



Canadian Conservation Institute

CCI Newsletter

ISSN 1180-3223

No. 12, September 1993

Treatment of a 16th-Century Tapestry

by Wojciech Jakobiec

In 1988, a tapestry entitled *Tobit Giving the Note-of-Hand of Gabael to Tobias and Raphael* was received for treatment in the Textile Section of the Canadian Conservation Institute (see Figure 2). The tapestry, measuring 352 cm x 354 cm, dates from the first half of the 16th century, and is one of a set of five tapestries that depict the Old Testament story of Tobit and Tobias. According to W.G. Thomson (*Art Worker's Quarterly*, no. 14, vol. IV, April 1905), this set of tapestries probably hung in Bisham Abbey, Buckinghamshire, once formed part of Henry VIII's collection, and was given to Anne of Cleves. In 1973, the tapestries were donated to the Winnipeg Art Gallery by Lord Gort, a renowned art lover and collector.

None of the tapestries shows any marks that identify the workshop in which they were produced. However, judging from the quality of the craftsmanship, it is safe to say that they were made in one of the major workshops in Brussels; these were widely recognized as being the best in Europe at that time. Stylistically, the design belongs to the School of Mannerism. It is thought that the designer was a Flemish artist who had been influenced by Raphael; most likely, Bernard Van Orly designed the tapestry.

Description

This work is woven in traditional tapestry technique: the weft threads completely cover the warp threads, creating a weft-faced textile in which the design is an integral part of the structure. (The weft runs vertically in the finished

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Figure 1. Reweaving in progress.



Figure 2. Tobit Giving the Note-of-Hand of Gabel to Tobias and Raphael (after treatment). The tapestry is from the collection of the Winnipeg Art Gallery.

piece, and the warp runs horizontally.) The weft is woven in sections according to the design. Wool is used for the warp and for the majority of the weft, and silk wefts are used for highlights. Slits, which were created by the original weaving process in areas of colour or thread change, are stitched closed with blue linen thread.

The central image depicts Tobias and his wife Anna on the left, Tobit and his dog in the middle, and Raphael on the right. The scene illustrates Tobias, who in the days of his prosperity had lent money to a kinsman Gabelus, sending young Tobit with a note-of-hand to collect the debt. Tobit is accompanied by the Archangel Raphael disguised as a young man. The smaller image on the left shows Anna holding a kid that Tobias forbids her to eat, fearing that it is stolen. On the far right, Raphael and Tobit are on the banks of the Tigris where a monstrous fish comes up to devour Tobit. The background is a detailed landscape of Flemish buildings. The top and bottom borders consist of leaves, fruit, and flowers. The bottom border also shows two young figures and a bird.

A border of blue fabric 5 cm wide, which was a later addition, had been machine-stitched along all four edges of the tapestry. This border was made of bands cut

from a rep weave fabric, which had been folded and pieced together around the tapestry. The lower right corner of the blue border has stitching that reads "Repaired by L. Chart, 1904".

The tapestry had a natural-coloured, plain weave, linen fabric backing through which repairs — presumably undertaken in 1904 — had been embroidered. The linen backing had been attached to the tapestry by large anchoring stitches on the back. Slits in the linen backing had no doubt been made in an attempt to re-

lieve some of the stresses that the backing created on the tapestry. A burlap dust cover had also been stitched onto the back of the work at one time. Finally, a series of metal rings had been stitched along the top edge for hanging the tapestry.

Condition

In general, the tapestry was received at CCI in quite stable condition. It did, however, exhibit some damages that are often found in tapestries of this age and type.

When the front of the tapestry was compared to the reverse, it was evident that many of the original, naturally dyed colours had faded. Threads from previous repairs had also faded or altered in a different way than the original threads, thereby making their presence more obvious.

Since the warp runs horizontally, the enormous weight of the tapestry was borne by the weaker and discontinuous wefts. This caused them to become weakened and broken in areas. In addition, many of the stitches used to close the slits created by the original weaving process had broken, thus causing the slits to gape open. The traditional method of hanging a tapestry from metal rings stitched along the top edge does not distribute the weight of the tapestry evenly. This, combined with an ill-fitting

backing, had caused the tapestry to become distorted and to hang in garlands. Silk is particularly susceptible to damage from light. Consequently, much of the silk weft used as highlights had disintegrated and had left the warp bare. Although wool is more resistant to light, the iron mordant used to dye the wool dark brown had caused these fibres to weaken. In some areas, warp threads were extremely weak or broken.

Most tapestries of this vintage have been previously repaired several times, and this tapestry is no exception. Often, old repairs are retained if they do not cause stress or interfere with the aesthetics of the tapestry. Indeed, such repairs often constitute an important part of the history of the piece. In this tapestry, two areas in the floral borders had been patched with floral pieces from other tapestries. Since the colours and motifs of the patches and the tapestry blended well together and did not cause stress, there was no need to remove or replace them.

In contrast, many areas of weakened or missing wefts had been repaired by embroidering through the linen lining, which put considerable stress on the

CCI Newsletter No. 12, September 1993

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tapestry. In addition, the embroidered repairs had become conspicuous due to fading and colour changes that were different from the original. For these reasons, it was decided to remove the embroidered repairs.

The edges of both sides of the tapestry had been cut away, probably along the line where the floral border would have been. The bottom border is narrower than the top, and its uneven lower edge suggests that it, too, had been cut away. The cut edges were turned back to the reverse, and a blue border guard was stitched to the tapestry.

There was surface dust and dirt on both sides of the tapestry. There were also dark, oily stains along the bottom edge just above the blue border on the front of the tapestry. Along the top edge below the blue border and on the right edge near the border, there were small, circular, rust-coloured stains that were probably caused by nails or tacks.

Treatment

The preliminary treatment involved preparing the tapestry for cleaning. Both sides of the tapestry were vacuumed through screening, as much of the linen backing was removed as was possible by cutting back to the embroidered repairs, and then the back of the tapestry was vacuumed again. The blue borders were also removed, and the cut edges of the tapestry were secured. The narrow blue border and the remains of the backing were left to keep the woven structure together until after cleaning, when these previous repairs would be replaced by reweaving. Due to the tapestry's size, unpicking the blue border and clipping the backing were time-consuming processes. Next, the unravelling edges of the tapestry were secured with whipstitches, the tapestry was vacuumed, and the edges were bound with wide cotton strips to give them more support and to reinforce them for handling. Finally, all weak or missing areas were secured by stitching between temporary cotton patches on both sides of the tapestry, and any major slits were closed with temporary whipstitches.

The choice of an appropriate cleaning method depended on the colourfastness of the dyes to various solvents. Tests were conducted to ensure that all the threads were colourfast in washing solutions, particularly those colours in

the repaired areas. Since another similar tapestry had been successfully washed with water and detergent, this method was tested for cleaning the present tapestry. The tapestry was divided into a grid of 49 numbered squares using 12 pieces of string: six placed vertically 20" apart, and six placed horizontally 20" apart. Very small pieces of each shade of yarn from a given square were cut from the back. Then each square's group of yarns was immersed in a beaker of sample wash water (lukewarm tap water and 0.2% WA Paste), was blotted between chromatography paper, and was left under weights overnight. Only one dye from the hundreds tested appeared to have run. This fugitive dye was probably from a repair yarn, but it did not bleed during further tests.

The tapestry was washed successfully with a noticeable improvement in its colours and handling (see Figure 3). As the lab's wash table was too small, a wash-frame was constructed in the CCI loading dock from wooden 2' x 4' planks covered by a fibreglass-reinforced polyethylene sheet.

The tapestry was then stretched, pinned out, and dried with air driers. After 12 hours, the tapestry was unpinned, the patches were removed, and the tapestry was then attached to cotton skirts and was rolled onto the prepared beams of a custom-made tapestry loom.

Compatible yarns of wool, silk, or cotton were used to reweave all areas where warp threads were still intact, and new linen warp threads were inserted where required (see Figure 1). In areas where sufficient evidence of the original design existed, it was recreated. Where there was not sufficient evidence for recreating the original design with confidence, the area was rewoven in an aesthetically pleasing manner that respects the integrity of the original. This traditional approach is more

time consuming than other repair techniques; however, it is more harmonious, both physically and aesthetically, with the original technique.

The tapestry was then taken off the loom and placed on tables to relax. Areas that had been missed were treated flat on the tables. Loose warp threads were tied, knotted, and cut.

To reinforce the cut edges, a double layer of prewashed linen canvas was placed underneath and was secured with matching threads using a small whipstitch. The same technique was used for the top uncut edge.

It was decided not to reuse the damaged blue fabric borders. Instead, narrow borders were custom woven that were closer to the original borders that had outlined the tapestry. The edge of the blue border was attached with prewashed cotton twill. It was left loose along the bottom.

A velcro support system was stitched along the top edge of the tapestry. This will distribute the weight of the tapestry much more effectively than the previous metal ring system. The tapestry was left to hang and adjust for a few weeks, after which some adjustments in the lining were made.

