The Tale of Two Paintings

Part of the ***Painting-with-Minerals Project***

by

Alan R Butcher, **Ester M Jolis** & **Sari Lukkari**
Geological Survey of Finland (GTK)
&
Andrew H Menzies & **Roald Tagle**
Bruker Nano Analytics GmbH Germany

In collaboration with
Halosenniemi Museum, Finland

September 2022

The Tale of Two Paintings

Kuutamo (Talvimaisema)
Månsken (Vinterlandskap)
Moonlight (Winter Landscape)

Painted in 1912
Oil on canvas

During 22 – 23 August 2022, two original oil paintings by Pekka Halonen (Halosenniemi Museum), were scanned at GTK using novel x-ray micro-XRF techniques provided by Bruker Nano Technology in Germany.

The results revealed the micro-chemical composition of the pigments used by the artist Pekka Halonen.

This presentation summarises the main findings, highlights and activities during the two days.

Further in-depth analysis is still on-going.

Spring

Painted in 1924
Oil on Hardboard

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Installation, set-up & calibration of the M6 JETSTREAM large-scale scanning micro-XRF

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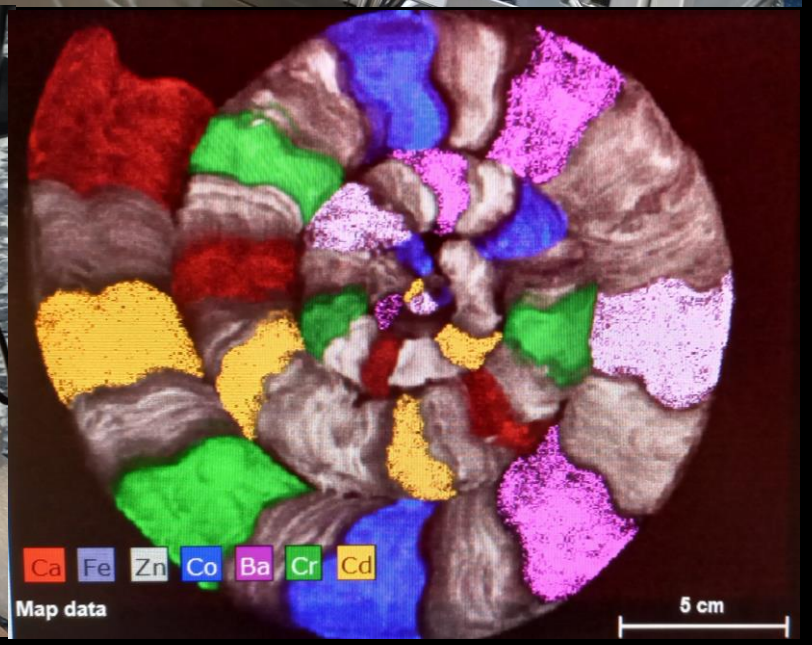
Arrival at GTK, installation & calibration



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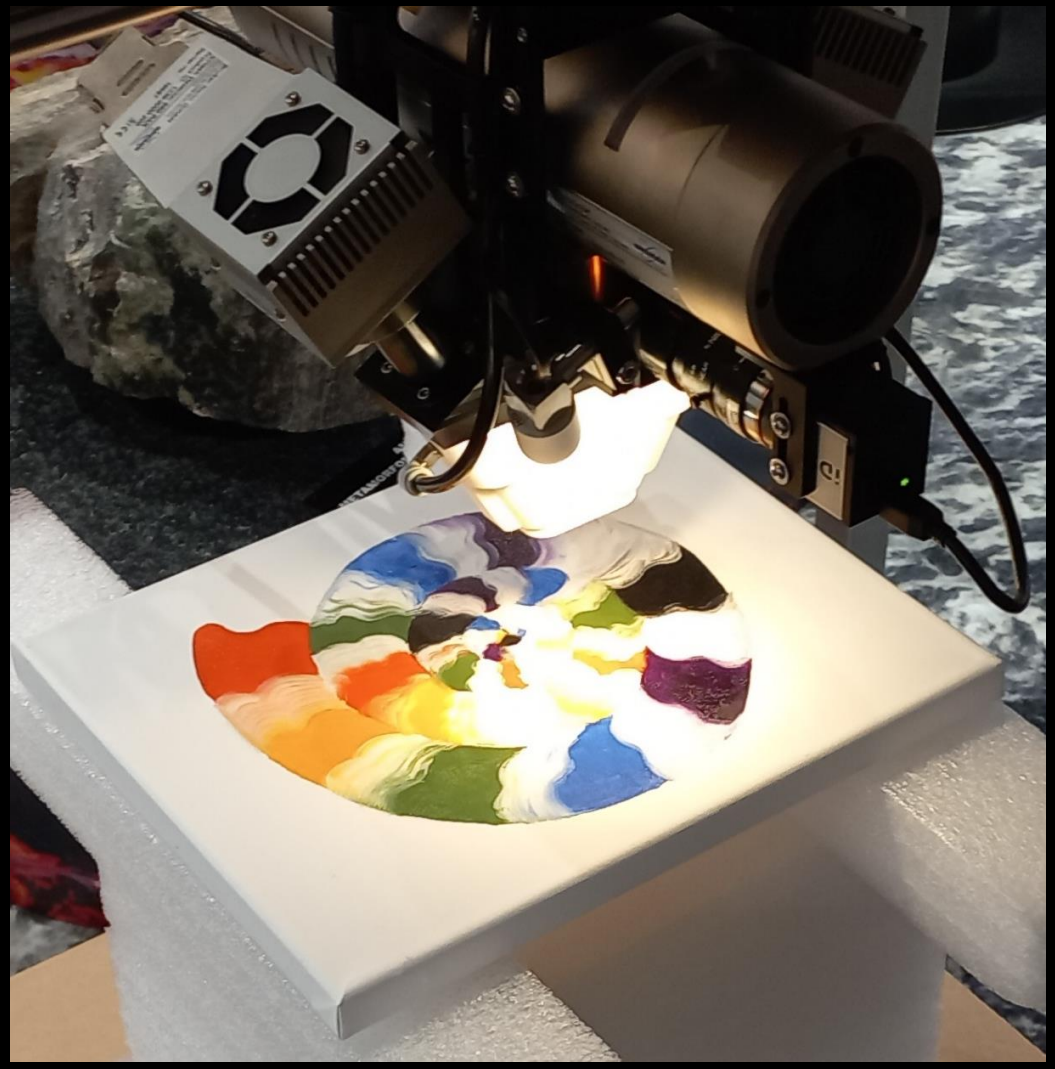
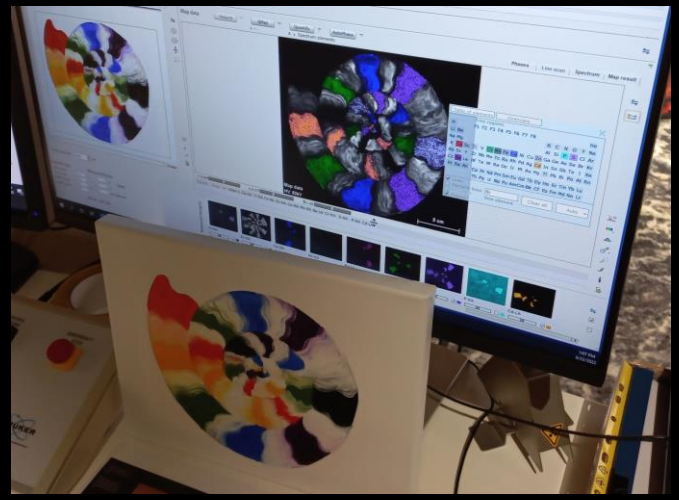
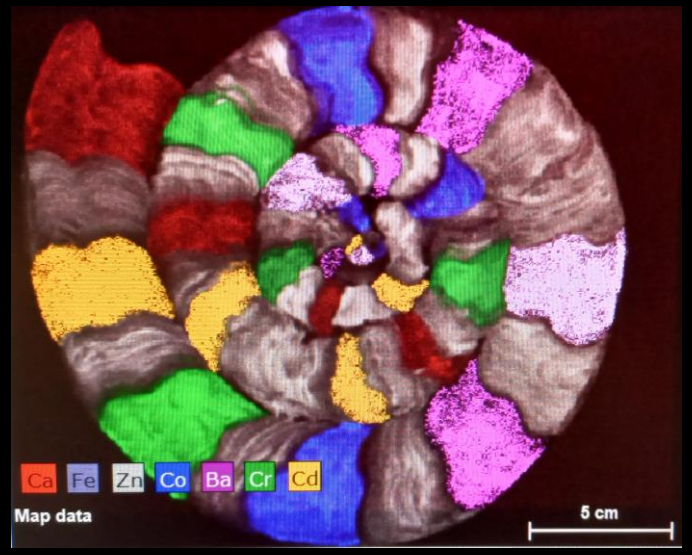
M6 JETSREAM Analysis of the GTK standard oil paint canvas







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M6 JETSTREAM system operational and ready for analysis

Pekka Halonen’s Moonlight Painting

Kuutamo (Talvimaisema)
Månsken (Vinterlandskap)
Moonlight (Winter Landscape)

Painted in 1912

Oil on canvas

Highlights of Moonlight

Snow is interpreted to be combinations of **lead white** and **zinc white**

Pekka Halonen painted his **signature** in **chrome green**

Moon is mostly zinc white with a **cadmium-rich** ring

Sky contains **lead blue**

Rocks painted in **mercury** and **iron**

No titanium white detected!

Nails used to stretch canvas on a wooden frame seen in the **iron** image!

Analytical Specifications of ”Moonlight”

MAP INFORMATION		
Mapping parameters		
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	288	mm
Height:	1034	pixel
	517	mm
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Acquisition parameters		
Frame count:	0	
Pixel time:	10	ms/pixel
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Overall time:	2:57 h	
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Stage position (X,Y,Z):	88.766;-171.5;58.986	mm
Tube parameter		
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Anode current:	199	µA
Filter:	Empty	
Optic:	Lens	
Collimator diameter:	0	
SpotSize:	230	
Chamber at:	Air 1000	mbar
Flow rate:	---	l/min
Anode:	Rh	
Detector parameters		
Selected detectors:	1,2	
Max. pulse throughput:	275000	cps

Delivery of the painting and setting-up for analysis

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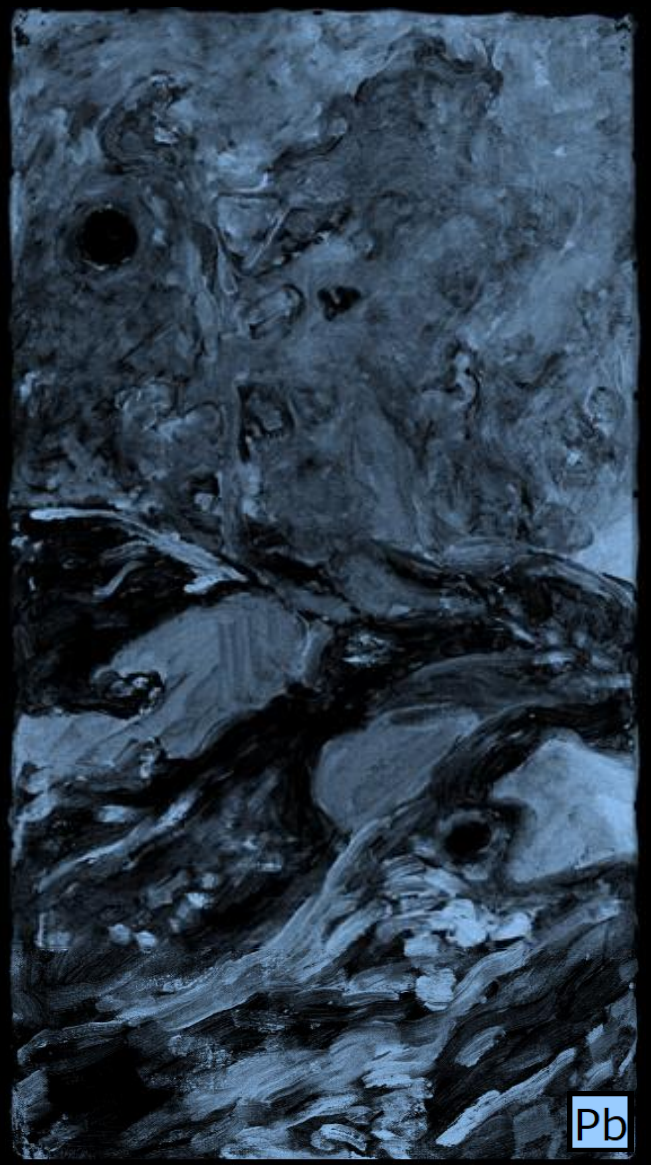
Results from the micro-XRF scanning



