Project was the highlight of a tour of a large number of heritage sites conducted over the weekend of September 15 to 17. A visit to the sculpture garden of internationally recognised Latvian artist Mr. O. Feldbergs underscored the benefit of the holistic approach. Mr. Feldbergs operates an excellent restaurant and country hotel in an historic manor house in the Abava Valley. His sculpture garden and landscape art exploit the cultural uniqueness of the valley and prove that a cultural attraction can have a measurable commercial value in addition to its more esoteric artistic worth.

CCI has started an information exchange with the Latvian heritage community. Our initial expectation was that we would provide detailed technical information, but the experience in Riga made it clear that the Latvian professionals needed assistance in drafting policy documents. With such a daunting task and severely limited resources, it is imperative that activities be directed to where they will have the greatest impact in preserving irreplaceable cultural resources. Through the generosity of our sister organizations in the Canadian heritage community, CCI has assembled a package of the best cultural resource and heritage protection policy documentation. These documents are being shared with the State Inspection for Heritage Protection in Latvia to assist the Latvians to develop effective policies specific to their situation.

CCI hopes that this is just the beginning of a fruitful information exchange. The Canadian conservation community has developed a range of innovative techniques and approaches to collection problems that are specific to our extreme climate. This information has direct application in the Baltic climate, as well, and could form the basis of a long-term technical exchange. ♦

Heavily ornamented facade of the State Museum of Art, Valdemara Street, Riga.

X-Ray Energy Spectrometry at CCI

by Marie-Claude Corbeil, Senior Conservation Scientist, Analytical Research Services Division

X-ray energy spectrometry has been used since the early days of the CCI Analytical Research Services laboratory to analyze a great variety of artifacts.[1] Indeed, the x-ray energy spectrometer has been called the "curator's dream instrument"[2] because such a diversity of objects can be analyzed and because analysis is *in situ*, without damaging the artifact or having to take a sample.

This highly useful method of analysis is based on the ability of chemical elements to emit energy in the form of x-rays when the elements are subjected to an excitation source (such as a proton beam, an electron beam, or an x-ray beam). Because each element emits unique, characteristic energies, x-ray energy spectrometry provides the researcher with information on which chemical elements are present in an artifact. The information can be either qualitative or, ideally, quantitative. It is important to understand that only the surface of the object is analyzed; in other words, the analysis may not be representative of the object as a whole. Another limitation is that, because the analysis is performed in open air, only elements of atomic number 19 and greater are detected. X-rays from elements that have an atomic number of less than 19 are absorbed by the air or by the beryllium window of the detector.

Over the years, the original equipment at CCI has been modified with a number of improvements. Since the early 1970s, our laboratory has chosen to use radioisotopes rather than sealed x-ray tubes as the source of x-rays, primarily because the radioisotopes are easier and safer to handle as well as more compact and portable. We performed analysis using a range of radioisotopes (iron-55, iodine-125, and americium-241), but recently, when iodine-125 sources were discontinued, we decided to replace them with cadmium-109. All analyses are now performed using either cadmium-109 or americium-241 sources.

Figure 1. A painting is examined with the x-ray energy spectrometer.

Secondary x-rays emitted by objects subjected to the analysis are detected with an intrinsic germanium detector or a lithium-drifted silicon detector, which allow for simultaneous detection of all chemical elements.

X-ray spectrometric analysis is often the first and sometimes the only analysis performed when examining a painting (Figure 1). With the information provided by ultraviolet fluorescence photography about the presence or absence of retouched areas, we can focus on specific areas of the original painting to deduce from the chemical elements detected which pigments were used. For example, the presence of mercury in a red area indicates that mercury sulfide was used, either as natural cinnabar or as synthetic vermilion. This method was sufficient to show that a panel painting attributed to Rubens was in fact a 19th-century copy; the original reds and yellows contained cadmium, and cadmium pigments were not developed until the 1840s, 200 years after Rubens' death.

Of course, there are cases where x-ray spectrometric analysis cannot provide all the answers, and other methods are required. For example, detecting copper in a green area of a painting does not give us enough information to determine which pigment was used, as there are many green, copper-containing pigments. In such a case, sampling followed by x-ray diffraction analysis or infrared spectroscopy is necessary to reach a conclusion.

Although sometimes of limited use for the study of paintings, x-ray energy spectrometry is extremely well suited to the analysis of metal artifacts, helping us to answer conservation-related or archaeometry-related questions. We can easily determine the nature of the metal (pure metal, brass, bronze, pewter, and so on) and, in ideal situations, can even perform a quantitative analysis to determine, for example, the exact composition of an alloy. Numerous metal artifacts from various archaeological sites in Canada have been analyzed at CCI

Figure 2. Some of the fraudulent trade silver pieces examined at CCI.

by x-ray energy spectrometry, including artifacts from Sainte-Marie Among the Hurons, Ontario, and Red Bay, Labrador. We recently performed analyses of hundreds of copper and iron artifacts from several Arctic sites to determine if the metal was of native origin or smelted; this is a question often asked by archaeologists, as the answer helps them to ascertain trade routes. For example, in the case of iron, detection of nickel indicates that the iron is of meteoric origin. Also, our laboratory has acquired considerable expertise in the analysis of church silver[3] and trade silver over the years. Many so-called trade silver objects on the market in the early 1980s proved to be of modern manufacture (Figure 2).[4]

X-ray energy spectrometry has also proven to be very useful for the examination of photographs and painted photographs.[5] Over the years we have had the opportunity to look at many photographs and daguerreotypes for institutions such as the National Gallery of Canada and the National Archives of Canada. X-ray energy spectrometry helps us to answer such questions as, Was a gold-toning applied on a daguerreotype? Is this print a platinotype or a palladium print? Is this a painted photograph?

For many years we performed X-ray spectrometric analysis in the laboratory on artifacts that had been sent to CCI for treatment or analysis. During 1986, however, we had to transport our equipment outside CCI for the first time when the Royal Ontario Museum requested the analysis of their collection of natural history specimens to check for the presence of arsenic or mercury. X-ray energy spectrometry proved to be an effective technique for addressing this question.[6] In 1988, we received a request from the Musée des arts décoratifs de Montréal to analyze numerous objects in their modern furniture collection. In each case, the number of objects involved and the importance of the question made us decide to travel to the museum, but the "portable" equipment we had to carry at that time proved extremely cumbersome—not really portable at all.