CCI returned the tapestry to the Winnipeg Art Gallery in February 1993, after thousands of hours of conservation treatment. Now the public can once again appreciate the intricate work and beauty of *Tobit Giving the Note-of-Hand of Gabael to Tobias and Raphael*. ♦



Figure 3. Washing the tapestry.

Plasticized PVC in Museums: Don't Use It!

by R. Scott Williams

Avoid using flexible plasticized poly(vinyl chloride), or PVC, in museum and conservation applications because it damages objects that it touches or that are exposed to its volatile degradation products.

Plasticized PVC tubing, commonly used to pad support wires and rods, armatures, and hooks, can stain other objects. This is due to oily plasticizers that migrate, or to corrosion by evolution of acidic gases (especially hydrogen chloride)¹ such as is shown in Figure 1. Fortunately, tubing made of more acceptable polymers (e.g., polyethylene, Teflon, silicone) can be used instead.



Figure 1. Green corrosion products produced where plasticized poly(vinyl chloride) tubing (Tygon) is attached to a brass fitting.

Commercial plasticized PVC enclosures used for filing photographs often deposit droplets of plasticizer on enclosed slides during storage.² The resulting disfiguration is shown in Figure 2. This problem can be avoided by using enclosures made from acceptable plastics such as polyethylene or polypropylene.

In spite of repeated warnings about using PVC in museum applications, reports of damage and queries about the suitability of PVC are still received at CCI. For example, a museum recently exhibited a painted glass bottle resting on synthetic leather.

When the exhibition was dismantled after a few months on display, it was discovered that the paint on the vase had softened and remained stuck to the synthetic leather at the points of contact between the two. Also, when the vase was put into its storage container, the tacky, softened paint from the vase stuck to the container as well. Subsequent analysis showed that the synthetic leather was made of flexible plasticized PVC and that the paint was based on cellulose nitrate.

Phthalate plasticizers commonly used in PVC are excellent plasticizers for cellulose nitrate. In the previous example, plasticizers from the PVC had migrated to the paint on the vase. They dissolved into and softened the paint, making it sticky, which caused the paint to adhere to the PVC "leather". This is a very common occurrence for plasticized PVC in contact with coated surfaces.

Figure 3 shows where the cellulose nitrate-based paint on a pencil softened and transferred to a plasticized PVC eraser with which it was in contact for less than a year in a desk drawer. Another common occurrence is photocopied documents sticking to a plastic 3-ring binder cover.

Plasticizers from the binder soften the polymer vehicle of the ink, making it sticky so that it adheres to the cover.

PVC without plasticizers is a hard, rigid, unbendable plastic. Plasticizers are added to make the PVC flexible.



Figure 2. Tiny droplets of phthalate plasticizer deposited on a photographic slide from the plasticized poly(vinyl chloride) filing sleeve in which it had been enclosed. These droplets, seen as bright spots due to the reflection of a bright light, are visible on the screen when the slide is projected.

Most plasticizers are organic liquids that are oily and that have a high boiling point and low volatility. Phthalate esters are most common, but many other organic esters are also used.³ They are good solvents for plastics — they must be to function as plasticizers. These added plasticizers migrate from the body of the flexible plasticized PVC to the surface of the PVC object, and then to any material in contact with the object. The plasticizers stain the materials in contact with the object; soften, swell, and make coatings sticky, which leads to coating transfer; corrode metals; and cause other disfigurations. For these reasons, flexible plasticized poly(vinyl chloride) products must be avoided in museum and conservation applications.

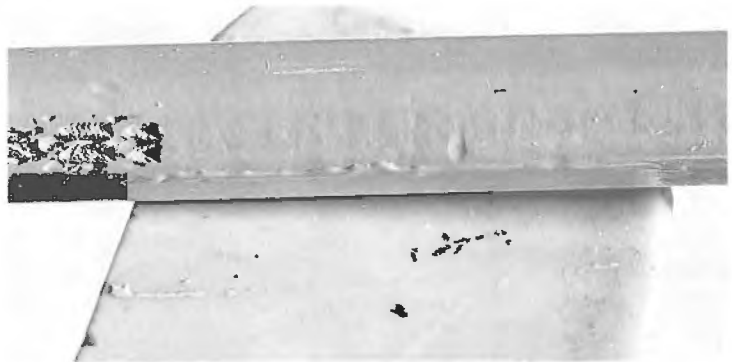


Figure 3. This eraser, made of plasticized poly(vinyl chloride), made the paint on a pencil soft and tacky while they were in contact in a drawer for less than one year. The paint has transferred from the pencil to the eraser, and is visible as a yellow line on the eraser.

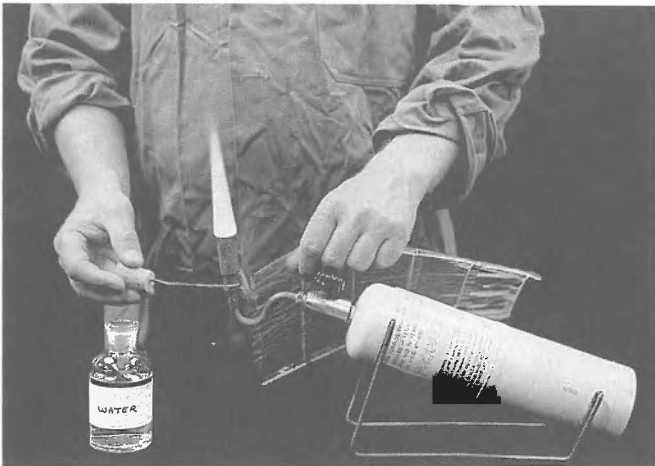


Figure 4. The Beilstein Test. Touch a red-hot copper wire to a piece of the plastic being tested. Position the materials in such a way that the smoke produced is drawn into the air intake of the propane torch. A bright green flame indicates that the plastic contains chlorine. If the flame remains faint blue in colour, the plastic does not contain chlorine.

Plastics that contain chlorine can be recognized by performing the test described in CCI Notes 17/1, *The Beilstein Test: A Simple Test to Screen Organic and Polymeric Materials for the Presence of Chlorine, with Examples of Products Tested*.⁴

When a plastic that contains chlorine is burned in the presence of red-hot copper (e.g., copper electrical wire, a penny) in a propane torch or Bunsen burner, it produces a green-coloured flame. Figure 4 shows one method of performing the Beilstein Test: the smoke produced by touching a red hot copper wire to the plastic is sucked into the air intake of a propane torch and causes the

flame (normally faint blue) to turn bright green.

The Beilstein Test will give a positive result for all polymers that contain chlorine, including PVC, poly(vinylidene chloride) or PVDC, chlorinated polyethylene, and chlorinated rubbers such as polychloroprene and neoprene. This simple test will also give positive results for products made from these polymers. Avoid products that test positive, especially if there are alternative choices.

References

1. Williams, R. Scott. "Tygon Plastic Tubing: Use with Caution," *IIC-CG Newsletter*, Vol. XII, No. 3 (1989), pp. 20-21.
2. Williams, R. Scott. "Commercial Storage and Filing Enclosures for Processed Photographic Materials," in *Printing of Transcript Summaries of Second International Symposium: The Stability and Preservation of Photographic Images*, Ottawa, Ontario, August 25-28, 1985. Springfield, Virginia: Society of Photographic Scientists and Engineers, 1985, pp. 16-30.

3. As an interesting aside, it can be noted here that Safest Stripper Paint and Varnish Remover (a 3M product) is a mixture of organic ester liquids that have been used as PVC plasticizers. It is no wonder that contact between plasticized PVC and painted objects damages the paint finish.

4. Canadian Conservation Institute. *The Beilstein Test: A Simple Test to Screen Organic and Polymeric Materials for the Presence of Chlorine, with Examples of Products Tested*. CCI Notes 17/1. Ottawa: Canadian Conservation Institute, 1993. ♦

R. Scott Williams, Conservation Scientist in CCI's Analytical Research Services Division for the past 16 years, has been seconded to CCI's Conservation Processes Research Division to concentrate on "Polymers and Plastics in Conservation and Museums". His primary topics of investigation will be the selection of safe polymer and plastic products for use in conservation applications, and the degradation and conservation of museum objects composed of plastics and other synthetic materials.

Field Conservation in the Eastern Arctic

by Tara Grant

Arctic sites produce a large number of objects that have been frozen in permafrost and that will react quickly to the changed environment once they are excavated. These organic artifacts require more care to prevent further deterioration than do most inorganic materials. A conservator on site can prevent the two greatest problems that can arise with these objects: uncontrolled drying and mould growth. One of the services that CCI offers is field conservation on sites within Canada, and I have acted as field conservator twice on sites in the Canadian Arctic.

In the summer of 1991, I joined a small field crew from McGill University who

were excavating a Thule site at Hazard Inlet on Somerset Island, NWT. Dr. James Savelle was the director and chief archaeologist of the field expedition. The crew was composed of one site coordinator/archaeologist, three students of archaeology, and two Inuk students from Resolute, Cornwallis Island, N.W.T.

The region around Hazard Inlet is one of the richest areas for Thule Eskimo bowhead whaling sites of circa A.D. 900 to 1600. There are approximately 4200 archaeological features relating to this culture along the coast of the Inlet. The 1991 field season concentrated on the excavation of three semi-subterranean dwellings and several tent rings.

