The Analysis and Treatment of Two Portraits Attributed to Paul Kane (1810-1871)

John R. Gayer

Restoration and Conservation Laboratory, National Gallery of Canada, 380 Sussex Drive, P.O. Box 427, Station A, Ottawa, Ontario, K1N 9N4, Canada.

This paper discusses the condition, analysis, and conservation treatment of two early Canadian portraits, both oil on canvas, in the collection of the National Gallery of Canada. The portraits are attributed to Paul Kane and date from the years 1834-36. Scientific analyses of samples from the portraits, undertaken by the Canadian Conservation Institute, were for treatment purposes and to determine the materials and techniques employed by the artist. Remedial and preventive conservation measures applied to the paintings were designed to preserve features both integral and specific to the history and appearance of the portraits.

Cet article traite de l'état, de l'analyse et du traitement de deux portraits canadiens anciens de la collection du Musée des beaux-arts du Canada. Les portraits, des huiles sur toile, sont attribués à Paul Kane et ont été peints vers 1834-1836. L'analyse scientifique d'échantillons provenant des portraits a été effectuée par l'Institut canadien de conservation afin de répondre à des questions reliées au traitement et de documenter les matériaux et les techniques employés par l'artiste. Les mesures correctives et préventives appliquées aux tableaux ont été choisies de façon à préserver des particularités directement reliées à l'histoire et à l'aspect des portraits.

Manuscript received October 1994; revised manuscript received December 1995

Introduction

This paper discusses the condition, analysis, and conservation treatment of the portraits *Freeman Schermerhorn Clench*,[1] and *Eliza Clarke Cory Clench*,[2] both dating from 1834-36, in the collection of the National Gallery of Canada (NGC). Both works were in relatively poor condition when acquired and, since information regarding Kane's materials and techniques is limited, the paintings provided an excellent opportunity for closer study. The results of this study showed that the paintings are similar in a number of ways, but also different. A number of the concerns which guided the chosen method of treatment and some of the problems associated with Kane's early work are also included in the text.

The Early Work of Paul Kane

Paul Kane, an Irish born Canadian artist, is primarily known for the sketches and paintings he produced of North American natives in the area of the Great Lakes and further west. His work is represented in a number of collections in both Canada and the United States. Principal holdings can be found in the Royal Ontario Museum, Toronto, Ontario and the Stark Foundation, Orange, Texas. While the paintings produced by Kane after 1845 are well documented, relatively little is known about his work produced before that year.

Kane's artistic activities are thought to have begun in the town of York in Upper Canada (now Toronto, Ontario).[3] Initially, Kane worked as decorative painter of furniture.[4] His employer, W.S. Conger, encouraged him to develop his artistic talents and supplied him with his first artists' materials, materials which Conger purchased during a trip to New York. In 1829 Conger relocated to the town of Cobourg some 115 kilometres east of York. Kane remained behind, possibly as the person managing the operations at Conger's workshop. Evidence of Kane's occupation has been found in the York Commercial Directory. The 1833-34 issue lists a coach, sign and house painter by the name of "Cane."[5]

Kane received some formal artistic training from Thomas Drury, the drawing master at Upper Canada College.[6] He was also listed as a member of the Society of Artists and Amateurs of Toronto.[7] The society's only exhibition was held in 1834 and Kane was a participant. Nine of his paintings were included, eight of which were copies. The only original work was a landscape.[8]

Kane joined Conger in Cobourg in 1834 and remained in that community for the next year or two. During his stay Kane spent time painting portraits. In an obituary notice written by the anthropologist Sir Daniel Wilson, it was stated that Kane's artistic endeavours in Cobourg included portraits of Mr. and Mrs. Conger. Further research based on this information uncovered additional portraits of Cobourg's early citizens. Most of these works were found to be in the possession of the subjects' descendants and it is possible that a number of them may have been executed by Kane.[9] The portraits *Freeman Schermerhorn Clench* and *Eliza Clarke Cory Clench* are two of these works (**Figure 1a and 1b**).

Figure 1a. *Freeman Schermerhorn Clench*, 1834-36, oil on canvas, 71.0 x 56.0 cm, before treatment (National Gallery of Canada, Ottawa).

Figure 1b. *Eliza Clarke Cory Clench*, 1834-36, oil on canvas, 71.0 x 56.0 cm, before treatment (National Gallery of Canada, Ottawa).

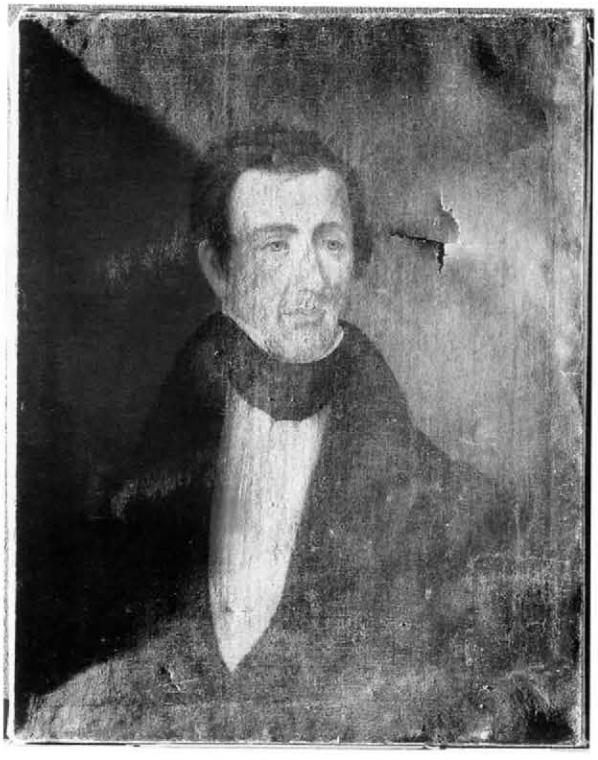

Figure 2a. *Freeman Schermerhorn Clench*, before treatment in raking light (National Gallery of Canada, Ottawa).

