Canadian Conservation Institute

2

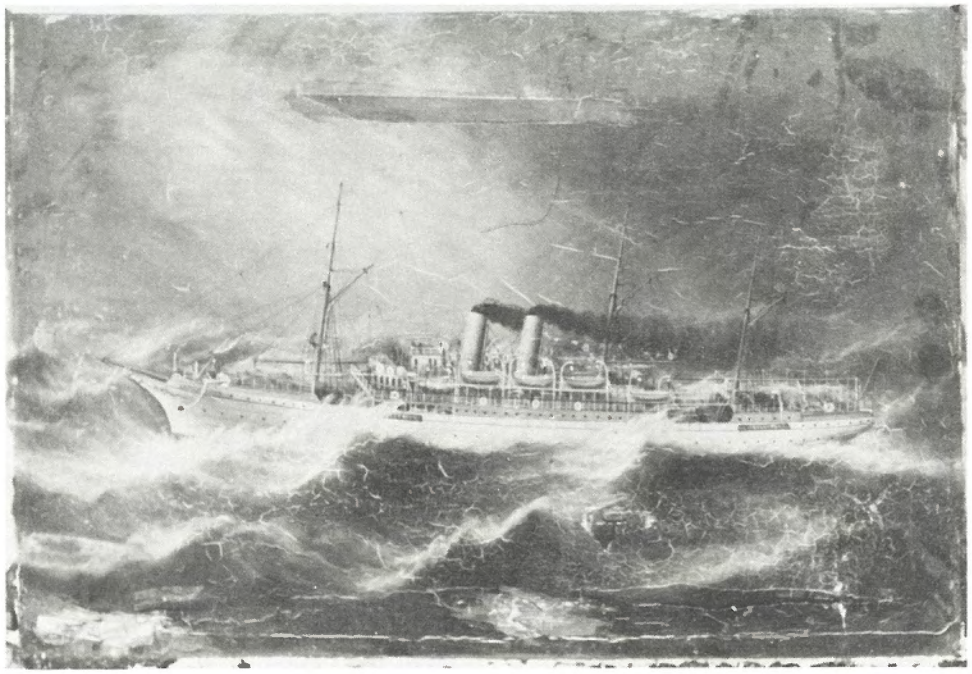
C.C.I. Activities

Our first Newsletter contained several references to cramped quarters; this has now been alleviated slightly by provision of some overflow space at the Bankal Building in Ottawa. It is by no means ideal but the move has enabled our conservators to undertake some practical work.

They undertook conservation treatment of nine paintings by Borduas that belong to the National Museums of Canada and are included in the Borduas retrospective exhibition circulated by the National Gallery. The paintings required treatment as a result of the artist's heavy impasto technique and fragility of the canvas. In all, six conservators worked on the paintings: Messrs. Dix, von Imhoff, Roche, Bosshard, Meese and Mrs. Levenson. Immediately after their return from the Pacific Region Survey, some of the conservators conducted a survey of paintings and drawings at the War Museum and as a result three paintings were treated. In addition, Messrs. Guldbeck, von Imhoff, Holm, Mrs. Levenson and Miss Nash have been working on various projects in connection with the Ethnology and Archaeology Divisions of the National Museum of Man, while Messrs. Roche and Graf have been treating documents from the Provincial Archives of New Brunswick that were damaged in the flood earlier this year. Much of the material requiring conservation arrived immediately after our move to the overflow space and Messrs. Bokman and Wainwright carried out the necessary documentation under difficult circumstances, since they were also engaged in checking and installing elaborate equipment.

At Vancouver the re-design and decoration of the premises for the Pacific Conservation Centre was completed. Situated at 325 Granville Street, it amounts to over 4,000 square feet outfitted for conservation work in fine arts, works of art on paper, ethnology and archaeology. Until October individual members of staff from headquarters went out to Vancouver to supervise the preparatory work in conjunction with the secretary, Miss Wanda Potrykus. Mr. Dix has been appointed Chief Conservator of the Pacific Centre and he has been joined by Mr. Barry Byers, Conservator, Works of Art on Paper. Additional staff are to be recruited.

The B.C. Regional Advisory Committee met at Ottawa 10–12 October to consider the B.C. Conservation Survey Report as presented by C.C.I. staff. The Regional Advisory Committee will advise the Canadian Conservation Institute on work priorities for the Pacific Conservation Centre. The first works for treatment are on their way from various area collections.



