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Global Positioning Survey of the Fossil Forest in the Canadian High Arctic

by Tom Strang, Conservation Scientist, Preventive Conservation Services

The fossil forest on Axel Heiberg Island in the Canadian High Arctic, discovered in 1985 by the Geological Survey of Canada, is a unique site due to the amount of exposed tree material — some of which is 40 million years old, and dates from the Eocene period. On hillside terraces formed by glacial rivers and the action of wind on thawed soil, tree stumps up to several metres in diameter poke through the forest floor detritus. The site is 1 km long x 5 km wide, and is located near 80° north latitude.

Over a vertical climb of 80 m, one passes through nearly 30 fossil forests that grew on the site at different times. Separate plant communities can be identified — from thick lower deposits containing giant metasequoia, to thin upper layers of larch and birch. In all, over 60 plant species have been identified. No animal or insect remains, however, have been found. Fossil forest wood, notable for its lack of mineralization, is similar to archaeological wood found in marine deposits, but is more compressed.

CCI Began Mapping in 1989

CCI began a map-inventory of the stumps and other features in 1989 accompanied by efforts to preserve the fragile specimens that were excavated from the site and subsequently treated in CCI laboratories. Over seven years, mapping surveys were accomplished despite the challenges presented by

Malcolm Bilz, Tom Strang and Carl Bigras with one of the exposed stumps.

Contents

Measuring soil loss at a stake prior to mapping with GPS. Floating markers are visible in the background.

navigating the narrow terraces that required frequent movement of the observer's survey station. As well, short stays on the site, often accompanied by foul weather, restricted most of the work to single sightings rather than using triangulation or measurement tape. The many individual surveys were integrated to produce a distribution map that was published in 1995, and to present estimates of the rate at which stumps were lost and new ones came into view.

In August 1995, CCI's David Grattan and I went to the fossil forest to gather a final set of erosion readings, cut off metal erosion markers that might pose hazards to landing helicopters, and to survey specific stump fields. We replaced the theodolite method used in prior mapping surveys with Global Positioning System (GPS) technology because it promised several advantages:

- The survey could be carried out by one person.
- The base station only had to be set up in one location, because measurement is coordinated by radio contact between the base and roving GPS units.
- The positions were automatically available as three-dimensional coordinates, residing in a rugged, hand-held computer. This eliminated error-prone hand recording and calculation.
- The day's work was easily viewed on a laptop computer and readily converted into one of many possible conventional map projections by the GPS mapping software.

The resolution of the GPS equipment we used (Trimble Systems 4000ssi) was about 1 cm horizontal and 2 cm vertical for static positions, and 4 to 6 cm for measurements taken while walking, all in relation to the base station's position. This GPS system determines the relative position of the rover by tracking continuous broadcasts from GPS satellites 20,000 km out in space, and passing data from a static base station via radio. Another useful capability was the GPS rover's ability to establish its position "on the fly", which meant I did not have to return to a previously surveyed point to initialize the instrument's location after losing radio or satellite contact when the antennae were obstructed. This is very useful when negotiating awkward terrain.

The 1995 survey expedition experienced several difficulties, the greatest being snow cover that obscured stumps, and cold weather that drained batteries. Despite these problems, we learned enough about logistical difficulties with GPS to propose a complete survey of the hill in 1996.

In 1995 we had to use 30 watt radios, far too powerful for the size of project and very greedy on batteries. In 1996, I chose to use 4 half-watt radios (Trimble Trimtalk), two for the GPS receivers, and two repeaters to bend communications over the hilltop in order to eliminate a radio shadow discovered in 1995. Without a repeater, the base station would have had to be moved far from the camp in order to complete the survey. We also rigged the repeater station with a small solar panel to replenish its battery, however an Arctic hare adopted it as a warm place to leave deposits, necessitating recharging the battery every week.

For the 1996 survey, my CCI colleagues, Carl Bigras, Malcom Bilz, and I put together a 66 amp hour, 12 volt gel cell battery bank, supplied by a 72 watt solar panel that recharged batteries and ran the laptop computer. The solar powered system also preserved the beautiful quietness of the Arctic — we were continually rewarded by the sight of caribou and muskox coming close to our campsite.

GPS Database

I also had uploaded a database of points, gathered during previous surveys, into the GPS hand-held computer, which let us navigate onto any known feature on the site. We still used maps, which aided in note taking and recognizing features on the ground. The maps proved quite useful since data collected in the past had contained errors up to 7 m compared to the final GPS locations. Resurveying all features with GPS eliminated these large errors and essentially allowed any recognizable feature to be a control point for re-establishing a future survey. This is a very useful ability when recording sites that may change dramatically due to erosion.

While Carl carried out his long list of photographic tasks, Malcolm and I collected points by GPS that included, among other data:

- Approximately 1,000 exposed stumps in growth position.

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- Latitude, longitude, and elevation of the site to an accuracy of one half metre, and precise control points for topographic map production.
- All remaining floating erosion markers and steel stakes.
- Recording accurately spaced elevations in a 20 m wide swath along our longest erosion study line to map a precise cross section of the hill.
- Kite aerial stereophotography control points.
- One metre square markers laid down for, and visible in, the 1989 aerial photographs.
- Four vertical profiles to measure the tilt and thickness of layers across the site.
- Fully exposed logs on terraces.
- Separation of logs by permafrost polygon activity.
- Perimeters of silicaceous hardpan subject to undercutting and erosion, often used as helicopter landing sites and scenic lookouts by visitors.
- Contours of likely walking approaches to the hill, and spot heights.
- River bank contours to compare with 1989 aerial photographs.
- Location of all optical survey stations to tie in previous optical surveys that had recorded vanished stumps.
- Notes on feature conditions.

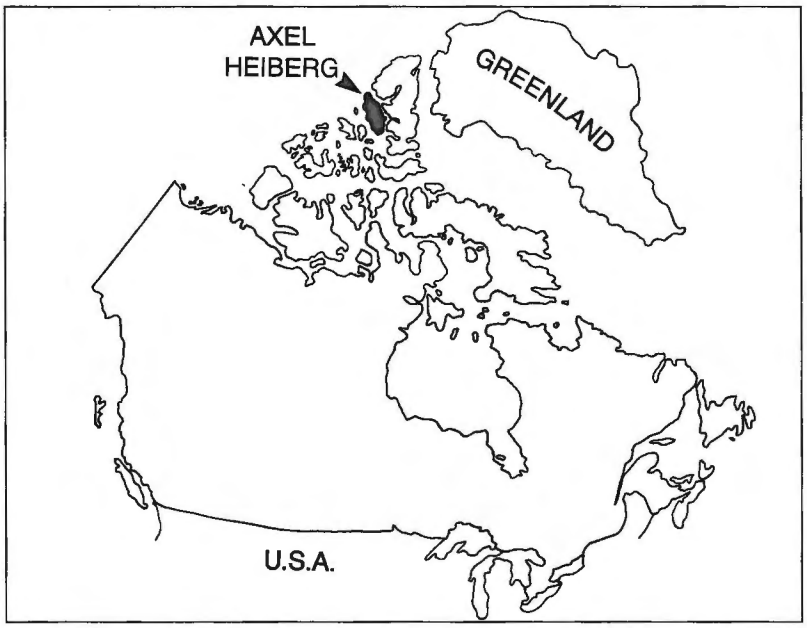
We also mapped and recorded the impact of human activities on the site:

- The many cairns erected by departed scientific parties.
- Visible remains of scientific excavations.
- Footpath duration from previous seasons of occupation.
- Tourist and visitor damage (bonfire, large-scale unauthorized excavation, graffiti spelled out in stones that was large enough to be read from the air, leaf-mat trampling, stump removal, modern trees transplanted to the site).
- Helicopter skid and wheel marks on the exposed forest floors.
- Loss of fossils lying on the ground surface.

Orienting our solar panel to power the camp.

The resulting 5,000 GPS records were easily combined with a topographic map, which was produced for us by Base Mapping Co. Ltd. of Ottawa from 1:2000 aerial photographs taken for CCI in 1989.

Initially intended as a study in natural loss, the focus of CCI's involvement has changed somewhat because ease of access and fame have drawn many visitors to the fossil forest, some of whose actions have damaged this site. Ultimately, CCI's map and photographs will contribute to a site management plan and to the efforts toward attaining protected status for the site. An information pamphlet will be produced by CCI that can be used by helicopter pilots to avoid landing on the often difficult to see stumps, and by visitors to avoid trampling sensitive features or creating erosion gullies. Above all, creating the most complete and accurate record of this site has allowed CCI to establish a thorough, long-term study of site use and abuse for one of the most sensitive environments on Earth.



Location of Axel Heiberg Island.