Figure 2b. *Eliza Clarke Cory Clench*, before treatment in raking light (National Gallery of Canada, Ottawa).

Unfortunately, little more is known regarding Kane's early period, and conclusive evidence that the portraits are by Kane's hand is lacking. None of the portraits which have been located, for example, are signed. Several factors, though, do support the idea that the portraits of Mr. and Mrs. Clench are by Kane. One factor is that both Kane and Mr. Clench were involved in the furniture trade. Since Mr. Clench was a manufacturer of furniture, it is possible that Kane may have been in his employ.[10] A second factor is that Kane eventually married Mr. and Mrs. Clench's daughter Harriet, who also happened to be an artist.[11] Another factor lies in the provenance of the two works. Research in this area revealed that the portraits remained in the hands of Mr. and Mrs. Clench's descendants, first passing to Fanny Jane Clench Lowe (Harriet's sister) then Fanny Jane's children.[12] Finally, no other artists are known to have been active in Cobourg around the time Kane lived and worked in the community.[13]

Information regarding the materials and techniques employed by Kane is also limited. Scientific analyses of Kane's materials have been limited to nineteen samples taken from a studio sketch box[14] which dates from a later period in his life,[15] and the analysis of a white ground layer.[16] With regard to his painting technique, it is known that Kane was in contact with a number of other artists; while in York his artist friends included the Americans Samuel Bell Waugh and James Bowman, the latter who is said to have studied in Rome and under Sir Thomas Lawrence, and worked in Québec City and Montréal before arriving in Toronto in October of 1834.[17] It has been suggested that these artists may have made the greatest contribution to Kane's early development, but more detailed information has yet to be uncovered.[18]

Condition Before Treatment

The condition of this pair of portraits prior to treatment was relatively poor (**Figure 2a and 2b**). Disfigurements to these works included the presence of tears, losses of paint and ground, and darkened overpaint, among others. In the description of the condition which follows, evidence regarding the history of these paintings and the results of scientific analyses are included.

Notes on the Portraits' History

Documentary evidence, in a letter written by one of Mr. and Mrs. Clench's descendants[19] and on the stretcher members of the paintings, provides clues to the portraits' history as well as aspects of their condition. In the letter it was noted that, following the death of Mrs. Clench in 1888, many of the family's belongings were put into storage. These goods were later redeemed by Kate Reed, granddaughter to Mrs. Clench and niece to Fanny Jane Clench Lowe. It is also suggested that the portraits were two of the items in storage and that Kate Reed may have had them copied[20] before returning the original pair to Clench family members then residing in the province of Manitoba. Inscriptions on the stretcher members of both paintings include the name "Mrs. Reed." Accompanying her name on the top member of Mr. Clench's portrait is the date "25/6/12" and the number two, circled. These inscriptions were written by the same hand and suggest 1912 as the year in which the portraits may have been restored and copied.

Auxiliary Support

The paintings were mounted on expandable wood stretchers measuring 71.0 x 56.0 cm. About half of the keys were missing, the wood was very brittle, and the joints were loose. Stamp marks on some of the members identified the auxiliary supports as Pfleger patented stretchers. Additional markings included a pair of registration marks on the back of Mr. Clench's portrait. One was on the top stretcher member and the other on the back of the painting. It was unclear when these marks may have been applied. The stretchers were obviously not original to the works.

Primary Support

Access to the canvas used for these portraits was limited since an opaque brown protective coating had been applied to the back of both paintings. It was determined that each portrait was painted on linen canvas having a 1 x 1 plain weave, but the types of canvas did not match. This can be seen in the accompanying x-radiographs (**Figure 3a and 3b**). The threads in the canvas used for Mrs. Clench's portrait are finer and more tightly woven than the threads in the canvas used for Mr. Clench's portrait.

Both canvases sagged into the stretcher openings and were affected by buckles and draws. Patches were present on the back of both paintings and, in the case of Mrs. Clench's portrait, study in raking light appeared to suggest that patches may have been applied to the front of the painting as well. A relatively large X-shaped tear was present in the background region of Mr. Clench's portrait.

The condition of the edges of the canvas made it obvious that both paintings had been reduced in size. The tacking margin of Mrs. Clench's portrait, for example, consisted of painted areas which had originally been part of the image. In the course of treatment a small fragment of the original tacking margin was found. It was still attached and had been folded under at one corner of the painting.

