Technical Analysis of a Tom Thomson Oil Sketch from the Agnes Etherington Art Centre, Queen's University

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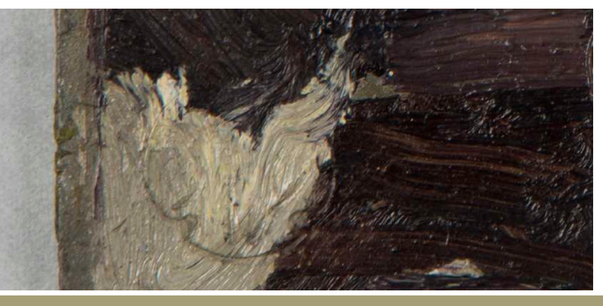
Introduction

Paintings that are thought to be originally by Tom Thomson (1877–1917) are still being discovered more than a hundred years after his death. Modern investigation techniques can help in the process of authentication of unconfirmed works. The Canadian Conservation Institute (CCI) has studied many authentic Thomson paintings in the past. This research project aims to add to the body of knowledge about Tom Thomson's choice of materials. For this purpose, a previously uninvestigated oil sketch (Figure 1) that resides at the Agnes Etherington Art Centre was analyzed. The investigation of this painting brought further insights into Thomson's work practice. The multi-analytical approach included multispectral imaging, X-ray fluorescence spectroscopy (XRF), and external reflectance infrared spectroscopy (ER-IR), all of which are non-destructive forms of analysis. The focus of the analysis was on the artist's use of painting materials including the paint referred to as Cambridge white. Additionally, the ink of the estate stamps (Figures 2 and 3) that were applied to many paintings after Thomson's death was analyzed for its characteristic traits. The stamp ink has not been discussed in depth in any previous publications, so this research will expand on the information about the painting's history.

Images from left to right and top to bottom.
Figure 1. *The Rapids* in normal light, Spring 1915, oil on board, 21.6 x 26.7 cm.
Figure 2. Close up of estate stamp on bottom left of *The Rapids*.
Figure 3. Close up of estate stamp the verso of *The Rapids*.



Experimental

Techniques employed:

- Digital photography
  - Normal light
  - Raking light
  - Ultraviolet fluorescence
  - Reflected ultraviolet
  - Reflected infrared
  - X-radiography
  - Infrared reflectography
- Multispectral document system Foster and Freeman VSC 8000
- HIROX 3-D microscope
- X-ray fluorescence spectroscopy (XRF)
- External reflectance-infrared spectroscopy (ER-IR)

Spots for XRF and ER-IR were chosen based on the differences in areas which could be seen throughout the different forms of imaging mentioned above. On the verso, the spots were selected to collect the data of the board support as well as the various inks used, including the estate stamp.

Results and Discussion

Zinc was found in major quantities in all spots. This is likely the result of the ground and the general mixing of paint throughout the panel. XRF analysis indicated the presence of the following pigments (based on previous findings by CCI):

Likely:
- Zinc oxide
- Lead sulfate
- Barium sulfate
- Yellow iron oxide
- Umber
- Vermilion
- Viridian
- Prussian blue
- Cobalt blue

Possibly:
- Red iron oxide
- Cadmium yellow
- Cobalt yellow

Due to the lack of adequate ER-IR reference spectra, no final conclusions could be made from the data. However the spectra from the front of the panel were divided into two types which are illustrated in red and pink in Figure 4. The meaning of these groupings remains unclear (Figure 5).

Table 1 (right). Major elements of XRF examination. The Ni peaks are ignored in the interpretation as they are the result of instrument interference. Spots 30–33 are from the verso and are not depicted here. They represent a reading from the panel itself as well as readings from the different different inscriptions on the panel. Spot 33 was taken from the estate stamp seen in Figure 3.

Spot	Observed Colour	XRF findings
1	stamp recto	Zn, Fe, Cr
2	green	Zn, Hg, Cr, Fe, Ba, Co
3	dark blue	Zn, Cr, Fe, Ni
4	green grey	Zn, Fe, Cr
5	grey	Zn, Ba, Pb, S, Fe, Ca
6	light blue	Zn, Cr, Ba, Fe
7	purple-brown	Zn, Cr, Co, Hg, Fe, Pb
8	black	Zn, Hg, Fe, Cr, Ba
9	white	Zn, Fe
10	yellow	Zn, Fe, Cr
11	purple	Zn, Hg, Fe, Co, Cr
12	dark blue	Zn, Co, Ba, Pb, Fe, Hg, Cr
13	dark green	Cr, Fe, Zn, Ba
14	dark purple	Co, Zn, Hg, Fe, Cr, Ni
15	light purple	Zn, Hg, Fe, Cr, Co
16	mid-tone purple	Zn, Hg, Cr, Fe, Co
17	dark purple	Zn, Cr, Hg, Fe
18	light yellow	Zn, Ba
19	green	Zn, Fe, Cr, Hg, Co
20	dark green	Zn, Cr, Hg, Ba, Pb, Fe
21	green	Zn, Cr, Fe, Hg
22	dark purple	Zn, Hg, Cr, Fe, Co
23	dark green	Cr, Fe, Pb, Ca, Zn
24	dark purple	Cr, Zn, Fe, Ba, Hg
25	dark brown	Fe, Cr, Zn, Hg, Pb, Ba
26	dark blue	Cr, Zn, Fe, Pb
30	panel	Fe, Ca
31	friable media	Fe, Ca
32	writing ink	Fe, Ca
33	stamp verso	Fe, Ca

