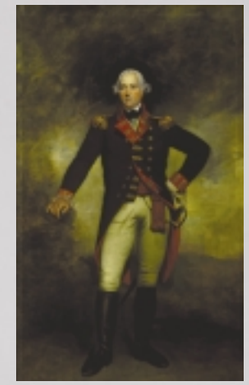
To Conserve and Protect



A behind-the-scenes look at the skill and detective work that goes into conserving artworks.

BY HEIDI SOBOL

It was the winter of 2007, and within the ROM's dark, silent storage vaults 97 paintings awaited permanent exhibition in the airy new Sigmund Samuel Gallery of Canada. My task, as the ROM's new paintings conservator, was to create a plan that would ready this daunting number of works for display.

Art conservators are entrusted with the task of preserving art and artifacts. We do this by analyzing and stabilizing the physical components of a work. Most of us specialize in a particular medium: the ROM has conservators of textiles, paper, metals, stone/glass, decorative arts, and ethnographic objects, as well as paintings. In the past when restoring was the main job of the profession, we were called restorers, but nowadays we not only restore, but also research, analyze, document, and preventatively conserve, preserve, and reconstruct objects of art. The bedrock of the profession is to seek the original intent of an artifact or piece of art—the vision its creator intended the public to see without the sometimes distorting effects of time and old restorations—and to preserve its original integrity with minimal intervention so that it will last into the future.

When we assess a painting for treatment, the methods we use are not unlike a crime scene investigator's. We make site visits, usually to outline travel requirements to ensure a painting's stability during transit or to assess the risk of pest or mould infestation. And at the lab, we conduct routine tests and examinations to try to discern exactly how and where past damage has occurred. One of these tests involves micro-sampling: we take minute paint samples for analysis. Another looks at solvent sensitivity: we use tiny amounts of solvents to

View of the City of Toronto. Top: After treatment. Middle: Before treatment. Bottom: Ultraviolet light examination before treatment. **Details:** Left: Overpainted left edge, before treatment. Top right: Multi-directional tear before treatment. Bottom right: Tear as seen under ultraviolet light.

determine the solubility of the paint and surface coating layers. Tests such as these can provide a better understanding of the material composition of the painting's image layers—and they also aid us in developing a treatment proposal. (And sometimes they reveal fakes, but that is for another story.) The most revealing examination methods involve observing paintings under various types of light—raking light, infrared light, and ultraviolet light—each of which provides different clues to what may lie beneath a painting's surface.

When it came to our Canadiana project, some of the paintings were newly acquired, while others were icons of the collection, such as *The Death of General Wolfe* by Benjamin West and studio. They came in all shapes and sizes, and in varying states of repair. To handle the scope of the project, the ROM hired several full-time and two part-time painting conservators. We found many of the 97 paintings to be in stable condition, but a few, about 15 percent, had tumultuous histories—they had a storied provenance, had already endured heavy restorations, or required a new method of display.

Our tasks on three of these paintings exemplify the detective work involved, the cunning and skill that conserving art can sometimes require. These paintings and the stories and images showing how they were conserved are featured in the exhibition *Returned to Former Splendour*, now on display in the Wilson Canadian Heritage Temporary Gallery within the Sigmund Samuel Gallery of Canada.

VIEW OF THE CITY OF TORONTO

By Edward Taylor Dartnell
c. 1850
105.7 x 186 cm

The ROM team began work on the oil-on-canvas painting *View of the City of Toronto* by scanning it with UV light. Similar to "black light," UV is good at revealing surface anomalies not visible to the naked eye. One problem commonly revealed with UV light is overpaint—paint added at a date later than that of the original work that is not on top of a repair, but hides the original painting. In this case, the UV scan revealed discoloured overpaint extending along the entire left edge of the painting. This thick discoloured coating of oil paint was hiding serious damage. We found a huge multi-directional tear in the upper right measuring some 32 x 32 cm (more than a square foot). Flaking paint indicated previous water damage, and telltale signs—transparency of paint layers, peaks of canvas threads showing through, and a scoured appearance under the microscope—indicated past overcleaning. Overcleaning, which occurs when paint strata are eroded by too much mechanical force (friction) or chemical means, puts the paint layers in a delicate condition, an over-sensitivity similar to allergies in humans. Because our treatment had to be extra sensitive, we used the least aggressive solvents that would gently clean and remove the overpaint.