The artifacts collected during the summer were made from skins, baleen, bone, ivory, stone, and driftwood. Some of the more interesting artifacts included cut decorative feathers, baleen knots and drum rims, wooden bowl bottoms and scoops, a worked horn bow drill, a copper awl tip, bone harpoon heads, boot soles, a small gut bag, a mitten, bone bola balls, an ivory toggle, baleen snow knives, and a collection of small wooden dolls. Several bone knives with iron blades were also excavated, one of which has a caribou hunting scene incised on the handle.

The archaeological field season in the Arctic is extremely short, running from the middle of June until the snow begins



Figure 1. Excavation of the Thule House. The archaeologist continues excavating while keeping a careful watch on the activities of a polar bear on the ice floes.

to fly in the middle of August. The permafrost that helps to preserve the artifacts makes digging a major chore (see Figure 1). The ground thaws to only a few feet in depth. After reaching the permafrost, excavation proceeds at a few inches per day as the exposed soil thaws further. If the archaeologist wishes, the process can be sped up by using hot water to melt the permafrost; however, this results in the archaeologist sitting in a wet, smelly hole for the rest of the day.

Because of the permafrost, one of the problems frequently encountered during excavation is long strips of organic material, such as baleen straps, where part of the artifact remains frozen in the wall of a structure. In such situations, it is necessary to keep the exposed section damp by covering it with wet sphagnum moss until the permafrost can be melted and the rest of the artifact can be excavated. Unfortunately, in the case of the first artifact we found in this condition, we returned the next day to finish the excavation only to discover that local foxes had eaten the artifact up to the point where it entered the frozen wall. We started placing rocks over the exposed artifacts after that incident.

The tent used for conservation activities was a large 8' x 10' double canvas structure with interior aluminum poles. I was responsible for importing the materials needed for conservation. The crates that had been used to ship supplies were also used as tables. Very few chemicals or solvents could be transported due to flight

restrictions on hazardous substances. Fortunately, all the requirements for a short field season in the Arctic can be contained in an insulated picnic cooler. The most useful items are Saran Wrap, aluminum wrap, Coroplast, microfoam, and lots of masking tape for packing artifacts for transport. Sphagnum moss, which grows locally, can be used as padding and to keep the artifacts damp. This reduces the amount of cushioning material that must be carried into

the site. Various small tools, Condition Report cards, and spray bottles are also useful. Small quantities of wax and plaster of paris were brought in for blocklifts.

Due to the lack of facilities and the shortage of time, the major concerns of field conservation are to prevent artifacts from degrading further after excavation and to prepare artifacts for shipment to a conservation laboratory for long-term treatment. If the conservator is present during the entire field season, it may be possible to do some minor conservation treatments in the field, for example, cleaning and air drying stable bone, and consolidating and drying baleen. At this site, even cleaning bone in the field became a major undertaking; all water had to be hauled in bags from the ponds ... uphill with an eight-pound shotgun in tow!

I arrived six weeks after the field season had started, so there was quite a backlog of artifacts awaiting packing and treatment. I began by doing Condition Reports on some of the bone artifacts, and then set about cleaning and slowly drying them in the back of the tent. After this, I started on the rest of the collection. I sorted the artifacts by material, and did Condition Reports on each object. I drew, measured, and described each artifact, and noted its condition. All data from the excavation bag — such as the number of the artifact, the number of the house or feature where it was found, the grid location and depth where it was found, the date of excavation, and the name of

the archaeologist who unearthed the artifact — was transferred onto the cards. The artifacts were then packaged with damp sphagnum moss, a layer of Saran Wrap, and a layer of aluminum foil. Where necessary, I used a piece of Coroplast to support objects. The damp sphagnum moss ensured that the objects were cushioned and remained damp, and it also helped to reduce mould growth during transport and storage. The Saran Wrap and aluminum foil prevented the objects from drying out.

In the six weeks since excavation, many of the artifacts had already begun to grow mould. I sprayed mouldy artifacts with 30% vol/vol isopropanol/water solution. In order to keep the objects at a low temperature, the cooler was placed in a hole in the ground, and the packed items were stored inside. The foxes took exception to this, and left a little "marker" on the lid of the cooler to show their displeasure.

The working conditions on this excavation were not always ideal. Unfortunately, the conservation tent was constructed of a camel-coloured canvas rather than of the traditional white canvas, so the light levels within the tent were poor. Occasionally, I had to take an artifact outside in order to distinguish some feature. On the few warm days we had, the mosquitos turned out in great numbers. The ground was cold, and a frigid draft crept under the edges of the tent. Working with wet moss in cool temperatures caused my hands to swell painfully. During high winds, the tents tended to lift. In fact, on a particularly windy day, one of the sleeping tents took flight, barrelling for the sea with all of someone's worldly possessions inside before it was recaptured.

However, there were some compensations. For example, the wildlife was terrific. We saw beluga and humpback whales, caribou, lemmings, foxes, polar bears, loons, and muskox. The whales passed the site in large pods every few days. The muskox were a rare sight because there is only one small herd of twenty or so on the island. The caribou were quite tame and allowed us to approach close to them before moving away. One of the caribou appeared to stand guard while the others grazed. Some mornings, we would crawl out of our tents to find a small herd of caribou grazing a few yards away.

Polar bears are magnificent animals, but are best viewed from a distance. On site, they were a constant threat. Generally, the polar bears stayed out on the pack ice near their food source. In August, after the ice had broken up, they began to wander inland (see Figure 2). Polar bears have little fear of people; the reverse, however, is not always true. Every member of the crew carried a gun at all times, and we left camp only in groups. When we were working, we left our guns by our sides. Bears have an incredible sense of smell, so the camp was set up to separate the kitchen tent from the sleeping tents. Garbage had to be burned every evening and then buried. Throughout the season, three polar bears wandered into our camp. One polar bear was quite insistent on retrieving a caribou carcass located about 300 metres behind the sleeping tents, even after we fired a shot above the bear's head. While a bear was in sight, work was suspended, all the crew assembled, and the bear was watched until it left the area.

We were adopted by a set of fox pups. We named them "Willie", "Blackie", and "Jim". They showed up every night to dig up the remains of the burned garbage (see Figure 3). Then they circled around to inspect the archaeological site and, finally, the sleeping tents. Occasionally, the foxes played tug-of-war with the radio antenna. One day, "Jim" stuck his head around the flap of the conservation tent, attracted no doubt by the aroma of decaying whale oil, but after eyeing me he decided not to come in.

A major advantage of working in the Arctic summer is the 24 hours of sunlight each day. We had incredible energy as our minds were tricked into believing it was always early. It was definitely a



Figure 2. Polar bear wandering inland.

unique experience to wake up at one o'clock in the morning when it looked as if it were high noon.

My second Arctic field experience took place the following summer when I flew to Baffin Island to join a crew from the Environmental Technology Program (ETP) of Arctic College-Nunatta Campus, Iqaluit, N.W.T. The crew was composed of five students from the ETP course and two ETP instructors including Dr. Douglas Stenton, the project leader and archaeologist. The three-week dig in 1992 marked the third year of the Arctic College's field school at this location.

The site was located only 8 kilometres outside Iqaluit (formerly Frobisher) at Peterhead Inlet. The site, called Tungat-sivvik (Place Where One Meets Spirits), contains approximately 100 features, including winter houses, tent rings, burials, meat caches, and fox traps from Pre-Dorset, Dorset, Thule, and the Modern Inuit periods. The aim of the three-week expedition was to excavate one of the Thule semi-subterranean house ruins. The excavation served a dual purpose: to provide information on the various cultures that occupied this site and to preserve the information and artifacts from destruction by people searching for artifacts and whale bone.

The camp was set up differently from the camp on Somerset Island. The sleeping and eating areas were located together because there was no polar bear problem here. Peterhead Inlet is located away from the mouth of Frobisher Bay, where the polar bears hunt, and is close to Iqaluit. There were guns in camp, but we did not have to carry them around with us at all times. The lack of wildlife was compensated for by three Eskimo puppies that belonged to one of the students. They ravaged

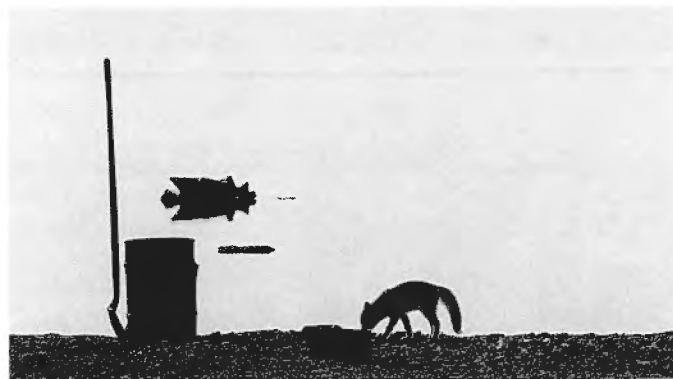


Figure 3. "Jim" making his nocturnal rounds and digging up the garbage.

the camp, chewing on anything that was left unguarded.