The edges of the canvas used for Mr. Clench's portrait showed obvious signs of uneven cutting and, unlike Mrs. Clench's portrait, the height and width of this canvas matched the dimensions of its stretcher. No tacking margin was present. The painting was attached to its stretcher with a strip lining which had been adhered to the back of the painting

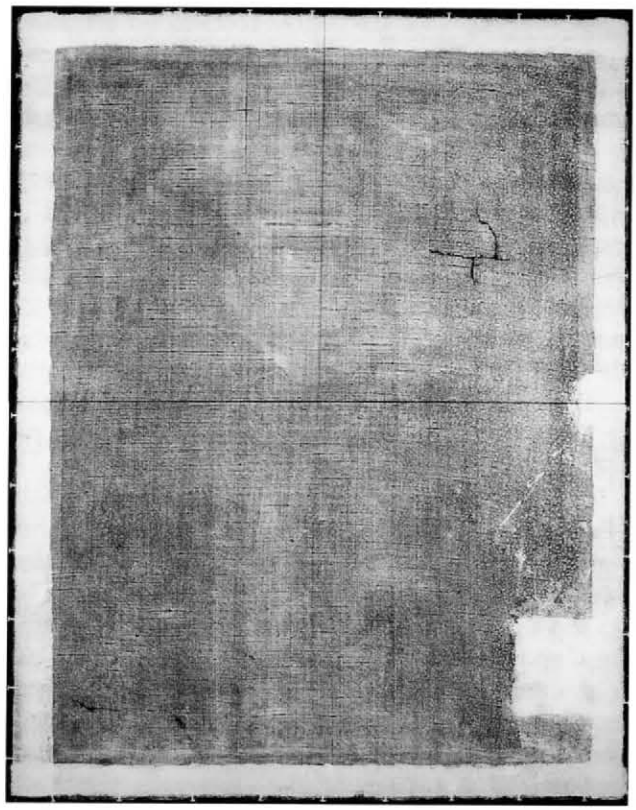

Figure 3a. *Freeman Schermerhorn Clench*, x-radiograph (National Gallery of Canada, Ottawa).

Figure 3b. *Eliza Clarke Cory Clench*, x-radiograph (National Gallery of Canada, Ottawa).

with lead white paint. Evidence of the condition of Mr. Clench's portrait is visible along the lower edge of the painting in the before treatment photograph (**Figure 1a**). Near the centre of this edge a missing chunk suggests that a portion of the painting may have been broken off rather than cut. Further information is available in the x-radiograph (**Figure 3a**). Not only are the strip lining and the damage on the lower edge clearly visible, but the scallop pattern along the top and bottom edges provides evidence of a previous tacking.

Preparatory Layers

Examination of the portraits with a low power binocular microscope revealed the presence of a single pale pink ground layer in Mrs. Clench's portrait and at least two ground layers in Mr. Clench's portrait. The upper layer in the latter painting is pink in colour, whereas the lower layer is a medium red. Some large white particles were also seen in the lower red layer.

Scientific analysis of samples from both paintings revealed that all of the ground layers are mixtures of lead white and oil, and the various tints of red are due to the presence of red ochre[21] (**Table I**). Light microscopy (LM) of samples from the face and coat in Mr. Clench's portrait revealed the presence of three preparatory layers. In addition to the pink and red layers, a white layer was detected below the red layer (**Figure 4**). The white layer was not observed in a third sample from this painting. LM also confirmed the presence of a single pale pink ground layer in Mrs. Clench's portrait.[22]

An additional preparatory layer may be present in Mrs. Clench's portrait. This layer consists of a yellowish-brown transparent material. It was observed under the pale pink ground layer in the green area of the dress. It was thought to be a layer of animal glue. Examination of a cross-sectional sample from the dress area by LM confirmed the presence of a transparent gelatinous layer below the ground layer (**Figure 4**). This transparent material fluoresced a bright yellow and contained no pigment particles.[23] The extent of its presence remains unclear, since it was not observed in any other areas of the painting.

The adhesion between the ground layer and canvas in Mrs. Clench's portrait was poor in a number of areas. Large losses, likely the result of water damage, were present near the bottom edge of the painting. Adhesion between the ground and canvas layers in Mr. Clench's portrait, on the other hand, was satisfactory.

Design Layers

Both portraits are painted in oil. Paint application ranges from thin, transparent layers to broadly applied, opaque strokes. Impasto is present in Mrs. Clench's bonnet where it is used to imitate the texture of fabric.

Areas in both portraits exhibit a form of cracking or breakage which has occurred in tiny plate-like sections, similar to that found in shale or slate. This was observed in the faces of both subjects and in several locations in the background of Mrs. Clench's portrait. Shrinkage cracks are also present in the green and white areas of Mrs. Clench's dress. A whitish coloured material is adhered to the edges of a number of cracks in both paintings. This condition was more prevalent in Mr. Clench's portrait where it is present nearer the top and bottom edges of the work (**Figure 1a**). In Mrs. Clench's portrait it is present in the subject's hair (**Figure 1b**).

Scientific analysis of the design layers revealed that the flesh tones in both portraits consisted of lead white in oil. This paint was pigmented with red ochre and, possibly, vermilion. Barium sulphate was also detected in the sample from Mr. Clench's portrait. Nothing in the composition of these materials, though, suggested a reason for the cracking in tiny plate-like sections.[24]

It was determined that the material present along some of the cracks was a leachate or an efflorescence. The contents of this leachate included inorganic components matching those present in the paint and ground layers, as well as some extraneous materials. The presence of the extraneous materials was suggested by absorptions in the infrared spectra of the leachate, absorptions which were absent from the spectra of other samples.[25]

Alterations which had been made to the design of each of these portraits were also evident. Much of the background of Mrs. Clench's portrait, as well as numerous small areas on her face, hair, and bonnet, had been overpainted. The repair of a large damage near the bottom right corner of Mr. Clench's portrait resulted in the back of a reddish-brown chair being eliminated from view. Much of this overpainted chair back had been uncovered through the previous and partial removal of varnish and overpaint at the NGC in early 1993.