A marine painting with bad cracks and tears

Marine fendillée et déchirée

Progress has also been made in establishing the Atlantic Conservation Centre. Temporary premises have been secured in Moncton and are being refurbished for C.C.I. occupancy in the near future. The Atlantic Regional Advisory Committee met in Fredericton 22 October to consider in detail the Atlantic Conservation Survey Report.

On 15 October Mr. J. Orraca of the International Museum of Photography, Eastman House, Rochester, N.Y., gave a seminar at C.C.I. on the conservation of photographs.

Mr. von Imhoff has two and a half months leave of absence in order to teach conservation at the Cursos Interamericanos of the Departamento de

Newsletter

No. 2 January 1974
Canadian Conservation Institute
National Museums of Canada, Ottawa K1A 0M8

Restauracion del Patrimonio Cultural in Mexico. The course is supported by the Organization of American States. His main subjects will be polychrome sculpture, documentation and non-destructive methods of analysis.

R. D. HARLEY

Conservation Surveys – A Personal View

'Gentlemen, it's seven o'clock and your taxi is waiting', the voice outside our room at the Hotel Newfoundland boomed, rousing Sten Holm and me from our deep slumber. Groan! Our flight was due to leave at seven – what the hell had happened to the morning call from the desk? 'Something wrong with your phone, Sir,' the commissionaire explained, 'I've called you twice before and you haven't answered. Your flight has been delayed for 40 minutes by fog, the taxi is leaving right away.'

We had celebrated our last night in St. John's, Newfoundland, with a gourmet dinner at the famous Woodstock Colonial Inn, supping on lobster and local delicacies such as seal flipper pie. The survey trip in the Atlantic provinces had started well. The four weeks since I had joined the Canadian Conservation Institute had been filled with concentrated effort preparing the trip by selecting and purchasing equipment, establishing contacts with the institutions to be visited, and making travel arrangements. After a brief visit to Fredericton, where I had discussed the first Regional Survey of the conservation needs of Canadian collections with Ian Lumsden, Director of the Beaverbrook Art Gallery, and David Webber of the Historic Resources Administration, sixteen institutions were selected and the itinerary involving almost 3,000 miles of travel was decided upon. With flight arrangements and hotel bookings in the capable hands of Miss Y. B. Gravelle, Executive Assistant at C.C.I., conservators Roger Roche, Sten Holm, Barry Byers and I were able to concentrate on the design of inspection forms and the assembly of a lightweight, yet fairly sophisticated survey kit to be carried by each member of the survey team. This included a 35mm single lens reflex camera with built-in exposure meter, a tripod, 200W and photoflood lamps and reflectors, extension cord, UV fluorescence lamp, an infra red image converter, a Bendix psychrometer, black and white and colour film for daylight and tungsten illumination. Although the IR converter and UV lamps were not used very frequently during the survey, they were found to be useful to determine the extent of old damage during detailed examinations. Less successful proved to be the choice of one particular light tripod which later gave way under strain of constant use. The two core heavy extension cord was rather cumbersome to pack into instrument bags which had to be sufficiently compact to fit under an airplane seat.

Portrait with serious cleavage and paint loss

Portrait détérioré par le clivage et l'écaillage

It was this survey kit, together with forms, notebooks, measuring tapes, and last but not least, our personal belongings, which Sten and I hurriedly collected as the fog began to lift over Signal Hill. Forty minutes later we were airborne, on our way to Fredericton.

A conservation survey seems singularly appropriate in a town which has just suffered its worst flooding in recorded history. A natural catastrophe had totally paralyzed one of the most effective museum climate control systems in the entire region, calling in question the wisdom of locating an art gallery on the banks of a river. Yet thanks to the prompt action of its Director, staff and a team of volunteers, the damage suffered by the collections of the Beaverbrook Art Gallery was negligible compared with the loss of

Corroded iron cannons recovered from the sea

Canons de fer rouillés arrachés à la mer

archival material submerged in the basement storage of the Provincial Legislature of New Brunswick. Here the specialists in the team could only offer advice while the salvage operations, which included a mobile deep freezing facility, were already in full swing.

Immense quantities of archival material in need of conservation became a familiar sight during the Atlantic as well as the Pacific Region survey, with estimated man-hours multiplied by a factor of so many linear feet of shelving. The final total of almost 1,000 man-years for conservation of archival holdings in the Atlantic Provinces alone is daunting indeed, and the fact that a substantial portion of this is estimated for the repair of rare books makes the task ahead appear no less formidable.