In 1994, we purchased a second system that fully deserves the qualifier "portable." This system, which was developed by Canberra Packard for gamma-ray spectrometry, was modified for our x-ray detectors. The spectrometer itself is not much bigger than the portable computer to which it is connected (Figure 3). The spectrometer and laptop, together with the various cables and connectors, fit into a soft carrying case. With the help of Paul Marcon, Conservation Scientist, Environment and Deterioration Research Division, we designed a special case to transport the lithium-drifted silicon detector. The case can be moved by any means of transportation; so far, the system has survived travelling twice by air and once by truck.

Figure 3. A natural history specimen is analyzed in the portable spectrometer.

The new system meets our needs totally. Working outside the laboratory can be challenging when it comes time to set up the equipment or to find an appropriate and safe location to perform an analysis. However, scientists truly value the chance to be in direct contact with museum staff, and we hope our visits are equally appreciated by our clients.

Whether used in the laboratory or in the field, x-ray energy spectrometry is an invaluable technique, especially because it is quick and non-destructive. For certain objects it provides all the information we are looking for; in other instances it often provides results that guide our subsequent approach to the study of museum objects.

Endnotes

1. See for example J.F. Hanlan, N. Stolow, J.M. Grant, and R.W. Tolmie, "Applications of Non-dispersive X-ray Fluorescence Analysis to the Study of Works of Art," *Bulletin of IIC-AG*, 10, 2 (1970): 25–40, and J.F. Hanlan, "The EDX Spectrometer in Museum Use," *Bulletin of IIC-AG*, 11, 2 (1971): 85–90.

2. V.F. Hanson, "The Curator's Dream Instrument," in *Application of Science in the Examination of Works of Art* (Boston: Museum of Fine Arts, 1973): 18–30.

3. R.F. Myers and J.F. Hanlan, "The Compositional Analysis of French-Canadian Church Silver," *Bulletin of the National Gallery of Canada*, 21 (1973): 22–33.

4. J.M. Taylor, "A Warning: All That Glitters Is Not Trade Silver," *CCI Newsletter*, 11 (April 1993): 13.

5. M.-C. Corbeil, "Application de la spectrométrie des rayons X à l'étude des photographies peintes," *Journal of IIC-CG*, 15 (1990): 3–8.

6. J. Sirois and J. Taylor, "The Determination of Arsenic and Mercury in Natural History Specimens Using Radioisotope X-ray Energy Spectrometry and Scanning Electron Microscopy," in *Proceedings of the 14th Annual IIC-CG Conference*, edited by J. Wellheiser (Toronto: The Toronto Area Conservation Group of the IIC-CG, 1989): 124–136. ♦

New Lamps for Museum Lighting

by Stefan Michalski, Senior Conservation Scientist, Environment and Deterioration Research Division

In the spring of 1996 some very common lamps in museums, galleries, and archives will disappear. New energy efficiency regulations[1] will ban lamps that were once the mainstay of commercial and institutional lighting and replace them with more energy-efficient varieties. The energy savings will reduce carbon dioxide emissions in Canada by 5.3 megatonnes in the year 2000, equal to the emissions of over a million automobiles.

The new regulations are aimed at manufacturers and suppliers (and are in harmony with those already in effect in the United States). Users need not abandon their existing stock, but they must anticipate its end. Suppliers will not be allowed to sell proscribed fluorescent lamps after February 1, 1996, or proscribed incandescent lamps after April 1, 1996. The regulations also adopt minimum colour rendering index (CRI) standards for fluorescent tubes: CRI 45 for some types; CRI 69 for others. The inadequate colour rendering of the standard cool white tube will be a thing of the past. Nonetheless, these minimums still fall short of good display lighting, so museums still need to specify better-than-average fluorescent lamps (minimum CRI 80, preferably 90 to 100).

Table 1 summarizes the main lamps of interest and their status. The biggest change occurs in conventional track lighting: The old reflector lamps will be replaced by quartz halogen reflector lamps or compact fluorescent reflector lamps.

Table 2 compares the old and new reflector lamps in terms of their light intensities, and gives the lux levels at

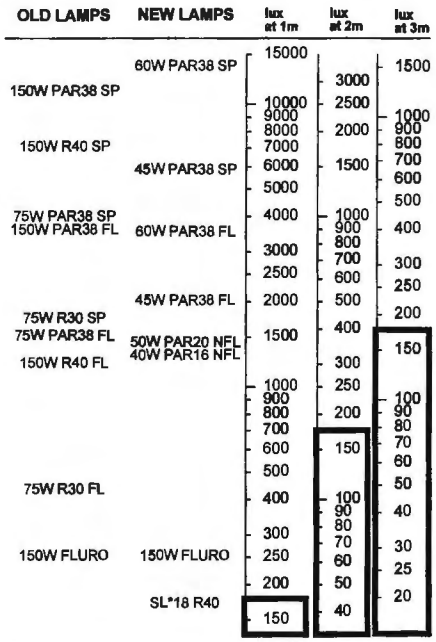


Table 2. Light intensities at 1 m, 2 m and 3 m for various old and new reflector lamps.

Table 1. Status of Commonly Used Lamps

Lamp Category	Specific Lamps	Changes	Comments for Museums, Galleries, and Archives
Old style tungsten lamps	**Old style reflector tungsten lamps, e.g., R30, R40, PAR 38**	**To be phased out April 1, 1996**	These are most easily replaced by 120-volt quartz halogen lamps with the same screw base (Table 2). The light will be "whiter", i.e., of higher colour temperature, than the old lamps. Relamping cost will be two or three times higher.
	Round lamps, FluroSpray, coloured reflector, rough service, ER type	Unaffected	
Quartz halogen lamps	120 volt 12 volt "low-voltage"	Unaffected	Many museums and galleries already choose these bulbs due to their other design advantages. Unfortunately, relamping cost is high.
Fluorescent tubes 1½" diameter (T12)	**Most traditional types, e.g.,cool white (CW), warm white (WW), and deluxe (WWX)**	**Phased out February 1, 1996**	These were the most common fluorescent tubes. They were never of much interest to cultural institutions due to their poor colour rendering.
	Cool white deluxe (CWX or 4100K) Cool white of colour rendering over 80	Unaffected	The survival of this tube is fortuitous, since CWX was always the best low-cost choice for cultural institutions. It has good (but not excellent) colour rendering and full spectrum phosphors. (A tube of excellent colour rendering costs several times as much.)
	Triphosphors (TRI)	Unaffected	Very energy-efficient tubes. Some score over 85 on the conventional colour rendering calculation, but they are not full spectrum and may prove unsatisfactory for some artifacts.
Fluorescent tubes 1" diameter (T8)		Unaffected	These narrower tubes are probably the future of fluorescents, offering high efficiency despite conventional phosphors. The fixture needs a ballast change if it previously used a T12 tube. Existing UV filter sleeves from T12 tubes will be loose, but okay.
Compact fluorescent lamps, some in reflector housings, e.g., SL*18 R40		Unaffected	These triphosphor lamps score well on the conventional colour rendering calculation and are the answer to many close-lighting situations, but they are not full spectrum and may provide unsatisfactory rendering for some artifacts.

distances of 1 m, 2 m, and 3 m. (Quartz halogen data is from the 1995 Philips catalog; the SL*18 R40 value from CCI measurement.) Most of the old bulbs can be replaced by new bulbs of comparable intensity. Unfortunately, the low intensity end of the scale, always a problem for museum and gallery lighting, finds the 75W R30 FL (flood) unmatched by any new replacement. The 150W FluroSpray remains the best of its kind and will probably remain available (we are awaiting confirmation).