A limited amount of cross-sectional study for the purpose of varnish and overpaint removal was carried out at the NGC before treatment began.[26] A sample from Mrs. Clench's dress showed the presence of three paint layers. A medium green lay on top of a brown layer. Below the brown paint was a pale green layer. Nearly the entire sample happened to be surrounded in a blue-white fluorescing layer of varnish.

A sample taken from the upper right edge of the background in Mr. Clench's portrait revealed the presence of two paint layers. Over these paint layers were two layers of varnish. A thin layer of pigment particles appeared to lie between the two varnish layers. A second sample, this time taken from the overpainted area in the lower right quadrant, revealed the presence of a thick white fill or ground material. This thick white layer had been applied over varnish and original paint layers. On top of the white material were two layers of black paint and another layer of varnish. Comparison of these two samples suggested that there may be a connection between the two areas. The pigment particles between varnish layers near the top of the painting may derive from the overpaint applied near the bottom, the particles' redistribution being a direct result of brushing varnish over a young paint film.

Further scientific analyses of the paint layers proved that the materials used in the two paintings were similar[27] (**Table I**). A drying oil was identified as the medium in both works and all of the pigments identified were available and in use in Canada in the 1830s. One variation was in the paint layer structure of Mrs. Clench's portrait. This proved to be more complex than the structure in Mr. Clench's portrait (**Figure 4**). Cross-sectional samples from Mr. Clench's portrait showed that a maximum of two paint layers were applied, whereas anywhere from two to four layers of paint are present in Mrs. Clench's portrait. All of the colours or colour mixtures had been tinted, the major component in all of the samples being lead white and lead carbonate.

	Freeman Schermerhorn Clench Location: subject's face CCI Sample No.: ARS 3275.1.3	***Eliza Clarke Cory Clench*** Location: subject's green dress CCI Sample No.: ARS 3275.2.6
paint		bright blue green layer; some red pigment
	very thin black layer (likely dirt)	thin lime green layer
	thin amber layer (likely varnish)	red and white pigment layer
	fine white layer; some red particles	lime green layer
ground layers	coarse pink layer	pale pink layer
	bright red layer	transparent gelatinous layer
	white layer	

Figure 4. Comparison of two cross-sectional samples.

Table I
Paul Kane's Pigments and Media

	Studio Sketchbox	*Freeman Schermerhorn Clench*	*Eliza Clarke Cory Clench*
Whites	lead white ($2PbCO_3 \cdot Pb(OH)_2$)	lead white [abc]	lead white [abc]
	—	lead carbonate [abc]	lead carbonate [abc]
	calcium carbonate ($CaCO_3$)	calcium carbonate [abc]	calcium carbonate [ac]
	—	barium sulphate [ab]	—
Blacks	bone or ivory black	bone black [a]	bone black [a]
	—	an unidentified black [a]	an unidentified black [a]
	calcium phosphate ($Ca_3(PO_4)_2$)	—	—
Yellows	yellow ochre	—	yellow ochre (Fe present) [a]
	—	chrome yellow (likely) [a]	chrome yellow ($PbCrO_4$) [a]
	—	an unidentified yellow (likely) [a]	an unidentified yellow [a]
	lead white ($2PbCO_3 \cdot Pb(OH)_2$) and partially oxidized lead white (probably $2PbO \cdot PbCO_2$)	—	—
Reds	alizarin	—	—
	—	red ochre [ab]	red ochre [ab]
	vermilion (HgS)	vermilion [a]	vermilion [a]
	—	red iron oxide [ab]	—
Blues	Prussian blue ($Fe_4(Fe(CN)_6)_3$)	—	Prussian blue [a]
	alunite ($Al_3(OH)_6(SO_4)_2$) (K,Na)	—	—
Browns	—	umber (Fe and Mn detected) [a]	umber [a]
	mixture of hematite and magnesioferrite (X Fe_2O_3 and $MgFe_2O_4$)	—	—
	Goethite ($Fe_2O_3 \cdot H_2O$)	—	burnt sienna (likely) [a]
	—	various iron oxide browns [a]	—
	Van Dyke brown	—	—
Other Inorganic Materials	gypsum	gypsum [ab]	gypsum [b]
	—	lead soaps [abc]	lead soaps [abc]
	sand	—	amorphous silica [a]
	—	other earth pigments or fillers (K, Ca, Si and Fe detected)[a]	—
	—	clay [c]	clay (Si, Al, and K detected) [a]
	—	trace calcium oxalate hydrate (possible) [c]	trace calcium oxalate hydrate (possible) [c]
	—	—	kaolin [a]
	—	—	trace quartz (possible) [a]
Resins, Oils, Diluents	mastic resin	—	—
	Batavia damar (possible)	—	—
	linseed oil	drying oil [ab]	drying oil [ab]
	—	boiled linseed oil [c]	boiled linseed oil [c]
	turpentine	—	—

Indicates location in Clench portraits: [a]—in paint layers; [b]—in ground layers; [c]—on the back of the canvas

It was hoped that x-radiographs (**Figure 3a and 3b**) of the portraits might reveal information that would enable comparison of the design layers, but the image of Mr. Clench's portrait turned out to be nearly transparent. The x-radiograph of Mrs. Clench's portrait did reveal additional areas of loss. These were situated beneath darkened layers of overpaint in the top left and right corners of the work. This image also recorded some diagonally oriented curves and forms. These are visible in the centre of the painting and may derive from the ground or lower paint layers. Some of these forms match topographical features visible in the paint surface under raking light (**Figure 2b** compared with **Figure 3b**).