Shortage of time necessitated a rapid inspection routine, in most cases allowing no more than one minute per object, often less. Well-organized storage facilities considerably helped to speed the job along, and in the conservators' minds must have earned the respective institutions many points. Phlegmatic as always, I tried to remain ostensibly tactful and diplomatic whenever more horrendous conditions were encountered, whereas my colleague Roger Roche, with his Gallic temperament, found this more difficult. At no point, however, did we look down on museums whose content was predominantly of local interest.

During the Atlantic survey the conservators did their best to evaluate the environment in which they found the immensely varied collections. In British Columbia, however, George Rogers, Research Chemist, Environment and Deterioration Research, studied in detail the museum climates of almost all

Direct daylight is a severe test for any work of art

La lumière du jour met une oeuvre d'art à dure épreuve

of the 18 centres visited, and thereby undertook to write a major portion of the forthcoming survey report, which promises to exceed in size even the 91-page dossier compiled after the Atlantic survey.

One fact emerged clearly during the survey trips: the need for conservation is great and urgent and presents a tremendous challenge to C.C.I. With preparations for the first regional conservation projects under way, the years ahead promise to be interesting and rewarding. URSUS DIX

Conservation Surveys – The Harsh Facts

Both surveys carried out in the Atlantic and Pacific regions by the team of experts from C.C.I. have produced convincing results in regard to conservation needs in the regions surveyed and in Canada generally.

These surveys related to a variety of artistic and historic objects generally encountered in museology, that is to say paintings, prints, sculpture, ethnology, archaeology, archives and rare books.

A discriminating but necessarily hasty selection was made to limit the number of museums and archives visited to 16 in each of the surveys. Our objective was to define the regional needs for conservation work and to plan the requirements for personnel as well as to evaluate the budget and the importance to accord the future regional centres.

See table for figures resulting from the surveys. Although these statistics are impressive for 32 institutions, with some mathematical calculation they can become horrifying.

In effect, one may consider that these 32 museums represent 25% of the regional collections and in some cases, such as the archival and rare books collections, the figures represent only 10%. On the other hand, it would not be an exaggeration to say that these figures represent only 10% of national collections if one considers the riches of Quebec, Ontario and the Prairies.

Added to this one must not forget that the surveys concerned only works regarded as 'national treasures', which does not mean that the other part of our cultural heritage should be ignored. Above all, one must not ignore the fact that certain of today's secondary works may perhaps be tomorrow's national treasures.

However, there are other important factors that may swell the totals, such as new acquisitions, continuing deterioration of collections or accidental damage during transit or exhibition. not forgetting the results of poor restoration work, environmental variations – so important in Canada – and a variety of natural or accidental disasters.

Some of these factors may be evaluated, but multiplying these totals 100 or 1,000 times does nothing to alter the impact, and this is not only in regard to the time required to conserve a small part of the collections, knowing that the rest will continue to deteriorate, but also in regard to the number of experts required, as well as the time it will take to train each group of ten students over a three-year period. This training program will not satisfy basic needs, still less when one considers continuing deterioration and new acquisitions.

There could be much more to say about national resources or international experts, and the statistics prove the necessity for gathering a large number of people to fill vacancies arising from future changes of profession or retirement.

I believe enough is said, the sooner we start the better . . . . R. ROCHE

	Atlantic		Pacific	
	Objects	Man-years	Objects	Man-years
Paintings	846	38	371	14
Prints	1,620	22	3,579	22
Sculpture	—	23	—	110
Ethnology	3,251	56	1,747	55
Archives	148,644	268	93,572	48
Rare books	25,010	704	19,710	249
Approximate total	179,371	1,111	118,979	498

Conservation Queries

We hope that this question and answer column will become a regular feature of our newsletter and that by publishing the answers to frequently asked questions we shall help a large number of people. You are invited to address any queries to Rustin Levenson who will arrange for a reply to be sent direct and for the most informative to be published here.

● *The collection of my small historical society includes some costumes and uniforms. I have heard that the fluorescent lighting we have is harmful to textiles. Is this true and is there anything I can do to protect the collection on a small budget?*

Yes, it can be harmful. Light from fluorescent lamps, like natural daylight, contains a significant amount of ultra-violet radiation. This invisible ultra-violet component induces chemical reactions which can cause textile fibres to weaken and dyes to fade. In time therefore, an exposed object will become embrittled and faded in colour. Silk fibres, most particularly can, over a relatively short period of time, deteriorate so much through ultra-violet radiation that they crumble to powder at a touch.