Fortunately, under UV light, the conservator was able to determine with pinpoint accuracy which brushstrokes were painted by the original artist and which contained newer paint, applied to conceal the significant damage. Under microscopic magnification, with great care the conservator applied solvent, and used mechanical methods, such as a scalpel and dental pick, on the individual brushstrokes to remove the overpaint.

The large tear needed to be repaired from both the front and the back of the painting, but a fabric lining restricted access to the back of the canvas. To see the tear from both sides, ROM conservators had to do a "lining reversal," applying heat to soften the adhesive and remove part of the lining fabric. To protect the "healthy" part of the painting from undue stress, only part of the lining was lifted. Fill material—in this case gesso, glue, and other additives—had been spackled on to cover the tear's seam. Once the old fill was removed, each thread was painstakingly re-woven and fused together to create a seamless mend. With a method

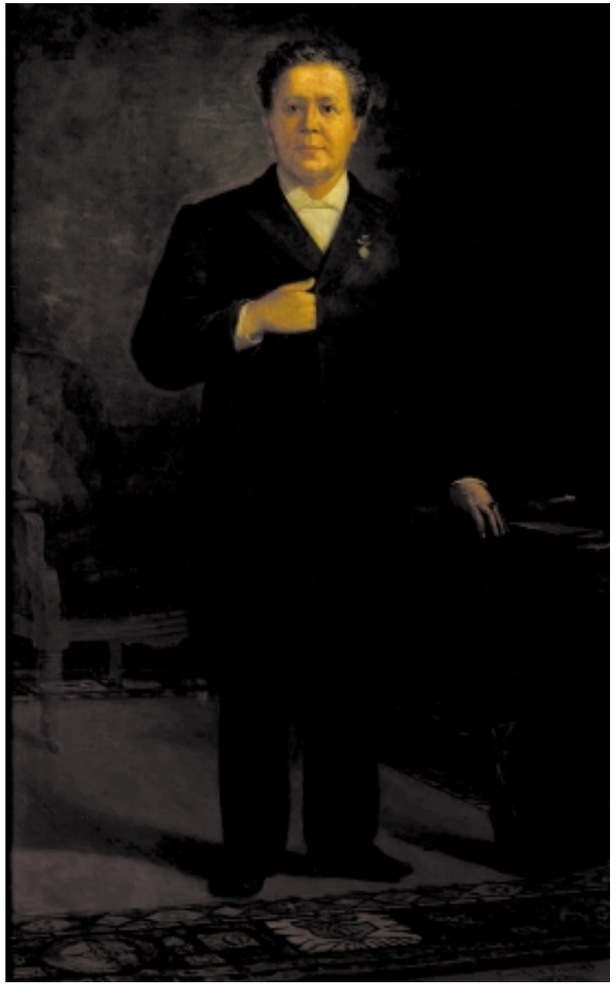
TERMINOLOGY

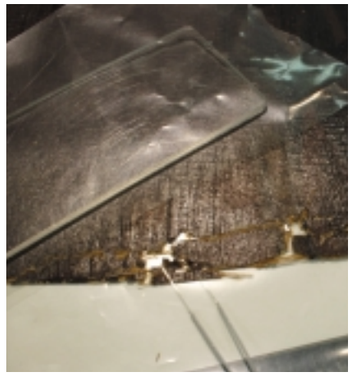
■ CONSERVATOR

Over the past 60 years, the term "conservator" was promoted by international conservation communities and organizations in an effort to redefine the nature of the work that is performed. At a conference in Rome in 1930, George Stout, a noted conservator and writer on conservation, noted that the conference "seems to have occurred at or near the end of an indefinitely long period of complacency with respect to the conservation of works of art," during which restoration was "a trade, a craft in which the craftsman could lay claim to diverse and irregular funds of knowledge and ability. By 1930 there was vocal disquiet about this . . . Many art historians and a few curators and collectors complained and asked for more rigid standards of qualification for those who would act as restorers." It seems to have been at this conference, attended by 150 museum professionals, that the term conservator was first definitively applied to this field of art.

■ CONSERVATOR WORKING AT A MICROSCOPE

Working under a binocular microscope, a paintings conservator is able to see minute damages such as tears and paint losses. Micro-testing must be done under the microscope to ensure a paint sample is taken accurately to minimize possible damage and to keep testing areas small and unnoticeable to the naked eye.





Dr. Oronhyatekha Top: After treatment. Bottom left: Detail of subject's left arm after treatment. Bottom right: During repair of a tear, acupuncture needles hold threads in place.

called "thread-by-thread" tear mending, the conservator uses a microneedle, glue paste, and a micro tacking iron to fuse each thread back together. As the work progresses—it can take several hours to mend one inch of tear—individual strands are held in place with acupuncture needles. After new filling was added to hide the mend, the conservator inpainted, discretely adding new watercolour paint, which is easily removable in future if necessary, to cover the fill material and any areas of paint loss. The job was finished off with a coat of synthetic varnish, which doesn't discolour as older versions did. What had been a poorly repaired area now looked uniform and intact.