Acknowledgements

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Cansel Survey Equipment, Ottawa
Base Mapping Co. Ltd., Ottawa

Further Reading

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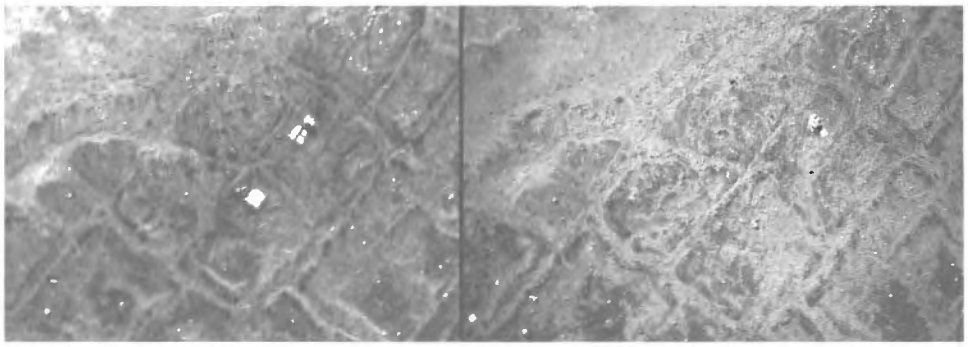
Kite Aerial Photography of the Axel Heiberg Island Fossil Forest

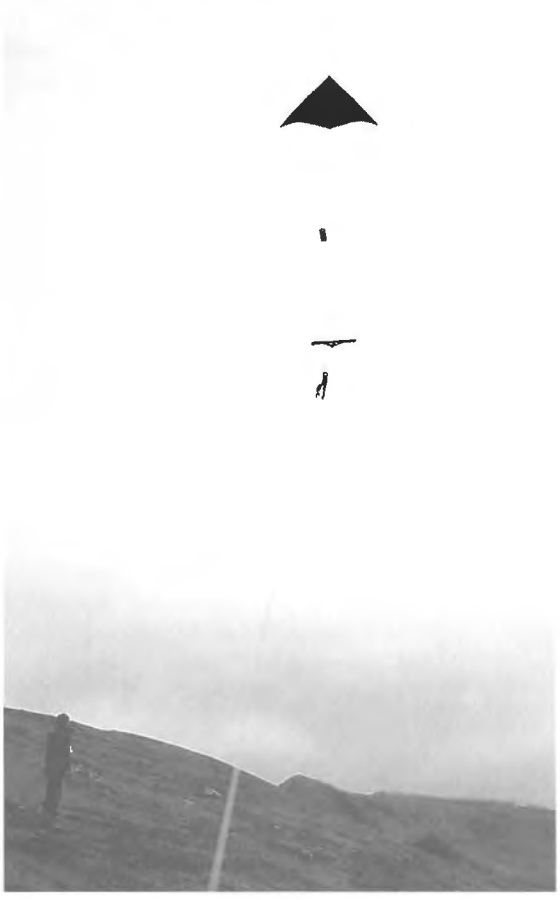
by Carl Bigras, Scientific Documentation Technologist, Analytical Research Laboratory

I made my third trip to the Canadian High Arctic this summer. I had already photographed every corner of the Axel Heiberg Island fossil forest with every available technique — from macrophotography to landscapes and stereo photography, to shooting out of a helicopter without a door. In 1989, aerial photos were done in colour and black & white at 1:2000, 5000 and 10000 scales. However, CCI still needed close-up details taken from the air of particular areas in order to study the changes that had occurred since 1989. I suggested we use my kite aerial photography equipment, using my two Tyvek delta kites (3.5 m and 6 m).



Left: Trig point 4 from 1989 aerial photo. Right: 1996 photo of same area.

I designed a stereo camera rig using two Kodak Cameo cameras. I adapted an apparatus, commonly used on remote-controlled aircraft, that would trigger the cameras using directional cables powered by a servo motor. This was all installed on a balsa-wood rig. The rig itself hung from a central point of the kite line using three 8 m long lines attached to each end of the frame. The mounted cameras triggered simultaneously.



6 m delta kite with stereo camera rig.

An on-site test flight revealed two problems. First, the rig swayed left to right without any sign of stabilizing. Second, the rig was being pushed back by the wind resulting in the camera lens axis no longer being perpendicular to the ground. I located the centre of balance on the stereo rig and mounted the Picavet (a self-levelling apparatus) with cable ties and duct tape. I then tied a small Canadian flag windsock at the back with 2 m string to keep the rig a bit steadier. Perfect! All we had to do was wait for good conditions.

The land surface has poor contrast for photography and has no useable natural features for proper scaling and identification. I used 30 cm x 30 cm white corrugated plastic boards with a black "X" drawn from corner to corner and held down with a fibreglass tent peg. My colleagues and I randomly placed the cards on the ground where we wanted aerial photos done and recorded their GPS locations. In the future, we can digitize the stereo images, reference the numbered cards with their GPS location, and output contour maps.

Weather conditions in the Arctic are unpredictable and can change many times a day. Our location was about 17 km from one tip of the Müller Ice Cap, which lies along the Princess Margaret Range and itself affects the weather. The first day we flew the kite, a Twin Otter aircraft came whizzing by at a 70 m altitude while I was hanging to a 6 m delta with a 225 kg line attached to a duffle bag full of rocks. You cannot imagine what went through my mind.

Conclusion

The results are good! We are able to see a direct comparison with the 25 cm x 25 cm aerial photographs taken in 1989. People are amazed at the projected stereo pairs, which detail three-dimensional views of eroding hill sides, ground slippage, and soil patterns caused by the behaviour of the permafrost.

I would like to thank Michael Harrington and Paul Heinrichs, furniture conservators, and my team members, conservation scientists Tom Strang and Malcolm Bilz, for their support and assistance on this year's field trip. Details on the exact construction of the kite stereo camera projection rig can be obtained from the author at CCI. ◊

Nd-Yag Laser Cleaning at CCI: An Update

by Thomas Stone, Objects Laboratory, and Carole Dignard, Objects Laboratory

Dr. Costas Fotakis (right) discusses cleaning tests with (from left to right) Carole Dignard, Paul Heinrichs and Tom Stone.

In January 1995, representatives from Atlas Laser Systems, Sainte-Foy, Quebec, and Quantel Lasers, France, spent a day at CCI demonstrating the cleaning potential of the Laserblast Nd-Yag laser (see, "Laser Cleaning Demonstration" *CCI Newsletter* No. 17). The demonstration, which aroused a great deal of interest among the conservators who attended, stimulated the formation of a Laser Cleaning Committee at CCI to investigate the potential for using this interesting tool in conservation. Composed of CCI conservators Carole Dignard, Paul Heinrichs, Helen McKay and Tom Stone, CCI scientists David Grattan and Greg Young, and Heather Garrod, conservator from Parks Canada's Historic Resources Conservation Branch (HRCB), the committee has been meeting regularly to assess the practicality of various types of laser cleaning and to see if it might be a tool that CCI should have. Not having a laser at CCI to experiment with has naturally been seen as a major problem for the committee. The National Research Council's (NRC) Laser Research Laboratory, however, has kindly offered us the use of their lasers. The committee hopes to begin work with Nd-Yag lasers at the NRC early in 1997.

This summer we were fortunate, thanks to the Quantel organization in France and to their branch office in California, to have the Laserblast 50 Nd-Yag system at CCI for most of August. During this time, members of the committee, as well as staff members at CCI, HRCB, the National Archives and the National Museum of Science and Technology had a chance to experiment with the unit to begin to get a feel for its parameters. It was an extremely useful experience. A wide variety of materials were tested including the removal of various coatings and lacquers from metals, dirt from gilded surfaces and accretions of dirt, wax and soot from stone and a range of organic materials. The committee is currently examining the results of the cleaning tests, which could be described as having mixed success, in order to narrow down the next round of tests at the NRC.

On October 24, 1996, Dr. Costas Fotakis, Head of the Laser and Applications Division of the Foundation for Research and Technology-Hellas in Heraklion, Crete, visited CCI. His lecture and subsequent meetings with staff, relating to the use of various excimer laser applications for cleaning surfaces, and to analytical processes used to monitor laser cleaning, were extremely interesting and have given the Laser Cleaning Committee much to think about.

In early November, Carole Dignard attended a one-week Nd-Yag laser cleaning course at the National Museums and Galleries on Merseyside Conservation Centre (NMGMCC) in Liverpool, England. Dr. Martin Cooper and Dr. Stephen Fowles lectured on laser radiation and on the basic chemistry and physics involved in laser cleaning. Practical sessions included laser-cleaning trials on a variety of stone objects, ceramic tiles, plaster reliefs, walrus ivory and vellum. The participants were also shown a variety of objects successfully laser cleaned, including an aluminium sculpture, a marble sculpture, plaster reliefs, ivory carvings and bone objects.