If your collection needs to be protected from exposure to ultra-violet from daylight and from fluorescent lights, a solution is the use of ultra-violet absorbing plastics to cover cases, lamp housings, windows, or skylights. These will filter out ultra-violet radiation while permitting passage of visible light. They are available from large plastics manufacturers such as Rohm and Haas Company, Imperial Chemical Industries, American Cyanamid and their various distributors.

If fluorescent lights are your source of ultra-violet radiation, an inexpensive solution is the use of tube filters on the light fixtures. The filters consist of clear plastic sleeves which completely surround the fluorescent tube. The plastic is impregnated with a chemical which absorbs almost all the ultra-violet but allows the visible light to pass through without perceptible change. The filter sleeves are available to fit most lighting fixtures and can be installed as easily as changing a burned out fluorescent lamp. It is necessary only to slip the plastic jacket over the fluorescent tube when it is being inserted. They do lose their effectiveness over a period of time but in most applications could be used for perhaps ten years without replacement.

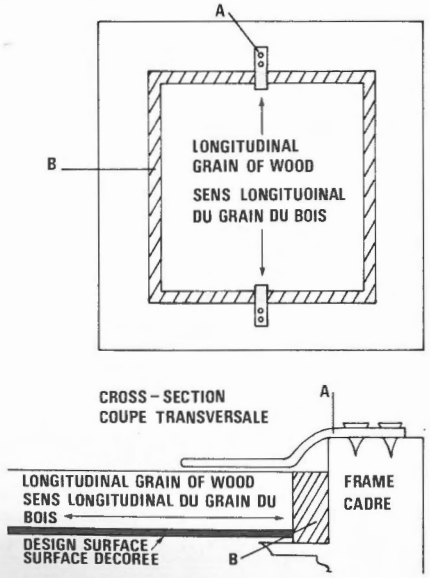
Such tubes are made by the Solar Screen Company, 53-11 105th Street, Corona, New York, 11368. The cost of the tube for standard 48 inch T-12 bulbs is $65 per hundred for the first 100 units and $60 per hundred for additional amounts. The prices are F.O.B. Corona, New York and do not include duty or sales tax.

Similar tubes are available from Canadian sources. One such producer is Commercial Plastic and Supply Company, P.O. Box 5146, Station F, Ottawa, Ontario K2C 0A0. Current prices are in the order of 65 to 70 cents per foot for Comco, Raysfield 403, ultra-violet filter tubes for fluorescent lights.

● *A panel painting in our museum is beginning to crack. Why did this happen? What can be done about it?*

Wood is a hygroscopic material and, no matter what its age, reacts with the amount of moisture in the air. When it is allowed to move naturally within reasonable bounds of humidity, wood will not usually crack, but, when it is held too rigidly and exposed to wildly fluctuating humidity, cracking is likely to develop.

Improper framing and restoration can prevent a panel painting adjusting to the amount of moisture in the air. By improper framing is meant holding the panel too tightly in the frame or holding it in the frame across the grain. A properly framed panel is illustrated here. It features:



A. Panel held along the grain with brass mending plates bent with pliers to conform to the width of the panel. These are held by screws in the frame (*never* in the panel) and do not exert pressure on the panel but merely hold it in place. A large panel may be held by two or three plates at each end; they should be placed toward the centre rather than at the corners. Brass mending plates are usually available in hardware outlets.

B. Sufficent space should be left between the edge of the panel and the frame to allow for free movement of the panel. To help prevent the panel rattling around in the frame, polyethafoam can be glued to the inside of the frame opening. Polyethafoam (expanded polyethylene) is a flexible, neutral material which is easily cut with scissors or a utility knife.

Improper restoration of a panel refers to attachments on the back. A panel does not gain and lose as much moisture on the front where it is covered by the ground, design and varnish layers as it does on the reverse where the wood is exposed. This causes the front and back of the panel to respond at a different rate to changes in humidity and warping may develop. To keep panels on an even plane, restorers in the past attached accessory reinforcements to the back of the paintings. The simplest were battens glued or screwed to the back of the panel across the grain. However, wood expands up to 50% more across the grain than with the grain. These rigid reinforcements did not allow the panel to move freely and often caused it to crack. A different, more complex, addition to the back of a panel is called a cradle. Slotted wooden strips were glued directly to the panel parallel to the grain of the wood; strips running perpendicular to the grain were inserted through the slots. It was thought that this design would allow the panel to expand and contract freely while the cradle held it in a flat plane. Unfortunately, the cradle itself frequently swells, the sliding members become jammed, and the wood cannot move naturally with the changing humidity. This construction often results in cracks, splits, or warping in the panel and blisters and losses in the paint layer. Once a panel has had an accessory attached it is usually more dangerous to the panel to remove the pieces than to leave them

on. Therefore, the panel and these pieces should be protected as much as possible from changes in humidity, and from too low or too high humidity.