DR. ORONHYATEKHA

By Frank Pebbles
1896 / 1897
266 x 177 cm

This portrait of a notable Native Canadian physician and businessman had been stored flat and unsupported with no existing frame. It had not been viewed upright in more than 30 years. A painting, especially of this scale, needs to be under constant tension in order for the layers of paint and preparation to remain adhered to the canvas. Without tension, the canvas could warp and the paint layers could separate.

An ongoing dialogue with the curator responsible for the painting is pivotal to the conservation process of almost any work of art. Curators and art historians provide insight into the history of the piece—its context, its meaning, and where it fits in the genre and the artist's oeuvre. Conservators provide the material history—the nuts and bolts of what comprises the physical painting.

For this artwork, the conservator determined that the painting was oil on canvas and had likely been revarnished at least once in the past hundred years. Most interestingly, the conservator unearthed a "double signature and date" at the bottom of the painting. It appears that the artist painted the canvas once in 1896 and repainted over it in 1897. Conservators can't necessarily explain why an artist would do this, although from artists' journals and other documents we know that sometimes the reason is that the artist, the sitter, or the patron, was unhappy with the results and wanted a different, more flattering, or more accurate look. But our diagnostic work can reveal that it occurred, providing an objective framework on which the curator or historian can build or validate theories about the painting.

Another puzzle was that *Dr. Oronhyatekha* had a crudely cut perimeter and no stretcher or frame. The curator knew that the painting had been cut out of its original frame with a sharp implement before its arrival at the ROM. With this knowledge, the conservator was better able to determine the original dimensions of the canvas, which provided the information needed to construct a new custom-made stretcher.

Before the painting could be placed over a stretcher, a new synthetic canvas backing needed to be applied, enlarging the canvas's size enough so that no painted portions would be in danger of being folded over the stretcher's sides. Called "lining," the process is essentially the reverse of our work on *View of the City of Toronto*, for which we removed the lining. Adding a lining involves brushing or rolling on a heat-responsive liquid or film adhesive to the back of the original canvas and then laying the painting over a new larger piece of fabric; using heat and constant suction with a vacuum pump, the two parts are welded firmly together. Because of the painting's large size, the lining had to be done on special equipment at the Art Gallery of Ontario. Their Maxwell combination table, sometimes called a hot table, is larger than the one in the ROM's lab and has a built-in evacuator to create suction. This equipment works like a giant electric griddle pan to heat the painting. The new backing it attaches to the artwork provides added support to the original canvas and paint layers.