Carole also visited Lynton Lasers, a manufacturer in Cheshire who, in collaboration with the NMGMCC, has produced the Phoenix laser system tailored for art conservators. After the course, Carole visited Mme Geneviève Orial, an engineer with the Laboratoire de Recherche des Monuments Historiques à Champs-sur-Marne, who has been a pioneer in France in the use of Nd-Yag lasers in conservation since the late 1980s. Together they visited a church at Mantes-la-Jolie (near Paris) that is currently being laser-cleaned using a B.M. Industries' Nd-Yag laser system. Carole also met two German conservators in Cologne who have used the Laserblast system. Regina Urbanek presented tests on cleaning a relic made of bone and silk, as well as cleaning bone relic wall decorations, and removing overpaint on the wooden panels of the Golden Chamber in the church of St. Ursula. Prof. Dr. Hans Leisen demonstrated tests, comparing laser cleaning to more traditional methods, on cleaning a Roman tower in the city.

Nd-Yag laser cleaning is being used more and more in Europe and is even becoming common in stone conservation cleaning. CCI plans to keep abreast of this new field by maintaining contact with major players, by pursuing applied research opportunities, and by developing expertise in treating objects in this manner and in making sound analytical assessments based on these treatments. In particular, CCI plans to expand this expertise in order to help establish laser cleaning as a safe, controlled method in conservation. ◊

Removing surface dirt from leather. The unit in the foreground controls the power and other cleaning parameters.

Delving Into the Paintboxes of Paul Kane and David Milne

by Jane Sirois, Conservation Scientist, Analytical Research Laboratory

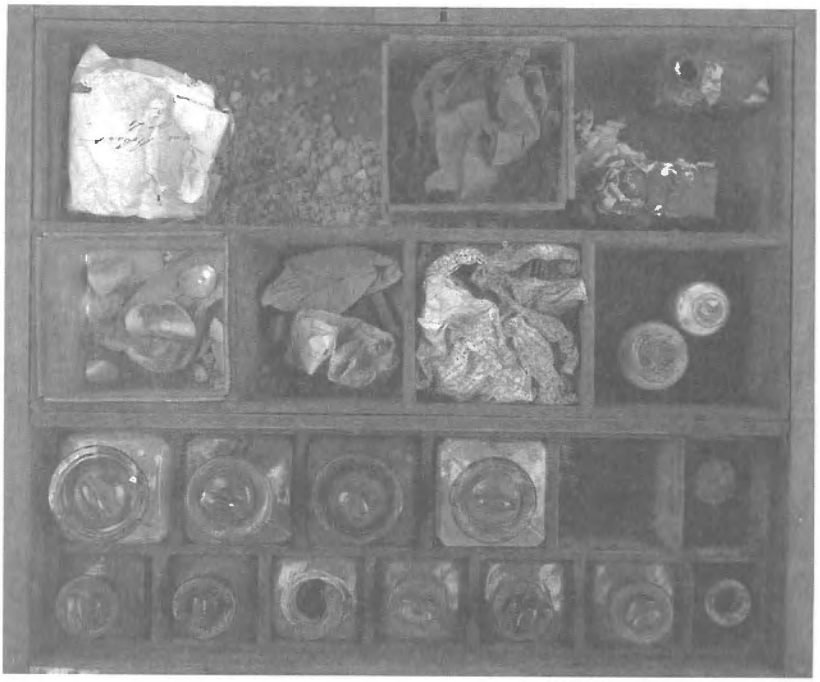


Figure 1. Paul Kane's studio sketch box (property of the National Gallery of Canada).

From 1994 to 1995, CCI's Analytical Research Laboratory analyzed the contents of the paintboxes of two prominent Canadian artists: Paul Kane (1810-71) and David Milne (1882-1953). Paul Kane most likely used his paintbox from 1820-1860, while David Milne started painting with oils sometime in the early 1900s.

Analysis of the materials in these paintboxes provides the basic data needed for scientific investigations into provenance or authentication. Understanding the artist's materials also helps conservators select appropriate treatments and suitable display and storage conditions for the art works.

Kane

Paul Kane was a Canadian painter of Irish descent who resided in York (Toronto) from 1819, when his parents emigrated to Canada, until 1836, when he left Canada for the United States and Europe. He began studying painting in 1830 in Toronto, and four years later painted the first of his numerous portraits of the citizens of Cobourg, Ontario. However, little more is known about his early work. Kane's travels in the United States and Europe lasted from 1836-1845, after which he returned to Toronto briefly in 1845 before setting off to travel through the Northwest. Over the next three years, he travelled from the Great Lakes to Vancouver Island. He returned from this adventure with a bulging portfolio of sketches, primarily romantic landscapes and First Nations subjects. In fact, Kane is known primarily for these sketches and paintings he produced of First Nations people, and for his book *Wanderings of an Artist* published in 1859. After 1859 he rarely painted, due possibly to his increasing blindness, which became noticeable for the first time that year. Major collections of Kane's work are held by the Royal Ontario Museum, Toronto, and the Stark Foundation, Orange, Texas.

The analysis of the contents of Kane's paintbox was undertaken as part of a study of two early Kane portraits, *Freeman Schermerhorn Clench* (NGC 30486) and *Eliza Clarke Cory Clench* (NGC 30487) for the National Gallery of Canada. Samples of pigments and media from the paintbox were also included as part of the project.

Kane's paintbox contained apothecary jars filled with media and pigments (see Figure 1). Fragments of shell gold (that is, powered gold sold as a drop of gold watercolour held in a mussel shell) and granules of resin were also present along with paintbrushes, a Conté crayon, charcoal and chalk. Many of the pigments were powdered and were wrapped in fragments of newspaper from Mobile, Alabama: one was dated 1844. Other pigments were purchased as hard pellets or drops. Labelled jars indicated that some of his materials were from New York and London, England. Some of the New York materials could date from as early as the late 1820s. Kane received his first artists' materials from W.S. Conger, for whom he worked in the late 1820s as a decorative furniture painter in Toronto. Conger had bought the materials while on a trip to New York City. The English supplies would most likely have been bought by Kane during his 1842 trip to England.

These materials were analyzed using scanning electron microscopy and x-ray microanalysis, infrared spectroscopy, x-ray diffraction, polarized light microscopy, and, to a limited extent, gas chromatography/mass spectrometry and liquid chromatography.

A number of interesting results were obtained. For example, one of the bundles in Kane's paintbox contained a mixture of drying oil, silicates and iron oxide, matching the composition of the components identified in the ground layers of the two Clench portraits examined for the National Gallery. Large, coarse particles were present in these ground layers as well as linseed oil, iron oxide pigments, lead white and lead carbonate.

A second bundle contained only the red-brown pigment. It was identified as red, iron oxide pigment consisting of the iron oxide compounds hematite and maghemite. While hematite is a commonly identified component of red iron oxide pigments, the occurrence of maghemite is more rare. Scanning electron micrographs of a dispersed sample of this pigment revealed that it had morphological properties similar to a sample of a 19th-century Mars red from Roberson and Co., a synthetic iron oxide pigment.

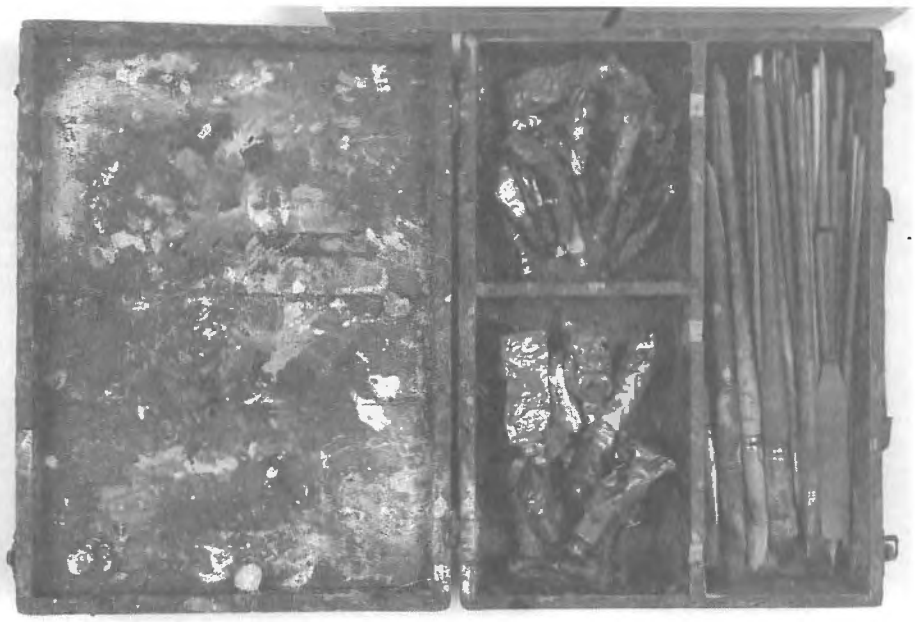


Figure 2. David B. Milne's paintbox (loaned to CCI by David Milne Jr.).