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Moonlight

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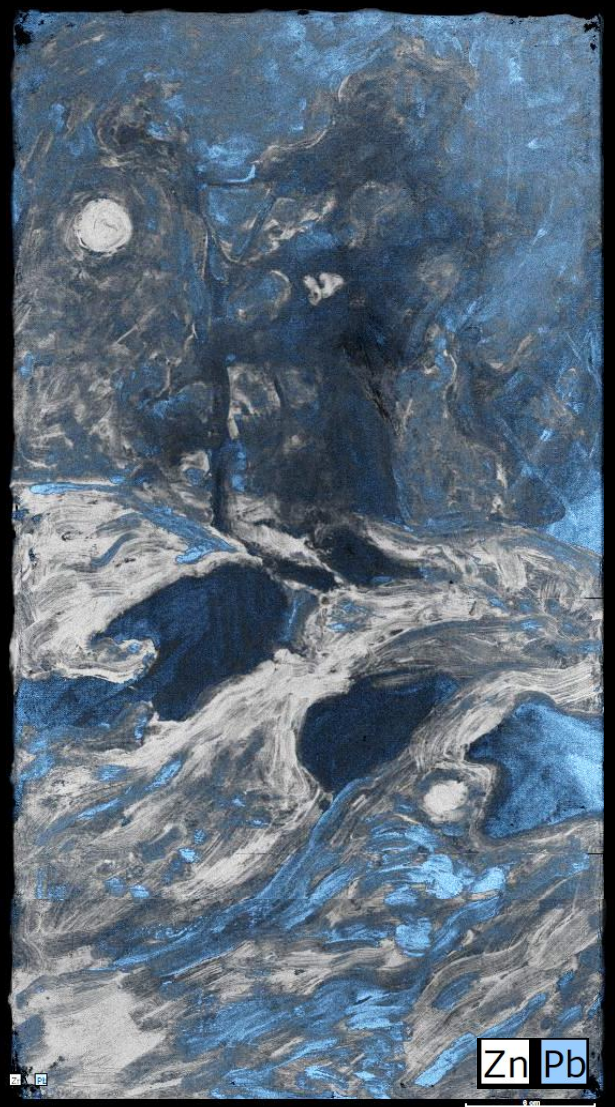
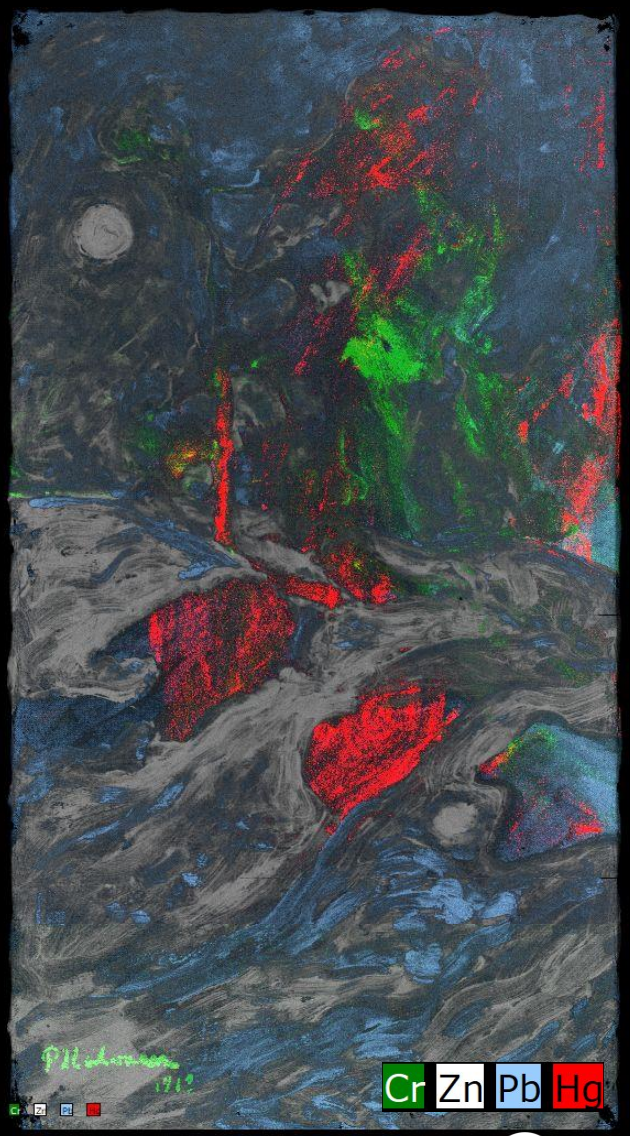
Results from the M6 JETSTREAM micro-XRF scanning

Elemental mapping – Zn, Pb, Cr, & Hg

Optical





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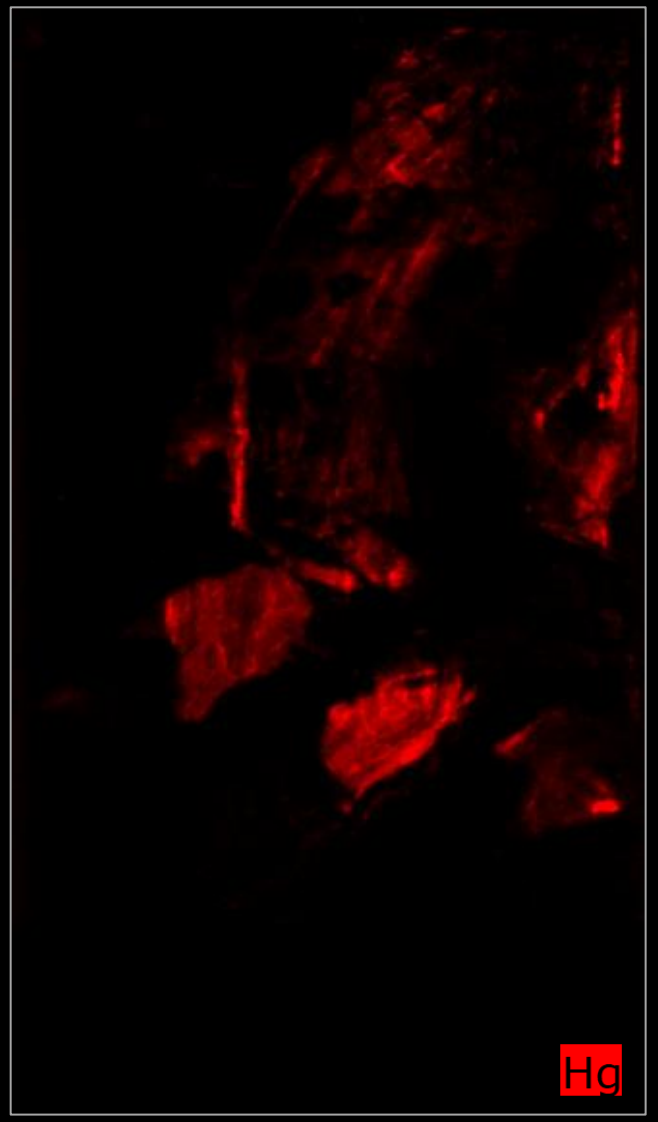
Results from the micro-XRF scanning

Optical



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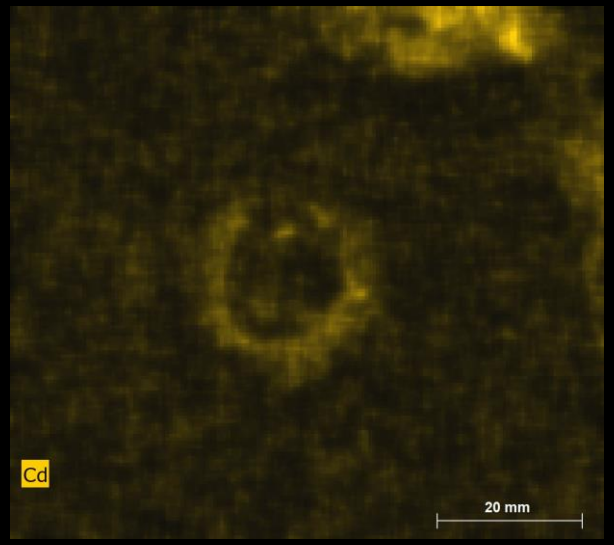
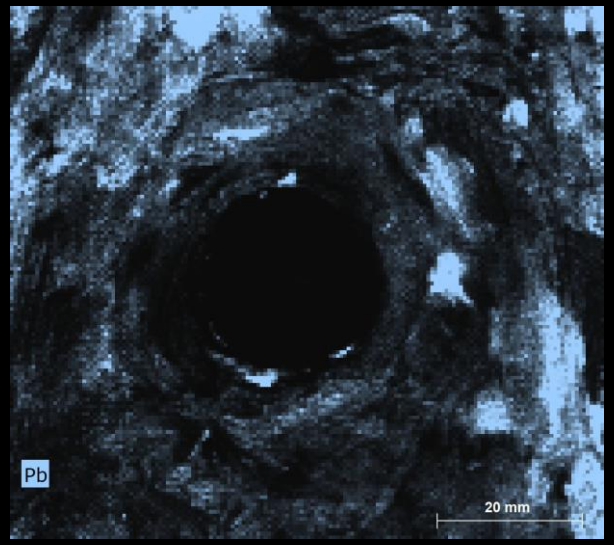
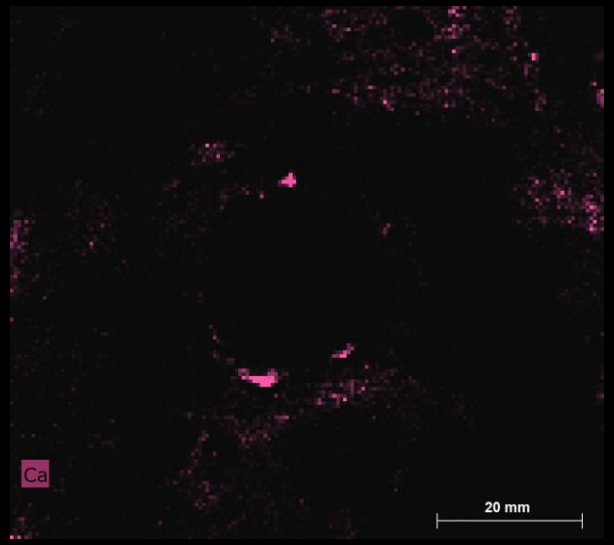
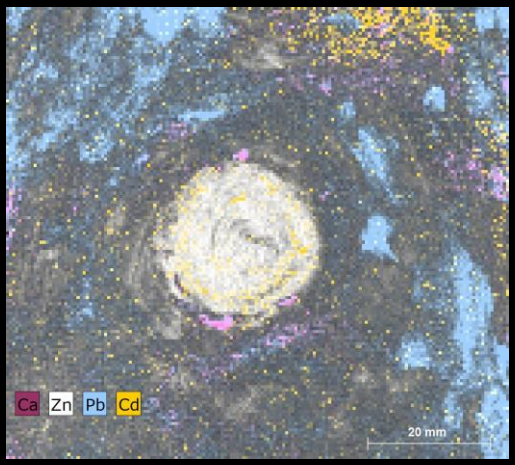
Results from the micro-XRF scanning

Optical









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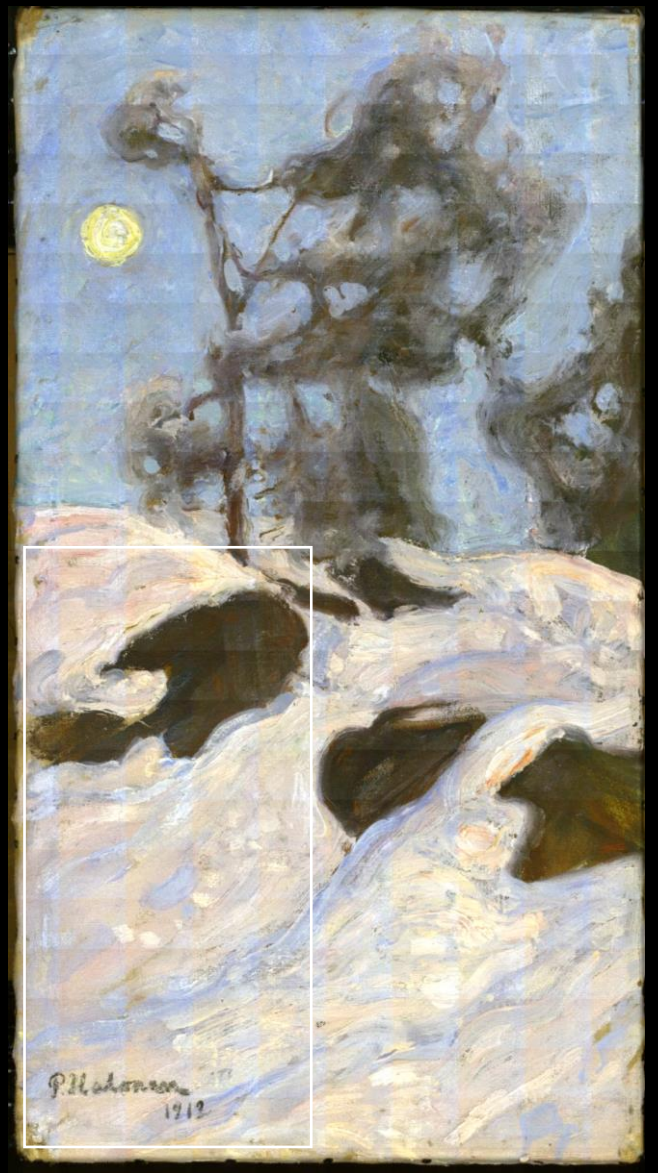
Results from the micro-XRF scanning