Constructing a new frame for this large painting was a monumental task. An elegant

HISTORICAL PIGMENTS

■ INDIAN YELLOW

Indian yellow actually did not originate from India but was introduced there in the 15th century from Persia. Used in watercolour paint and as a glazing colour in oil paint (glaze is a tinted oil-based medium that is typically semi-transparent), real Indian yellow pigment was considered by A. Eibner, an early 20th-century researcher of pigments, as "an incomparably beautiful, deep and luminescent gold yellow in a shade which is achieved with no other pigment." To produce this hue, cows were fed exclusively on mango leaves and their urine was evaporated into a precipitate, then hand-formed into balls. Unfortunately, this caused the cows extreme pain and early death, and was outlawed in 1908. The Indian yellow available today is synthetic, called nickel azo yellow.

■ CARMINE

This strong red-crimson pigment is derived from cochineal insects, which have been fed exclusively on the nopal cactus. Their bodies are dried, boiled in water, and precipitated onto an alum base. Carmine can fade in strong sunlight and is fairly expensive. Cochineal is sometimes used in the food industry primarily as a dye, listed as "colour added," "E120," or simply "natural colour." Foods such as yogurt, imitation crab, juices, and Campari made in some countries contain cochineal extract.

■ ULTRAMARINE

The pigment ultramarine, from the Middle Latin word "ultramarinus," meaning literally "beyond the sea," was so named because it was imported from Asia by sea. It is a primary component of the mineral lapis lazuli. By the 14th century, it numbered among the most valued pigments, and was often reserved for the robes of Christ and the Virgin. Today, it is the most valuable pigment in the world, ounce for ounce equal in value to gold. Ultramarine has high stability under light exposure, which explains why paintings made with ultramarine blue are still very vibrant. The high costs of transport and processing of the complex rock mixture containing lapis lazuli led to the development of a synthetic version manufactured in France in the 1820s. Nowadays, the synthetic ultramarine blue is the only one commercially available to artists.

■ IVORY BLACK

Also known as bone black, ivory black has been used since ancient times and is considered quite a "blue" black. The historic version of this pigment is made from the charring of ivory, and artists and pigment makers often made it themselves by burning ivory in an airtight container. Since ivory harvesting has been mainly illegal since 1989, contemporary ivory black is often derived from mixed animal bones, although old combs, piano keys, and corset boning are sometimes pressed into service to manufacture genuine ivory black today.

George Townshend, 4th Viscount and 1st Marquess of Townshend. Top: After treatment. Bottom: During varnish removal.

presentation was desired, so the conservator and curator consulted to select a simple frame profile with a toned gold-leaf finish. The frame's pieces were custom-milled from basswood and then water-gilded using 13-karat white gold. Despite its luminosity, gold leaf is very thin: you'd need 26 stacked sheets of it to equal the thickness of an onion skin.

GEORGE TOWNSHEND, 4TH VISCOUNT AND 1ST MARQUESS OF TOWNSHEND

Attributed to Gilbert Stuart
c. 1786
265 x 173.5 cm

The third major project, also an oil on canvas, began as a straightforward surface cleansing of dust and grime. One of the most simple and effective solvents conservators use is saliva, gently rolled onto the surface of the painting with a cotton swab, followed by a fresh swab of distilled water. An ideal cleansing agent, saliva contains a great deal of water, weak surfactants (soaps), and a variety of ionic materials, the chief of which is sodium.

As the treatment progressed, we decided to remove the disfiguring varnish that was dulling richly coloured areas of the painting. For both aesthetic and protective reasons, oil paintings often receive a final coat of varnish once the artist has finished. Varnish provides all colours with an optimal level of uniform saturation while acting as a film that protects the painted surface from the harmful effects of dirt, light, humidity, and minor physical abrasion.