Controlling the humidity factor can take two forms. Externally the optimum is above 40% and below 60% relative humidity. Extreme fluctuations are dangerous for wooden works of art; pieces should be kept in a humidity controlled environment if possible or on an inside wall away from radiators or other heating outlets. The exposed wood on the back of the panel can be protected somewhat from fluctuations in humidity by a wax coating. A good wax for this is Butcher's Bowling Alley Wax, a paste wax which is easily applied with a cloth or paper towel. It should be applied to the reverse of a panel two or three times a year. If a painting is cradled, both the cradle and the back of the panel should be waxed thoroughly. Butcher's Bowling Alley Wax is available commercially.

● *Where can I purchase acid-free mounting board in Canada?*

Acid-free mounting board can be obtained from: Buntin Gilles and Company Ltd., P.O. Box 8201, Ottawa, Ontario K1G 3H7. Attention: Mr. J. S. Crawford (Telephone: 613–733–9006).

Their 'Harumi' acid-free mounting board is available in small or large quantities. More information will be published in the next issue on size standardization and various forms of this material. RUSTIN LEVENSON

Rock Art Studies at the Canadian Conservation Institute

Exposed to the ravages of wind, rain and extreme temperature changes in remote areas of the world, an adventurer can find literally thousands of examples of one of the oldest forms of art known to modern man – rock paintings or pictographs. Although the significance of many of the paintings is largely unknown, it is thought that the aboriginal artists painted largely for religious purposes and in some cases to chronicle historical events. Some pictographs in the Ural Mountains and others in northern Australia are believed to be 5,000 years old. In Canada while few have been dated, rock paintings have been located from the coast of British Columbia east to Lac Wapizagonke in Quebec. For example, in the Canadian Shield region alone, Selwyn Dewdney has recorded over 200 sites. In other areas of Canada active projects are under way to locate and record the paintings.

John Taylor using the x-ray diffraction and x-ray macroprobe spectrometer equipment

John Taylor utilisant l'appareil de diffraction des rayons x et macrosonde à rayons x (Photo: John Evans)

Omitting the artistic significance, the pictographs throughout the world have two characteristics in common. First they have lasted for centuries and second they are subject to the process of rock weathering which is slowly destroying the paintings. It is interesting to consider briefly the reasons for both. In general a red iron oxide pigment was used to paint on a hard igneous rock such as granite. Independently both these materials are relatively insoluble and inert in an exposed environment. In combination the iron oxide forms an extremely strong bond with an igneous rock. Curiously, the aboriginal artists of the world have selected two of the best materials to create a durable painting.

A pictograph subject to natural deterioration may have the following appearance. The painting appears as though it is fading. Rather than fading it is likely that the pigment particles are falling away resulting in a decrease in pigment layer thickness. Also in spots sizeable flat chips of surface rock with attached pigment have fallen away. Over the surface of some paintings a white mineral deposit may have formed which totally or partially obscures the underlying painting. With others, a layer of lichen may have grown over the painting. These factors are caused by the natural process of rock weathering – the slow series of complex physical and chemical interactions of the rock with the surrounding environment. For example it is well known that the chemical leaching action of rainfall slowly converts the surface layer of sound rock to a soft clay which eventually falls from the rock and in time becomes common soil. Quite possibly this is the process that contributes to the deterioration of the pigment layer, resulting in 'fading'. In addition extreme temperature changes with the resulting expansion and contraction cycles, physically weakens the surface areas of the rock. This process, known as exfoliation, enables chips of rock from the paintings to fall away. With some rocks carbon dioxide dissolved in rain reacts with calcium leached from the rocks to form a deposit of white calcium carbonate on the surface of the paintings.

Somewhat in competition with the natural processes of deterioration, an unnatural process – vandalism – must be considered. Unfortunately some

vandals remove large pieces from the pictographs while others either paint or carve initials and dates on the paintings.