The conditions of the artifacts were also quite different at this dig. There was less permafrost associated with this excavation: only one small patch was located at the lowest point in the entrance tunnel to the house. Consequently, the artifacts were more degraded. Several of the bone pieces had the consistency of marshmallow. Almost no skin or baleen artifacts were found. The artifacts recovered from this site include several bone harpoon heads, a sled runner, soapstone lamps and bowls, a copper-plated lead pendant, a bone pendant, and a magnificent and fully intact iron-bladed ulu.

In addition to carrying out normal field conservation at this site, I also taught field conservation to the students from the college. Each student spent a day working with me on the artifacts. There were also two evening lectures: one covered field conservation techniques and materials; and the second was on the structure and decomposition of wood, skin, bone, ivory, baleen, and metals and the conservation techniques used to stabilize each material. This was followed by a short exam at the end of the field season.

Giving artifacts immediate care as they are excavated helps to reduce damage. I found that working in the Arctic offered many challenges and many rewards. It was definitely a physical and cultural challenge for a southern urbanite. However, such an experience can help give conservators a better appreciation of the constraints our archaeological colleagues work under, and can help us to better understand the artifacts we work with by gaining some insight into where they have come from. ♦

Scanning Electron Microscopy and X-Ray Microanalysis at CCI

by Ian N.M. Wainwright

By a small sample we may judge of the whole piece.

Miguel de Cervantes, *Don Quixote*.

Virtually every analysis undertaken by CCI's Analytical Research Services (ARS) scientists involves some form of microscopy. This is hardly surprising in view of the extremely small size of sample that we are able to remove for study from artifacts and works of art. Microscopy *per se* is used to solve a wide range of problems and is also used in conjunction with other analytical methods, such as x-ray microdiffractometry or Fourier transform infrared spectrometry. Microscopical methods are versatile, adaptable, and sensitive, which are great advantages considering the extraordinarily diverse nature of the objects which we encounter from museums and archaeological sites.

Microscopy is a process, one that involves carefully examining an object with the naked eye, with infrared and fluorescence photographs, and with x-ray radiographs. These and other techniques help in selecting sites for extracting samples

using finely drawn tungsten needles or microsurgical blades. Ideally, samples are representative of the problem to be solved and at the same time are as small and inconspicuous as possible, no easy task when an artifact is in pristine condition or has been extensively modified in the past. Frequently, cross-sections are prepared from microscopical cores that are carefully removed from objects. These cross-sections are used to study paint and varnish layer sequences, corrosion and accretion, and the internal structure of materials. Depending on the materials and the nature of the problem, particles, fragments, or cross-sections are studied with several light microscopes: a polarizing microscope, an incident light microscope, a fluorescence microscope, or a metallograph (a microscope especially designed for the study of alloys).

In conjunction with light microscopy, many analyses make use of CCI's scanning electron microscope (SEM). There are currently about a dozen regular users of the SEM, including both ARS staff and a group of scientists from the Canadian Museum of Nature (Figure 1).



Figure 1. Kate Helwig inserts a specimen into the sample chamber of the scanning electron microscope for x-ray microanalysis.

The Hitachi S-530 SEM incorporates a secondary electron detector, a backscattered electron detector, and an x-ray detector and spectrometer. This year, the spectrometer was upgraded to allow for more precise digital electron beam control, increased automation, digital imaging processing, and video microscopy. A Noran Instruments Voyager microanalysis system is now integrated with the SEM and x-ray detector. The new system uses a Motorola 68030 microprocessor for x-ray signal processing and a Sun Microsystems SPARCstation engineering workstation for x-ray analysis and digital imaging. A video interface allows image acquisition from light microscopes or other devices.

When CCI acquired its first SEM in 1973 and coupled an x-ray detector to it, such systems were still a new innovation. Since then, they have evolved into an indispensable tool in many areas of biology, geology, and materials science. Why is the SEM so useful in conservation and archaeological science? The structure and composition of museum objects are both heterogeneous and complex. It is not unusual to find a cross-section from a polychrome sculpture, a ship's figure-head, or a heritage carriage with 15 to 30 layers of paint. Artists' pigments (both naturally occurring minerals and synthetic precipitates), corrosion products, and accumulations of dirt and other pollutants are often very finely divided, with particle sizes ranging from 30 micrometres to the sub-micrometre level. Paint layers, glazes, surface coatings, and altered surfaces of corroded metals or crizzled glass can be extremely thin. Materials encountered in or on museum objects come from a rich variety of plant, animal, and geological origins. It is frequently of interest to examine differences in morphology and chemical composition, which vary from one source to another or which stem from manufacturing processes or environmental deterioration.

An SEM, with x-ray and backscattered electron detectors, is a versatile instrument for studying these phenomena because it offers high spatial resolution, depth of focus, and the ability to relate chemical composition to topography. The SEM is closely related to the electron microprobe, an instrument that was first described by Raymond Castaing in 1948. The SEM and electron microprobe represent a powerful fusion of electron optics and x-ray spectrometry. In both instruments, a beam of energetic electrons is brought to a fine focus at the surface of the sample (Figure 2). The beam can be maintained in a fixed position or it can be scanned in an X-Y grid pattern over a rectangular area of the sample. At each point on the specimen, any of a number of events can occur, including the emission of electrons, photons, and x-rays. In 1913, shortly after the invention of the x-ray spectrometer by W.H. Bragg and his son W.L. Bragg (see article by Jane Sirois in *CCI Newsletter*, no. 8, October 1991, pp. 4-6), H.G.J. Moseley discovered a

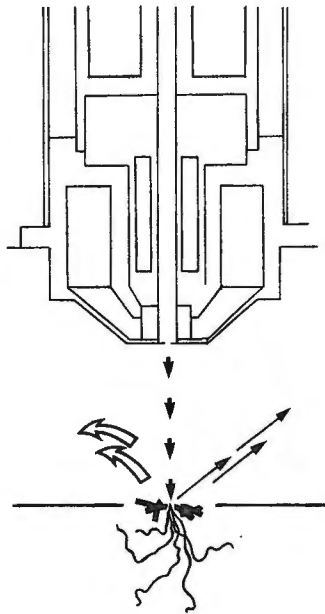


Figure 2. An electron beam is focused on the sample surface.

relationship between x-ray wavelengths and the atomic number of the chemical elements from which they are emitted. Moseley's law forms the basis of modern x-ray spectrometry, which enables us to identify the chemical elements present in a volume of sample of less than one cubic micrometre.

Several examples will serve to illustrate some of the applications of SEM.

A common application of x-ray microanalysis is in the straightforward qualitative analysis of particles such as artists' pigments. Emerald green is a good example. This poisonous material was first synthesized at Schweinfurt, Germany, in 1814 — as an artists' pigment it is also known as Schweinfurt green. It is a copper aceto-arsenite compound that has also been used as the insecticide Paris green. It is quite easily identifiable by polarized light microscopy, and its elemental composition can be confirmed by SEM. A secondary electron micrograph of emerald green from our pigment reference collection and its x-ray energy spectrum are shown in Figures 3a and 3b. The spectrum includes x-ray lines due to the elements copper (Cu) and arsenic (As). Emerald green was among the pigments found in three pastels by Degas that we examined in collaboration with the National Gallery of Canada as part of its research into the artist's technique.

ARS has recently undertaken a detailed study of the materials used by Canadian

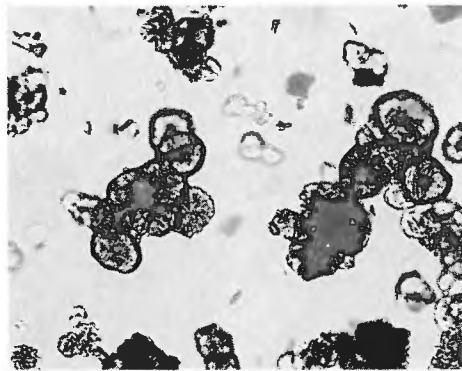


Figure 3a. Micrograph of emerald green.

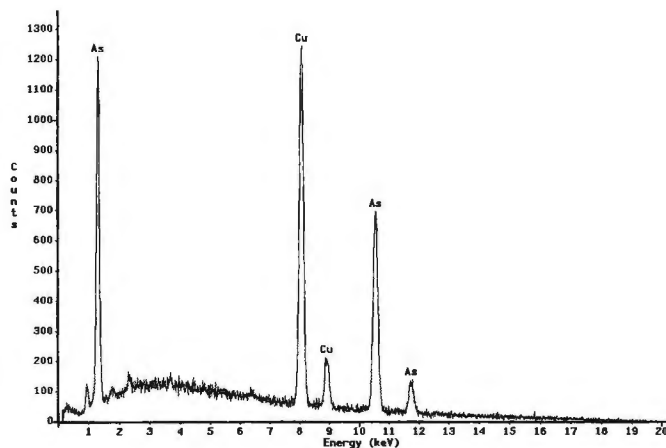


Figure 3b. X-ray energy spectrum of emerald green.

