

Transcript of the video The Materials and Techniques of J.E.H. MacDonald

Video length: 9:55 minutes

Kate Helwig (Senior Conservation Scientist, Canadian Conservation Institute): “So our project on the materials and techniques of J.E.H. MacDonald's started in the spring of 2013 and it's now almost complete.

It's a collaborative project between the McMichael Canadian Art Collection and the Canadian Conservation Institute in Ottawa, where I work as a conservation scientist.

There are 32 paintings in the project and they're from three different institutions: the McMichael, the National Gallery of Canada and the Art Gallery of Ontario. And my colleague Alison Douglas who's the conservator at the McMichael can tell you more about the choice of the paintings and the different periods in MacDonald's career as well as how the project really got started.”

Alison Douglas (Conservator, McMichael Canadian Art Collection): “Well the project really got started because we really felt it was long overdue to do significant research on one of the co-founders of the Group of Seven and a very distinguished Canadian artist, but also because we do have a number of exhibitions upcoming at the McMichael celebrating the 100th anniversary of the group.

And in terms of once we were all on board with the project I worked with our chief curator in order to categorize his body of work into periods. This was then basically done geographically.”

[Details of an early period painting: *Snow, High Park*. An Algoma period painting: *Forest Wilderness*. A British Columbia/Georgian Bay period painting: *Cathedral Peak and Lake O'Hara*.]

Alison Douglas: “So we have early period then Algoma, Nova Scotia, British Columbia and Georgian Bay and then Barbados. And in terms of choosing the particular works for the study it was really looking across the collections of the three institutions you mentioned and picking significant representative works with a variety of materials.”

Kate Helwig: “And the goal of the project is to develop a database of MacDonald's materials and techniques which can be useful for several different reasons, including for conservators to help develop conservation treatments that are appropriate and determine storage and display conditions.”

[A conservator examining a JEH MacDonald painting under magnification. A conservation scientist examining a JEH MacDonald painting under magnification. A conservator removing a JEH MacDonald painting from storage shelf. A conservation scientist looking at the JEH MacDonald database on a computer monitor.]

Kate Helwig: “And also more on the curatorial side when there are questions of attribution, if there's an unknown painting we can look at the materials in that work and then compare it to the materials in our database to see if they're consistent with what MacDonald used during a certain period.”

Alison Douglas: “So for my part of the study I examined all 32 works visually where we can identify supports and see the different layers of the work; under magnification where you can

see brush strokes and technique and under ultraviolet illumination we can identify various coatings used to produce the work.”

[Details of painting: *Algoma Hills*. Detail of painting: *Snow, High Park*. Conservator looking at the painting *Algoma Hills* with a stereomicroscope. Detail of *Algoma Hills*, as seen through stereomicroscope. Conservator putting on protective glasses, preparing to observe the painting *Algoma Hills* with UV illumination (handheld UV light). Conservator examining *Algoma Hills* with a handheld UV light. *Algoma Hills* displayed on an easel. Conservator rotating the painting *Algoma Hills* to show the very thin board used as the painting support.]

Alison Douglas: “In this particular piece, *Algoma Hills* from 1920, when we look at it visually we are first struck by this very thin board that the work is executed on.

This dense laminated board is thought to be a mill board from the bookbinding industry.

Also when we look under magnification, we can identify some of his working methods. So MacDonald used an under drawing or under painting with very thin translucent oil paints before he began his final composition. When we examined this work under ultraviolet illumination we are struck by this bright orange fluorescence. And this is the signature fluorescence of shellac. J.E.H. MacDonald in this period, the *Algoma* period, coated his supports front and back with shellac first before he painted.”

[Magnification of various regions of *Algoma Hills* and painting: *Moose Lake* showing underpainting with thin, translucent oil paints. *Algoma Hills* shown under ultraviolet illumination. Lower right corner of *Algoma Hills* under ultraviolet illumination, showing the orange fluorescence. Showing stereomicroscope used for sampling.]