Milne

David Milne, the youngest of 10 children, was born in 1882 in a log farmhouse in Saugeen Township, Bruce County, Ontario. When he was 21, he set off for New York City to attend art school. Milne's first exhibit was in 1909 with the American Watercolour Society. He continued exhibiting every year thereafter up to 1922. In 1914-15 Milne made summer trips to the Hudson Valley, where he settled in 1915. After returning to Canada in 1918, Milne was appointed an official war artist and in 1919 painted war scenes in Britain, France and Belgium. Milne's painting also took him to the Adirondacks in New York State, Ontario, and various other locations. During his career, he created 3,000 paintings and as many colour drypoints, etchings and drawings. His artistic achievements and writings made a major contribution to Canadian and American art. Milne died in 1953 in Bancroft, Ontario. Most of Canada's major art galleries hold some of Milne's works, however two major collections are held at the National Gallery of Canada, Ottawa, and the Art Gallery of Ontario, Toronto.

Milne's paintbox, graciously loaned to us by his son, David Milne Jr., contained a wooden palette, two palette knives, 34 brushes, 31 tubes of Winsor and Newton oil colours, a small tin cup and a paint stained cloth (see Figure 2). The Winsor and Newton paints present in Milne's paintbox were: Permanent Violet, Alizarin Orange, Ivory Black, Rose Madder, Genuine Alizarin Crimson, Vermilion, Field's Orange Vermilion, Yellow Ochre, Cadmium Yellow, Viridian, French Ultramarine, Zinc White, and Burnt Sienna. The labels on the paint tubes help date some of the paints more precisely. When Winsor and Newton moved their head office from Rathbone Place to Wealdstone in 1938, the information printed on their labels changed (see Figures 3 and 4). Milne's paintbox contained tubes labelled both before and after the move.

Information on the materials in the paint box was obtained using the methods listed above for the Kane paintbox analysis. The Milne analysis, a valuable addition to the research into his oil painting methods and materials, has helped to determine what pigments, media and extenders were used by the manufacturer in the paints. This will, in turn, help determine what Milne mixed into the paints to achieve the effects he desired.

The paintboxes of Paul Kane and David Milne are tremendous resources. They provide us with a set of reference materials to their unadulterated paints. By comparing the materials in the paintboxes to the works by these two important Canadian artists, we can learn a great deal about their working techniques.

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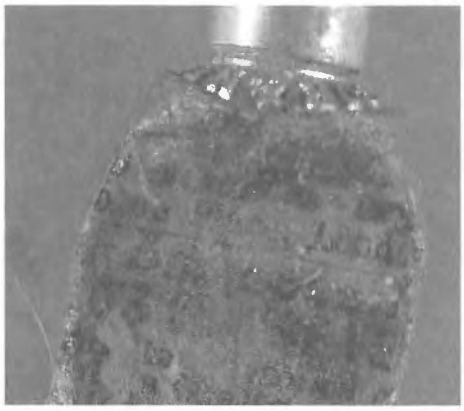


Figures 3 and 4. Some of the paints can be dated by their labels. Winsor and Newton moved from Rathbone Place to Wealdstone in 1938. Some of the paints in Milne's paintbox predate this move, while others were purchased after they had moved to their new location.

More information on CCI and its activities can be found on CCI's World Wide Web pages:

http://www.pch.gc.ca/cci-icc

CCI Consults its Clients

by Bill Peters, Director General

The Canadian Conservation Institute is many things to Canadian heritage institutions, but in essence it is a service agency that supports the cause of conservation in this country.

Confronted with serious budget cuts, and the possibility of greater service reductions in the future, CCI decided last year to investigate the feasibility of greatly expanding its revenue generation in order to maintain services to its clients. A national consultation exercise, based on a discussion paper, took place in late fall 1996. Representatives from museums, galleries, archives, libraries, private conservators, professional associations, provincial governments and other stakeholders met in nine locations across the country. Teleconference sessions were also held to hear the views of those located in remote areas.

As well as assessing several fee structure options, the sessions were a useful opportunity to review CCI's activities across the board, and to speculate about its role in the future. There was virtually unanimous agreement that CCI has and must continue to play a vital role in Canadian heritage preservation, and to continue its active international presence. It was generally accepted that CCI research — based on the knowledge generated from treating objects, coupled with supporting scientific investigation — and resulting information dissemination, should continue to be its focus.

Three potential fee structures were presented for discussion. The first was a flat user fee, the second a variable fee with different rates depending on the client and the proposed work, the third a "membership" option in which clients would purchase a set amount of service in a given year, which could be allocated to any of CCI's products or services.

None of the three options received unanimous endorsement, although the first and second options had the greatest support.

Faced with making the choice between reduced service or revenue generation, most participants agreed — if reluctantly — that some form of user fee is necessary. This agreement was tempered by a strong caution that CCI must do everything possible to reduce the costs of delivering its services, and that revenues should be sought first and foremost from non-mandated clients, particularly from international clients.

Private conservators forcefully expressed the opinion that competing with CCI would undercut their business, believing that there is a fixed amount of money available for conservation in this country. At the same time, there is a keen interest in developing cooperative joint ventures between CCI and private practitioners, and some optimism that in working together, creative means can be found to increase the resources available for conservation. The Institute was strongly encouraged to develop a clear policy concerning competition with the private sector, and to make known its proposed criteria for acceptance of projects.

It is clear that individuals at all levels throughout Canada's conservation community feel they have a stake in the future of the Canadian Conservation Institute and want to be involved in setting its future directions. Acknowledging that reality, CCI has made major changes in the discussion paper, "New Directions for the Canadian Conservation Institute", to reflect the advice received in our consultation round. In it, a minimal user fee for all services delivered to mandated clients is described. Accordingly, a much higher percentage of the Institute's revenue will be sought from non-mandated and international clients. This substantially revised document is now being distributed.

The Institute has also committed itself to ongoing exchanges and discussions with the individuals and institutions in the conservation community. As CCI adapts to the changing realities of the coming years, it will continue to do so in concert with our colleagues in conservation. ◊

Identification of Plastics In-situ with a Portable Infrared Spectrometer

by Lisa Nilsen, Intern, University of Göteberg, Sweden and Scott Williams, Conservation Scientist, Conservation Processes and Materials Research

The conservation of plastics still requires much research. One of the main issues is to identify the different types of plastics in order to suggest correct treatment and storage strategies. Some plastics can be harmful when in contact with other materials, some are sensitive to cleaning with water, etc. Another reason for identifying plastics is to help discover forgeries and imitations, perhaps even before acquisition. Materials such as horn, jade, ivory, mother of pearl, glass, amber, leather and tortoiseshell have frequently been copied in plastic. An experienced conservator might be able to distinguish one plastic from another by smell, sight, feel or other non-destructive methods. But for most of us, destructive tests that include burning and dissolving samples are necessary.

Identifying Plastics

Plastics can be identified by using Fourier transform infrared (FTIR) spectroscopy.[1] Usually, this requires taking samples from the objects and sending them to a laboratory which has the instrument. Even though the required sample is smaller than a pin-head, it is not always permissible to remove even the tiniest amount of material from an object. The conservator might also encounter objections when suggesting to take a sample from an object that does not need immediate conservation. There exists, however, another possibility — using a portable

Figure 1. Scott Williams uses the portable IR Spectrometer to analyze fans in storage drawers at the ROM while being assisted by Shannon Elliot and Jackie Spafford of the ROM.

infrared spectrometer with a fibre-optic probe for non-destructive, in-situ analysis. In 1996, CCI acquired such an instrument. Scott Williams has been evaluating its possibilities. The instrument has been taken to museums, where objects have been analyzed non-destructively, and the composition of hundreds of museum objects has been determined.

How Does It Work?

The instrument can be packed into a 47 x 48 x 60 cm box, which meets the size rules for airplane luggage. It is lightweight and can be easily transported by car. The instrument is modular, consisting of a MIDAC Illuminator with an infrared source and interferometer, and a REM-SPEC Mercury Cadmium Telluride (MCT) detector connected to a fibre-optic probe, which delivers the infrared radiation from the source to the object and collects the reflected radiation in order to deliver it to the detector. A laptop computer, which controls the instrument and processes the data, completes the equipment. The instrument can be installed on a laboratory cart in approximately 20 minutes and then wheeled around to different locations in galleries and storage areas in a museum. To collect infrared spectra, the fibre-optic probe is positioned about 2-5 mm from the object surface, as shown in Figure 1. Materials are identified by comparing their spectra to reference spectra.

Testing the Equipment in the Field

After tests in the laboratory, the apparatus was tested in the field to find out how well it would function on site. Two museum visits were carried out in October and November 1996. We visited Richard Gagnier, conservator, National Gallery of Canada, Ottawa. For two days, works of art, many of them listed only as "plastic" in the catalogue, were analyzed with the instrument. Objects were analyzed in storage areas, and, on a Tuesday when the museum was closed to the public, the cart was wheeled into the exhibition areas to analyze objects on display. Very few objects had to be moved around — the scanning could be done while the objects rested in their drawers or hung on the walls. An interesting object was *Confedspread*, a multi-coloured plastic quilt made by Joyce Wieland in 1967. Infrared analysis showed that it contains at least three different kinds of plastics — poly(vinyl chloride), polyurethane and nylon. The size and ease of transporting the spectrometer allowed access into installations such as *Bedroom Ensemble* by Claes Oldenburg (1963). Objects in this artist's dream contained poly(vinyl chloride), rayon, and polyurethane. This test very clearly demonstrated the portability and versatility of our instrument for analysis in situ.