Only one new lamp offers a broad flood of low intensity: the SL*18 R40. This is an 18W compact fluorescent lamp housed inside a plastic R40 reflector with a diffusing lens. It offers very long life (10,000 hours) and very low energy consumption (which will help air-conditioning costs in galleries). Despite high initial cost, it is cost-competitive over time. Colour rendering is good (82), but the tricolour phosphor spectrum may not be perfectly suited to some artifacts.

The generalizations in some documents, such as replacing old 150W PAR38 bulbs with new 90W PAR38 bulbs, and old 75W PAR38 bulbs with new 45W PAR38 bulbs, are much too imprecise for museums and galleries. The new bulbs not only are more efficient but often are more narrowly focused, so beam intensity can be several times too high if the above generalizations are followed.

We thank Sandra Lawrence and her colleagues at the Art Gallery of Ontario for bringing this impending change to our attention.

Endnote

1. Canadian Energy Efficiency Regulations, Department of Natural Resources, Ottawa, 1995. ♦

Treatment Provides Information: Conservation of Three 18th-Century Artifacts

by Robert L. Barclay, Senior Conservator, Ethnology Section, CCI, and P.R. White, Conservator, Objects and Weapons, Canadian War Museum

Conservation and restoration are most often regarded as essentially treatment functions, but the information yield resulting from the bench treatment of an artifact is often undervalued. In fact, conservation training emphasizes a knowledge of materials of fabrication and techniques of manufacture unrivalled in other museum disciplines. Because of the conservator's predisposition toward the physical understanding of objects, dismantling during treatment very often results in elucidation of construction details and a net increase in information. The three artifacts described here all benefitted in this way from conservation treatment.

Fowling Piece

The David M. Stewart Museum in Montréal recently purchased an 18th-century fowling piece from a dealer in the United Kingdom. The acquisition of this artifact by a Canadian museum was considered a high priority, as the gun was thought to be the earliest known Canadian-made firearm.[1] At the time of purchase, the gun was described as being made by Treyvoux of Québec City, whose name is engraved on the lockplate. Although little is known of Treyvoux, the gun was dated stylistically to the mid to late 18th century. This firearm was submitted to the CCI for treatment and examination.

Lock of the fowling piece from the David M. Stewart Museum showing the name "Treyvoux a Quebec"

Once the gun had been disassembled it was necessary to gain clearer images of the inscriptions on the various components. Traces were visible on the outside and inside surfaces of the lock, the top of the barrel, and the left side of the barrel. Routine cleaning of the outside of the lock clarified the inscription "Treyvoux a Quebec." This inscription had been engraved into the surface and was still easily legible. An incomplete inscription on the inside of the lock could not be enhanced in any way as the die had been struck off-centre, causing only the top part of the lettering to penetrate fully. Nevertheless, from the letters visible it was not difficult to reconstruct the first name Clement.

Cleaning of the barrel revealed a stamped mark on the left side at the breech end: a horseshoe spelling out the name La Forge. This mark established the barrel as being of French manufacture. Preliminary cleaning of the top surface of the barrel at the breech end revealed the letters "Sou," and further cleaning extended this to the legend "Soullard à la Rochelle." Soullard was a gunsmith probably trained in France and known to be working subsequently in Annapolis and Québec between 1678 and 1723.[2] This information therefore clarified the provenance of the gun and established the date at 1723 at the latest. The gun also proves to be the only known extant example of this maker's work. As with other artifacts of the period, the fowling piece was built around metal components, particularly the lock and the barrel, made by specialized craftsmen in Europe. The Canadian gunsmith finished the pieces, made the wooden stock, assembled the gun, and applied his name to the finished work.

Trade Musket

Lundy's Lane Museum in Niagara Falls, Ontario, submitted a trade musket of late-18th-century pattern for treatment at CCI a few years ago. The gun had originally been made as a flintlock and later converted to a caplock by removing the powder pan and flint hammer and replacing them with a cap nipple

Side view of the musket from Lundy's Lane Museum showing the converted lock.

and cap hammer. This change indicated a long life for the gun and suggested that it was a treasured piece, which its owner had considered worth modernizing. On arrival, the metal parts of the gun were corroded to the extent that the more pronounced makers' marks were not easily discernable and the lesser ones were completely invisible.

Disassembly and cleaning of the metal parts revealed several interesting features. Once cleaned, the brass trigger guard appeared more ornately engraved than one would suppose common for a trade musket. A black metal inlay on the stock proved, on cleaning, to be a silver cartouche bust of an Indian chief, and the foresight set into the end of the barrel was also made of silver. All these features indicated that the weapon was a presentation gun for a chief, rather than one made simply for trade. The steel parts yielded more information after the corrosion was removed. A stamp depicting a boar in a circle, a feature of all guns presented to chiefs in Upper Canada at that time, appeared on the lock. Cleaning of the barrel revealed the stamps of the English ordnance department and the crown of King George IV. Above them was a fox in a circle, the trade gun mark of the North West Trading Company, which came into being after the War of 1812. The barrel also had "London" stamped on it, while the lock carried the maker's name, Moxham. Thomas Moxham was an English gunsmith working in Birmingham who lived from 1762 until 1837.[3] On the left side of the stock the stamped initials "TC" were revealed during cleaning of the wood. These were probably the mark of the maker of the stock and possibly the person who assembled the gun in Moxham's workshop.

Silver Cake Bowl

The Prince Edward Island Museum and Heritage Foundation submitted a sterling silver fruit basket which required cleaning and minor repair of several cracks around its rim. This piece was believed to be Irish and was tentatively dated at 1814. However, drawing on an expertise in early silver, it was possible to provide more accurate and extensive information. The "basket" proved to be a cake bowl and bore the mark of Dublin silversmith John Stoyte, who had made the piece in 1790. A further mark showed that an assay of the quality of the silver had been done at the time of production by Matthew West.

Hallmarks on the underside of the silver bowl from the Prince Edward Island Museum and Heritage Foundation.