Varnish and Protective Layers

A considerable amount of grime and unevenly applied layers of yellowed varnish were present on both portraits. All of the surface dirt and much of the varnish present on Mr. Clench's portrait were removed at the NGC at an earlier date, as has been noted above. The greenish yellow fluorescence of the varnish in UV light suggested that a natural resin had been used.

The back of both paintings was coated with a thick brown material having a leathery appearance. This material was thicker on the back of Mr. Clench's portrait. From the bubbled or nubbly texture present in areas on the back of both paintings it would seem that they had been exposed to high heat at one time. In the areas where this material was not protected by the stretcher members, a dense, but relatively irregular network of cracks is present. A number of losses, likely resulting from abrasion, are present on the back of Mrs. Clench's portrait.

Many of the characteristics of this coating are visible in the x-radiographs of the paintings. The bubbled texture is visible as a collection of white spots on the right side of Mr. Clench's portrait (**Figure 3a**). The irregular network of cracks and losses in this layer are visible near the central left side of Mrs. Clench's portrait (**Figure 3b**).

Scientific analysis of the material on the back of the paintings revealed that it consists of linseed oil,[28] but in a form that R. Mayer has referred to as a blown, bodied or boiled oil.[29] This type of oil is produced when the drying oil is heated in the presence of air and driers. The presence of driers was confirmed in the analysis of this material. Both lead white and lead carbonate were detected in the samples analyzed (**Table I**).

Treatment and its Revelations

Varnish and Overpaint Removal

The removal of varnish and overpaint was carried out after Mrs. Clench's portrait had been locally consolidated with parchment size and then surface cleaned. Various mixtures of isooctane and 2-propanol were initially used in the varnish removal, but a 1:1 mixture of 2-propanol and toluene proved to be the most effective and was used to remove some of the overpaint as well as the varnish from both paintings. Overpaint resistant to the 2-propanol and toluene mixture was removed with a 1:1 mixture of dichloroethane and ethanol. A 3:1 mixture of toluene and dimethylformamide was also used to remove some of the overpaint on Mrs. Clench's portrait. A successful method for removing all of the overpaint as well as the leachate material was not found and these areas were, therefore, left in place. Following the varnish and overpaint removal process, the paintings were left for six to eight weeks in order to ensure the maximum evaporation of solvents.

In addition to uncovering original design elements, the removal of overpaint revealed extensive areas of damage (**Figure 5a and 5b**). The damage near the lower right corner of Mr. Clench's portrait appeared to be related to the repair of an L-shaped tear. This tear was barely noticeable within an area that was dramatically altered, an alteration which likely occurred from the application of too much heat. The removal of overpaint from Mrs. Clench's portrait revealed a multi-coloured column along the left side, extensive areas of loss near the top edge, and the presence of four rectangular canvas inserts. The uncovering of these inserts disproved the idea that patches may have been applied to the front of the painting.

Structural Modifications

Following the period allowed for solvent evaporation, a facing of wet strength tissue and an adhesive consisting of a 1:1 mixture of BEVA 371 solution and Shellsol 715 was applied to the front of Mrs. Clench's portrait. Both portraits were then taken off their stretchers. The patches on the back of the paintings were peeled away and any residual adhesive was scraped away with a surgical scalpel knife. The tacking margins of Mrs. Clench's portrait were also flattened, thus enabling them to rejoin the picture plane. Since the condition of the stretchers was unsatisfactory, it was decided that they would not be re-used, but stored for reference purposes.

Strip linings were applied to both portraits and the paintings then mounted on temporary working stretchers. Initially, a polyester filter cloth was used for the strip linings. Strips of this fabric were adhered using BEVA 371 film, heat, and pressure. For some reason adhesion between the adhesive and filter cloth, as well as the adhesive and the back of Mr. Clench's portrait, failed in a number of areas when the

Figure 5a. *Freeman Schermerhorn Clench*, during treatment following varnish and overpaint removal, and flattening (National Gallery of Canada, Ottawa).

Figure 5b. *Eliza Clarke Cory Clench*, during treatment following varnish and overpaint removal, and flattening (National Gallery of Canada, Ottawa).

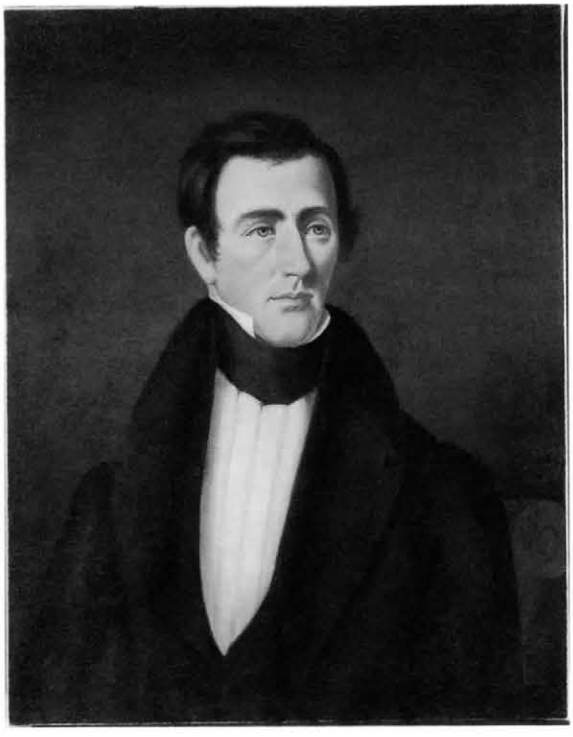

Figure 6a. *Freeman Schermerhorn Clench*, 1834-36, after treatment, final dimensions: 71.0 x 56.0 cm (National Gallery of Canada, Ottawa).