A couple of weeks later, the Royal Ontario Museum (ROM) in Toronto and conservator Julia Fenn hosted us. Here, we collected as many spectra as possible in order to build a library of spectra for comparison in the identification process. Spectra were collected not only from different plastics, but also from non-synthetic materials often imitated by, and easily mistaken for, plastics, such as tortoiseshell and horn (see Figure 2). The textile department possessed a great variety of plastics including cellulose nitrate combs, fans and collars, evening shoes with cellulose acetate fronts and acrylic heels and "vinyl" boots from the late 1960s that were made of polyurethane.

Plastics in textile collections may pose problems for the conservator. For example, degrading cellulose nitrate emits nitric acid and can accelerate the deterioration of other near-by materials.[2]

Some plastics did not give very clear infrared spectra, and others have yet to be compared with reference spectra for proper identification. Interpretation may be difficult in some cases because the range of frequencies that can be measured by this instrument is smaller than that of conventional infrared spectroscopy. Also, the shape or surface texture of some objects does not permit analysis by this instrument. However, the majority of objects could be analyzed. At the National Gallery, 75 spectra were obtained from 19 objects, and at the Royal Ontario Museum 150 spectra were gathered from 112 objects. About 90% of the spectra obtained could be interpreted and the plastic composition determined.

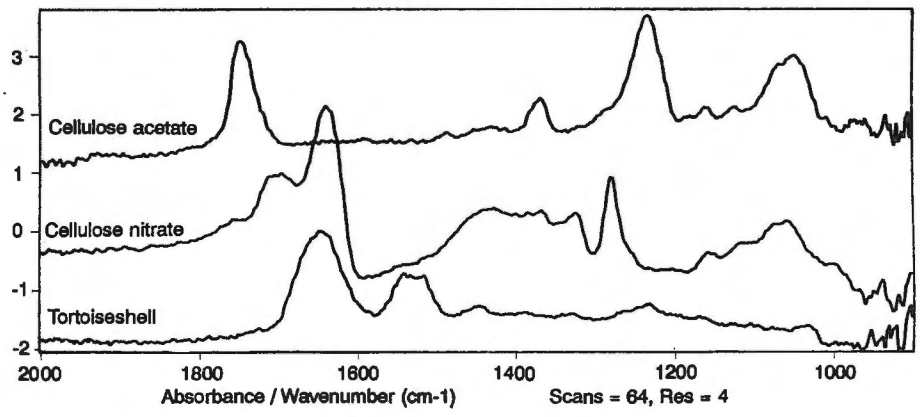


Figure 2. Spectra from objects of tortoiseshell, cellulose nitrate (claimed to be tortoiseshell), and cellulose acetate.

This project aroused considerable interest among the staff at the museums we visited. Much time was spent discussing the instrument, the value and potential of infrared spectroscopy for analysis in the museum, and the general nature and conservation of plastics. Often staff brought objects to us "just to see if we could run these too." We usually did. These discussions are very useful and are an added bonus to a visit intended for analysis. However, this does take time. A more efficient process would involve simply collecting the spectra (up to 100 per day) in situ, then processing the data and analyzing the spectra afterwards in the CCI laboratory followed by sending a written report to the museum.

Future Use of the Portable IR Spectrometer

The portable infrared spectrometer has many advantages:

- The analysis is non-destructive; no sample is taken.
- The analysis is made in situ, in locations remote from the CCI laboratory.
- The instrument is easily packed, transported and set up.
- The instrument is easily used in exhibition rooms, storage vaults and conservation laboratories. An object might not even have to leave the display case or storage drawer.
- Not only plastics, but other materials, including other organics like varnishes, lacquers and natural products, and inorganics such as corrosion products and minerals, can be identified in some cases.
- 100 spectra per day could easily be acquired.

CCI hopes that this newly available method of identifying plastics will prove useful to museums across Canada and abroad. Anyone interested in finding out more about this service should contact Scott Williams at CCI.

Endnotes

1 Elizabeth Moffatt. "Infrared Spectroscopy at CCI," *CCI Newsletter*, no. 16 (Sept. 1995), pp. 12-14.

2 Canadian Conservation Institute. "Display and Storage of Museum Objects Containing Cellulose Nitrate." *CCI Notes* 15/3. Ottawa: Canadian Conservation Institute, 1994. ◊

Focus on ... CCI and the David M. Stewart Museum

by Edwinna von Baeyer, Editor/Writer, Extension Services

The David M. Stewart Museum is one of Montreal's hidden treasures. Located in the Fort on the île Sainte-Hélène, it is only a 10-minute drive from downtown Montreal. The museum has been operating since 1955 when David M. Stewart, a prominent Montreal businessman and philanthropist, established the institution.

The museum's birth was a bit serendipitous. Stewart, concerned because Montreal had only one history museum, wanted to rectify this. When the only suitable building he found at that time was located in an old military blockhouse on île Sainte-Hélène, he and a group of former military officers decided to establish a military museum, which became known as the Montreal Military and Maritime Museum.

As interest in the collection grew, it evolved from a purely military museum into an institution housing expanded collections relating to Canadian history: an exceptional rare book and map collection, domestic utensils collection, lock collection, a number of artifacts belonging to famous Canadians and visitors to the country such Père Marquette, Champlain, Montcalm, as well as the military-related collections of guns, medals, etc. (This is not to say the museum has lost its military focus. Historic reenactments in the summer are animated by the 78th Fraser Highlanders and La Compagnie Franche de la Marine.) The museum now concentrates on the development of Canada in a global context. Throughout the museum's evolution, David M. Stewart was a driving force. After he died in 1984, the museum was renamed to reflect his sustaining support.

David M. Stewart Museum

The David M. Stewart Museum, Montreal, was originally a military blockhouse.

CCI First Contacted in 1980

CCI conservators first began consulting and working with the museum in 1980 when they were approached by André Lépine, a marine archaeologist associated with the museum, who had located a shipwreck in Baie de Gaspé. M. Lépine identified it as a late-17th, early-18th-century French ship. CCI provided two staff members to help lift, pack and ship artifacts to CCI. As well, CCI agreed to treat some of the 168 artifacts, including bone, ceramics, lead, cannon balls, and a 2.27 metre long, cast-iron cannon.

CCI normally does not accept objects from shipwrecks, because it does not have the space or the personnel required to properly treat artifacts found at marine

sites — which can be numerous, large, and sometimes time consuming and difficult to conserve. However, an exception was made in this case for several reasons. One was that the treatment of the objects complemented a major research effort at the time — the conservation of iron. CCI was also assured that this was not going to turn into a major excavation, and that the quantity of artifacts was something that CCI could handle. Many of the objects were put through routine conservation treatments. However, the cannon required long-term treatment, custom-made equipment, and a lot of individual care.

This was just the beginning of a close relationship that still continues between the two institutions. CCI was called back a number of times to advise and to treat different artifacts. In 1985, CCI was collaborating once again with the museum over another shipwreck — one of the Molson fleet of steamships, the *Lady Sherbrook* (about 27 m) which was built near Montreal in 1836. The brewer John Molson had established, in 1810, a new shipping service shuttling between Montreal and Québec — an innovation in Canadian industry at the time. The vessel, discovered in 1983 by Mr. Lépine, sank in the St. Lawrence River channel separating the île Charron from île Marguerite. CCI was called in to help conserve 12 wooden objects, a leather shoe, and a number of iron objects, such as rivet heads, iron washers, pair of scissors, and a sickle.

In 1991, a team of conservators travelled to the museum to examine the flaking surface of a 17th-century celestial globe created by Willem Janszoon Blaeu in Holland. The paper globe had been rebuilt at some time using new paper, inking in missing designs, and applying a thick varnish over the entire sphere. It was decided that it was not feasible to reverse prior attempts at restoration because the intervention would have to be massive, and the results would probably be disappointing, thus, stabilization was chosen as the best alternative.

Three Firearms Conserved

Three firearms were also conserved in the early 1990s for the museum: a rampart gun, a fowling gun, and an arquebus. The work on the fowling gun was especially noteworthy because it established that the gun was the earliest-known, Canadian-made firearm. It was not until the gun had been disassembled that a clear image of the engraved inscriptions appeared on the outside and inside surface of the lock, the top of the barrel, and the left side of the barrel that established the provenance of the gun to be no later than 1723. The inscriptions also indicated that the barrel was made by a gunsmith (Soullard) who trained in France, and who was known to have worked in Annapolis and Québec. A Canadian gunsmith would build a gun around its metal components, which were often made by specialized European craftspeople. (The name Treyvoux engraved on the outside of the lock is presumed to be this gunsmith.) In this case, CCI provided more than conservation treatment — research by CCI staff helped to provide key information that enhanced the understanding of the artifact and its historical context.[1]

David M. Stewart Museum

A view of the Cartography Gallery featuring the Coronelli Globe — one of many in the museum's collection.