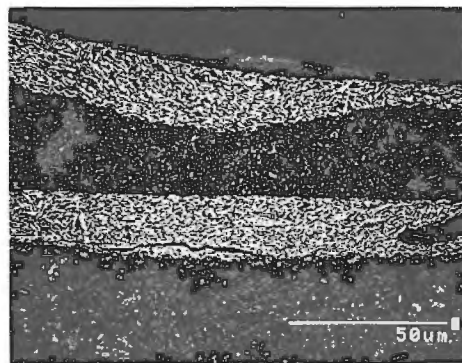


Figure 4. Cross-section from Red House and Barn by David Milne.

artist David Milne as part of our Canadian Artists' Painting Materials Project (see article by John Taylor in *CCI Newsletter*, no. 10, September 1992, p. 8). Among the paintings analyzed so far is a double-sided painting, *Red House and Barn*, from which a number of cross-sections were removed to reveal Milne's use of paint (Figure 4). The SEM can be used to map the distribution of chemical elements in a section or to produce a profile of element concentration across any given line in the sample.

In this way, we can decipher the complex sequence of paint applied by the artist.

Rock painting sites in Canada and other countries are usually covered with natural deposits that have formed after the rock art was executed. Examination of these deposits — which, in Canada, are typically hydrated amorphous silica gels — has helped researchers determine how rock paintings have been preserved and how they are deteriorating. Microscopical analysis of the deposits can also establish a relative chronology for a rock art site. A cross-section from a

rock painting in the Similkameen Valley of British Columbia, shown in Figure 5, reveals the fine structure of such a deposit.

As with most of the research conducted in ARS, the SEM with x-ray microanalysis is seldom used in isolation. Advances in x-ray diffraction and infrared spectroscopy instrumentation

have extended the application of these techniques to the microscopical analysis of art and archaeological materials. These parallel developments make it possible for the scientist to extract more detailed information from small samples. ♦

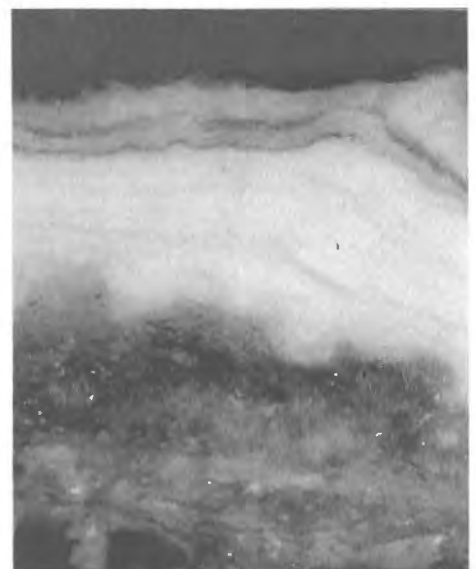


Figure 5. Cross-section from a rock art site in the Similkameen Valley reveals a natural deposit over the painting.

Who's Who at CCI — Jean Bisson

by Charles Costain

Judging by the number of calls over the CCI intercom, Jean Bisson must be one of the most popular and sought after members of the CCI staff. As CCI's systems analyst and computer resource person, Jean is finding that his services are in great demand and that every day brings new challenges.

Jean was born in Ottawa, and has lived in the area ever since. He appears to enjoy moving, since he has lived in various locations in both Ontario and Quebec. This penchant for moving is currently proving useful at CCI, since his office has been temporarily destroyed while a new ventilation system for the building is installed.

Jean was initially hired at CCI in 1982 on a three-month contract to measure the building and everything in it. While the work was perhaps less than challenging, Jean says that it gave him a unique opportunity to get to meet all of the CCI staff and to see all of their furnishings. This was followed by the first of many contracts to enter information into the in-house database system that was operating then, known as DEGRADE (Data Entry into a General Registration Array). While DEGRADE served our purposes at the time, it was run on a small Hewlett-Packard computer, and it soon became clear that we required something larger and more flexible. In 1984, with the assistance of Canadian Heritage Information Network (CHIN) staff, CCI began using our current in-house system known as ICARUS (Index of Conservation and Analytical Records — Unified System), which runs on CHIN's mainframe computer. Jean received training from CHIN on how to carry out programming for ICARUS. From that point on, Jean began tailoring the system to CCI's needs, in addition to carrying out his normal data entry functions.

In 1987, CCI began to buy computers for some of the staff. The recipients of these computers quickly realized that they needed assistance with this new tool, and it seemed natural to turn to Jean for advice. Jean evolved into the person responsible for setting up computers, troubleshooting, installing software, and

sorting out communication problems. As the years went by, CCI acquired more computers and software, the problems became more complex, Jean's responsibilities increased, and his contracts continued to be renewed. Finally, in 1990, CCI realized that Jean had become indispensable to the smooth operation of the Institute, and he was given a full-time position.



CCI now has many computers in the building. In addition to this, over the past two years we have had a Banyan local area network (LAN) installed in CCI. This LAN is part of a much larger network that connects all employees of the Department, and is part of a plan to "re-engineer" the Department's administrative processes and to move towards a "paperless office".

Jean, as CCI's systems analyst, has been given responsibility for maintaining all of these technological advances. As far as CCI staff are concerned, this means that he is "on call" to help resolve problems with computers, be it repair, configuration of the computer, or software. Jean also takes responsibility for installing new computers and software on most systems.

The installation of the Banyan LAN has been a challenge for all CCI staff, but it has had the greatest impact on Jean. He is still in the process of learning about Banyan LANs, but he is learning fast! All regular staff should be connected to the LAN by the fall. Jean is currently in the process of setting up our servers to accommodate these new connections, and will then be training staff in the use of the LAN. Jean has been fortunate in having Richard Bédard, from Information and Extension Services, seconded to help him for a few months while the LAN is being installed.

Because the CCI LAN is part of the larger LAN within the Department, our systems must conform. In order to ensure that this evolves as smoothly as possible, Jean now has regular meetings with the systems manager and with other systems analysts within the Department.

In spite of his obvious interest in computers, Jean is otherwise a normal, well-adjusted individual. He finds that he and his wife, Carole, have most of their leisure time taken up by their two children, Sylvain (aged 8) and Carolane (aged 5). Jean's hobbies, aside from moving between Ontario and Quebec, are generally oriented towards playing sports. During the summer, Jean plays softball, and has been a regular fixture at second base on the CCI softball team for many years. During the winter, he plays hockey, and for several years has been a goalie with the Navan Old-Timers. His main claim to fame with this hockey league is that John Taylor (also of CCI), who plays in the same league, has yet to score on him.

Jean's job and skills have changed a great deal since he first arrived at CCI eleven years ago. With our increasing reliance on computers, it seems clear that the challenges that Jean faces will continue to evolve. It is a credit to Jean's good nature that he has yet to throttle any member of staff as he gets yet another appeal for help. ♦

Videos on Preventive Conservation

by Laurier Lacroix

Conservators at the Centre de conservation du Québec (CCQ), the Canadian Conservation Institute (CCI), and the Audio-Visual Services of the Université du Québec à Montréal (UQAM) have cooperated in producing a new tool for use as an introduction to preventive conservation. With the support of a grant from the Department of Communications' Priority Initiatives Component of the Museums Assistance Program, a series of 21 videos on various aspects of preventive conservation, with a total length of approximately three hours, will be available to museology students and museum staff in the fall of 1993.

The series covers general subjects such as controlling lighting, relative humidity, and temperature, eliminating pollutants, and dealing with insects and other pests that can harm museum collections. The videos also explore issues relating to packing and transporting works, handling, storage, condition reporting, protecting artifacts on display, security measures with regard to fire and vandalism, plans for emergency prevention and disaster preparedness, and the closing of seasonal museums. Eight other videos describe some of the materials used in

preventive conservation for paintings, for works on paper, for wood and plaster sculptures, for metals, for textiles, for artifacts, for furniture, and for synthetic materials such as plastic and rubber.

The videos are accompanied by a manual that contains a transcript of the narration, a glossary of terms, and a bibliography of sources and of suggested further reading.

Jacques Archambault, an associate historian with UQAM's Audio-Visual Services, has been responsible for the production of the series, and Laurier Lacroix, a UQAM professor and head of the university's Museology Department, has been coordinating the project with CCQ and CCI. Members of the International Centre for the Study of the Preservation and the Restoration of Cultural Property (ICCROM) have participated in script revisions. Several museums in both Quebec and the National Capital Region have allowed their facilities and collections to be filmed for the videos.

This series will be available in both French and English. Copies of the videos will be given to two conservation and restoration centres and to the Canadian provincial museums associations to be used



Filming a video at CCI.

for training purposes. Complete sets will be available, at an affordable price yet to be determined, from the Audio-Visual Services at UQAM, which is responsible for their distribution.