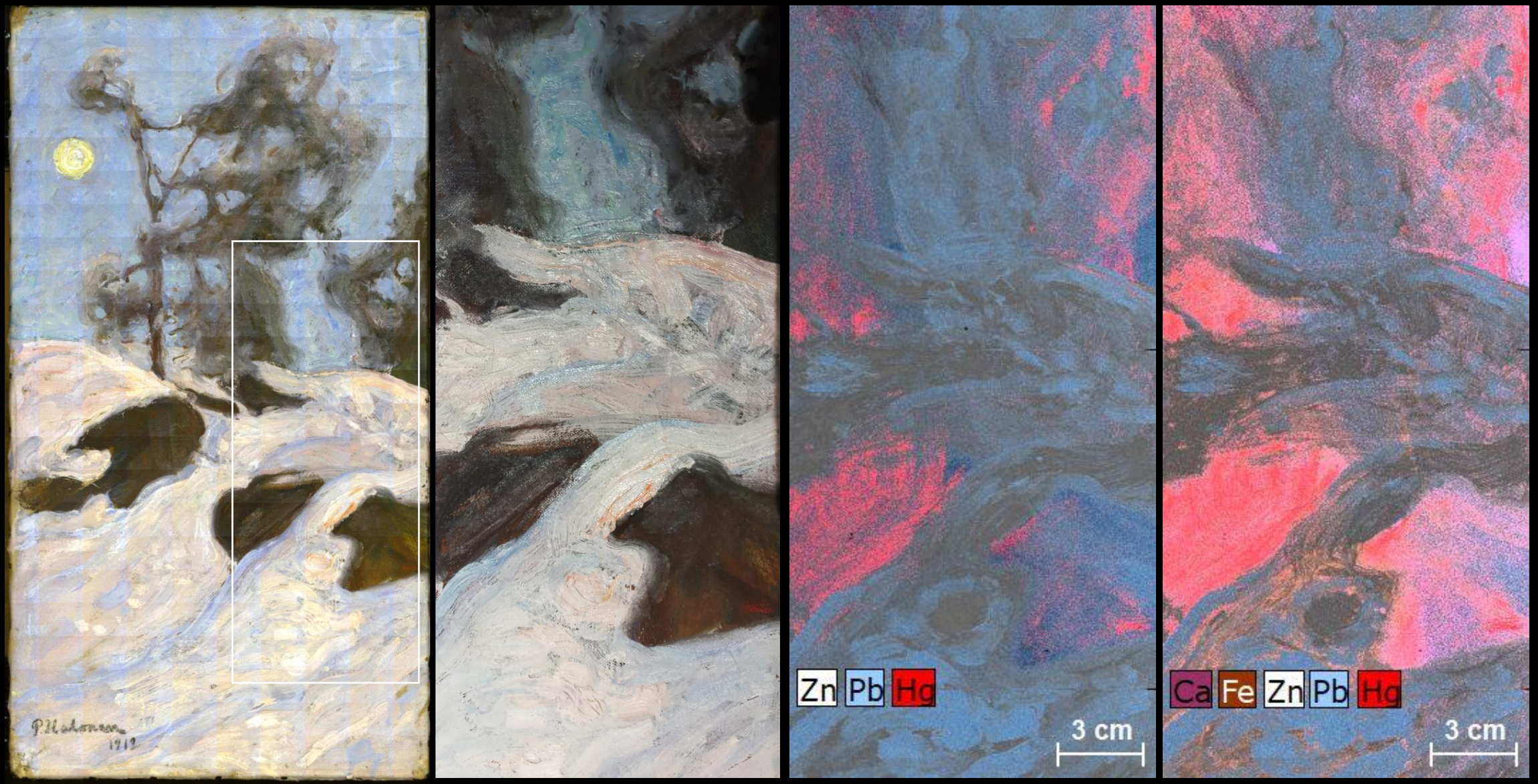
Optical



Ca Fe Zn Pb Hg

Results from the micro-XRF scanning

Optical



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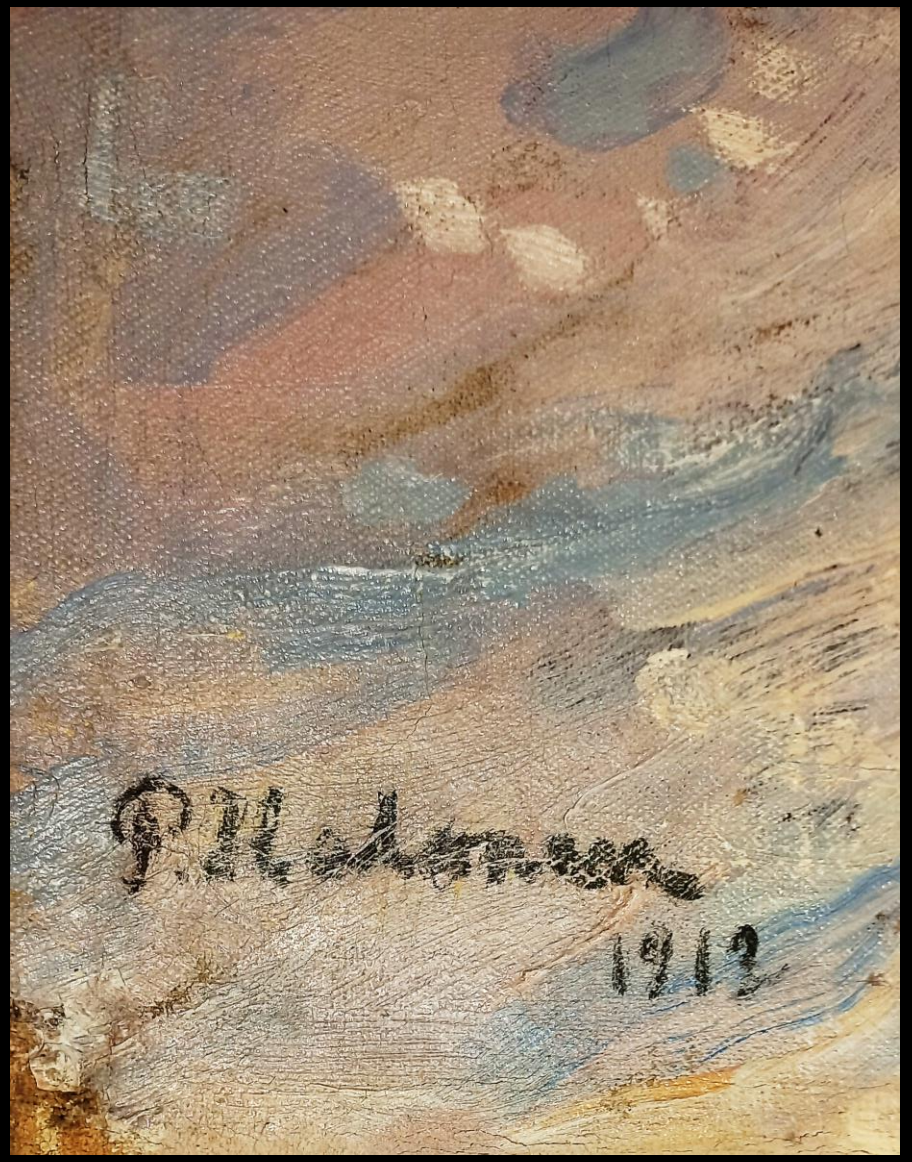
Results from the micro-XRF scanning

Optical

Optical



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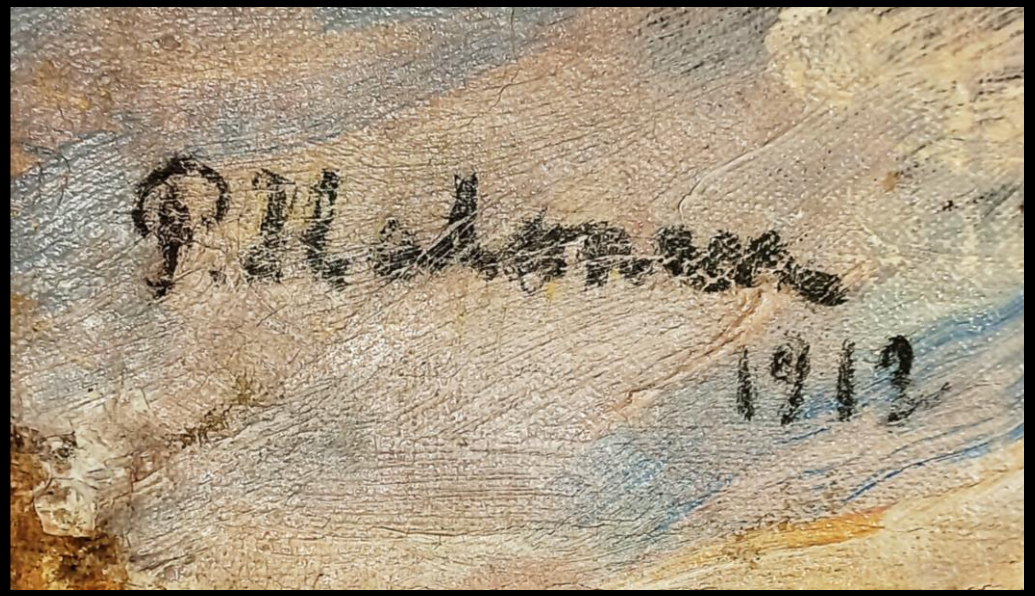
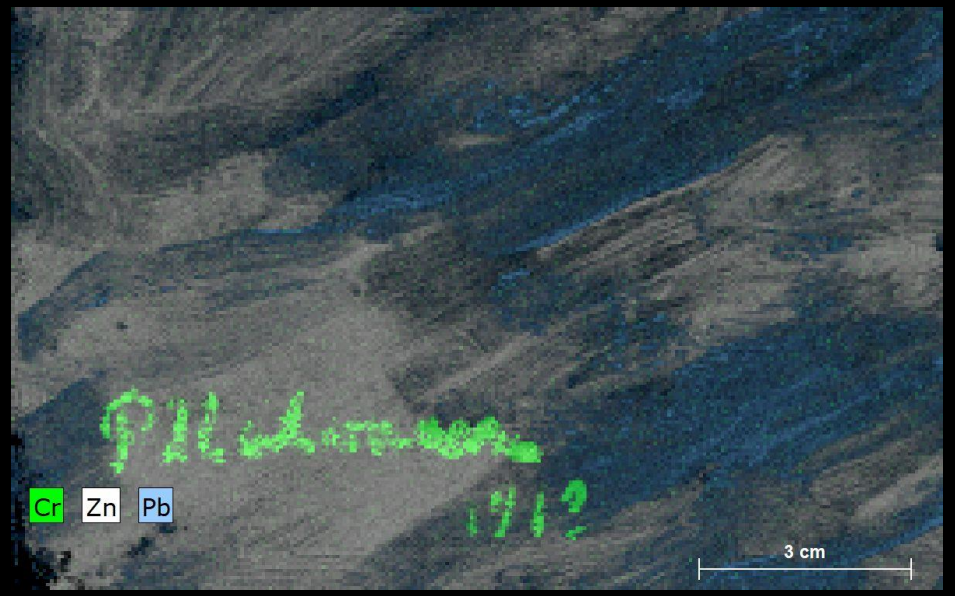
Results from the micro-XRF scanning