In all three cases, treatment of the object resulted in a high yield of historical information. The fowling piece from the David M. Stewart Museum was shown to predate any other Canadian-made gun by about a century, and the inscriptions revealed during treatment placed it fifty years earlier than first supposed. Once disassembled and cleaned the musket from Lundy's Lane Museum proved to be a valued presentation piece and not simply an anonymous trade musket. The silver bowl from the Prince Edward Island Museum and Heritage Foundation proved to be a quarter of a century earlier than originally thought, and the maker and assayer were also identified. Treatment on the bench does more than just stablize and beautify—it provides key information that gives a much enhanced understanding of the artifacts and a deeper appreciation of their context.

Endnotes

1. The second oldest Canadian-made firearm is by Woods of Brantford and was made in 1830. It is in the collection of the Château Ramezay, Montréal.

2. Eugene Heer, *Der Neue Stockel*, 3 vols (West Germany: Journal-Verlag Schwend Gmbtt, Schwabisch Hall, 1982).

3. Claude Blair, ed., *Pollard's History of Firearms* (Feltham, U.K.: Country Life Books, 1983). ♦

Reminder to Museums: CCI's Emergency Service

In the event of an emergency such as fire or water damage to collections, CCI can be contacted for advice at any time, day or night, seven days a week. In certain situations it may be possible to send CCI staff to assist with salvage operations. This service is free of charge to Canadian institutions with publicly owned collections.

Should an emergency occur that affects the collections, call CCI immediately. Indicate to the CCI operator that you have an emergency. This will ensure that the proper response procedures are activated.

CCI's number is (613) 998-3721; we accept collect calls.

Alternatives for Plasticized Poly(vinyl chloride) Tubing

by R. Scott Williams, Conservation Scientist, Conservation Processes Research Division

Flexible plastic tubing and hoses are used in conservation applications to form gaskets in display cases and storage furniture, to pad or cushion hooks and pegs holding objects, and to make various supports and fittings, as well as in the conventional applications of transporting fluids such as in vacuum and steam tables or in ultrasonic misters. In previous articles I have stated that flexible tubing made of plasticized poly(vinyl chloride), or PVC, should not be used for conservation applications because components of PVC tubing or its degradation products might stain organic materials or corrode metals.[1] Unsuitable PVC tubing, also called vinyl tubing, includes Tygon types R-3603, B-44-3, S-50-HL, and S-54-HL; Nalgene types 180 and 380; and generic vinyl house brands from other suppliers.

The appealing characteristics of PVC tubing are its flexibility, glasslike transparency, crystal clarity, and ready availability in diameters ranging from 0.25 mm for microbore catheter tubing to several centimetres for laboratory or process tubing. Alternative tubings that are more acceptable for conservation uses should have these properties, should be free of migratory or extractable additives, and should not produce hazardous degradation products as they age.

In response to many requests about substitutes for PVC tubing, this article provides details about suitable alternative tubings.

A perusal of the catalogues from the major laboratory and plasticware supply houses shows tubings of many different compositions. Some of the available tubings were evaluated for their suitability for conservation applications, concentrating particularly on tubings that were flexible, transparent or translucent, and readily available in a variety of sizes through laboratory and plasticware supply houses. Suitability was judged on the basis of the chemical stability of the constituents identified by chemical analysis and on the basis of the lack of extractable material in water and common organic solvents. No long-term or accelerated aging testing was done on any product to determine its degradation characteristics.

Suitable Substitutes

Tubings made of silicone (peroxide-cured and platinum-cured), Teflon (fluorinated ethylene propylene or FEP, and polytetrafluoroethylene or PTFE), polyethylene, and polypropylene have no significant volatile or extractable additives and have stable base polymers that are unlikely to produce obnoxious degradation products. These tubings are unlikely to cause chemical damage to any object during long-term storage or display applications. Their physical properties—such as flexibility and transparency—may influence their suitability for particular applications.

All these tubings are colourless and nearly transparent or slightly translucent with sufficient clarity that liquids inside them are visible. The silicones are flexible and elastic. The others are stiff to rigid and tend to kink when bent into tight radii, making them difficult to push over rods or hooks.

Summary of Tubing Properties

Tubing Name	Chemical Composition	Physical Characteristics	Methanol Extract	Comments (Extract Composition)
Masterflex 96400 series	Silicone, peroxide-cured	Flexible, translucent white	1.3 wt%	Silicone oil, colourless extract
Masterflex 96410 series	Silicone, platinum-cured	Flexible, translucent white	1.7 wt%	Silicone oil, colourless extract
C-FLEX, Masterflex 06424 series	Thermoplastic elastomer based on styrene-ethylene-butylene-modified block copolymer with silicone oil	Flexible, opaque white	50 wt%	Silicone and mineral oil, oily colourless extract
PharMed, Masterflex 06485 series	Thermoplastic elastomer based on polypropylene with mineral oil	Stiff, opaque beige	11.1 wt%	Same as Norprene, oily yellow extract
Norprene, food grade, Masterflex 06402 series	Thermoplastic elastomer based on polypropylene with mineral oil	Stiff, opaque beige	11.5 wt%	Same as PharMed, oily yellow extract
Tygon R-1000	Phthalate plasticized PVC	Flexible, transparent	51 wt%	Phthalate
Tygon R-3603	Phthalate plasticized PVC	Flexible, transparent	51 wt%	Phthalate
Tygon B-44-3	Phthalate plasticized PVC	Flexible, transparent	34 wt%	Phthalate
Tygon S-50-HL	Phthalate plasticized PVC	Flexible, transparent	32 wt%	Phthalate
Tygon S-54-HL	Phthalate plasticized PVC	Flexible, transparent	22 wt%	Phthalate

Peroxide-cured and platinum-cured silicones differ in the type of catalyst used in the curing or vulcanization of the silicone polymer. The platinum-cured silicone is more suitable because its vulcanization byproduct is ethanol, whereas the vulcanization byproducts from peroxide-cured silicones are volatile and extractable peroxides and ketones.[2] Ethanol is easily removed, and any small amount of ethanol residue is unlikely to damage objects. Peroxide and ketone residues from peroxide-cured silicone could be hazardous to objects. The quantity of methanol extract from either type was small, about 1.5 wt% for the two types of silicone tubing. When pressed between two sheets of copier paper at about 2000 psi, the silicone tubing did not produce oily stains, whereas Tygon R-3603 (50% phthalate plasticizer) and C-FLEX (about 50% silicone and mineral oil plasticizer) both produced distinct oily stains.[3]

FEP and PTFE are totally fluorinated fluorocarbon plastics with no extractable additives. PTFE is opaque white; FEP is translucent, and liquids in it are visible.