The C.C.I. Project

At the request of Mr. Selwyn Dewdney, an eminent authority on Canadian rock art, a scientific study was initiated at the Canadian Conservation Institute in June 1973, in co-operation with the Trent University Rock Art Project (T.R.A.P.). T.R.A.P. is co-directed by Dr. Nathan Stolow, Director of C.C.I., and Dr. Rom Vastokas, Head of the Anthropology Department at Trent, and co-ordinated by Selwyn Dewdney.

In such a study there are a number of aspects which must be considered:

1. Analyses of the pigments, rock base and the organic binding medium which may have been mixed with the pigment are required to determine the composition of each.

2. An investigation of the nature of the strong bond that forms between the pigment and the rock.

3. Since the deterioration of a painting is a function of rock weathering, an examination of the rock base associated with a painting for weathering is required. Such a study may show which paintings are more susceptible to decay.

4. A scientific method of dating the paintings is a significant problem. So far, dating has usually been done by historical means and by comparing styles.

5. Finally, the problem of prime importance is a means of preserving the paintings and protecting them from vandalism.

It is quite apparent that the last two problems are by far the most complex. Their solution will require information obtained from the first three questions and a comprehensive research project involving the co-operation of experts from several disciplines. Consequently when the C.C.I. laboratory study was started it was decided to concentrate experimentally on the first three problems and to conduct a literature review for information which would be useful in a study of the final two problems. As such it is a 'pilot' laboratory study and when completed a decision can be made concerning the future direction of the project.

Experimental Procedures

For the work, small intact rock chips (1–3mm in surface width) consisting of the pigment layer and underlying rock were removed from the pictograph sites at Agawa Bay (Ontario), Blindfold Lake (Ontario) and Lac Wapizagonke (Quebec). Where possible the samples were taken from cracked or exfoliated areas of the paintings which were liable to fall from the rock in due course. Consequently the paintings are not defaced much more seriously than they shortly would be by nature.

In the laboratory the samples are first examined for significant features and photographed using a stereo microscope by Mr. Ian Wainwright. Next cross-sections which permit an examination of the internal structure of some of the samples are prepared and photographed in detail at high magnification using an optical microscope.

For the inorganic analyses of the pigments and rock base small particles of each are removed from the samples for x-ray diffraction analysis using a Gandolfi camera. A petrographic microscope which is conventionally used to analyse rock samples 1–2 cm. in diameter cannot be used to study pictograph specimens since the sample size is too small. Therefore to establish the type of rock used for a particular painting a chip 1–2 cm. in diameter is removed from an area adjacent to the painting for petrographic analysis.

The versatile scanning electron microscope (SEM), operated by Mr. Robert Myers is used extensively in this work. With this microscope the painted chips and cross-sections are examined at magnifications in excess of 100,000 x with an excellent depth of field. Using the x-ray analysing facility of the SEM, locations of the various chemical elements within the samples can be determined with precision. This information is useful in pigment binding studies and in determining the amount of weathering of the base rock.

In an effort to detect the presence of an organic binding medium in the pigments – such as bear grease or fish oil – pyrolysis gas chromatography experiments are being performed by Mr. Raymond Lafontaine. In this technique, (which is conventionally used to determine the binder in a typical painting) the samples are heated to a very high temperature to degrade and vaporize any organic material which may be present. The vapors are then passed through a gas chromatograph for analysis.

Work on the project is still in progress. A detailed report will be available from the Institute when the project is completed and it is hoped to include a discussion of the main results in a future issue of the newsletter.

J. M. TAYLOR

C.C.I. Personnel

We have been pleased to welcome several new members of staff: Mrs. Brenda Wallace, Training Coordinator; Mr. Roy Graf, Conservator, Artistic and Historic Works on Paper; Mr. Barry M. Byers, Conservator, Works of Art on Paper; Mr. P. J. Chandler, Finance Officer; Miss Erika Schaffer, Research Chemist; Miss Marilyn Wheeler, Chemist; Miss Barbara S. Klempan, Assistant Conservator, Documentation Studies. Both Miss Wheeler and Miss Klempan have joined the permanent staff after working for some months under contract. Mrs. M. L. Florian, trained in biology and fine art, is under contract. Miss Y. B. Gravelle, has been promoted to Executive Assistant.

Dr. Rosamond D. Harley is editor of the Newsletter.

The column Conservation Queries is prepared by Mrs. Rustin Levenson to whom questions should be sent at the Canadian Conservation Institute
National Museums of Canada
Ottawa K1A 0M8