The wheel-lock rampart gun presented a different task: the wood parts of the gun were in very poor condition due to an attack by wood-boring beetles; however the metal parts were in good condition. Although the gun's wooden parts were nearly hollowed out by the beetles, stabilization and consolidation was successful. This was mainly accomplished by creating a resin/solvent mixture that was dripped into damaged areas, followed by epoxy resin/microballoon applications, and then by inpainting with acrylic colours.

Consulted on Condition of Cannons

One of the latest consultations occurred in November 1995 when CCI scientist Nancy Binnie and conservator Bob Barclay were asked to advise on priming and repainting the museum's extensive outdoor cannon collection. This collection includes nine cannons taken from the Gulf of St. Lawrence, originating from the Walker expedition, and one from the Fortress of Louisbourg. Many of the 18 cannons on display were found in saltwater. Soaking in saltwater creates serious conservation problems because the salt is absorbed into the porous iron and is very difficult to eradicate.

Displaying historic cannons outdoors, under less than ideal conditions, is a common solution for many museums when faced with a cannon's space and weight requirements. However, these cannons are at the mercy of the elements which, in turn, set in motion continual corrosion problems. Painting protects for awhile, but the forces of the freeze-thaw cycle in winter constantly wear away the iron, and introduce fresh sites for corrosion to begin. CCI conservators and scientists assessed the condition of the 18 cannons, and decided that a low-tech solution would be best, because the root of the problem (embedded salt, and the continual weathering the cannons are subjected to) cannot easily be solved. They recommended that the museum switch to an industrial grade paint, which should offer longer protection than the paint it had been using.

Over the last 16 years, CCI and the David M. Stewart Museum have, in the words of the museum's director, Bruce Bolton, "developed an open, constructive cooperation throughout the activities of our partnership." The opportunities presented by the conservation treatments and consultations requested by the museum have made a significant contribution to the body of CCI research.

Endnote

1 R.L. Barclay and P.R. White. "Treatment Provides Information: Conservation of Three 18-Century Artifacts," *CCI Newsletter*, no. 17 (March 1996), pp. 8-9. ◊

Contemporary Varnishes, Materials and Techniques:
A Workshop at University of Canberra, Canberra, Australia

by James Bourdeau, Senior Assistant Conservator, Treatment and Development

In November 1996, I had the privilege of travelling "Down Under" at the invitation of Barbara Klempan, lecturer in paintings conservation at the University of Canberra, Australia, to present a specialized workshop and seminar on picture varnishes: Contemporary Varnishes, Materials and Techniques. This workshop, which ran from November 18 to 22, was intended to draw together some of the diverse information on standard and experimental varnishing materials and practices used by paintings conservators in North America and Europe to enable participants to judge their usefulness.

The 20 participants came from public institutions, regional labs and private practice in Australia and New Zealand, from cities like Canberra, Sydney, Melbourne, Adelaide, Auckland, Wellington, and from various smaller centres.

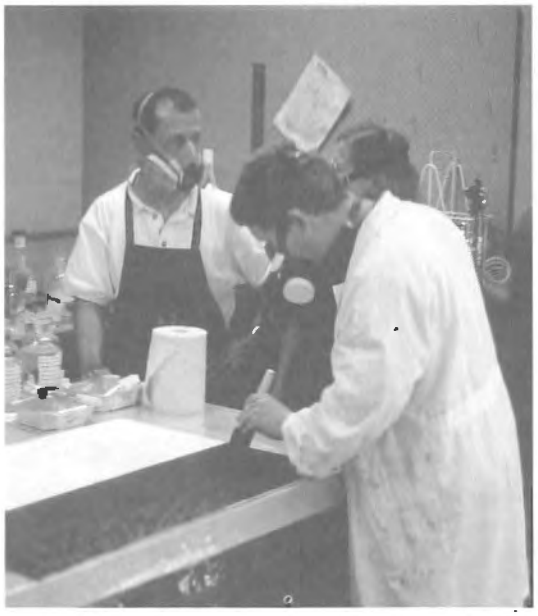
The workshop emphasized the hands-on application of a wide variety of modern varnishes and varnish additives in order to allow side-by-side comparisons of such properties as handling, flow, evaporation, film formation, levelling, gloss and colour. In order to accomplish this, 10 artists' boards were prepared with oil paint for each of the workshop participants (200 boards in total), as well as several large-scale boards for demonstrations. These local preparations were graciously handled by Barbara Klempan and two very capable undergraduate students in the University of Canberra's Conservation of Cultural Materials program, Nicole Tse and Caroline Fry. They kindly gave brief presentations on their own final-year projects on coating research. They were also responsible for mixing most of the 40 different varnishes used in the workshop, and they functioned as lab assistants during the workshop. I am indebted to them because the workshop could not have occurred, in this form, without their very hard work.

The practical varnishing sessions were preceded by lectures and discussions during which I covered the following areas:

- historical attitudes to the "look" of picture varnishes; current national practices, preferences and problems;
- the development and use of synthetic materials for coatings up to the late 1980s, and more recent conservation research into the optical properties of polymers and resins used for varnishes;
- the research on new synthetic polymers for coatings including an outline of René de la Rie's research on Regalrez 1094 and Shell Kraton-G rheological modifiers;
- the protection of natural resin varnishes and unstable synthetics with various additives — phenolic antioxidants, HALS, UV absorbers in barrier top coats;
- the composition of proprietary varnishes and their appropriateness in conservation treatments; and
- the phenomena of gloss and colour.

Chris Adams, a chemist from the Australian War Memorial, presented a talk on basic polymer chemistry on the first day, which set the stage for the more complex material presented during the rest of the week. The week also included a Thursday morning visit to the National Gallery of Australia to look at paintings and varnishes in context and to discuss the importance of lighting and display.

In order to complete the practical work, each participant received a workshop guide which contained the recipes of all of the varnish solutions used, "roadmaps" carefully guiding the brushing out of different varnishes, a suppliers' list for Australia, and a comprehensive bibliography. The participants' boards were coded and stacked in racks in the main spray booth in the university's painting's lab to ease access for everyone and to minimise the escape of solvent vapours. Two main varnishing stations were set up in the spray booth and in front of a fume hood to contain toxic vapour. For added safety, participants



James Bourdeau (left) assisting participants in practical applications of various contemporary varnishes.

wore organic vapour masks when near freshly applied varnishes. I was pleased that there were no "casualties" or complaints, and not one headache among the group.

The brushing out was gruelling: five comparisons per board including alternative varnishing schemes and varnish top coats. The participants were justifiably exhausted by the Friday afternoon. Much favourable comment was expressed about some of the new hydrogenated hydrocarbon varnish mixtures, including commercial products based on Regalrez 1094.

There was an added bonus to the workshop — summer had just begun there with warm temperatures and long sunny days. This, of course, was matched by the wonderful warmth and kindness of the Aussies and the Kiwis. To a Canuck like myself (apparently pronounced "Caanook"), it was a pleasant way to introduce a new, specialized workshop. The feedback was most helpful and I certainly look forward to presenting this workshop again as part of CCI's commitment to international conservation development. ◊

Yee-ha! Test Driving a New Seminar in the Yukon

by Fiona Graham, Museum Planning Advisor, Preventive Conservation Services

A brave group of Yukon museum and heritage site workers showed that the pioneer spirit is still strong in the Territory when they signed on to participate in a new CCI seminar. Carole Dignard (Conservator, Objects Lab) and I flew to Whitehorse in early October 1996 to present the two-day Collections Preservation Assessments for Museums seminar at the MacBride Museum.

Combining my site-visit experience and Carole's teaching expertise, we developed a seminar, which would enable the participating directors, curators, collection managers, etc. to identify collection preservation problems, devise solutions, and prioritize actions according to the urgency and the availability of resources. The primary objective of the seminar was to teach individuals by using the host museum as an example how to conduct a collection preservation assessment of their own facility.

A second goal was to show how to use collection preservation assessments as planning and management tools. In prioritizing actions to be taken in the short-, medium- and long-terms, it is possible to break down a lengthy and often costly "to do" list into a feasible, yet effective, set of tasks. The application of preventive conservation theory to concrete problems allowed participants to build on the knowledge they had gained from a previous Framework for Preventive Conservation seminar. Links to the Framework approach were made throughout the seminar.

In addition to covering new ground in terms of content, the presentation also broke with the traditional CCI seminar format. The seminar content was mostly derived from tours of the museum with the participants. An interactive technique was used where the participants, working in groups, wrote down collection preservation problems on individual cards that were then pinned up on a board at the front of the room. Observations were compared and discussed so that the participants could learn from one another's experience. The "problem cards" were then given back to the groups who were asked to provide a variety of realistic solutions, each on a different card, for each problem. The solutions in turn were discussed and, finally, everyone pitched in to decide what priority should be given to the different tasks.