Optical



P. Halonen1912



P. Halonen1912

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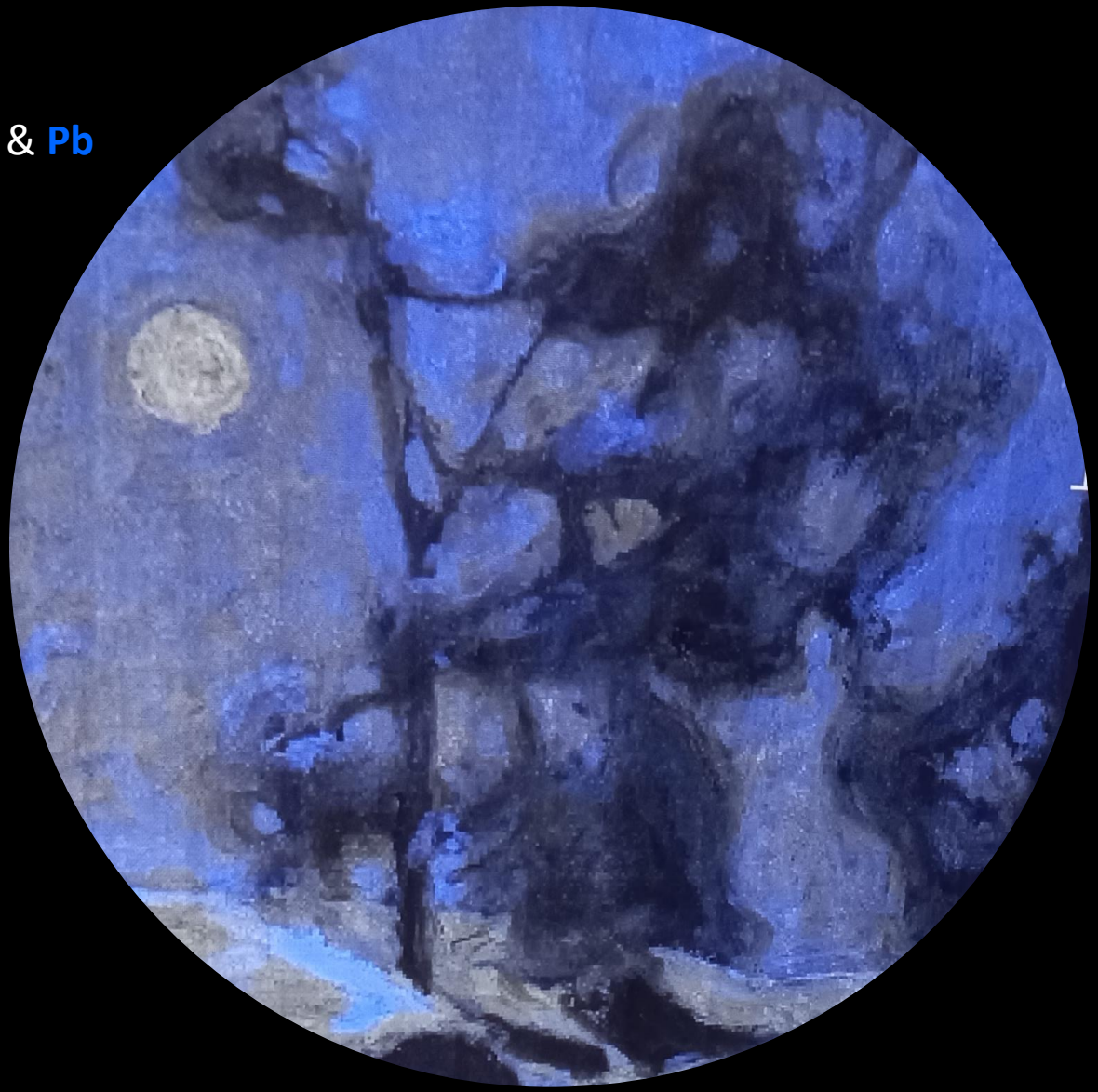
Zn & Pb



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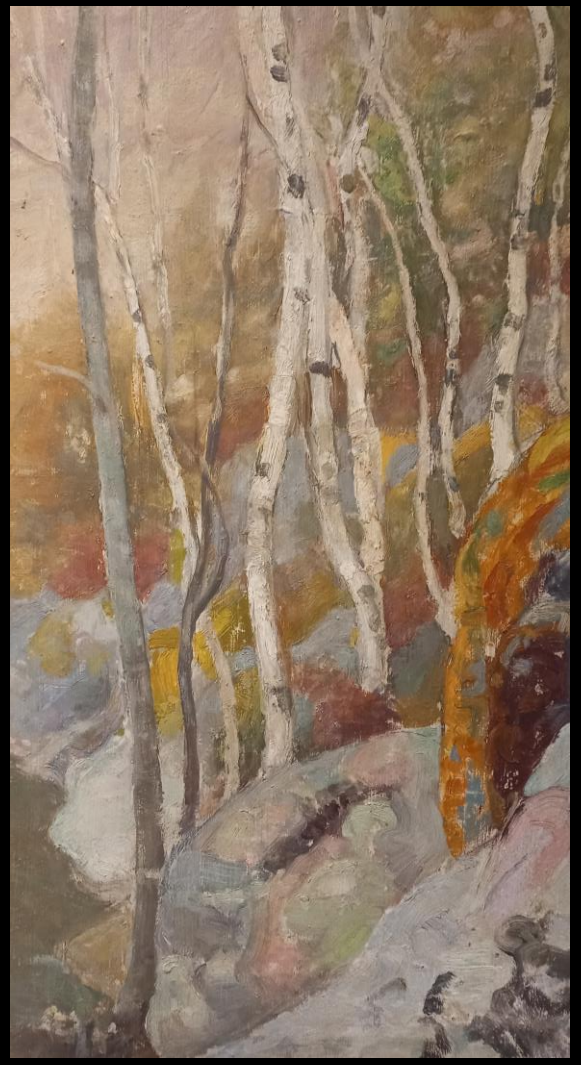
Pekka Halonen's Spring Painting

Spring

Painted in 1924

Oil on Hardboard

Analytical Specifications of ”Spring”



MAP INFORMATION

Mapping parameters		
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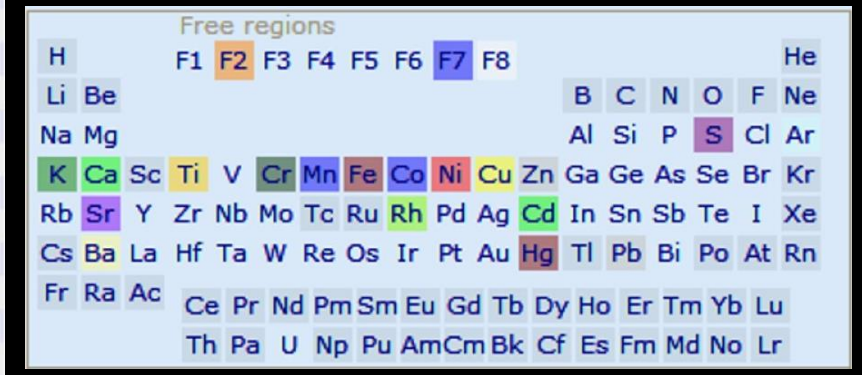
	434	mm
Height:	1036	pixel
	518	mm
Pixel Size:	500	µm
Total number of pixel:	899248	pixel
Acquisition parameters		
Frame count:	1	
Pixel time:	5	ms/pixel
Measure time:	25 min	
Overall time:	3:08 h	
Stage speed:	100.0	mm/s
Stage position (X,Y,Z):	113.209;453.511;78.292	mm
Tube parameter		
High voltage:	50	kV
Anode current:	300	µA
Filter:	Empty	
Optic:	Lens	
Collimator diameter:	0	
SpotSize:	230	
Chamber at:	Air 1000	mbar
Flow rate:	---	l/min
Anode:	Rh	
Detector parameters		
Selected detectors:	1,2	
Max. pulse throughput:	130000	cps



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Scanning ”Spring”

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Highlights of Spring

Complex use of lots of different paints and pigments

Birch tree trunks were likely painted using lead white

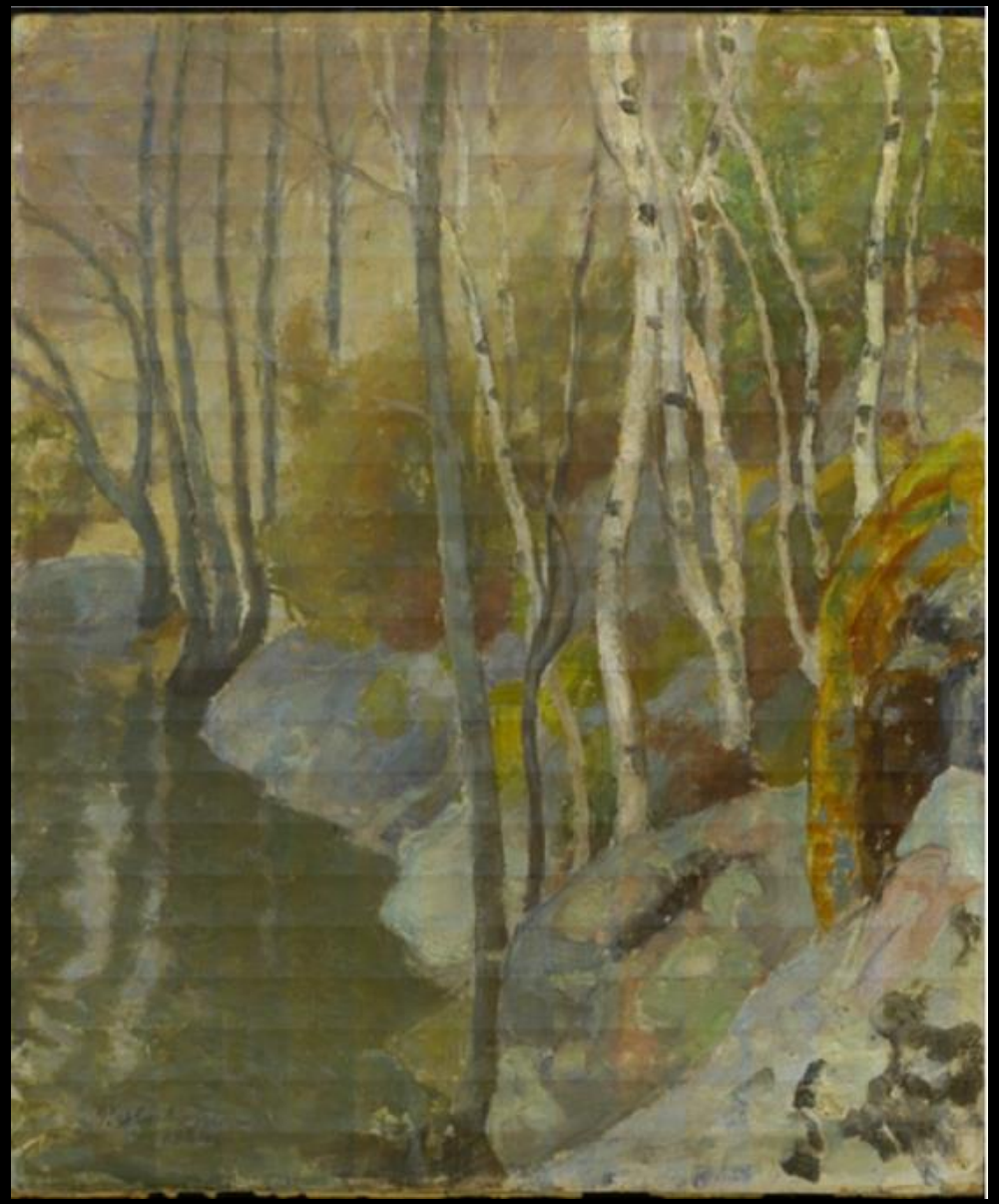
Chromium green used to create water effects