Applied by spraying or brushing, varnish forms a thin, transparent layer on the surface of a painting. Historical varnishes were made with tree resin dissolved in a solvent, and have the unfortunate tendency to discolour and degrade over time—necessitating their eventual removal, usually with solvents, such as ethanol. Since the 1950s dozens of surface coatings manufactured in various industries, the vast majority of them synthetic, have been investigated for use as picture varnishes. In this case we used Paraloid B-72.to replace the older coat of varnish.

This painting contains a compelling example of the phenomenon known as "pentimenti," ghosted images that can be seen beneath the painting's top layer. Different from what is seen above, these images signal that the artist reworked certain of the painting's elements. The original position of Lord Townshend's feet, for instance, is visibly different from their final positioning. The word pentimento derives from the Italian *pentirsi* meaning to repent. Three different conditions can lead to pentimenti: the upper layers of paint become more transparent over time; cracks develop in the uppermost layers to reveal different-coloured paint underneath; or different-textured paint below reveals brush marks going in a different direction than the ones on the top layer.

Historically, restorers often covered up pentimenti with excessive coats of paint, usually to hide awkward areas of the painting, or (unfortunately) to exhibit their own creative flair. Today, pentimenti are considered an integral part of the image and history of the painting. Despite the fact that they can detract from the painting if they are very noticeable, conservators are no longer likely to cover them up with overpaint. In this painting, we left the distracting ghosted images as we found them.

The Samuel Gallery now displays these 3 paintings, alongside the other 94 from the storage vaults. While all 97 treatments are complete for now, the conservation process is an ongoing one. Some objects will always need treatment, but the vast majority are under preventive conservation: we aim to maintain proper environmental standards and display requirements.

In essence, a work of art or an artifact is a communication from the past. Viewers are a brief audience to that communication. It is the conservator's job to be mindful of the painting's past and to preserve it for the future. ROM

TOOLS OF THE TRADE

■ **DAMAR VARNISH CRYSTALS**

Derived from the damar fir tree, these "tears" of resin are dissolved using a solvent to make a spirit varnish. This natural resin varnish has been in use for hundreds of years but has a tendency to yellow and become brittle over time. This type of aging is often termed an "antique look" but actually can skew the chromatic balance originally intended by the artist. Nonetheless, it is still used sometimes in conservation work.

■ **MINIATURE TACKING IRON**

Exactly like a clothes iron but the size of a pink eraser, this tool is used to heat an area of a painting requiring treatment. Conservators use the miniature iron to secure adhesive, gently plasticize—or soften—the paint, and aid in humidification, which makes the dried paint less brittle, thereby reducing the chance that the paint will crack during treatment. The temperature on this model can be varied one degree at a time.

■ **BEAKERS AND FUNNELS**

Scientific glassware is used to measure solvents and aqueous mixtures used in the conservation of paintings.

■ **MICRO-TOOLS**

Delicate work under the microscope often requires tools with very fine instrumentation. Microspatulas, scalpels, and small natural-hair brushes all come to very fine points, allowing the conservator to manoeuvre with precision.

■ **LOCAL EXHAUST VENTILATION**

Solvents play a big role in paintings conservation. Some—such as overpaint removers—can be quite noxious. Local exhaust ventilation, or elephant-trunk ventilation, is used to evacuate the fumes precisely where they are generated, usually right at easel level.

■ **LIGHT METHODS**

Raking Light: Accentuates the topography of a painting and can reveal canvas undulations, peaked or cracking paint, and sometimes underpaintings found beneath textural pentimenti. Transmitted Light: Reveals cracks, tears, or repairs and can also sometimes show underdrawings or design changes. Ultraviolet Light: UV light is useful for revealing surface anomalies not visible to the naked eye, such as overpaint—paint added at a date later than that of the original work.