Seminar participants holding their work cards on which collection preservation problems were written.

All of the stages involved animated discussion. The participants worked from their own experiences to point out the pitfalls of certain remedies, and to contribute innovative ideas they had come up with over the years. While the serious aspects of the problems facing all institutions were acknowledged, the realization that everyone shared these difficulties led to a relaxed atmosphere where bizarre stories competed with humorous anecdotes.

The departure from a traditional didactic format was extremely effective in this case, but it was largely unfamiliar ground to the instructors. Fortunately, there was an opportunity to do a dry run in Ottawa where the larger wrinkles were ironed out. CCI interns were recruited to act as guinea pigs and the Billings Estate Museum let us use their facility to test the seminar. The interns gave us excellent suggestions for improving content and delivery. Many thanks to them and to the staff at the Billings Estate who were incredibly generous with their time and expertise.

In the Yukon, Diana Komejan, Territorial Conservator, and Clifford (Tip) Evans, Director of the MacBride Museum, contributed the most in making the seminar a success thanks to their generosity and professionalism, as well as their organizational and coffee-making skills.

The enthusiasm and input of the participants were both gratifying and educational for the instructors. We are looking forward to giving this seminar again, and to using the same teaching technique in other seminars. Anyone interested in knowing more about this or other seminars should contact CCI. ◊

Upcoming Training Presentations

Please contact the provincial museums association listed to confirm details or to register for any of these CCI training presentations. Times and places are subject to change.

March 1997

Quebec
(Société des musées québécois)
"Plan de préservation des collections de musées"
Date: March 21, 1997
Place: Montreal

April 1997

Manitoba
(Manitoba Heritage Conservation Service)
"Adhesive Research Update"
Date: April 10, 1997
Place: Winnipeg

Ontario
(Ontario Association of Art Galleries)
"Care of Paintings"
Date: April 14-15, 1997
Place: Art Gallery of Hamilton

New Brunswick
(Association Museums New Brunswick Inc.)
"A Framework for Preventive Conservation"
Date: April 17-18, 1997
Place: Carrefour Beausoleil, Miramichi

Internships

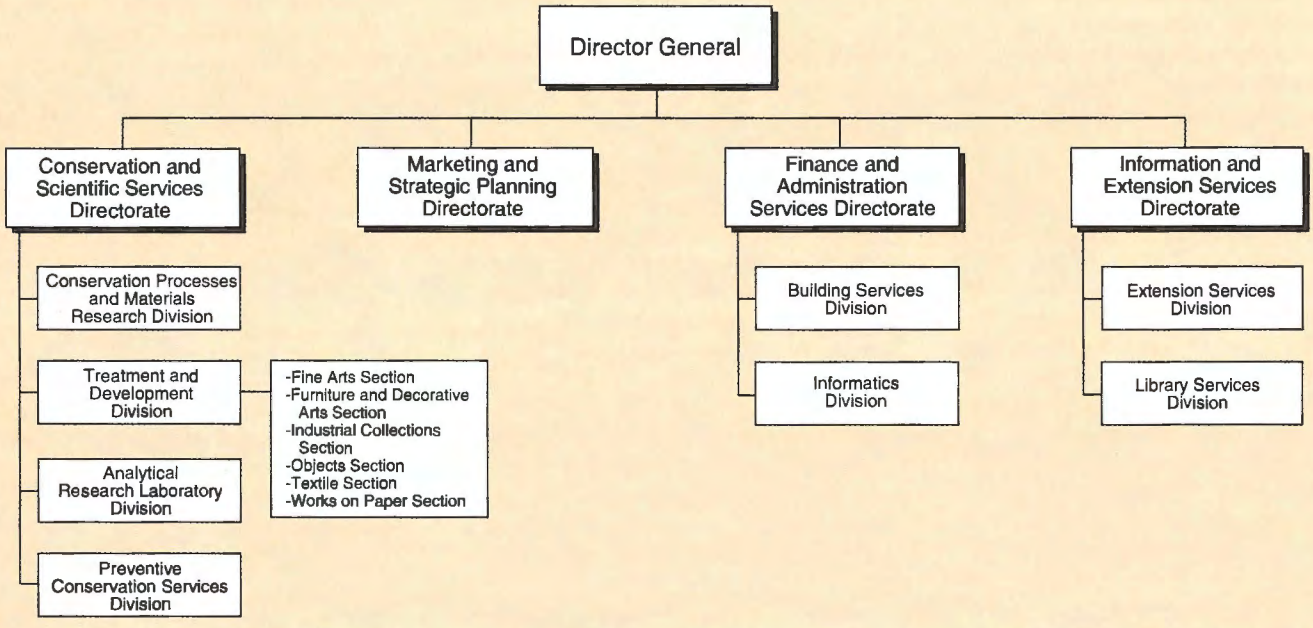
The following individuals have recently participated or are currently involved in an internship at CCI.

Anne-Laurence Dupont, November 1996 - June 1997, Conservation Processes and Materials Research Division. Anne-Laurence is working with conservation scientist Season Tse on a project dealing with silk and the evaluation of its degradation. Her internship was made possible through a grant from the Canadian Association for Conservation (formerly IIC-CG), with funding from the Cultural Human Resources Council.

Anna Ehn, a student at the Institute of Conservation, University of Göteborg, Göteborg, Sweden. October 1996 - January 1997. (Curriculum Internship - Objects Lab).

Bill Peters, Director General, Canadian Conservation Institute, presented a medal for 35 years of service to Jacques Richer, Chief, Building Services, and a book for 25 years of service to Scott Williams, Conservation Scientist.

CCI's New Organizational Chart



Textile Symposium 97

Fabric of an Exhibition: An Interdisciplinary Approach

September 22 to 25, 1997

Textile Symposium 97, Fabric of an Exhibition: An Interdisciplinary Approach, will be hosted by the Canadian Conservation Institute, Department of Canadian Heritage, in Ottawa, Canada, September 22-25, 1997. This four-day symposium will bring together curators, designers, conservators and other museum professionals to discuss issues related to the successful exhibition of textiles.

Three days will be devoted to the formal presentation of papers in the auditorium of the National Gallery of Canada, with simultaneous translation in English or French. Poster sessions will be held in the lobby adjacent to the auditorium. The last day of the symposium offers demonstrations of practical and innovative techniques, equipment and materials used for the conservation and exhibition of textiles, as well as tours of the collection holdings and conservation facilities at the Canadian Museum of Civilization, the treatment and research facilities at the Canadian Conservation Institute, and Laurier House, an historic site operated by Parks Canada. Please see the preliminary programme for more details. The Symposium banquet will be held in the Great Hall of the National Gallery of Canada.

Preprints of the papers will be included in the symposium package. The papers will be published in the language in which they were presented, accompanied by abstracts in both English and French. Abstracts of the posters and demonstrations will also be published in the preprints.

A list of accommodations, with prices, will be available in the registration package. Block bookings at special conference rates have been arranged at the Chateau Laurier ($150 CAN per room, single or double occupancy) and the Market Square Inn ($88 CAN per room, single or double occupancy). Participants will be expected to make their own reservations.

Register early for Symposium 97 and pay just $225 US or $275 CAN (early-bird fee available up to June 30, 1997). Registration fees after June 30 are $250 US or $300 CAN. Registration at the conference will be $275 US or $325 CAN. Full-time students, who register before September 15, 1997, will pay a reduced fee of $150 US or $175 CAN; all students must supply appropriate identification. There will be no one-day registrations.

To receive a registration package, please contact Christine Bradley in writing at CCI or by E-mail: christine_bradley@pch.gc.ca

Information concerning the symposium is available through the CCI Web site at: http://www.pch.gc.ca/cci-icc

Background: Textile Symposium 97, "Fabric of an Exhibition: An Interdisciplinary Approach" is the first North American Textile Conservation Conference. Subsequent conferences, with varying themes, will be hosted by major institutions in North America on a biennial basis.

The Institute of Textile Science will be holding its semi-annual meeting at CCI on Friday, September 26, 1997 to coincide with Symposium 97. The theme of the meeting is "Ageing and Degradation of Textiles". Symposium 97 delegates will be able to register at the rate normally reserved for ITS members, $50 CAN with a student rate of $25 CAN. The ITS is offering a bursary of $500 CAN to enable a student to attend Symposium 97 and the ITS meeting. To be eligible, you must be a Canadian student enrolled in a college or university conservation or textile-related program. To apply for the bursary and to receive further details about the ITS meeting, please contact Peter Aspley, c/o P.O. Box 2100, 455 Front Road, Kingston, Ontario K7L 4Z6, Tel. (613) 548-5220, FAX (613) 548-5708 or by E-mail PASPLEY@KING5.DNET.DUPONT.COM

New Publications Available from CCI

Technical Bulletin #17 - "Threaded Fasteners in Metal Artifacts", by George Prytulak
Practical guidelines for the removal, cleaning, documentation and reinstallation of threaded fasteners in metal artifacts.
$6.00 each, bulk discounts available

NEW CCI Notes - $2.00 each, bulk discounts available

Note 1/4 - Triwall Containers *Developed by Parks Canada, the triwall container is a low-cost alternative in certain circumstances to conventional wooden shipping cases. Assembly and fabrication instructions included, illustrated.*

Note 3/3: Controlling Insect Pests with Low Temperature
Guidelines for pest control are presented based on the entomological literature and previously successful treatments.