The demonstrations and the computer graphics used in the videos should help to achieve the goal of making the basic principles of preventive conservation more accessible. It is hoped that the videos will promote better conservation of museum collections by making available better knowledge of the fundamental rules and practices that must be observed. ♦

Archival Collection of Antique Bandings

by Martha Perry

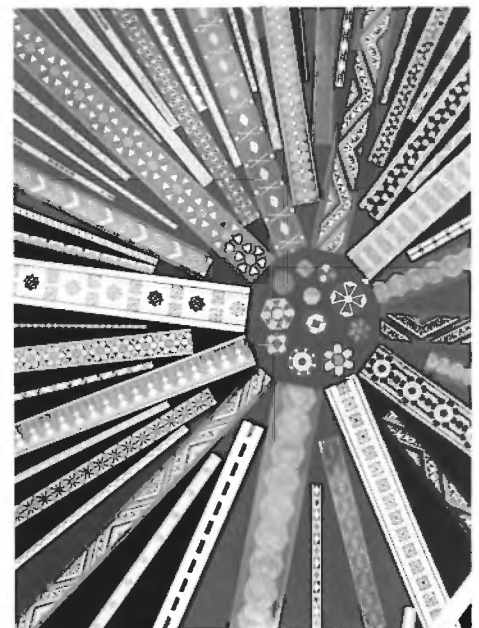
The Canadian Conservation Institute has acquired a rare collection of the Buffard Frères of Paris furniture bandings. These decorative bandings are examples of veneer trims that can be used on furniture, picture frames, or any other kind of wooden object.

After Buffard Frères' bankruptcy in the 1930s, the bandings were in storage until the stock was purchased by Lee Valley Tools of Ottawa in 1989. It was from Lee Valley Tools that CCI was able to obtain an example of each style of banding as well as of each available "macaron" or medallion.

These beautiful sawn bandings of Art Deco design have been crafted of face grain rather than by the more modern

technique that uses end grain. This results in an increase in the strength of the banding and in greater exploitation of the natural grain and beauty of the wood. Unlike modern banding, the materials used have not been dyed to look like exotic woods but are the exotic woods themselves. In fact, some of these woods will never be available again. In addition, Buffard Frères' designs incorporate pewter and vegetable ivory (from the palm nut), something unheard of today. This striking collection will probably be unique in 40 or 50 years.

CCI welcomes inquiries from people who would like to study this collection. Anyone interested should call the staff of CCI's Furniture and Wooden Objects Section at (613) 998-3721, or write to them at the Canadian Conservation Institute. ♦



Detecting Art Fraud: Sometimes Scientific Examination Can Help

by J.M. Taylor

Art fraud is a major problem facing museums, conservation laboratories, dealers, collectors, and the police in Canada. The paintings shown in Figures 1 to 7 were attributed to such artists as Rembrandt, Rubens, Monet, van Gogh, Chagall, and Miró. None are genuine. All were offered to unsuspecting collectors in Canada at substantial prices — some for millions of dollars.

According to a recent article in *The Financial Post Magazine*, it is estimated that in 1990 Canadian collectors spent about \$250,000,000 purchasing works of art.¹ Seasoned collectors generally purchase works from reputable art dealers, often from members of the Professional Art Dealers Association of Canada (PADAC). They do so after considerable study of the work and usually after obtaining a second opinion. Unfortunately, unsuspecting collectors purchase works at auctions or from private vendors — often for large sums — without doing any "curatorial footwork". They often accept the "certificates of authenticity" that accompany a work at face value.

When collectors becomes suspicious that an acquired work may not be genuine, it can be a very frustrating experience to establish the attribution. They may seek a second opinion from a well-qualified museum curator or art historian. Another option is to take the work to a dealer who is a member of PADAC. A third approach is to seek scientific assistance. In art fraud court cases, scientific evidence is often requested to corroborate expert testimony. As a result, in recent years the Analytical Research Services



Figure 1. A Spring Landscape near Arles, attributed to Vincent van Gogh.

Division at CCI has received many requests from private collectors, and from the police, for help.

Unfortunately, inflated claims made in articles in the press have raised undue expectations of the role of scientific examination. Despite these claims, the fact of the matter is that a scientific examination can help only in certain instances. For a successful examination, scientists must be able to compare the materials in the work in question with a data base of information on materials known to have been used by the specific artist or to have been used during definite periods in history. This information is usually obtained by analyzing well-documented objects of known provenance.

At present, reliable reference information is available only for certain periods and for certain types of objects. For example, excellent chronological data is available on the traditional pigments used in European paintings from 1300 to 1900.² This is the result of years of research by various laboratories including the National Gallery in London, the National Gallery of Art and the Freer Gallery in Washington, the Mellon Institute in Pittsburgh, the Doerner-Institut in Munich, and CCI. CCI also has a substantial data base on Amerindian paints used north of the 49th parallel since 1800. As well, we have excellent data on North American church and trade silver of the 1750 to 1850 period.³ Consequently, scientific examinations on objects falling within these categories generally yield useful information. Examinations of objects falling outside these categories are much less useful.

Examples of Scientific Examinations

One of CCI's services is to provide scientific assistance to the police with art fraud investigations.⁴ Let us consider a few examples.

The painting shown in Figure 1, *A Spring Landscape near Arles*, bears the signature "Vincent" and was sold as the work of Vincent van Gogh (1853-1890). Although the canvas was old and correct for van Gogh's time, the paint was very soft and pliable — it had not fully dried. A survey analysis of the surface by x-ray spectroscopy indicated widespread

presence of the element titanium (Ti) in white areas throughout the painting. A more detailed analysis of the white identified the pigment as a form of titanium dioxide white known as rutile.⁵ This variety of the pigment was not available before 1938. Consequently, since the introduction of the pigment postdates van Gogh's death, the painting could not have been done by van Gogh.⁶ When the painting was examined using infrared illumination, a second, earlier composition was found under the present image. In order to obtain an aged canvas, the forger had purchased an older painting and had painted *A Spring Landscape near Arles* over the original composition. This is one of the oldest "tricks of the trade" in the art fraud world.

The print shown in Figure 2, *The Gold Weigher (Jan Uytenbogaert, Receiver General)*, bears the etched plate inscription "Rembrandt, 1639" and was sold as the work of Rembrandt van Rijn (1606-1669). An examination of the work by David Tremain of CCI's Works on Paper Section showed that it had been done on a type of paper called "wove paper". Wove paper was not invented until 1757 — some 88 years after Rembrandt's death. A type of paper known as "laid paper", which can easily be distinguished from wove paper by a simple examination using a light box, was used during Rembrandt's



Figure 2. The Gold Weigher (Jan Uytenbogaert, Receiver General), attributed to Rembrandt van Rijn.

time. David also noted a number of other stylistic features that were characteristic of prints known to have been made from reworked plates subsequent to Rembrandt's death.

The painting shown in Figure 3, *The Little Jesus, St. John and Two Angels*, was attributed to Peter Paul Rubens (1577-1640) and was valued at many millions of dollars. It had been stolen in Edmonton in 1981 and, when it was recovered in 1989, it became the subject of an extensive police investigation.⁷ The police asked CCI to examine the painting in an attempt to establish the date of execution. The analysis of small samples — each about the size of a typewriter period — from original areas showed that the pigments white lead, vermilion, lead antimonate (Naples) yellow, cadmium yellow, and barium sulphate had been used. When the pigment analyses from this painting were compared with the reference data available from European paintings, it was noted that cadmium-based pigments had not become commercially available until the 1840s, barium sulphate had been used in paints only since the early 19th century, and Naples yellow had its greatest popularity between 1750 and 1850. Accordingly, the painting cannot be attributed to Rubens.

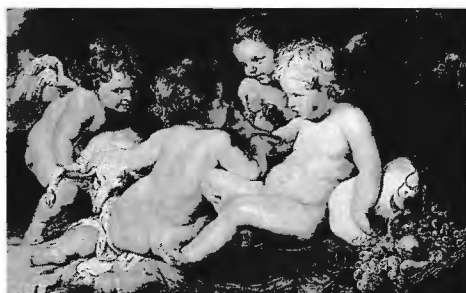


Figure 3. *The Little Jesus, St. John and Two Angels*, attributed to Peter Paul Rubens.

The Impressionist-style painting *The Gardens of Luxembourg* (Figure 4), bears a signature "Claude Monet 1923", and was attributed to Monet (1840-1926). An examination of the lower left-hand corner, around the signature and date, revealed that this area had been altered. Using x-radiography and infrared photography, it was found that the original signature, but not the 1923 date, had been removed. A new layer of green paint, and subsequently the signature "Claude Monet", had been added. Although the original date had not been removed, it had been overpainted to match the colour of the new signature



Figure 4. *The Gardens of Luxembourg*, attributed to Claude Monet.

(Figure 5). In this example, the forger had obtained an Impressionist-style painting that could be considered in the style of Monet and had replaced the original artist's name with that of Monet. This is another old and oft-repeated "trick of the art fraud trade."



Figure 5. Infrared detail of signature of *The Gardens of Luxembourg*. Note the difference in brushstroke patterns between original and added background, and the fact that the background has not been altered around the date.

The paintings shown in Figures 6 and 7 were included among a suite of five similar works attributed to the artists Marc Chagall, Joan Miró, and Wassily Kandinsky that were the subject of an art fraud investigation. Little information on the materials and techniques of the artists had been published in 1986 when the work was performed. Consequently, we could not conclude whether the materials present were or were not characteristic of the three artists. Considering the paintings on an individual basis, the analytical data provided little assistance towards establishing attribution. This illustrates the limitation of scientific examinations, and demonstrates the need for reliable reference



Figure 6. *Rainbow*, attributed to Marc Chagall.

information on the materials and techniques used by artists at different periods.