Figure 6b. *Eliza Clarke Cory Clench*, 1834-36, after treatment, final dimensions: 76.0 x 61.0 cm (National Gallery of Canada, Ottawa).

painting was being mounted. As a result of this, the filter cloth was replaced with a monofilament fabric having an open weave. The area to which the monofilament would be adhered was abraded, since the surface appeared to be too slick in places. The lining was then attached using the same method.

Losses on the back of Mrs. Clench's portrait were consolidated with a 1:1 mixture of BEVA 371 solution and Shellsol 715. They were then filled with a 40% weight/volume mixture of Cosmolloid 80H wax in Stoddard solvent to minimize any unequal effects caused by the future use of moisture.

Each painting was then treated in a humidity chamber. The environment within the chamber was controlled with a Micro-Climate Generator and exposure was for a period of five days. After each painting had been put in the chamber, the relative humidity was gradually increased over a two day period until an RH of 80% had been reached. Technical problems, such as the power outages necessary for building maintenance work, made it impossible to maintain a constant level of humidity within the chamber. The RH levels, therefore, varied between 65% and 80%.

Once the planar character of each work appeared to have been sufficiently re-established, each painting was removed from the chamber and placed under slightly damp blotters, pads, and weight. Any remaining deformations from plane were greatly reduced by this procedure.

Small portions of exposed canvas threads were removed from the edges of some of the tears with a surgical scalpel so that the tears could be properly aligned. A stock solution of Jade 403 adhesive was used to join the tears. Missing areas of canvas were filled with pieces of the polyester filter cloth or linen canvas threads. The old rectangular fabric inserts found in the background of Mrs. Clench's portrait were left in place. The adhesives used to adhere or reinforce new or existing fabric additions were BEVA 371 film or Jade 403. Small areas of flesh coloured paint in Mrs. Clench's portrait which had lifted following humidification were consolidated with Rohamere P-550 and set into plane using heat and pressure from a hand held spatula. A 1:1 mixture of xylenes and Stoddard solvent was used to dilute a stock solution of Rohamere P-550 in order to obtain a consolidant with a 20% solids content for this purpose.

The paintings were then mounted onto new stretchers with their new strip linings. These bevelled wood stretchers were fitted with turnbuckle joints and were first prepared with a dry lining. The fabric used for the dry lining was a multi-short fibre polyester that appears very similar to linen canvas.

Aesthetic Reintegration

Losses were filled with a traditional gesso consisting of calcium carbonate and parchment size. The fills were then toned in with Winsor & Newton's Designers Colours. The colours used to tone in the fills were mixed to simulate the colour of the ground in each portrait. The paintings were then varnished with a 5% weight/volume solution of dammar resin dissolved in Winsor & Newton distilled turpentine. Application of the varnish was with a brush.

Inpainting and minimal overpainting of the fills and non-removable stains and accretions were carried out using dry pigments and a solution of Acryloid B-72 in xylenes as medium. This process included the reconstruction of missing parts of the subject's left arm and the back of the chair.

The final step in the treatment was a spray application of varnish, consisting of a 10% weight/volume solution of dammar resin in distilled turpentine. This varnish, as well as the one applied before inpainting, was modified with Tinuvin 292, a hindered amine light stabilizer (HALS). The addition of this substance was based on the results of research which showed that Tinuvin 292 stabilizes dammar films in environments where UV radiation below 400 nm is absent.[30] The paintings were then ready for framing (**Figure 6a and b**).

Discussion

The condition of these paintings raised a number of questions as to what measures might be most appropriate for treatment. One important consideration which guided the treatment process was that the removal of any pertinent historical information should be avoided. Three of the most important situations to be considered are outlined in the following discussion.

The Coating on the Back of the Portraits

One of the concerns with regard to treatment involved the coating on the back of the portraits. Although the approval to remove the coating had been secured from curatorial staff, the removal operation proved to be unnecessary. This coating provides the canvases with a satisfactory degree of stiffness. There was also nothing about the condition of the paint film in the portraits that warranted the coating's removal, nor were there any indications that the coating's presence would adversely affect the paintings in the future. Since the portraits will be housed in a controlled environment and will not likely travel, the application of strip linings was the most suitable method for attaching the paintings to their new stretchers.

The preservation of the coating was desirable since it met one of the aims of the treatment, namely the preservation of elements with historical importance. References regarding the

application of such coatings have been documented and found to be recommended in a number of nineteenth century artists' manuals.[31] Their purpose was to protect against the effects of moisture or impact.

Unfortunately, there are no indications as to when this coating may have been applied or by whom. Comparison of these portraits with others dating from the same period did not provide any answers. This is because few works exist, information and access to them is limited, and technical inconsistencies are not uncommon. The portraits of Mr. and Mrs. Norton provide one example with regard to this situation. These unsigned paintings depict another pair of Cobourg's early citizens. They are attributed to Kane and date from the same period as the portraits of Mr. and Mrs. Clench. Both paintings are on wood panels, but the panels are not of the same type of wood. The back of Mr. Norton's portrait is stained a greenish yellow colour, whereas the back of Mrs. Norton's portrait is red.[32]

Visual Reconstruction in Mr. Clench's Portrait

The aim of making the portraits presentable required that the details missing in the lower right quadrant of Mr. Clench's portrait be visually reconstructed by inpainting. Research, undertaken to find a model for the chair back, was unsuccessful. In response to this result it was decided that, rather than invent details, a proper visual balance should be recreated by working with the information available in the portrait. Working in close contact with conservation and curatorial staff at the NGC, the reconstruction was carried out by basing boundaries and colour values on the contours and tones present in the adjoining sections of the region. Because of the lack of a suitable model, linear details and sharply defined passages tended to be avoided. Details or transitions in form were rendered through the use of tonal gradations.