Titanium white was used in the upper half and middle right of the painting

Possible damage to the painting shown by calcium carbonate in-filling

Signature was signed using cobalt-rich paint

Optical



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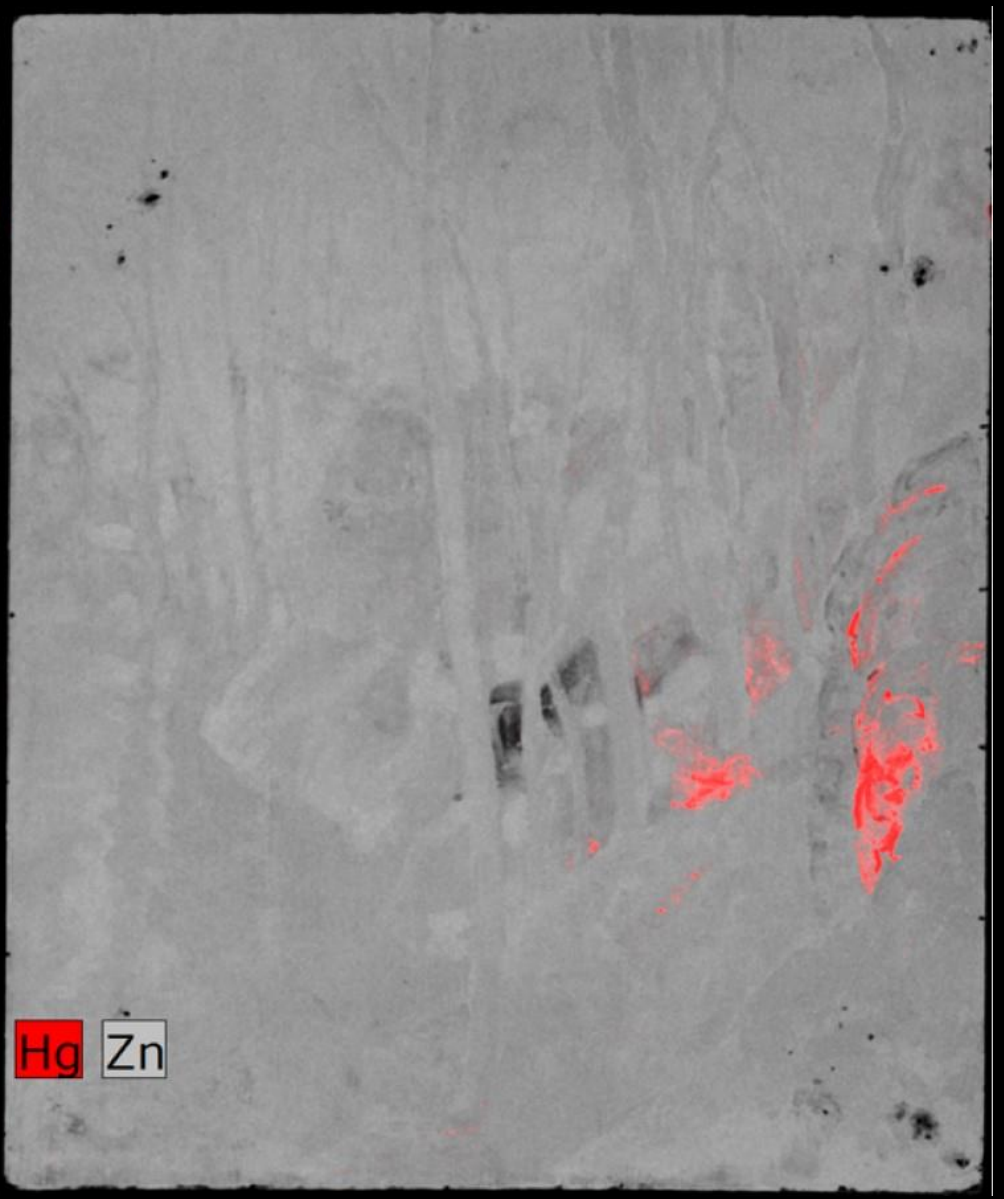

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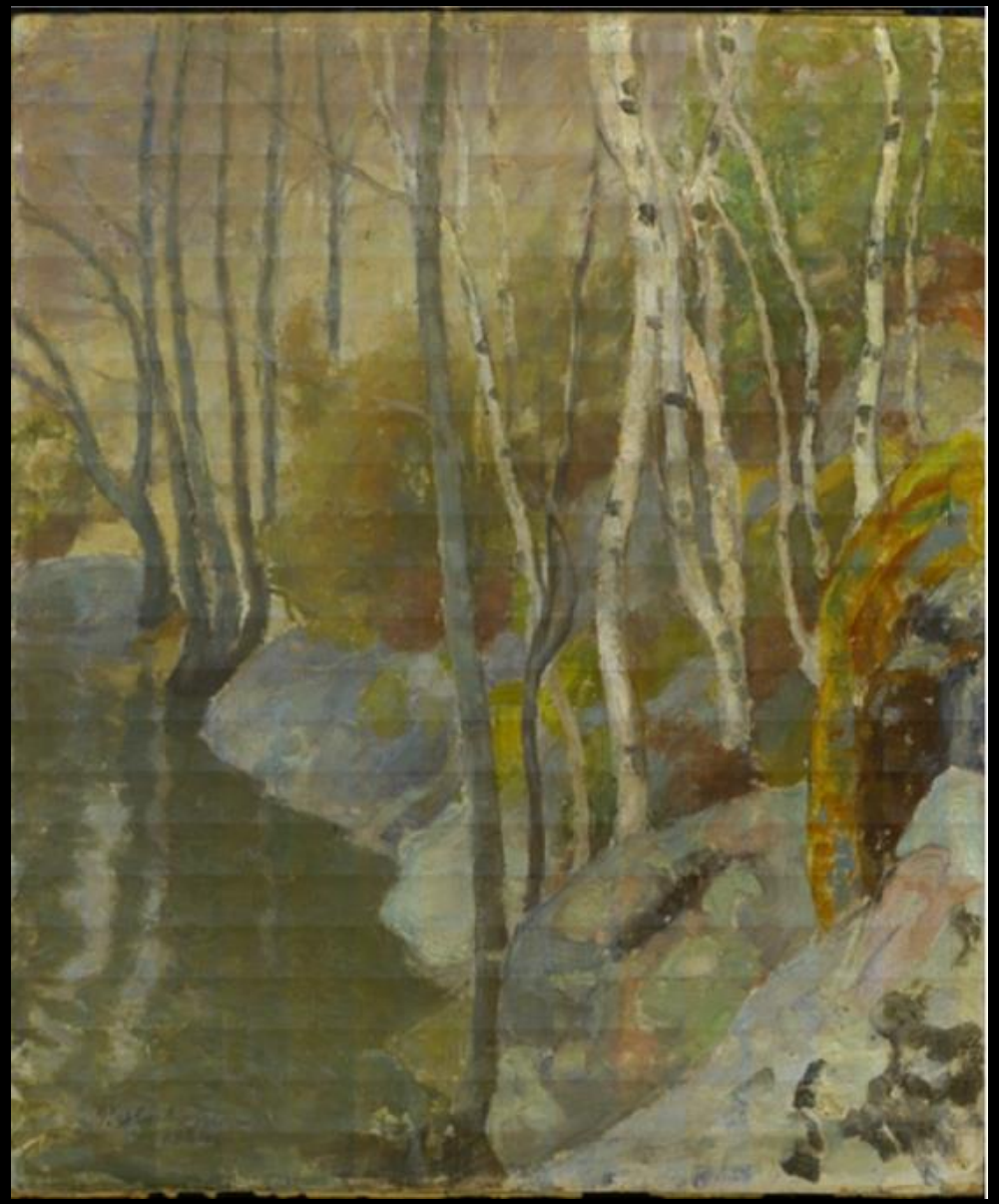

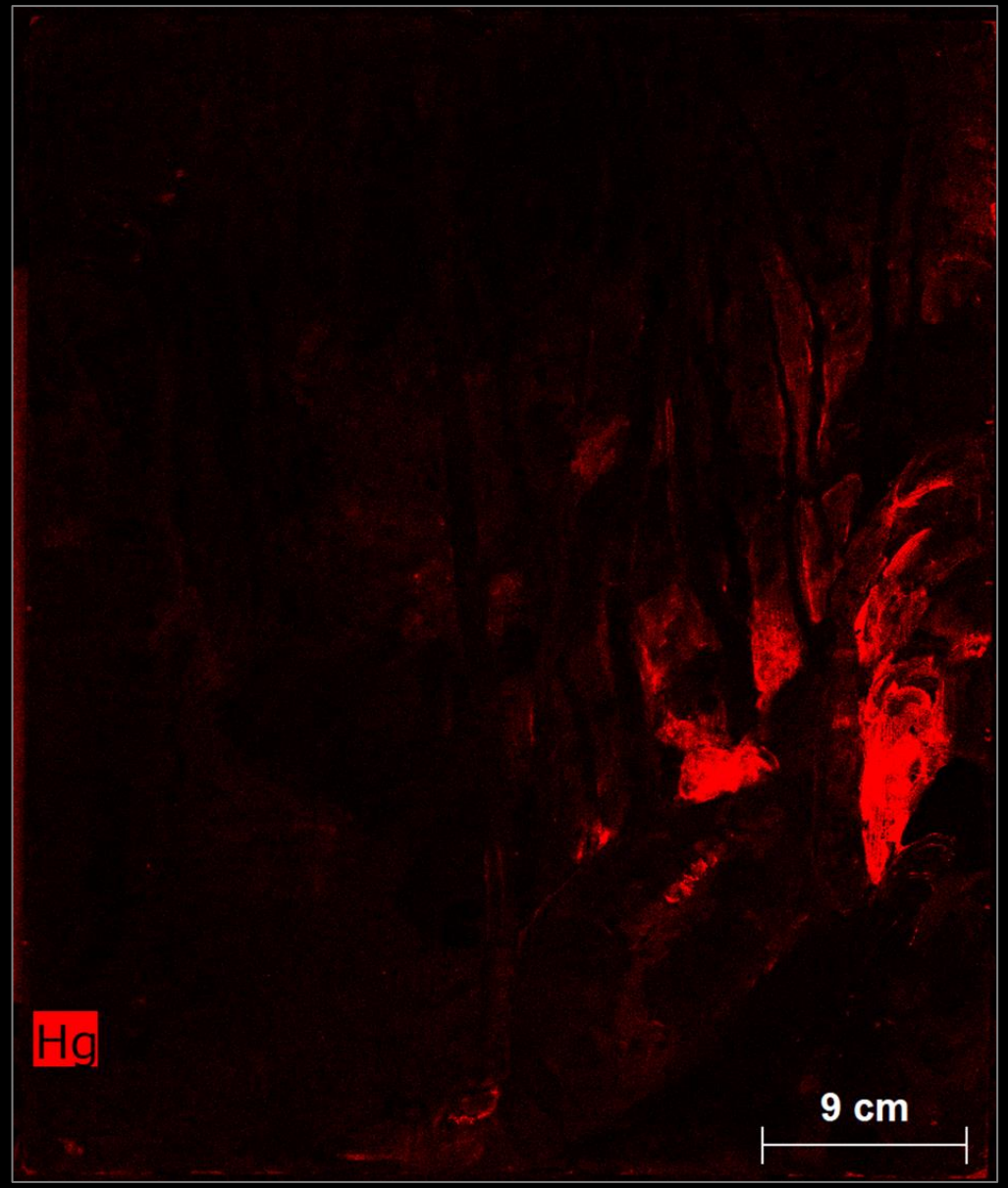

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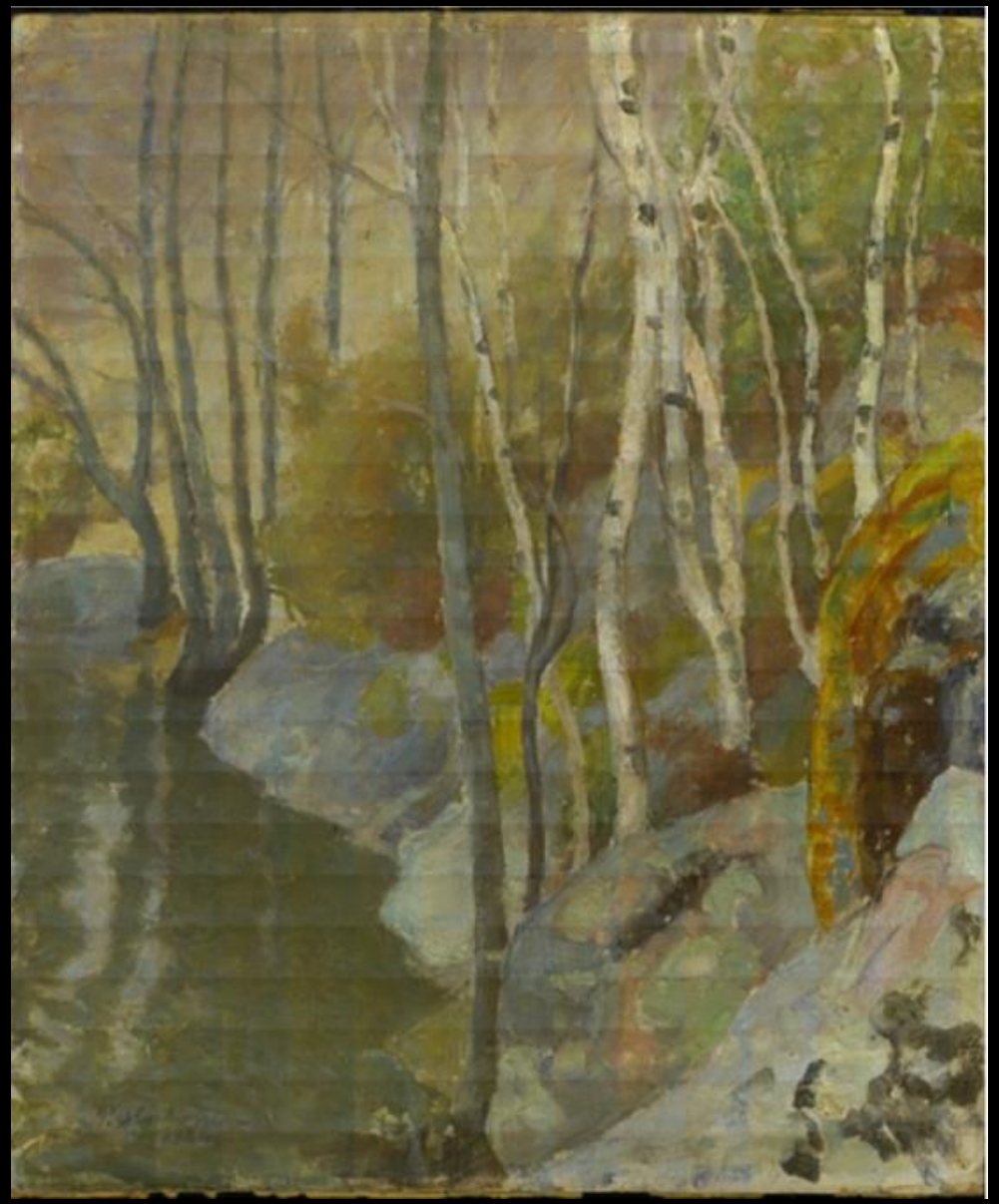
Optical