Kate Helwig: “For chemical analysis of the paint a number of tiny samples of all the different colours were taken from each painting. These are extremely small samples in fact they're barely visible to the naked eye. We do all our sampling through a microscope using surgical tools like scalpels, tweezers, etc. And it's very important that our tools as well as the glass slide where we place the sample are clean and dust free.”

[Conservation scientist removes a microscopic sample from the painting: *Algoma Hills*, using a surgical scalpel under magnification. Conservation scientist transfers the sample from the scalpel tip to a glass slide. Close up of tools: tweezers, tungsten needle and scalpel.]

Kate Helwig: “To show how MacDonald applied his preparation layers in his paint some of our samples were taken as tiny cross-sections. These are core samples that contain all the layers from the support, the preparation, the paint layers and a varnish if there is one.”

[Core samples (cross-sections) under high magnification from three JEH MacDonald paintings: *Snow, High Park, Algoma Waterfall* and *Near Minden*.]

Kate Helwig: “We mount the cross section in polyester resin and we polish it to expose the layer structure, then we look at our cross-sections through a microscope using both visible light and with UV fluorescence.”

[Close up of a cross-section sample mounted in block of polyester resin. Conservation scientist polishing a cross-section. Conservation scientist observing a cross-section using visible light and ultraviolet fluorescence microscopy using a polarizing light microscope. Cross-section shown is from: *Cathedral Peak and Lake O'Hara*.]

Kate Helwig: "Sometimes it takes up to five different techniques to be able to thoroughly characterize a paint in terms of the pigments, the binding media and the fillers that might be present. All of our instruments are optimized for the analysis of very tiny amounts of sample so most of them are interfaced to a microscope and they all have very sensitive detectors. One of the key instruments we used for the analysis of the paint is a scanning electron microscope with energy dispersive spectrometry."

[Conservation scientist placing a cross-section sample in a scanning electron microscope, equipped with energy dispersive spectrometry. Conservation scientist using the scanning electron microscope with energy dispersive spectrometry to analyze a paint cross-section.]

Kate Helwig: "This instrument allows us to look at the sample in very high magnification with an electron beam and at the same time we can determine the chemical elements that are present in the paint. It's important to note this doesn't actually tell us what pigment is present just what element is present. So for example, if we see lead in a paint sample that could correspond to the pigment lead white; but it could also correspond to another lead containing compound like lead sulfate."

[Showing the x-ray diffractometer; Fourier transform infrared (FTIR) spectrometer and Raman spectrometer. Conservation scientist using a polarizing light microscope.]

Kate Helwig: "To determine the nature of the compounds and the exact pigments that are present we used a combination of different techniques including X-ray diffraction, Fourier-transform infrared spectroscopy, Raman spectroscopy and polarized light microscopy. The Fourier-transform infrared spectrometer is one of our most versatile instruments and in fact we analyzed all the paint samples using this method. To prepare the sample we put it on a very tiny diamond to flatten it prior to analysis and then we take the diamond holder and put it on a stage of the infrared microscope."

[Conservation scientist filling detector of FTIR spectrometer with liquid nitrogen, placing a sample on the diamond cell and putting it on the stage of the microscope. Conservation scientist looking at an FTIR spectrum on the computer monitor of the FTIR spectrometer.]

Kate Helwig: "This technique is based on the fact that molecules absorb infrared radiation at different wavelengths depending on their chemical bonds. And so the overall infrared spectrum is a combination of all the absorptions of the different materials that are present. So the pigments, binding media, etc. The spectra can give a lot of information but they're sometimes quite complicated to interpret. A polarizing light microscope is very helpful to visualize the paint mixtures that MacDonald used.

We can also identify a number of the pigments using this technique, by observing the size, shape, colour of the pigment particles as well as the way they interact with polarized light."