Restoration of the Tacking Margin in Mrs. Clench's Portrait

The examination of Mrs. Clench's portrait before treatment revealed that all of the tacking margins were painted and had originally formed part of the design. Although extensive paint and ground losses were present (**Figure 5b**), the opinion of curatorial staff was that the margins should rejoin the picture plane. As a result of this decision the height and width of Mrs. Clench's portrait each increased by 5 cm, making the final dimensions of this work 76.0 x 61.0 cm.

After the painting was mounted on its new stretcher, all of the losses in the former tacking margins were filled, toned in, and inpainted. Finally, the impending question of the balance of scale between the two portraits was resolved by modifying the rebate of the frame for Mrs. Clench's portrait. As a result, when the portraits are in their respective frames, their sizes appear to be the same.

Conclusion

This paper has outlined the condition, results of analyses, and treatment of two early Canadian portraits. The processes involved in this project and the information deriving from it serve a number of purposes. Firstly, the treatment carried out on the portraits of Mr. and Mrs. Clench has not only made it possible for them to be exhibited in a public gallery, but it has done so by preserving certain features which are both integral and specific to their history and appearance. Secondly, additional information regarding the pigments in Kane's palette and the materials available to and in use by artists in nineteenth-century Canada is provided. By comparing the results of this project with those of other studies, this information may work to substantiate earlier findings, illustrate variations in practice, or generate new questions for research.

A case in point involves the documented use of red grounds. A study of painters in Québec City has shown that red grounds were used by a small group of early Canadian artists. The artists included in this group are Baillairgé, Légaré, and Dulongpré.[33] Kane's use of red grounds shows that their use was neither limited to these artists, nor to the province of Québec. It may also be a result of his contact with the artist James Bowman.

Although this project supplied much information, certain specific questions about the portraits remain unanswered. The original size of the paintings, the reasons for the variations in painting technique, and the exact nature of previous treatments, especially with regard to the presence of the leachate along the cracks or the boiled oil coating on the back, are all left to conjecture.

Acknowledgements

I would like to extend my appreciation to all of the persons who contributed to this project, especially the following: Marion Barclay, then Senior Conservator of Paintings and Contemporary Art, Restoration and Conservation Laboratory (RCL), NGC, for her observations, guidance, and support; to Charles Hill, Curator, Canadian Art and René Villeneuve, Assistant Curator, Early Canadian Art, NGC for their insights and support; to the Training Initiatives Programme of the Canadian Conference of the Arts, financed by Employment and Immigration Canada, for funding; to J. MacGregor Grant, then Head of RCL, and Anne Ruggles, Conservator, Fine Art, NGC, for their assistance; and to Jane Sirois and David Miller, Analytical Research Laboratory, Canadian Conservation Institute, for the information derived from their scientific work.

Materials and Equipment

Acryloid B-72, a PMA/PEMA copolymer: manufactured by Rohm and Haas Co., U.S.A. and available from Canada Colours and Chemicals Ltd., 80 Scarsdale Road, Don Mills, Ontario, M3B 2R7, Canada, 1-800-387-8006.

BEVA 371 Film, a PVA/ethylene copolymer: Conservator's Products Company of Canada, 23 Morrow Avenue, Toronto, Ontario, M6R 2H9, Canada, (416)539-8069.

BEVA 371 Solution: Conservator's Products Company of Canada.

Cosmolloid 80H, microcrystalline wax: Talas, Technical Library Services Inc., 568 Broadway, New York, New York 10012, U.S.A., (212)219-0770.

Dammar resin: A.F. Suter & Co. Ltd., Swan Wharf, 60 Pace Road, Bow, London, E32NQ, U.K.

Dichloroethane: BDH Chemicals Canada Ltd., 350 Evans Avenue, Toronto, Ontario, M8Z 1K5, Canada, (416)255-8521 *or* Fisher Scientific Ltd., 1200 Denison Street, Unionville, Ontario, L3R 8G6, Canada, (905)479-8700.

Dimethylformamide: BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

Ethanol: BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

Isooctane (2,2,4-trimethylpentane): BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

Jade 403, a PVA/ethylene copolymer: Talas, Technical Library Services Inc.

Micro-Climate Generator: Micro-Climate Technology, 4271 Longmoore Drive, Burlington, Ontario, L7L 5A4, Canada, (905)637-8191.

Multi-short fibre 100% polyester fabric, warp of 20 threads per cm and weft of 16 threads per cm: Art et Conservation, 33 ave. Trudaine 9^{e}, Paris, France, (1) 42 74 95 82.

Pecap, 100% polyester fabric, 53 mesh, 315 micron filament: B & SH Thompson and Co. Ltd., 140 Midwest Road, Unit 11, Scarborough, Ontario, M1P 3B3, Canada, (416)751-1654.

Polyester filter cloth, quality 2325: B. Henr. Lampe B.V., Postbus 202, 8600 AE Sneek, The Netherlands, (51)501 25 41.

Rohamere P-550, a PBMA homopolymer: Monomer-Polymer and Dajac Laboratories Inc., 1675 Bustleton Pike, Seasterville, Pennsylvania 19053, U.S.A., (215)364-1155.