Polyethylene and polypropylene tubings have no significant quantities of extractable additives. Their main disadvantage is their stiffness, which may make them difficult to use.

Unsuitable Tubings

Tubings made from the following polymers are unsuitable because of volatile or extractable additives or obnoxious degradation products that may damage objects: PVC (10–50 wt% extractable plasticizer and acidic degradation products); C-FLEX thermoplastic elastomer based on styrene-ethylene-butylene-modified block copolymer with silicone oil (50 wt% extractable silicone and mineral oil additives[4]); PharMed and Norprene (extractable components), general purpose rubber, gum rubber, latex rubber, butyl rubber, neoprene rubber (volatile reducible sulfur compounds, and obnoxious, often brightly coloured, acidic degradation products); and polyurethane (obnoxious, often coloured, degradation products).

Tygon SE-200 is a special fluoropolymer-lined tubing. It has a thin clear inner liner of FEP with a normal plasticized PVC outer jacket. It is nearly as flexible and clear as regular Tygon R-3603 tubing. This tubing is not suitable for storage or display applications where the plasticized PVC outer shell may cause stains during contact with objects or for closed spaces where degradation products from the PVC may accumulate, but it is a suitable product for transporting liquids, as in ultrasonic misters, because the inner liner of FEP is very inert and unaffected by solvents.

Suppliers

- Canlab Scientific Products (416-821-9660)
- Cole-Parmer Instrument Company (1-800-323-4304)
- Fisher Scientific (613-226-8874)

Endnotes

1. R. Scott Williams, "Tygon Plastic Tubing: Use With Caution," *IIC-CG Newsletter*, XII, 3 (March 1987): 20–21; 2. R. Scott Williams, "Plasticized PVC in Museums: Don't Use It!" *CCI Newsletter*, 12 (September 1993): 4–5.

2. "Vulcanization of Siloxanes," Masterflex Application Tip #56 (Chicago: Cole-Parmer Instrument Co, n.d.).

3. R. Scott Williams, "Analysis of C-FLEX Tubing," CCI Service Request Report No. CPR 577, internal report (Ottawa: Canadian Conservation Institute, 8 November 1994).

4. Williams, "Analysis of C-FLEX Tubing."

Textile Research Focus Group Meetings

by Season Tse, Conservation Scientist, Conservation Processes Research Division

In January of 1995, CCI initiated a series of meetings among textile conservation professionals to identify research priorities within the Canadian textile conservation community and to obtain feedback on CCI's current research program. The meetings are part of our continuing process of consultation to ensure that CCI research addresses the needs of the Canadian conservation community.

To date, two formal meetings have been held and a number of verbal and written comments have been received. At the first meeting, held at CCI on February 8, 1995, conservators and scientists from CCI met with a group of textile conservators from the Ottawa and Montréal areas. A second meeting, at which participants met with three CCI representatives, was held in Calgary on May 28 as one of three concurrent discussion groups during the annual conference of the International Institute of Conservation—Canadian Group (IIC-CG).

During both meetings, CCI described recent research activities and our clients identified the areas of greatest concern. The following review summarizes the high-priority issues.

Priorities

The **"wet-cleaning" of historic textiles** is the highest priority for most textiles conservators we consulted. While washing of cellulosic textiles is common, wet-cleaning of proteinaceous textiles is less common because it is considered more problematic. A current project on washing of cellulosic textiles will provide some answers, and we will gain further understanding when research into the effect of wet-cleaning silk begins later in 1996. Other areas, such as the duration of washing and the long-term effect of additives and detergent residues, will be studied in future work.

Closely related to wet-cleaning is the issue of **water quality and water purification.** Textile and paper conservators have made a number of requests for a CCI publication on this topic. Conservators are looking for guidelines

to help them choose from the myriad of water purification systems that are commercially available. A *CCI Note* will be prepared to guide the selection.

Conservators and collection managers have made many requests for CCI to provide guidelines for selecting plastic storage and display materials and for choosing **storage systems**. Two CCI publications now under way will address many of the concerns about storage materials and enclosures; we will inform our clients when these become available. CCI is not currently researching storage system fabrication; clients are advised to contact manufacturers directly for specificatons.

Exhibition guidelines are another priority for conservators. Conservators need better methods to help them identify display conditions, appropriate length of time for display, and methods of transportation that might be damaging to artifacts. Potential damages include fading of certain colorants, discolouration of textile fibres resulting from extended light exposure, and physical damage caused by stress during exhibition or use of the artifacts. Acceptable light levels for exhibition are well established in general terms, but defining appropriate exposure times for particular materials and media is more difficult. CCI is developing a microfading apparatus that will be able to predict light damage to certain artifacts and fugitive colorants. Details of this apparatus were presented at the 1995 annual conference of IIC-CG. The Minolta chromameter is also useful in detecting small colour changes in artifacts on display. Furthermore, developments in infrared and thermoanalytical techniques are expected to be useful for monitoring the degradation of protein fibres under exhibition conditions.

To answer questions about the effects of treatments (such as the washing of silk and wool) and the effects of display and storage conditions, the development of sensitive analytical methods to evaluate **protein fibre degradation** is fundamentally important. CCI will continue to develop thermoanalytical and infrared microanalytical methods for silk. After-treatment evaluation of the Gondar Hanging will be the first step toward developing these techniques.

There have been a number of requests for the development and evaluation of methods for **consolidating textiles**, both painted and highly degraded and fragile. One device being evaluated by the textile conservation laboratory at CCI is the ultrasonic mister. The mister, developed by CCI, delivers a fine mist of consolidant to a small area. It has been successfully used in treating ethnographic materials and friable media on paper works of art, and is now being considered for painted textiles. The use of parylene, as a last resort, to consolidate weighted silk fragments and archaeological cellulosic and wool textiles has also been evaluated at CCI and elsewhere. While there were no general recommendations for the treatment of all textiles, parylene was useful for highly degraded artifacts and has been used for archaeological textiles on a number of occasions. For somewhat less degraded archaeological textiles, POLYOX®, a water-soluble resin, has been successfully used. There are no plans for further research on parylene or POLYOX® consolidation of textiles, but publications have been produced on the CCI work to date.

Adhesive research continues to be important to most textile conservators. The long-term interaction of adhesives on textile artifacts and adhesive removability are the main concerns. CCI offers a seminar called "Adhesives Used in Textile Conservation." In addition, research on the stability of adhesives based on vinyl acetate ethylene (VAE) copolymers with various modifiers continues. The objective is to obtain an adhesive formulation that is suitable for conservation. To date, CCI has not investigated the properties of any adhesives with relation to any substrates. These application aspects will be addressed after the stability question has been answered.