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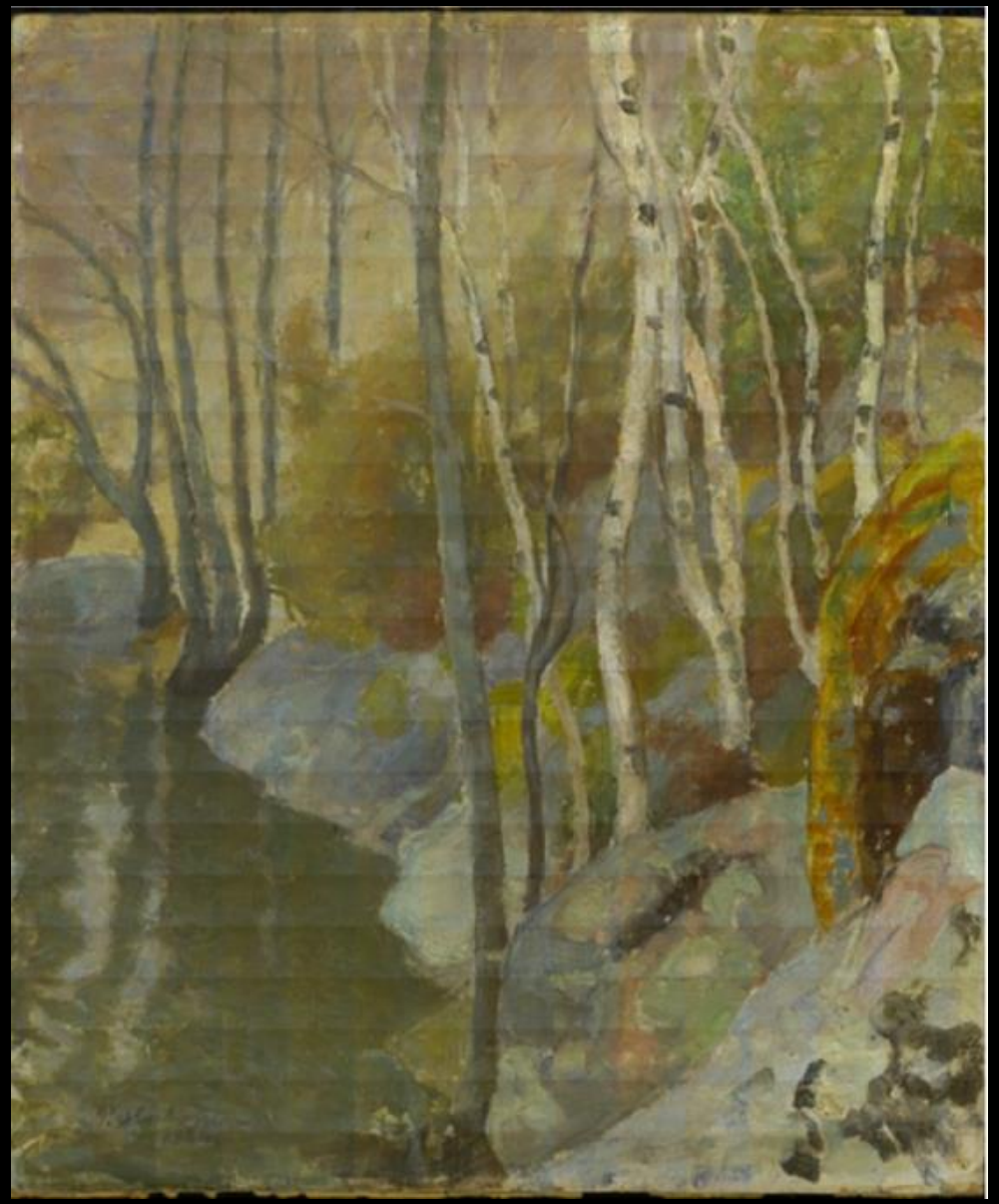