Shellsol 715, odourless mineral spirits: Shell Canada Ltd., 75 Wynford Drive, Don Mills, Ontario, M3C 2Z4, Canada, (800)567-8860.

Stoddard Solvent, mineral spirits: Fisher Scientific Ltd.

Tinuvin 292, hindered amine light stabilizer: Ciba-Geigy Canada Ltd., Additives Division, Mississauga, Ontario, L5N 2W5, Canada, (905)821-4420.

Toluene: BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

2-Propanol: BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

Xylenes: BDH Chemicals Canada Ltd. *or* Fisher Scientific Ltd.

Notes and References

1. Oil on canvas. Collection: National Gallery of Canada, Ottawa (Accession Number 30486).

2. Oil on canvas. Collection: National Gallery of Canada, Ottawa. (Accession Number 30487).

3. The town of York was incorporated as the city of Toronto in 1834. The British province of Upper Canada existed from 1791-1840. It occupied the area which currently forms the southern portion of the province of Ontario.

4. Harper, J. Russell, *Paul Kane's Frontier* (Toronto: University of Toronto Press, 1971), p. 9.

5. Lowrey, Carol D., "The Society of Artists & Amateurs, 1834: Toronto's First Art Exhibition and Its Antecedents," *Revue d'art canadienne/Canadian Art*, vol. 8, no. 2, 1981, p. 101.

6. Harper, p. 9.

7. Lowrey, p. 106.

8. Harper, p. 10.

9. Guillet, Edwin C., *The Valley of the Trent* (Toronto: University of Toronto Press, 1957), p. vii, note 3.

10. Harper, p. 10.

11. Guillet, p. vii.

12. Baker, Victoria, Assistant Curator, National Gallery of Canada, "For the Collection of Early Canadian Art," Research report on the Clench portraits prior to acquisition, 8 November 1989.

13. Harper, p. 10.

14. *Ibid.*, p. 325. The publication noted that the scientific analyses of the samples were completed at the National Gallery of Canada in 1969. The methods used included x-ray diffraction, infrared spectroscopy and odour.

15. Hill, Charles, Curator, Canadian Art, National Gallery of Canada, personal communication, 2 December 1993 and 23 August 1994. Newspaper fragments in the box are from Mobile, Alabama, where Kane worked from 1839 to 1841 and again from 1843 to 1845.

16. Corbeil, Marie-Claude, Senior Conservation Scientist, Canadian Conservation Institute, personal communication, 20 October 1993.

17. Harper, p. 10.

18. Allodi, Mary, Curator, Canadiana Department, Royal Ontario Museum, personal communication, 26 November 1993.

19. Lowe, Jessie, correspondence with Charles Hill, Curator, Canadian Art, National Gallery of Canada, 9 June 1992.

20. Visual evidence in the form of colour photo copies accompanied Jessie Lowe's letter. The copies made of the Clench portraits hung in the Reed family's home in St. Andrews, New Brunswick and may still be in the possession of Kate Reed's descendants.

21. Sirois, Jane and Miller, David, "Analysis of Samples from a Pair of Portraits Attributed to Paul Kane," *Canadian Conservation Institute Analytical Report*, ARS 3275, Part I, 8 February 1994, p. 3, unpublished.

22. Sirois, Jane and Miller, David, "Analysis of Samples from a Pair of Portraits Attributed to Paul Kane," *Canadian Conservation Institute Analytical Report*, ARS 3275, Part II, 6 July 1994, pp. 17-23, unpublished.

23. *Ibid.*, p. 4.

24. Sirois and Miller, 1994, ARS 3275, Part I, p. 3.

25. *Ibid.*, pp. 2, 3.

26. Samples were prepared with a Reichert HistoStat Rotary Microtome and examined with BHSP model Olympus microscopes using polarized light and a reflecting light fluorescence system.

27. Sirois and Miller, 1994, ARS 3275, Part II, The analyses of media included the preparation of eight cross-sections for examination using light and fluorescence microscopy. A selection of these cross-sections was also examined by scanning electron microscopy/x-ray energy spectrometry (SEM/XES). Remaining samples were analyzed using Fourier transform infrared (FTIR) spectroscopy, x-ray diffraction (XRD), polarized light microscopy (PLM), gas chromatography/mass-spectrometry (GC/MS), as well as SEM/XES.

28. Sirois and Miller, 1994, ARS 3275, Part I, p. 2.

29. Mayer, R., *The Artist's Handbook of Materials and Techniques*, 5th ed. (New York: Viking Penguin, 1991), p. 173.

30. de la Rie, E. René, "Polymer Additives for Synthetic Low-Molecular-Weight Varnishes," in *Preprints, 10th Triennial Meeting, ICOM Committee for Conservation*, vol. 2, Washington, DC, 22-27 August 1993, edited by Janet Bridgland (Paris: ICOM Committee for Conservation, 1993), p. 568.

31. Carlyle, Leslie A., *A Critical Analysis of Artists' Handbooks, Manuals and Treatises on Oil Painting Published in Britain 1800-1900: with reference to selected eighteenth century sources* (London: Courtauld Institute of Art, University of London, 1991), pp. 251-52.

32. The portraits of Mr. and Mrs. Norton were examined in December of 1993, when they were on deposit at Massey College, University of Toronto.

33. Levenson, Rustin Steele, "Materials and Techniques of Painters in Québec City, 1760-1850," *The Journal of Canadian Art History*, vol. 7, no. 1, 1983, p. 4.

Author's current address: 4814 Flanders Avenue, Kensington, Maryland 20895, U.S.A.