Other areas that were discussed include stain removal techniques for protein fibres, the use of the suction table, the treatment and care of composite and modern materials, colour monitoring of artifacts, and the identification of highly degraded cellulose fibres. Guidelines for the fire-proofing of fibre art were also discussed; CCI has put together an information package on various aspects of fire-proofing of textile artifacts (published in the Fall 1995 issue of the *Textile Conservation Newsletter* and also available on request).

In general, conservators are placing more emphasis on preventive measures and short-term treatments, a reflection of the current lack of time and resources for long, complex (and expensive) treatments. During the meetings, it was emphasized that CCI research must result in practical recommendations for treatments, choice of materials, and guidelines for collection care to enable conservators to apply experimental findings to the everyday handling of objects. Participants pointed out that there is a need for better communication between CCI and our clients and for more effective dissemination of information. The focus group consultations are a first step in meeting these needs.

Further Consultations

In early September, CCI invited Dr. John Crighton from the Department of Textile Industries at Leeds University, England, for a two-day consultation. The discussions centred on the textiles research being done at Leeds University and at various research centres in Europe. We hope this meeting will lead to the continuing exchange of information on sensitive analytical techniques and perhaps to collaborative projects in the future.

Participants highly appreciated CCI's effort in organizing these meetings, and we were gratified by the general support for CCI's current research projects as well as future plans. More importantly, the meetings were an opportunity for professional exchanges among textile conservators, scientists, educators, and collection managers. To obtain the Textile Research Focus Group Report, a more detailed account of these meetings, please send your request to Cliff McCawley, Director, Conservation Research Services, CCI. Inquiries and comments about textile conservation research at CCI should be addressed to the author. ♦

Laser Cleaning Demonstration

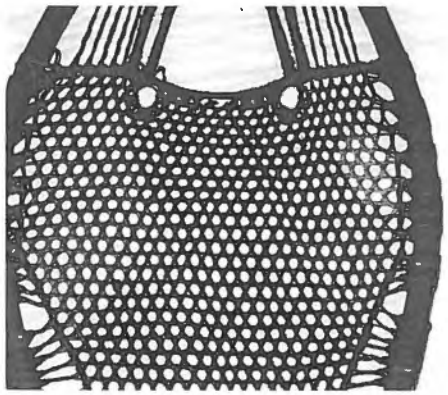
by Tom Stone, Chief, Ethnology and Furniture Division

In January 1995, representatives of Atlas Laser Systems of Sainte-Foy, Quebec, spent a day at the Canadian Conservation Institute demonstrating the potential of the Nd-YAG laser surface cleaning system. The Laserblast was originally developed by Quantel in France, one of Atlas's parent companies, for cleaning stone surfaces.

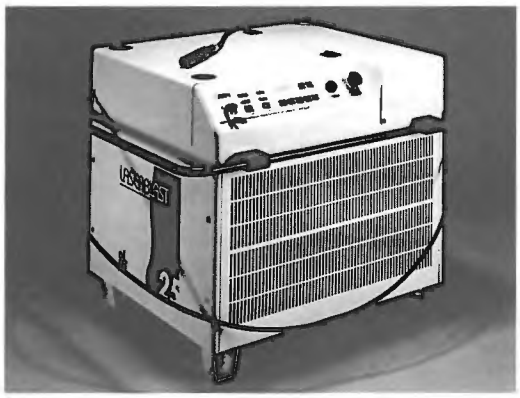
Conservators from CCI, the Historic Resources Conservation Branch of Parks Canada, and the Department of Public Works and Government Services Heritage Conservation Program Directorate provided samples of a wide range of materials for cleaning. The materials included leather, shell, metal (corroded, painted, and bright), textiles, basketry, feathers and quillwork, tinplate, paper documents and prints, and stone with simulated graffiti in paint and grease pencil.

The system cleans through the photomechanical effect of the intense plasma shock wave that is generated by the high power of the laser pulse at the surface of the material being cleaned. The superficial layer being removed (organic pollutants, grease, oil, paint, dust, and so forth) is fragmented into small particles with no apparent alteration of the substrate.

As the tests progressed, it became apparent that the operator has a fair degree of control in most cleaning situations. It is possible to adjust the number of pulses per second and the amount of energy per pulse. In general, it seemed to be very easy to remove layers of paint, wax, and dirt. Light to medium iron corrosion could be removed easily, but a bluing effect was sometimes created on the bare iron if the laser had to be focused into pits for a slightly longer time. On copper corrosion products, the laser changed the appearance of some corrosion products from light green to dark green.



Gut webbing on a snowshoe. Cleaned areas are at the two o'clock and nine o'clock positions.



The Nd-YAG laser surface cleaning system. Light energy is delivered through a fibre optic cable and handpiece.

One aspect of the system that surprised most of the participants was the degree to which the cleaning process was colour dependent. Darker colours absorbed more of the light energy and therefore were much easier to remove. Where a lighter-coloured coating was being removed from a darker substrate, it was sometimes difficult to remove the top layer without affecting the darker under layer. Success in this situation seemed to depend on operator experience and on the degree of colour difference between the surface and the underlying layer. At the extreme, it was virtually impossible to remove a white paint layer and leave a dark brown or black substrate intact. Conversely, when trying to remove black grease pencil from white marble, the grease pencil was removed completely.

On silver with light surface tarnishing, the laser succeeded in removing the blue-black tarnish layer only to create another uncontrolled reoxydation of the surface. This made for rather odd-looking silvery-grey tarnish.

A number of very dirty ethnographic materials, including basketry, a tooth necklace, and the gut mesh of a snowshoe, were cleaned rapidly. To the naked eye, the results were excellent.

Tests on dirty feathers, however, were less positive. Although dirt was removed, a greyish cast was often left, perhaps due to a physical reconfiguration of the barbules and hooklets.

Removal of registration numbers was also attempted. Numbers written in black ink were removed easily; however, there was some difficulty in removing the clear lacquer coatings associated with the numbers, especially if the underlying substrate was a light colour. Often, the lacquer layer was left intact except where the black numbers had been removed.

It became apparent that the laser cleaning process, while potentially quite effective at removing material from the surface of an object, was not at all effective at removing stains and mould that had penetrated the surface. Surface dirt and flyspecks could be removed from paper and textiles, but the laser process did nothing to remove stains or dirt particles that were amongst the fibres. Surprisingly, the laser also failed to remove pressure-sensitive adhesive residue from the surface of paper. Because of the problem of uncontrolled reoxydation, the laser was not successful at cleaning metal thread in textiles. On paintings, the success of the process was highly colour dependent, and the laser did not seem to distinguish well between layers of colour. The Nd-YAG laser that was demonstrated operates in the infrared range; for the removal of stains and mould, a laser tuned to the ultraviolet wavelengths might be more appropriate.