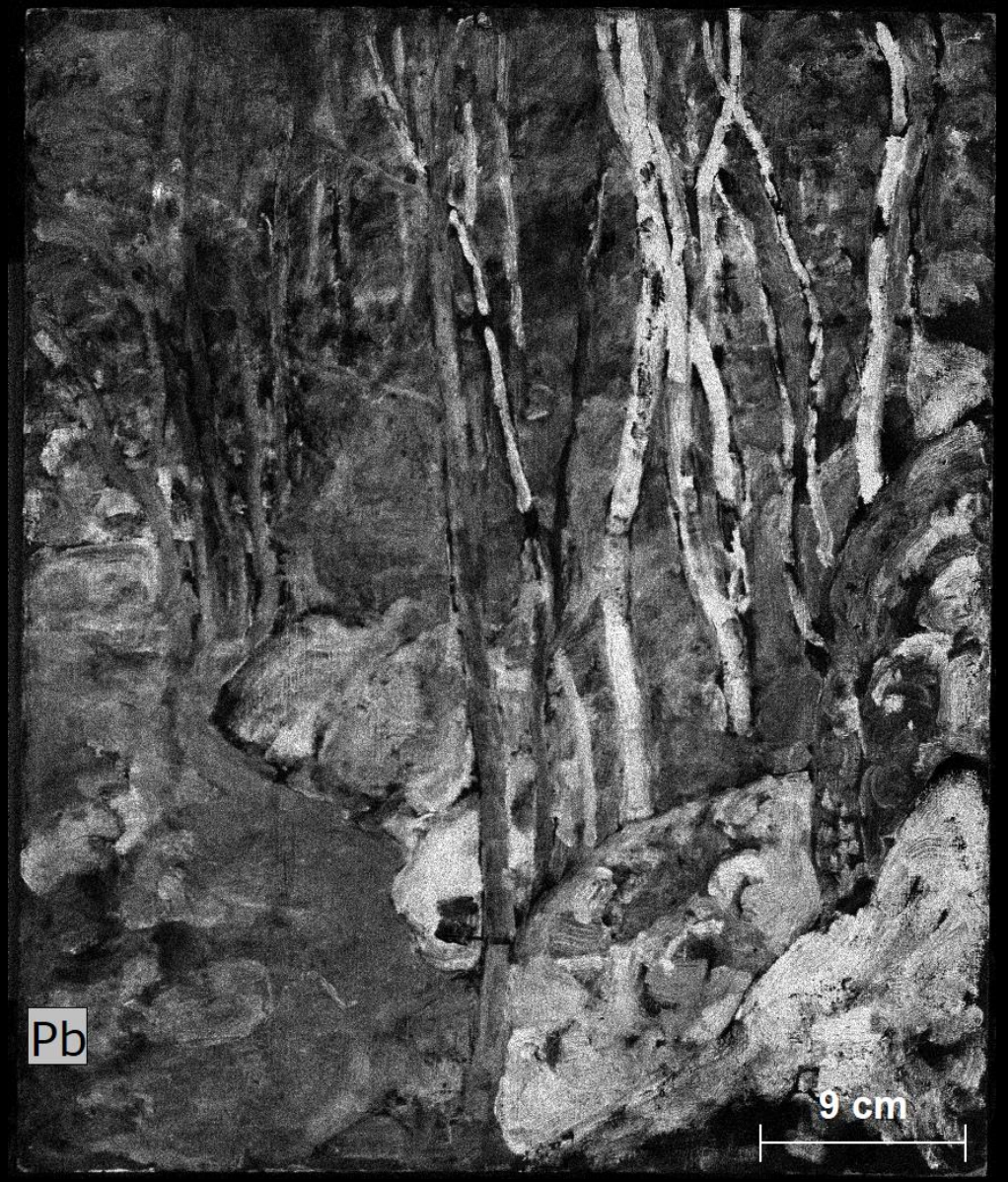

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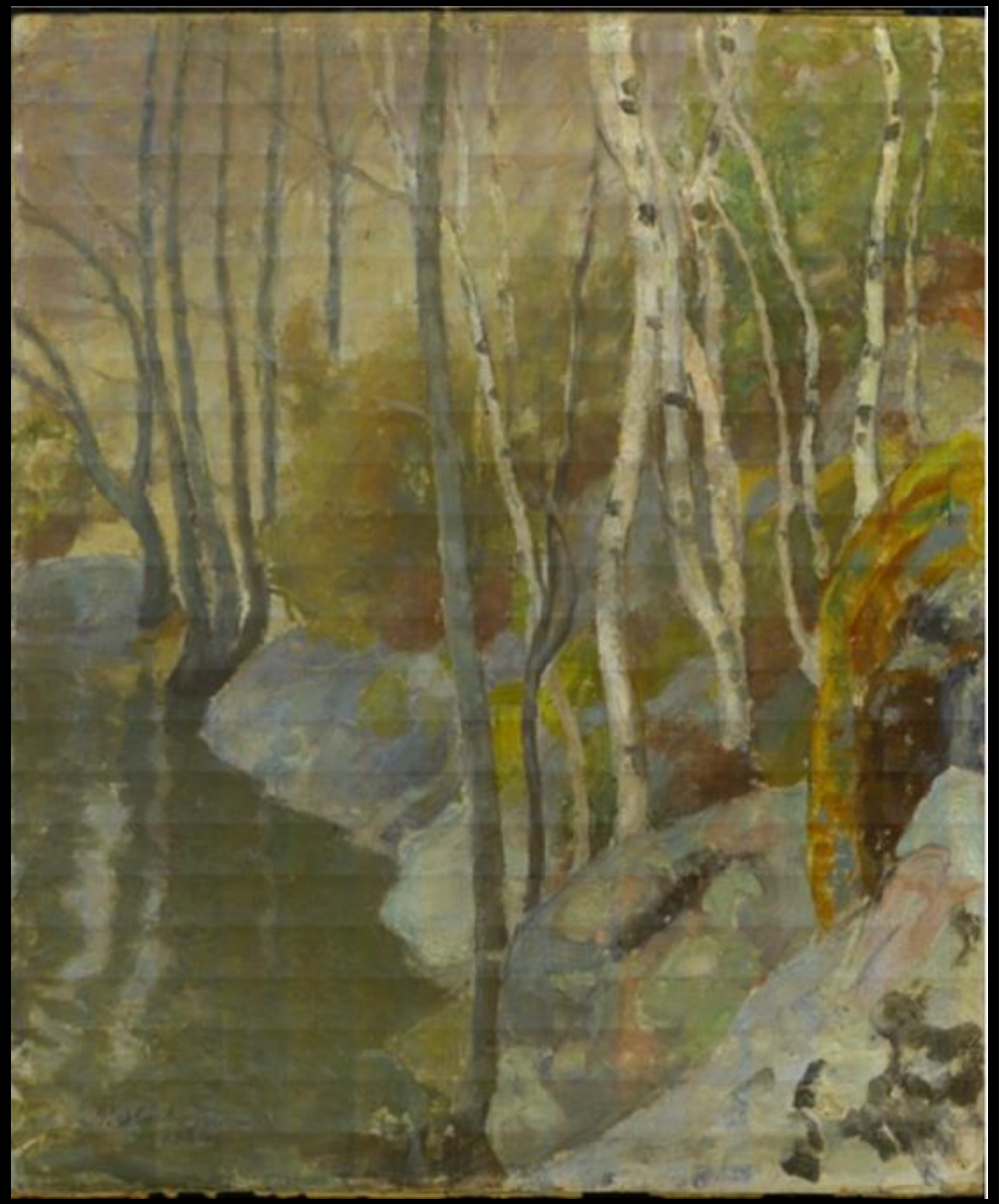
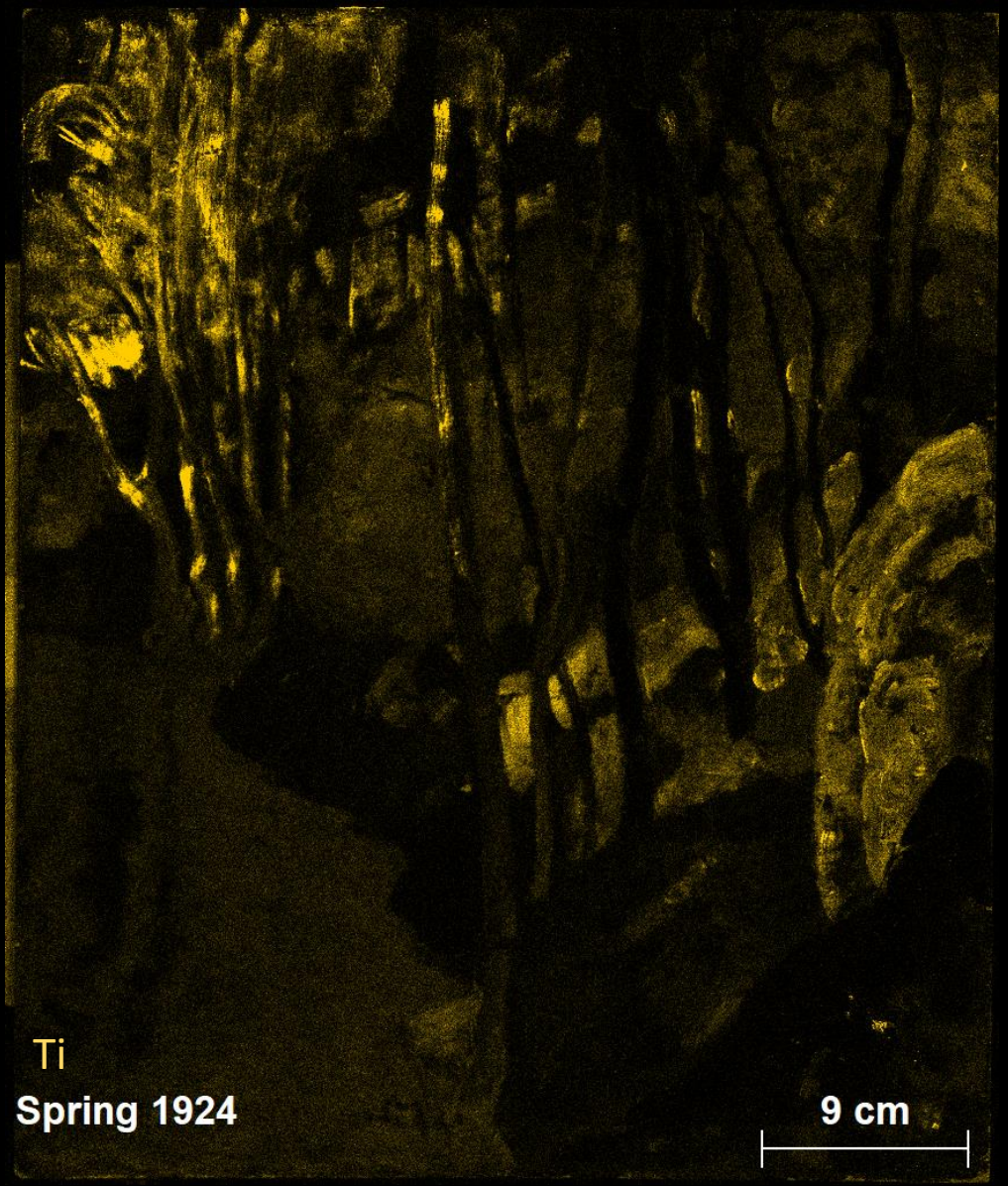
Optical





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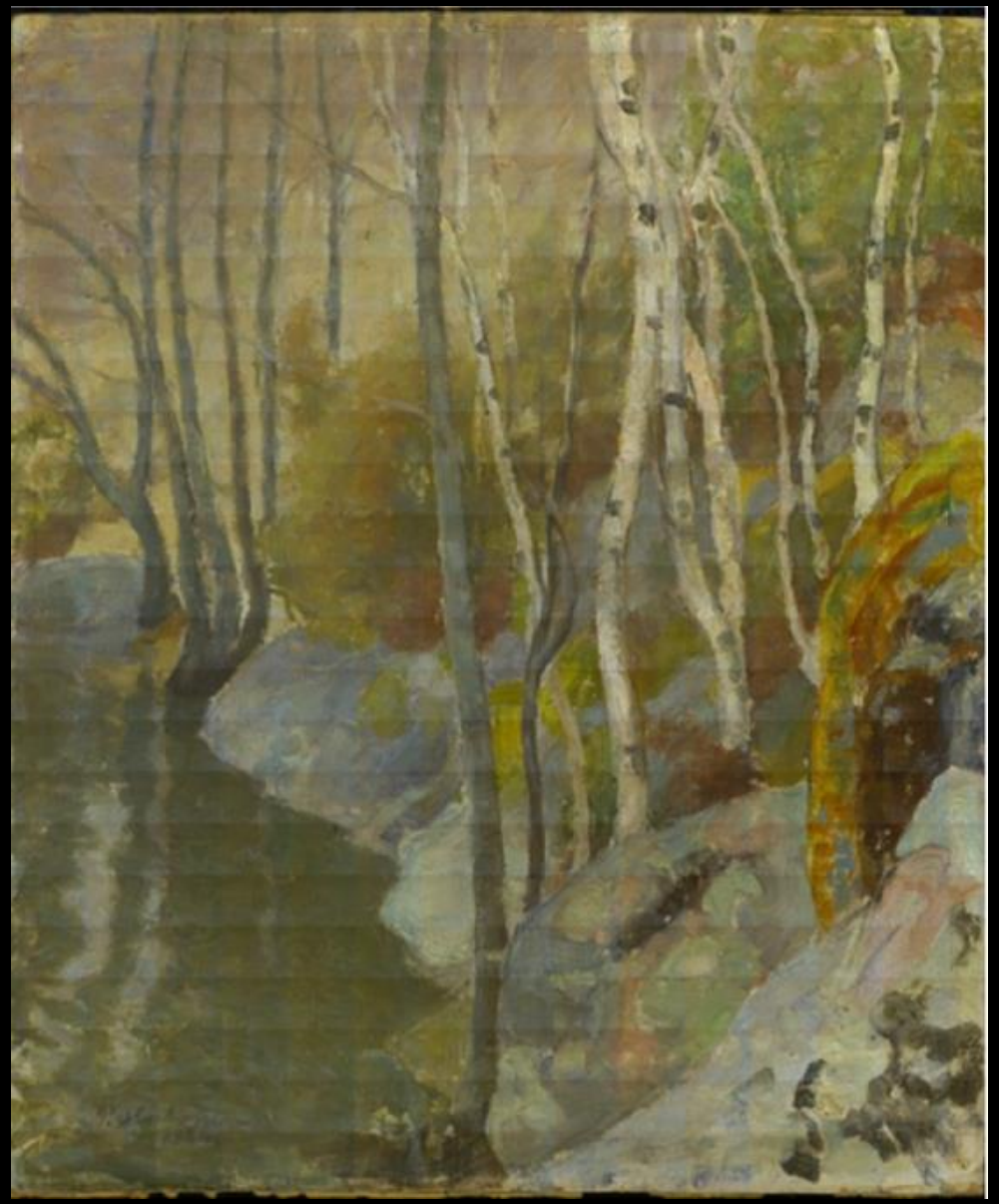
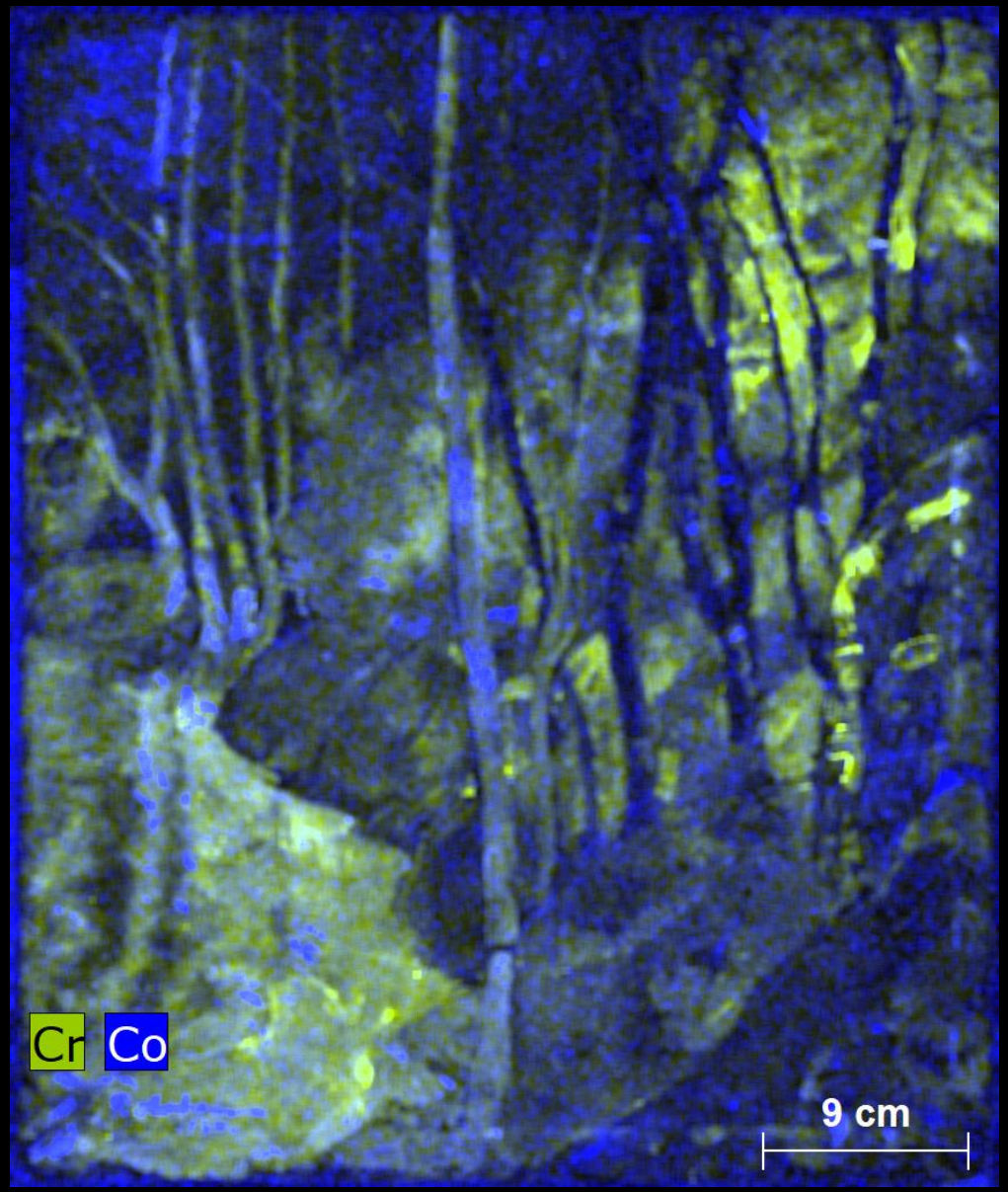
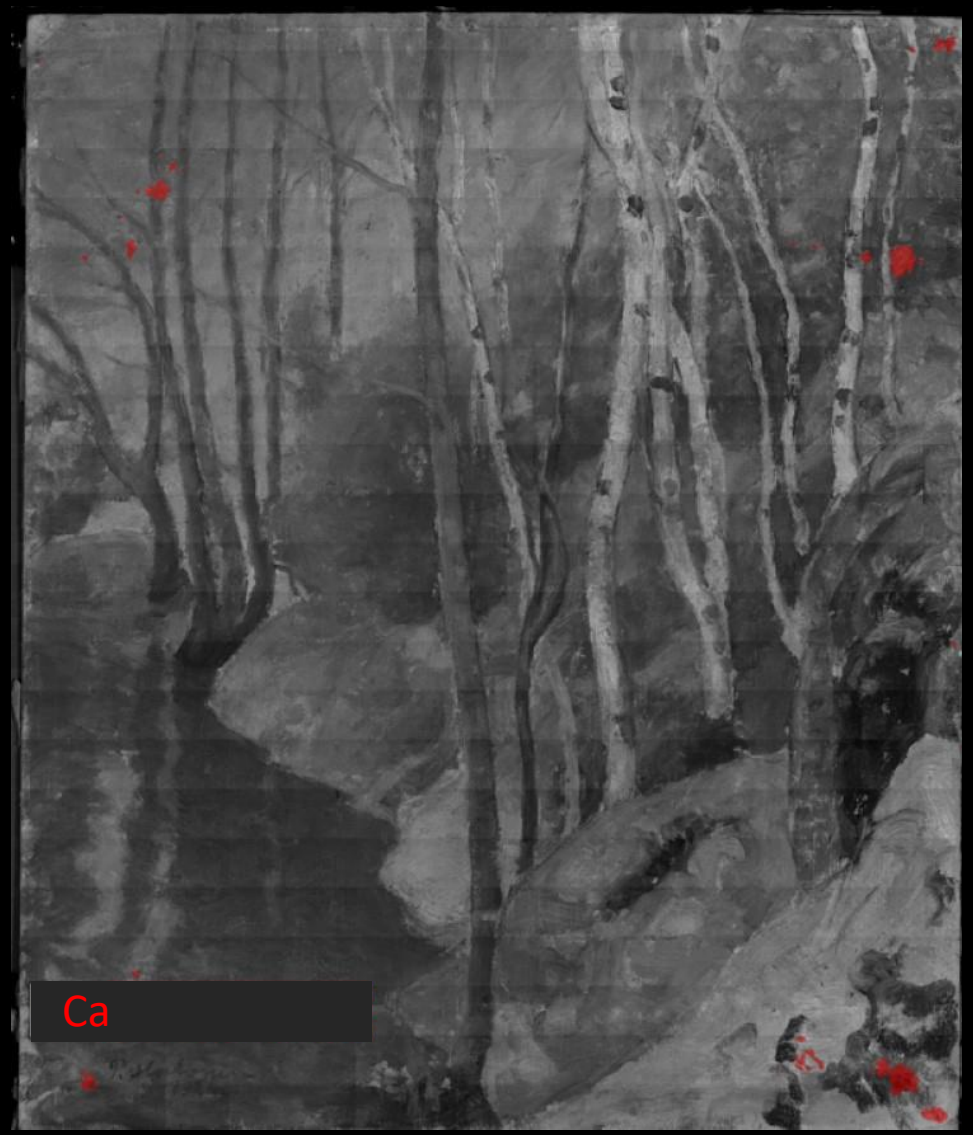
Optical