However, in this case, we did notice that the medium used for all five paintings was the same: an alkyd resin commonly used for domestic paints and not frequently used by artists. Further, one of our staff had noted similar versions of the five paintings in catalogues of works by Chagall, Miró, and Kandinsky. This, combined with the fact that the same resin had been used for all the works, led us to believe that the paintings may have been copies made in a single studio. Additional analyses showed that the brown "stains" on the backs of the canvases were identical mixtures of iron oxide pigments in drying oils. The grounds were similar, and each of the canvases was attached to its stretcher with staples from



Figure 7. *Moon and Stars*, attributed to Joan Miró.

the back without tacks in the edges. The fact that the same materials and techniques had been used in a suite of five paintings alleged to have been painted by three different artists was considered quite unusual.⁸ This information was useful to the Crown in obtaining a conviction.

Applications and Limitations of Scientific Examinations

These examples serve to illustrate the applications as well as some of the limitations of scientific examinations in art fraud investigations. In the cases of the "van Gogh" and "Rubens" paintings, we were able to compare the pigments used with a substantial analytical data base of reference information. The data enabled us to conclude that the works could not have been done by the suggested artists.

The "Chagall", "Miró", and "Kandinsky" examples illustrate the limitations. Very little information on the materials used by these artists has been published, and we were unable to compare the materials found in the paintings with materials known to have been used by the three artists. Accordingly, one of the clear limitations in performing scientific examinations on works of art is the lack of reference data, particularly on materials used by 20th-century artists. As a result, we are often unable to provide assistance

in investigations of 20th-century works, particularly by Canadian artists. To address this problem, we initiated the Canadian Artists' Painting Materials Project in 1992.⁹ Like the traditional artists' pigments project, it will take years to complete.

In the meantime, when purchasing a work of art, remember the old adage: Buyer Beware!

References

1. Damsell, K., "Missing Treasure," *The Financial Post Magazine* (April 1993), pp. 32-36.
2. See for example: Kühn, Herman, "Terminal Dates for Paintings Derived from Pigment Analysis," in W.J. Young, ed., *Application of Science in Examination of Works of Art*, Proceedings of the Seminar, 15-19 June 1970, Boston: Research Laboratory, Museum of Fine Arts, 1973, pp. 199-205; Feller, Robert L., ed., *Artists' Pigments: A Handbook of Their History and Characteristics*, vol. 1, Washington: National Gallery of Art, 1986; Gettens, Rutherford J. and George L. Stout, *Painting Materials: A Short Encyclopedia*, New York: Dove Publications, 1986.
3. Taylor, John, "A Warning: All That Glitters is Not Trade Silver," *CCI Newsletter*, no. 11 (April 1993), p. 13.

4. CCI provides scientific examination services in art fraud investigations to public institutions such as museums, galleries, and archives as well as to police agencies. Examinations can be undertaken for private collectors on a cost-recovery basis. For information, contact the author.

5. For further information on the techniques used at CCI to examine paintings and to analyze pigments, see Sirois, Jane, "X-ray Diffraction at CCI," *CCI Newsletter*, no. 8 (October 1991), pp. 4-6; Wainwright, Ian N.M., "Examination of Paintings by Physical and Chemical Methods," *Shared Responsibility: Proceedings of a Seminar for Curators and Conservators*, Ottawa: National Gallery of Canada, 1990, pp. 79-102.

6. For further information on this analysis, see Sirois, Jane in the above reference.

7. See for example *The Ottawa Citizen* or *The Edmonton Journal*, 2 August 1990.

8. For further information, see Warner, Glen, "The Truth About the Art of Forgery," *enRoute* (April 1988), pp. 40, 87.

9. Taylor, John M., "The Canadian Artists' Painting Materials Project," *CCI Newsletter*, no. 10 (September 1992), p. 8. ♦

Internships and Fellowships

In response to the diverse training requirements of the conservation community in Canada and abroad, the Canadian Conservation Institute offers Internship and Fellowship programs.

Internships are classified according to need, and comprise four distinct categories: curriculum internships, specialized technique internships, professional development internships, and conservation research internships.

The Fellowship program encompasses work in designated laboratories at CCI, as well as participation in CCI services to museums, galleries, and related institutions and associations throughout Canada (e.g., workshops, surveys).

The following individuals have recently participated or are currently involved in one of these programs at CCI.

Internships

Elke Beck, Student, Fachhochschule Köln, Köln, Germany. March 1 to September 30, 1993 (Curriculum Internship — Textiles Section).

Krystyna Spirydowicz, Assistant Professor of Artifacts Conservation, Art Conservation Program, Queen's University, Kingston, Ontario. March 22 to April 22, 1993 (Special Techniques Internship — Archaeology and Ethnology Sections).

Fellowships

The following people have begun the first year of their fellowship at CCI.

Laura Wardlaw, graduate of the Masters program in Art Conservation (Artifacts), Queen's University, Kingston, Ontario. Laura recently worked as a Conservator

on contract at the Canadian Museum of Civilization, Hull, Quebec. April 1, 1993 to March 31, 1994 (Archaeology Section).

Diana Dicus, Objects Conservator, Pacific Regional Conservation Center, Bishop Museum, Honolulu, Hawaii. June 1, 1993 to March 31, 1994 (Ethnology Section).

Alison Murray, doctoral candidate, Conservation Science Program, Johns Hopkins University, Baltimore, Maryland. July 1, 1993 to March 31, 1994 (Analytical Research Services Division).

The following people have begun the second year of their fellowship at CCI.

Joan Marshall, graduate of the M.Sc. program in Textiles Conservation, University of Alberta, Edmonton, Alberta. April 1, 1993 to March 31, 1994 (Textiles Section).

Robyn Douglas, graduate of the Masters program in Art Conservation (Paper Objects), Queen's University, Kingston, Ontario. April 1, 1993 to March 31, 1994 (Works on Paper Section).

Susan Walker, graduate of the Masters program in Art Conservation (Paintings and Painted Objects), Queen's University, Kingston, Ontario. April 1, 1993 to March 31, 1994 (Fine Arts Section).

Kathleen Helwig, graduate of the Masters program in Art Conservation (Artifacts), Queen's University, Kingston, Ontario. Kathleen also has an M.Sc. in Chemistry from Stanford University, Stanford, California. April 1, 1993 to June 30, 1993 (Analytical Research Services Division).

Upcoming Seminars

The following CCI training presentations are scheduled for the remainder of 1993 and for 1994. Times and places are subject to change. Please contact the appropriate provincial museum association to register or to confirm dates and locations for specific seminars.

September 1993

Northwest Territories

(Prince of Wales Northern Heritage Centre)
"Construction of Mannequins for Historic Museums"
Date: September 8-9
Place: Prince of Wales Northern Heritage Centre, Yellowknife, Northwest Territories

British Columbia

(British Columbia Museums Association)
"Opening and Closing a Seasonal Museum"
Date: September 9-10
Place: Fort Steele Heritage Town, Fort Steele, British Columbia

Nova Scotia

(Federation of Nova Scotian Heritage)
"Storage and Display of Textiles"
Date: September 9-10
Place: Parkdale-Maplewood Community Museum, Barss Corners, Nova Scotia

New Brunswick

(Association Museums New Brunswick Inc.)
"Care of Historic Furniture Collections: A Sensible Approach"
Date: September 9-10
Place: New Brunswick Heritage Collections Centre, Administration Building, Prince William, New Brunswick

Quebec

(Société des musées québécois)
"Fermeture et ouverture d'un musée saisonnier"
Date: September 10
Place: Site historique de la Maison Lamontagne, Rimouski-Est, Québec.

Ontario

(Ontario Museum Association)
"Emergency and Disaster Preparedness for Museums"
Date: September 23-24
Place: Sault Ste. Marie Museum, Sault Ste. Marie, Ontario

Prince Edward Island

(Community Museums Association of Prince Edward Island)
"The Care of Paintings"
Date: September 30 - October 1
Place: Confederation Centre Art Gallery and Museum, Charlottetown, P.E.I.

October 1993

Yukon

(Heritage Branch, Department of Tourism)
"Care of Works of Art on Paper"
Date: October 14-15
Place: Yukon Archives, Whitehorse, Yukon

Northwest Territories

(Prince of Wales Northern Heritage Centre)
"Pest Management"
Date: October 21
Place: Prince of Wales Northern Heritage Centre, Yellowknife, Northwest Territories

November 1993

Saskatchewan

(Museums Association of Saskatchewan)
"Current Issues in Light and UV Deterioration"
Date: November 2-3
Place: Saskatchewan Institute of Science and Technology (Wascana Campus), Regina, Saskatchewan

Alberta

(Alberta Museums Association)
"What's New with Old Metals?" and "Update on Adhesive Research"
Date: November 4-5
Place: Glenbow Museum, Calgary, Alberta

British Columbia

(British Columbia Museums Association)
"Current Issues in the Relative Humidity Response of Wooden Artifacts"
Date: November 5
Place: Royal British Columbia Museum, Victoria, British Columbia

Newfoundland

(Museum Association of Newfoundland and Labrador)
"Conservation of Inorganic Archaeological Materials"
Date: November 6-7
Place: Archaeology Unit, Memorial University of Newfoundland, St. John's, Newfoundland.