Although clearly not appropriate for all applications, laser cleaning may be a useful technique in certain situations. It appears to be especially promising for removing surface coatings such as paint, wax, and dirt from metal, stone, and some organic materials. In many cases, more "low-tech" methods could achieve equally desirable results but may cause more damage to the underlying surface and be a great deal slower than laser cleaning. In other cases, the laser might be the only viable way to remove some materials from some surfaces.

The samples cleaned at CCI have not yet been examined by scanning electron microscopy, and much more work needs to be done to evaluate fully the potential of laser cleaning. Nevertheless, the demonstration of this exciting tool created considerable interest among the conservators who participated.

CCI thanks Mr. Sarto Barsetti of Atlas Laser Systems, Mr. Jules Parent of Quantel North America, and Mr. Philippe Aubourg of Quantel France for performing the demonstration. ♦

Planning for the Future: An Interview with Bill Peters

by Deborah Robichaud, Director, Information and Extension Services

CCI has embarked on a planning exercise that will chart the course for its programs and services into the next millennium. Prompted by the rapid changes that are continuing in the heritage community and by the series of program reviews that will reduce the operating budgets of all federal government departments, including CCI, as well as the approach of CCI's 25th anniversary, the exercise will enable CCI to prepare a thorough corporate plan, from which strategic and operational planning will flow. Priorities will be identified, and programs will be modified as a result of these changes.

"We can't continue to do more and better at the same time," says recently appointed Director General Bill Peters. "We know that the next four years will be characterized by fewer resources, and we have to examine the ways we provide services to museums and related organizations across Canada. We have to identify the things we do best and build on those strengths." He stresses that this is a healthy review, which fully involves staff throughout the organization. "CCI has served the Canadian and international heritage communities for almost 25 years, and those communities have seen some radical changes. We must be certain that we can respond to the most important of the current and rapidly changing needs of our clients, while at the same time carefully planning the services and research programs that will provide the greatest benefit to the heritage community."

Peters also sees consulting with representatives of major stakeholders as a critical part of the process; stakeholders include large, medium, and small museums and archives, professional associations, provincial governments, and international agencies. "As we do not want the planning and consultation process to consume large amounts of our available financial resources and detract from our services, we have decided to consult with selected representatives of the communities we serve, rather than conduct massive and expensive surveys and meetings."

During the main phase of the planning process, slated from January to June 1996, clients may notice some slowdown in the response time from CCI staff and some delays in treatments. "We want to have strong participation from all staff, so that we can all fully participate in determining our collective future. This inevitably means that some services will be disrupted. We will keep this to a minimum and will keep in close touch with any clients who are affected," said Peters.

"I would also encourage heritage professionals to pick up the phone and call me, or write to me with their opinions about the future directions for CCI. We are focusing on innovation and excellence to guide us through these rough financial times, and I am convinced that this exercise will greatly benefit CCI and its clients."

Internships

The following individuals have recently participated or are currently involved in an internship at CCI.

Pia Christensson, a textile conservation student from the University of Gothenburg, Sweden. Sept. 6, 1995 to Dec. 22, 1995. (Curriculum Internship - Textiles Section).

Vera de la Cruz Baltazar, a student in the Art Conservation Program at Queen's University, Kingston, Ontario. Jan. 15, 1996 to April 30, 1996. (Curriculum Internship - Conservation Processes Research Section).

Annaïg Gautier, an applied physics student from the Université de Bordeaux III, France. Oct. 16, 1995 to Sept. 30, 1996. (Curriculum Internship - Analytical Research Services).

Kevin Machan, a conservation student from Sir Sandford Fleming College, Peterborough, Ontario. Sept. 6, 1995 to April 30, 1996. (Curriculum Internship - Ethnology Section).

Evelyn Thompson, a conservator with the Jamaican National Heritage Trust, Kingston, Jamaica. Dec. 4, 1995 to Jan. 30, 1996. (Professional Development Internship - Archaeology Section).

CCI Services: Seminars, Lectures, Workshops, and Visits

September 1995

Bob Barclay spent two days at the Maritime Museum of the Atlantic in Halifax providing advice on the consolidation of a wooden boat hull.

Carole Dignard and **Bob Barclay** presented the "Artifact Mounting" workshop in Charlottetown, Prince Edward Island.

Charlie Costain and **Carole Dignard** gave the seminar "A Framework for Preventive Conservation" in Parrsboro, Nova Scotia.

Deborah Robichaud participated in the annual conference of the British Columbia Museums Association in Fort St. John, British Columbia.

Ela Keyserlingk gave the paper "Ethics in Textile Conservation" at the interim meeting of the ICOM Committee for Conservation's Textile Working Group in Budapest, Hungary.

Jane Sirois and **Tom Strang** visited the Chatham Kent Museum in Chatham, Ontario, with a portable x-ray spectrometer system (a Canberra Packard Inspector) to survey the natural history collection for the presence of arsenic and mercury compounds. The curator, Dave Bentson, arranged for other local museums to bring any specimens they wanted examined. In total 130 spectra were collected from 129 specimens.

Marie-Claude Corbeil and **Elizabeth Moffatt** were featured in an episode of the television series "Découvertes" which dealt with contemporary art.

Michael Harrington and **Daniela Kolbach** presented workshops on the conservation of furniture for the Art Conservation Techniques students at Sir Sandford Fleming College, Peterborough, Ontario.

Janet Mason and **Deborah Stewart** presented the workshop "Closing a Seasonal Museum" for the Ontario Museum Association at the Muskoka Pioneer Village in Huntsville.

Jane Down presented a paper entitled "Adhesive Projects at the Canadian Conservation Institute" at the Resins Ancient and Modern Conference sponsored by the Scottish Society for Conservation and Restoration, Aberdeen, Scotland.

Season Tse organized the two-day visit of Dr. John Crighton from the Department of Textile Industries, Leeds University, England, including meetings and a lecture by Dr. Crighton.

Sherry Guild and **Patricia Smithen** were at the Yukon Centre for the Arts in Whitehorse, Yukon, to present the seminar "Permanence of Artists Materials and Techniques for Paintings and Paper" and to do a condition survey of works of art on paper by the artist Lilias Farley.

Stefan Michalski and **Carole Dignard** gave the seminar "A Framework for Preventive Conservation " to trainees in the Aboriginal Training Program at the Canadian Museum of Civilization, Hull, Quebec. For the first time in this program, the trainees for the year included several Inuit.