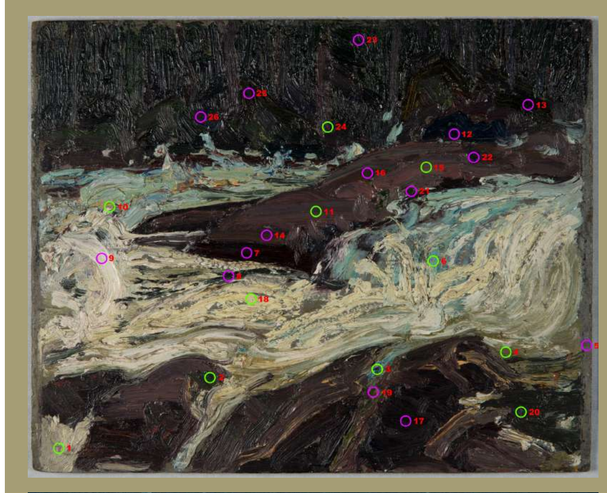


Figure 4. *The Rapids* annotated with spots which were analysed through XRF and ER-IR. The colours denote the two groups found in ER-IR.

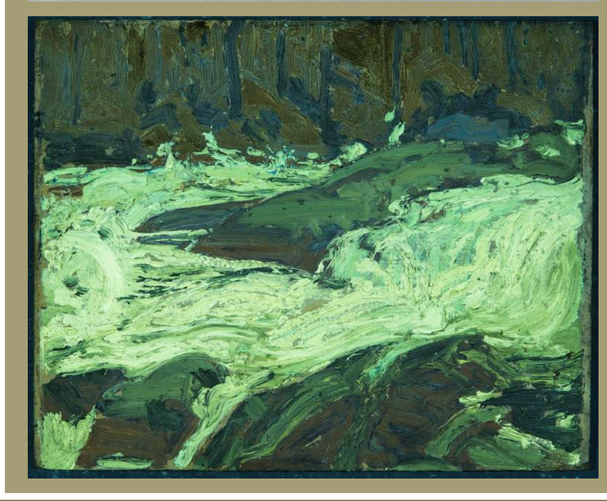


Figure 5. *The Rapids* under UV fluorescence. No correlation was found between the fluorescence and the groups identified through ER-IR.

Conclusion

The results show that the elements in the paint are consistent with those found in other paintings by Tom Thomson. Though lead sulfate, zinc oxide and barium sulfate (the components of Cambridge white) were found in some of the colours, the zinc component is significantly greater than would be expected for Cambridge white. However, this does not however negate the panel's authenticity, as Tom Thomson did not exclusively use Cambridge white in his works. The XRF of the estate stamps showed the presence of Fe, which could be indicative of the ink used in them. However Fe was also found in the board, so an organic ink cannot be discounted.

Further research would include the establishment of ER-IR reference libraries which would allow further confirmation of the make-up of organic and inorganic content in the paint and ink. Additionally, ink mock-ups could be analysed under multispectral imaging in a future research project.

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References

Corbeil, Marie-Claude, Elizabeth A. Moffatt, P. Jane Sirois, and Kris M. Legate. "The Materials and Techniques of Tom Thomson." In *Journal of the Canadian Association of Conservation* vol. 25, (2000): 3–10.
Corbeil, Marie-Claude, P. Jane Sirois, and Elizabeth A. Moffatt. "The Use of a White Pigment Patented by Freeman by Tom Thomson and the Group of Seven." In *Triennial meeting (12th)*, Lyon, 29 August-3 September 1999: preprints vol. 1, (September 1999): 363–368.
Corbeil, Marie-Claude, Eric J. Henderson, and Susan Walker. "A Survey of the Use of Cambridge White by Canadian Artists." In *Journal of the Canadian Association of Conservation* vol. 45, (2020): 51–58.