[Conservation scientist looking at an FTIR spectrum on the computer monitor of the FTIR spectrometer. Conservation scientist using a polarizing light microscope to examine pigment dispersions. Images of pigment dispersions from JEH MacDonald paintings under magnification in a polarizing light microscope, shown in normal transmitted light and cross-polarized light. The first dispersion is from: *Canoe Lake*, the second dispersion is from: *Logs on the Gatineau River*.]

Alison Douglas: "Some of the interesting things I observed while examining these 32 paintings for the study: with MacDonald's oil sketches his early period supports are quite varied."

[Back and edge of the support for an early period painting: *Logs on the Gatineau River*. Back and edge of the support for an Algoma Period support: *Algoma Hills*. Edge of an early period work: *Near Minden*, showing the coloured ground. Detail of an Algoma period painting: *Algoma Hills* showing the support with no ground layer visible between paint strokes.]

Alison Douglas: “Whereas his Algoma period supports he favored a very thin mill board support. In terms of oil sketch preparation, in the early period again we see a varied use of ground and coloured ground, whereas in the Algoma period and beyond we see the use of shellac with an under drawing and then the final composition executed over top of that. In terms of his works on canvas he used both linen and jute. Jute is interesting as it degrades very quickly and weakens over time. In terms of technique, early period works had paint that was applied wet-on-wet, more thickly, with muddier tones, whereas later works were produced with directional, juxtaposed bright colors.”

[Detail of canvas support for: *Goat Range, Rocky Mountains* showing linen warp threads and jute weft threads. Detail of painting technique for an early period work: *Snow, High Park*. Detail of painting technique for two Algoma Works: *Leaves in the Brook (sketch)* and *Forest Wilderness*.]

Kate Helwig: “Although there were some changes in the materials that MacDonald used over his career there were definitely certain pigments and pigment mixtures that he preferred. For example, all the purple colours that we see on his paintings are red-blue mixtures; very often a mixture of ultramarine blue and alizarin red. And his favored green pigment was viridian. It's almost the only green pigment that he used in fact. Sometimes his green colours might be mixtures of viridian with other pigments but generally they're based on that hydrated chromium oxide pigment.”

[Pigment dispersion of purple paint from: *Old Dock, Petite Rivière*, showing a mixture of ultramarine blue and alizarin red. Pigment dispersions of green paint from: *Algoma Hills* and *Near Minden*, showing viridian. Cross-section from: *Algoma Waterfall* showing layers of green paint. Detail of dark purple paint from: *Snow, High Park* that appears almost black.]

Kate Helwig: “MacDonald rarely used pure blacks on his works. Colours that appear to be black on his paintings are generally either very, very dark purples or dark blues. Like other members of the Group of Seven, as well as Tom Thompson, MacDonald preferred a white pigment composed of a mixture of lead sulfate and zinc oxide.”

[Hand pointing out areas of white paint on: *Algoma Hills*. Cross-section from: *Mount Goodsir, Yoho Park* with paint based on Cambridge White. Hand turning pages of a *Cambridge Colours* catalogue.]

Kate Helwig: “This was a very characteristic white paint and our research has shown that it came from the Cambridge Colours Artists' brand which was made by British colourman Madderton & Company. This paint was available in Toronto as early as 1906 and was still available in 1932 which is the year of MacDonald's death.”

[Tubes of Cambridge Colours paint from Madderton and Company.]

Kate Helwig: “We determined through the analysis that this was his preferred white pigment during all periods of his career. So at this point I've completed all the analysis of all our tiny paint

samples from the 32 works and put them all into the database. And Alison has completed all her visual examinations and writing up all her observations and so now I think the fun part starts.”

Alison Douglas: “Yeah this is where the fun begins and we get to compare notes and look for trends. And so I'm really looking forward to our ongoing collaboration. I've had an amazing experience working with CCI on this project and so there will be more to come.”

[*Algoma Hills* displayed on easel.]

[Canadian Conservation Institute signature and Canada wordmark]