Note 18/3: Construction of a "Soft" Profile Gauge
Used in making artifact mounts, the "soft" profile gauge can be constructed using supplies frequently found in museum workshops. Illustrated, with instructions.

These and the nearly 130 other items on CCI's Publications List can be purchased by calling (613) 998-3721 or fax (613) 998-4721 (credit card orders only - VISA or Master-Card accepted). Request a copy of the new List, and order by mail: CCI, 1030 Innes Road, Ottawa, Ontario K1A 0M5.

CCI Services: Seminars, Lectures, Workshops and Visits

August

Tom Strang presented a talk to the Second World Congress on the Preservation and Conservation of Natural History Collections on Contributions and Future Direction of Conservation Research, at Cambridge University, Cambridge, England. Tom also attended a session at the Polar Tourism conference hosted by the Scott Polar Institute. There he reported on CCI's site impact findings at the Axel Heiberg Island fossil forest in the Canadian High Arctic.

Nancy Binnie undertook a field trip to Fathom Five National Marine Park, Tobermory, Ontario, to work on the shipwreck monitoring program with the Historic Resources Conservation Branch and Marine Archaeology Unit staff of Parks Canada.

September

Marie-Claude Corbeil, with Professor John Peter Oleson of the University of Victoria and Rebecca Foote of Harvard University, gave a lecture entitled, "Characterization of Pigments Used on Roman and Abbasid Frescoes in Jordan" at the 11th Congress of the Conservation Committee of ICOM held in Edinburgh. Marie-Claude was also elected coordinator of the ICOM-CC working group, Scientific Investigation of Works of Art.

Bob Barclay and **Marie-Claude Corbeil** helped organize the 15th Congress of the Scientific Instrument Commission of the International Union for the History and Philosophy of Science, held in Ottawa.

Carole Dignard and **Bob Barclay** presented the Artifact Mounting Seminar at the Lake of the Woods Museum in Kenora, Ontario. The seminar was jointly sponsored by the Association of Manitoba Museums and the Ontario Museum Association.

Peter Vogel, **Wojciech Jakobiec**, **Bob Arnold** and **Bob McRae** visited the Mill of Kintail Museum near Almonte, Ontario to return and install *The Call*, an 8 m long plaster bas-relief sculpture by the artist Robert Tait McKenzie.

Tom Strang presented a two-day workshop on Pest Management for the Federation of Nova Scotia Heritage, at the Annapolis Valley MacDonald Museum in Middleton, Nova Scotia.

Tara Grant and **Malcolm Bilz** presented papers in York, England at the conference for the ICOM group on Wet Organic Archaeological Materials.

Paul Heinrichs and **Michael Harrington** presented the seminar, Care of Historic Furniture Collections, for the Ontario Museum Association at Dundurn Castle in Hamilton, Ontario.

October

Marie-Claude Corbeil examined the trade sliver collection of the University of British Columbia's Museum of Anthropology, Vancouver. She also analyzed a number of objects from that collection using a portable x-ray spectrometer.

Ian Wainwright presented a public lecture, "Art, Archaeology and the Analytical Laboratory," at the Museum of Anthropology, University of British Columbia, Vancouver. As well, he was interviewed by Vicki Gabereau on her CBC Radio program *Gabereau*.

Wojciech Jakobiec and **Peter Vogel** visited the Mill of Kintail Museum, Almonte, Ontario, once again in order to complete the in-situ conservation treatment of a three-dimensional plaster sculpture, *The Young Soldier*: a companion piece to the bas relief they had installed previously.

Siegfried Rempel and **Brian Laurie-Beaumont** travelled to Morrisburg, Ontario, to advise Upper Canada Village on their collection storage conditions in connection with their ongoing development planning.

Wayne Kelly ran full security evaluations at the Toronto Police Museum, and the historic site, Ruthven Park (Lower Grand River Land Trust Foundation Inc.), Cayuga, Ontario.

Nancy Binnie made two field trips to the *Psyche*, a shipwreck in Deadman Bay, Kingston, Ontario, where a project is being carried out to determine the effect Zebra mussels are having on artifacts found at underwater archaeological sites.

Fiona Graham and **Carole Dignard** presented the Collections Preservation Assessment Seminar at the MacBride Museum in Whitehorse, Yukon. They had already given a "dry run" of this seminar at the Billings Estate in Ottawa in September.

Tom Strang was one of the instructors for the Pest Management and Control for Museums training course held by the Getty Conservation Institute and the Museums & Galleries Commission Conservation Unit at West Dean College, England.

Michael Harrington and **Paul Heinrichs** presented the seminar, Care of Historic Furniture Collections, for the Museums Association of Saskatchewan in Regina, Saskatchewan.

Scott Williams presented two workshops on plastics in museums, one for conservators and the other for collection managers. The workshops were organized by the Museums Association of Saskatchewan, and took place at the Western Development Museum in Saskatoon, Saskatchewan.

November

Réjean Baribeau attended *MCN '96/CHIN '96*, the Annual Conference of the Museum Computer Network, co-hosted by the Canadian Heritage Information Network, Ottawa, and was a panellist for the session "AMUSE: 3D Colour Imaging, Remote Access and Display" along with John Taylor and George Forester (National Research Council of Canada), and Forrest Livingstone (Hymarc Ltd.).

Bob Barclay visited the Conservation Unit of the Museums & Galleries Commission in London to discuss production of the forthcoming book — *The Care of Historic Musical Instruments*.

David Tremain and **Deborah Stewart** presented the seminar, Emergency and Disaster Preparedness for Museums, for the Alberta Museums Association at the Museum of the Regiments in Calgary, Alberta.

Brian Laurie-Beaumont and **Siegfried Rempel** travelled to St. John's, Newfoundland, to discuss the proposed building development concept for the Cabot Centre, one of Newfoundland's 500th anniversary projects marking Cabot's discovery voyage.

Carole Dignard attended the "Introduction to Laser-Cleaning" course at the Merseyside Conservation Centre in Liverpool, England. Carole also visited the Golden Chamber of the St-Ursula Basilica in Cologne, Germany, and the cathedral of Mantes-la-Jolie, outside Paris. Laser cleaning was being done by private conservators at these two sites.

Wayne Kelly did a full security evaluation at Glanmore House (Hastings County Museum) Belleville, Ontario.

Season Tse was invited to present a lecture, " Measuring and Interpreting pH of Diverse Media," at the Eastern Analytical Symposium, Somerset, New Jersey. She repeated the lecture in January for the Master of Art Conservation Program at Queen's University, Kingston, Ontario.

December

Elizabeth Moffatt, Marie-Claude Corbeil and **Jane Sirois** worked for two days at the Art Gallery of Ontario. There they took samples from a number of Tom Thomson's paintings as part of the study of the materials and techniques of this Canadian artist.

January

Judy Logan assisted in presenting a one-day workshop, along with Betty Seifert, Jefferson Patterson Park and Museum, which was sponsored by the Advisory Council for Underwater Archaeology (ACUA). "Coping with Water Saturated Artifacts: Conservation Workshop for the Non-Specialist" was given at the Corpus Christi Museum of Science and History, Corpus Christi, Texas. Judy attended meetings of the ACUA during the course of the conference.

Deborah Stewart and **David Tremain** presented the seminar, Emergency and Disaster Preparedness for Museums, for the Museum Association of Newfoundland and Labrador at the Newfoundland Museum in St. John's, Newfoundland.

Tom Strang gave two seminars in Cuba, "Systematic Preventive Conservation", and "Pest Control, Generic and Tropical Approaches", to 100 staff members from 37 Cuban institutions. The project was coordinated by the Center for Marine Conservation, the Northeast Document Conservation Center, APOYO, the Cuban National Museum of Natural History, and the Cuban National Archives in Havana.

Carole Dignard and **Bob Barclay** presented the Artifact Mounting Seminar for the students of the Conservation and Collections Management Program at Sir Sandford Fleming College, Peterborough, Ontario.

Stefan Michalski presented a lecture on current issues in relative humidity, and a seminar on the design and uses of suction tables to students in the Queen's University Master of Art Conservation Program, Kingston, Ontario.

February

Judy Logan gave a lecture on the conservation of archaeological basketry and textiles to the students of the Queen's University Master of Art Conservation Program, in Kingston, Ontario.