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**Extended Abstract**

CONSOLIDATING BRITTLE INK: TECHNICAL ANALYSIS AND TREATMENT OF AN EARLY 20<sup>TH</sup>  
CENTURY SERIGRAPH

*The Painters of Canada Christmas Card Series* (c. 1931) was an early endeavour by the Canadian graphic art company Sampson-Matthews Ltd. (1918-1980) to produce serigraphs that would popularise the works of Canadian artists throughout the nation. However, due to the economic instability of the time, the series was a financial failure and the surviving cards now remain scarce. One of these serigraphs, *The Red Canoe* by J.E.H. Macdonald, was deposited for conservation treatment by a private client to the paper conservation lab at Queen's University. The media layer of the print showed a severe state of deterioration, with extensive delamination, cracking, and flaking (see figure 1). The goal of this project was to determine an approach for the consolidation of thick brittle ink on paper, and to minimize testing on the original print by creating artificially aged mockup samples. A technical analysis of the materials and methods of *The Red Canoe* was therefore carried out, with a primary focus on the identification of the binder.

Samples of the ink were taken from non-recoverable losses, and analysed using light microscopy, scanning electron microscopy/ energy dispersive x-ray spectroscopy (SEM/EDS), Fourier transform infrared spectroscopy (FTIR), and x-ray fluorescence spectroscopy (XRF). These analyses revealed the presence of a zinc carboxylate salt, and the identity of two pigments: ultramarine blue and lithopone (i.e. barium sulfate and zinc sulfide). Zinc carboxylate salts, commonly called metal soaps, are sometimes formed in an oil paint film through the reaction of fatty acids and zinc oxide. The zinc carboxylate salt in the print was however not necessarily indicative of an oil-based ink, as it could have been added as a drier. The identity of the binder remained inconclusive.

Representative mockup samples were not created due to the unknown binder. Treatment tests were therefore performed on minimally invasive areas of the print. An ethanol solvent vapour chamber was placed over a localised area of the print for two hours to allow the ink flakes to relax (figure 2). Consolidation was achieved by brush application: 2% w/v TRI-funori in distilled water was applied underneath the flake using a 000 sable hair watercolour brush, and ethanol was subsequently fed in to disperse the consolidant. The flakes were gently pressed down with a fine-tip silicone shaper tool and a dry 000 watercolour brush. After consolidation, a blotter or Tek-Wipe was placed over the area and dried under light weights for 12 hours. Further stabilization of minor lifting areas and cracks was achieved using 2% w/v Klucel-G in ethanol. Klucel-G, despite its viscosity, was chosen for its shorter drying time and its ability to adhere the flakes without weight. Additional applications of ethanol helped to increase the flow of the consolidant. Consolidation treatment successfully brought the media layer back to a flat surface (figure 3).



**Figure 1.** Before treatment detail photograph of ink layer of *The Red Canoe*. Media is severely cupped and delaminating from the paper substrate.



**Figure 2.** Localised areas of *The Red Canoe* conditioned with ethanol solvent vapour chambers to relax ink flakes. Chambers were created using ethanol-saturated blotters set into place with rare earth magnets in small beakers.



**Figure 3.** After treatment detail photograph of *The Red Canoe*.