Tom Stone and **Bob Barclay** visited the Sharon Temple Museum in Sharon, Ontario, to inspect an early handmade organ, and the South Simcoe Pioneer Museum in Alliston, Ontario, to examine a kayak that once belonged to Sir Fredrick Banting.

October

Bob Barclay presented a paper entitled "Treatment Phase Analysis in Restoration and Conservation" at the ARRAFU conference in Paris, France. The theme of the conference was "Restoration, De-restoration, Re-restoration..."

Marie-Claude Corbeil, in collaboration with Michel Cauchon, Claude Payer, and Colombe Harvey of the Centre de conservation du Québec, gave a presentation to the Ursulines community on the restoration of the sculpted decor at the Ursulines chapel of Québec City. The restoration work was finished in September.

James Bourdeau and **Carole Dignard** attended a conservation conference organized by the Arbeitsgemeinschaft der Restauratoren in Bremen, Germany. James presented the paper "Practical Considerations in the Use of Acrylic UV-Barrier Top Coats for the Protection of Dammar Picture Varnishes," and Carole presented a paper entitled "The Ultrasonic Mister: A Tool to Consolidate Powdery Paint."

Judy Logan gave two lectures to the Grade 11 Ancient History classes at Gloucester High School, Ottawa, Ontario. She also met with members of the West Pubnico Historical Society and Nova Scotia's Provincial Archaeologist to consult about the excavation and conservation of an Acadian aboiteau at West Pubnico, Nova Scotia.

Maureen MacDonald gave a lecture on environmental monitors and indicators used in museums to the Archives Technician students of Algonquin College, Ottawa, Ontario.

Stefan Michalski went to Regina, Saskatchewan, to present a workshop entitled "The Mini-Suction Table for Stain Removal in Paper and Textiles" for the Museums Association of Saskatchewan.

November

Judy Logan was a guest lecturer for the Classics Department, University of Victoria, and gave another lecture for students in the Introduction to Conservation course at Simon Fraser University, Burnaby, British Columbia.

Carole Dignard and **Renée Dancause** conducted a survey of the anthropology collections storage area at the Université de Montréal.

David Hanington and **Agata Sulkiewicz** visited the Goulbourn Historical Museum in Stittsville, Ontario, to provide advice on the care and conservation of the museum's collection.

Tom Stone and **Kevin Machan** (a Sir Sandford Fleming College intern) visited the Perth Museum, Perth, Ontario, to provide advice on the care of native semi-tanned clothing.

Ian Wainwright presented the seminar "Scientific Examination of Museum Objects" in Victoria. The seminar was sponsored by CCI, the Pacific Conservation Group, the British Columbia Museums Association and the Royal British Columbia Museum.

Jane Down and **Ela Keyserlingk** presented the seminar "Adhesives in Textile Conservation" for the Alberta Museums Association at the University of Alberta, Edmonton.

Jean Tétreault and **Malcolm Bilz** of CCI and France Rémillard of Centre de conservation du Québec gave a seminar on the preventive conservation of plastics and elastomers at the Centre de conservation du Québec in Québec City.

Lyndsie Selwyn conducted a site visit at the Field Museum of Natural History in Chicago to give advice on silver corrosion.

Marie-Claude Corbeil gave a seminar on the methods for testing and analyzing museum objects to the Masters of Museology students at Laval University in Québec City.

Lyndsie Selwyn, Vasilike Argyropoulos, and **Nancy Binnie** gave a four-hour workshop on CCI metals research at Sir Sandford Fleming College in Peterborough, Ontario.

Michael Harrington and **Daniela Kolbach** presented workshops on the conservation of furniture to the Master of Art Conservation students at Queen's University, Kingston, Ontario.

Tom Strang attended a meeting in Washington, D.C., of an advisory group for the International Atomic Energy Association, Vienna, Austria, on the application of radiation for biodeterioration control in cultural materials. At the same meeting, **Charlie Costain** presented the paper "Pest Control Technologies Currently Applied to Cultural Properties."

Stefan Michalski was the keynote speaker at the Scientific Program Research Symposium III, the Getty Conservation Institute, Marina del Rey, California. He presented the paper "Current Issues and Future Research in Humidity and Temperature Guidelines."

Ela Keyserlingk met with staff from the Vancouver Museum and the Point Ellice House Museum in Victoria, British Columbia.

Tom Strang presented the lecture "Introduction to Pest Management for Collections" to both years of the Master of Art Conservation program at Queen's University, Kingston, Ontario, and to the Master of Museum Studies program at University of Toronto.

December

David Grattan organized a one-day seminar on mass deacidification. Speakers included **Season Tse, Paul Bégin, Elzbieta Kaminska** and **Helen Burgess** of CCI and scientists from the Pulp and Paper Research Institute in Montréal.

Judy Logan attended the annual conference of the Archaeological Institute of America as a member of the AIA's Conservation and Heritage Management Committee, in San Diego, California.

Scott Williams visited the Costume Institute of the Metropolitan Museum of Art, New York, to examine plastics used in costumes in its collection and to advise on the storage and treatment of these plastics. He also lectured to students in the costume history course in the MA program at New York University. This visit was in preparation for a tentatively planned symposium on the use of unstable materials in contemporary fashion, at which Scott will present papers and lead sessions.

January 1996

David Hanington and **Agata Sulkiewicz** presented a box-making workshop to students in the Art Conservation Techniques program at Sir Sandford Fleming College, Peterborough, Ontario.

David Tremain presented lectures on disaster preparedness and recovery to the students in the Art Conservation Techniques program at Sir Sandford Fleming College.

Jane Down presented a seminar entitled "Adhesive Research at the Canadian Conservation Institute" to the Queen's University Master of Art Conservation program students.

Judy Logan served for her third year as a member of the Advisory Council for Underwater Archaeology at the meeting of the Society for Historical Archaeology / Council for Underwater Archaeology in Cincinnati, Ohio.

Season Tse and **Jan Vuori** presented a lecture entitled "Material and Practices of Textile Conservation—an Introduction" to students in the Fibre Arts program at Concordia University, Montréal.

February

David Tremain and **Agata Sulkiewicz** presented the seminar "Care of Works of Art on Paper" to members of the Federation of Nova Scotian Heritage at the Acadia University Art Gallery, Wolfville, Nova Scotia.

Janet Wagner and **Renée Dancause** presented the seminar "Storage and Display of Textiles" for the Museum Association of Newfoundland and Labrador in St. John's, Newfoundland.

Michael Harrington and **Daniela Kolbach** presented the seminar "Care of Historic Furniture Collections" for the Association of Manitoba Museums in Winnipeg.