February 1994

Manitoba

(Association of Manitoba Museums)
"Artifact Mounting Workshop"
Date: February 2-4
Place: Western Canada Aviation Museum, Winnipeg, Manitoba

Saskatchewan

(Museums Association of Saskatchewan)
"Nineteenth-Century Artists' Oil Painting Materials and Techniques"
Date: February 24-25
Place: University of Saskatchewan (Art History Department),
Saskatoon, Saskatchewan

March 1994

Quebec

(Centre de conservation du Québec)
"Soin des peintures"
Date: March 1-2
Place: Musée d'art de Joliette,
Joliette, Québec

Newfoundland

(Museum Association of Newfoundland and Labrador)
"The Permanence of Contemporary Artists' Materials and Techniques: Paintings and Paper"
Date: March 3-4
Place: Memorial University Art Gallery,
St. John's, Newfoundland

Manitoba

(Manitoba Heritage Conservation Service)
"Conservation of Inorganic Archaeological Materials"
Date: March 10-11
Place: University of Winnipeg,
Winnipeg, Manitoba

Nova Scotia

(Federation of Nova Scotian Heritage)
"Care of Furniture and Wooden Objects"
Date: March 17-18
Place: Annapolis Valley Macdonald Museum,
Middleton, Nova Scotia

CCI Services: Seminars, Lectures, Workshops, and Visits

To respond to specific needs within the museum community, CCI, in co-operation with provincial museum and art gallery associations, offers workshops, seminars, and lectures related to the conservation and care of museum and art gallery collections. CCI staff also participate in and present lectures to meetings of professional groups and associations.

February 1993

Wanda McWilliams joined the staff of the Works on Paper Section for a six-month term from January to June of 1993.

Helen Burgess and **David Grattan** attended a meeting of the Chairman's Committee for the Preservation of Documentary Heritage, in Toronto, Ontario, to discuss the Evaluation of Commercial Mass Deacidification Processes project.

Bob Barclay visited Hart House, University of Toronto, Toronto, Ontario, to advise on the care and preservation of a set of six 17th- and 18th-century violins in a 17th-century oak chest.

Seminars

"Aménagement des réserves"
Esther Méthé and Carole Dignard at the Centre culturel franco-manitobain, Saint-Boniface, Manitoba.

March 1993

Paul Marcon presented an Art in Transit Workshop at the Art Institute of Chicago, Chicago, Illinois.

Jeremy Powell and **Carl Bigras** visited Bon Echo Provincial Park, Cloyne, Ontario, to photograph the rock paintings on Mazinaw Rock. The photographs will be used for some subsequent digital image enhancement work on the faded pictographs.

Debra Daly Hartin, **Wanda McWilliams**, and **Susan Walker** carried out a survey of works of art at the Canadian Sport and Fitness Administration Centre in Ottawa.

Ian Wainwright presented a workshop on Rock Art Conservation and Recording at the Centre de conservation du Québec.

Stan Frydryn gave a presentation at a one-day Casting and Moulding Workshop organized by the Ottawa Regional Group of the International Institute of Conservation — Canadian Group (IIC-CG). The workshop was hosted by the Canadian Parks Service, Historic Resource Conservation Division, in Ottawa. **Réjean Baribeau** also presented a talk at the workshop on "Range Sensing and the Replication of Museum Objects."

Ela Keyserlingk and **Jan Vuori** completed a survey of textiles on display in the National Arts Centre, Ottawa.

Debra Daly Hartin presented an illustrated lecture on paintings conservation to students at Ridgemount High School, Ottawa.

Seminars

"Conservation of Organic Materials"
Tara Grant and **Tom Daley** at the Prince of Wales Northern Heritage Centre, Yellowknife, N.W.T.

"Care of Works of Art on Paper"
Wanda McWilliams and **Robyn Douglas** at the Winnipeg Art Gallery, Winnipeg, Manitoba.

"Emergency and Disaster Preparedness for Museums"
David Tremain and **Deborah Stewart** at the Antigonish Heritage Museum, Antigonish, Nova Scotia.

April 1993

Marie-Claude Corbeil, **David Miller**, and **Elizabeth Moffatt** visited the Musée d'art contemporain de Montréal, in Montreal, Quebec, to sample several paintings by **Alfred Pellon** for the Canadian Artists' Painting Materials Project.

Charles Costain and **Paul Marcon** presented an Art in Transit Workshop at the Montreal Museum of Fine Arts, Montreal, Quebec.

Gaelen Gordon started a 12-month term position in the Textiles Section.

Wanda McWilliams presented a lecture on "The Media of Prints, Drawings, and Watercolours" to students at Sir Sandford Fleming College in Peterborough, Ontario, as part of the course on Conservation Theory.

David Hanington and **Robyn Douglas** carried out a survey of collections in the Library and Archives of the Assembly of First Nations in Ottawa.

Helen Burgess spoke to students of the Master of Art Conservation Program at Queen's University, Kingston, Ontario, on "Current Research on the Alkalinization of Paper."

Gordon Fairbairn presented an introductory lecture on "Conservation and the CCI" to the Heritage Carpentry, Millwork, and Masonry Programme at Algonquin College's School of Lanark County in Perth, Ontario.

May 1993

Several CCI staff members attended the Conference of the International Institute of Conservation — Canadian Group (IIC-CG) held in Halifax, Nova Scotia. The following people wrote and presented papers: **David Miller**, "Characterization of Varnishes by GC/MS of the Trimethylsilyl Derivative with a Unique Application to the Identification of Ketone Resins"; **Elizabeth Moffatt**, "Spectroscopic and Chromatographic Analysis of Samples from a Suite of Paintings from the Parisian Period of Paul-Émile Borduas"; **Maureen MacDonald**, "Use of Electronic Dataloggers" (presented by Charles Costain); and **David Tremain**, "Commodore Billings' Voyage to the Arctic: The Treatment of a Portfolio of Etchings".

Réjean Baribeau presented a lecture on three-dimensional imaging of works of art at the IIC-CG Workshop on "Computer Technology for Conservators: The Second Wave", in Halifax, Nova Scotia. **Stefan Michalski** also presented a workshop session on "Computer Use and the Systematic Care of Collections".

John Taylor presented a talk on "Art, Archaeology, Heritage and Chemistry: The Role of the Chemist in the Study and Preservation of Our Past" at the 76th Annual Conference of the Canadian Society for Chemistry, held in Sherbrooke, Quebec.

Ian Wainwright presented a paper on Rock Art Conservation at the annual Conference of the Canadian Archaeological Association in Montreal, Quebec.

Marie-Claude Corbeil attended a planning meeting for the Ursuline Chapel Restoration Project in Quebec City, Quebec.

Stefan Michalski gave a paper on "A Systematic Approach to the Care of Collections in Historic Buildings" at the General Session of the American Institute for Conservation Conference held in Denver, Colorado.

Janet Wagner presented a lecture on the "Conservation of Quilts" for the Ottawa Valley Quilters Guild.

Judy Logan worked on-site as Conservator at the Humeima Project, Jordan, from May 22 to July 5. Dr. John Oleson, of the University of Victoria, Victoria, B.C., was the director of the excavation.

Dr. Leslie Carlyle acted as an external examiner of students in the Queen's University Master of Art Conservation Program.

Deborah Robichaud attended the annual meeting of the American Association of Museums in Fort Worth, Texas.

A.P. (Joe) Dorning attended the annual meeting of the Federation of Nova Scotian Heritage in Baddeck, Cape Breton, N.S.

Nancy Green attended the annual meeting of the Community Museums Association of P.E.I. in Orwell Corner, P.E.I.

Seminars

"A Framework for Preventive Conservation"

Jean Tétreault at the Museum of Northern History at the Sir Harry Oakes Chateau, Kirkland Lake, Ontario.

"Emergency and Disaster Preparedness for Museums"

Deborah Stewart and Wanda McWilliams at the Central New Brunswick Woodmen's Museum Inc., Boiestown, New Brunswick.

June 1993

Dr. Leslie Carlyle presented the paper "Varnishes and Varnishing Practices 1750-1858" at the conference on Turner and His Context, held at the Tate Gallery, London, England.

Helen Burgess and **David Grattan** attended a meeting of the Editorial Board of the *Art and Archaeology Technical Abstracts* (AATA) in New York City, New York.

Bob Barclay taught a three-week component on "Conservation: Wood and Metal Cleaning" at ICCROM's PREMA course in Jos, Nigeria.

Deborah Robichaud attended the annual meeting of the Canadian Museums Association in Regina, Saskatchewan.

Charles Costain presented an Art in Transit Workshop at the National Gallery of Art in Washington, D.C., and **Paul Marcon** presented the workshop at the Institute of Fine Arts, New York University Conservation Center, New York City, New York.

Seminars

"Pest Management for Museums"
Tom Strang at the Potato Museum, O'Leary, Prince Edward Island.