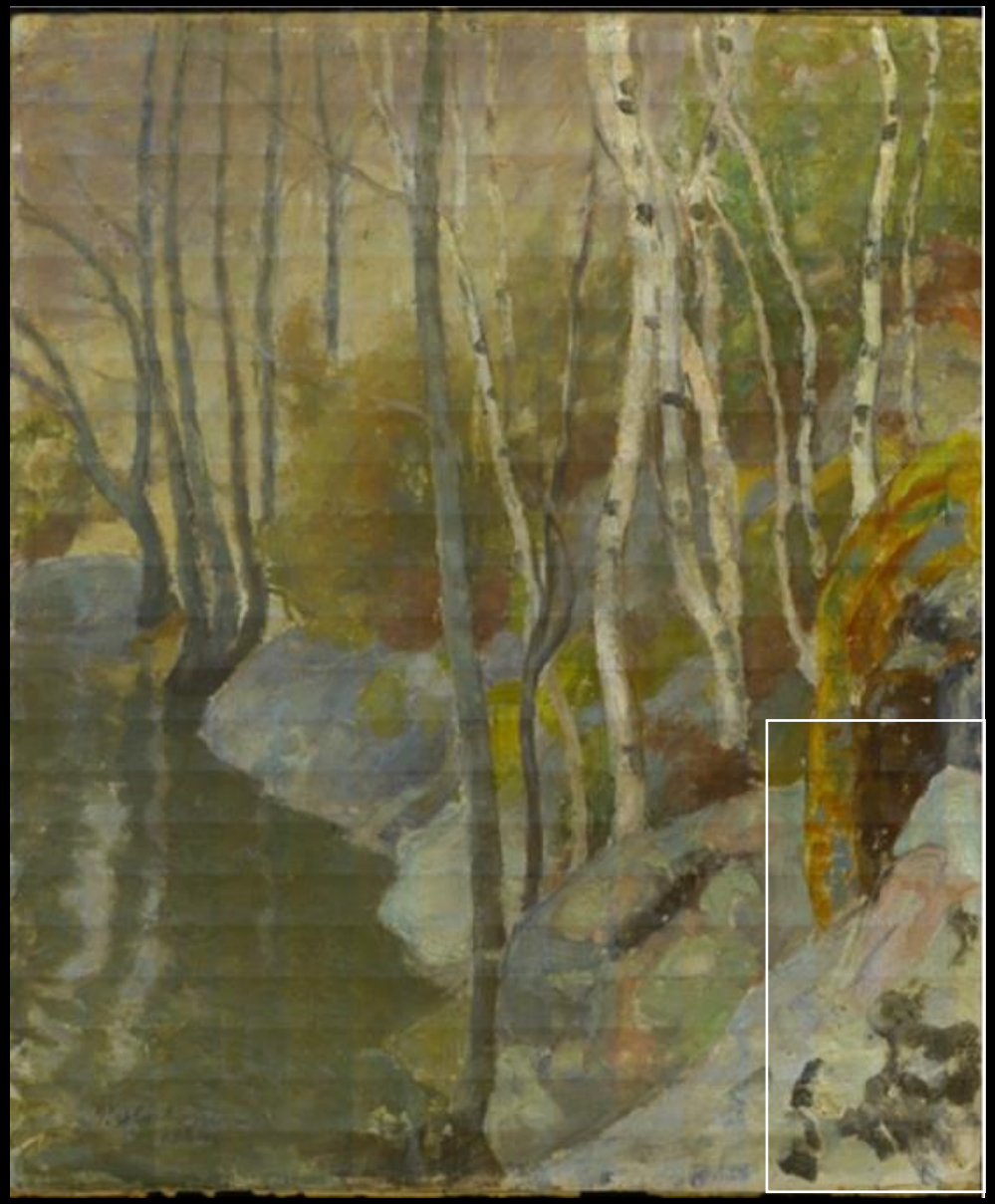


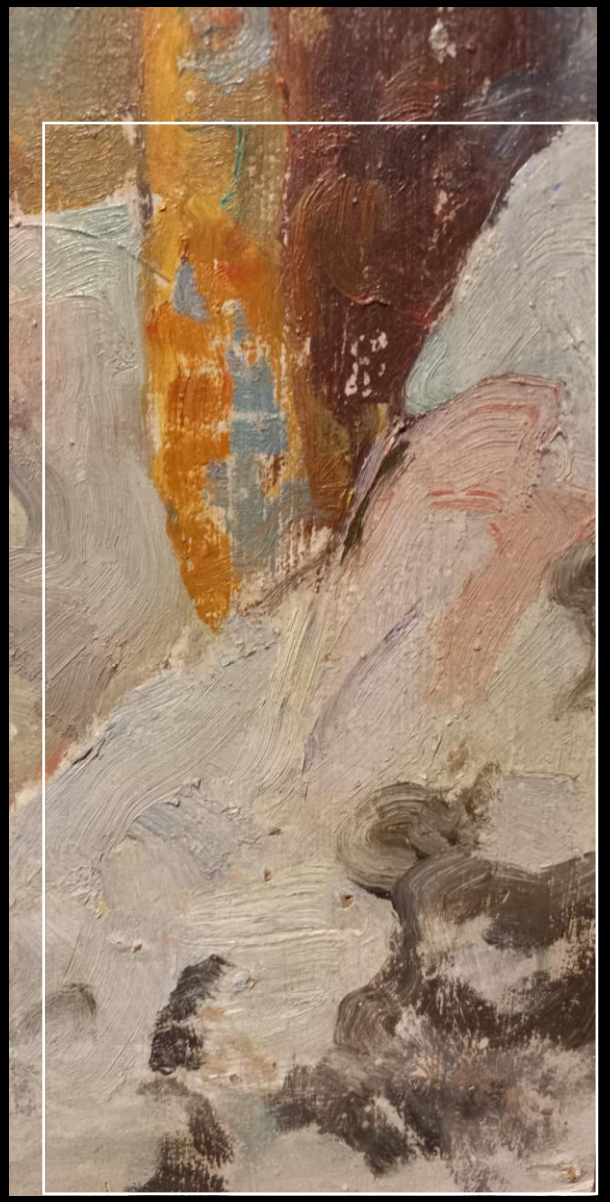




Damage? – calcium carbonate in-filling?

Optical





Detail – multi-elemental

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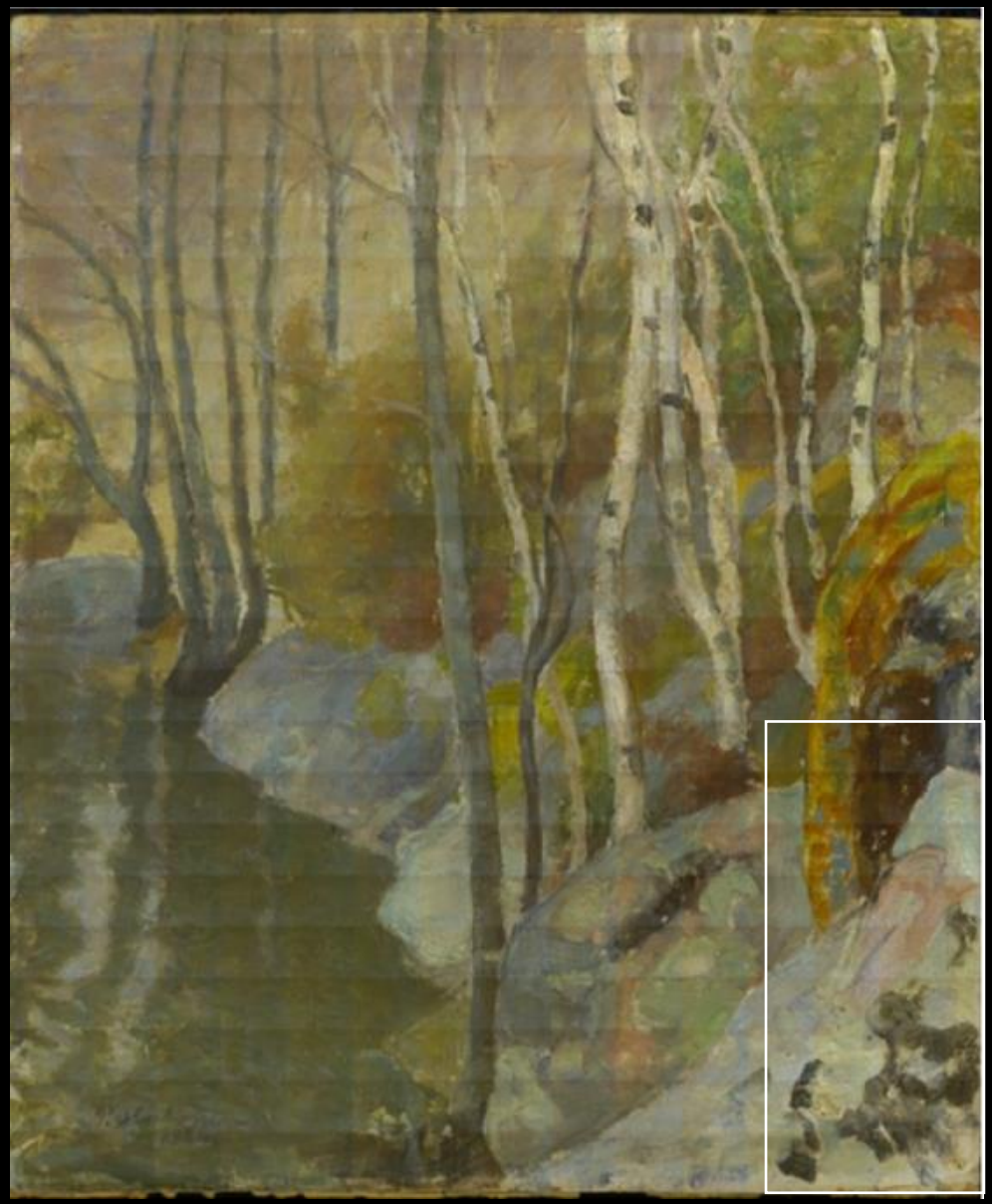
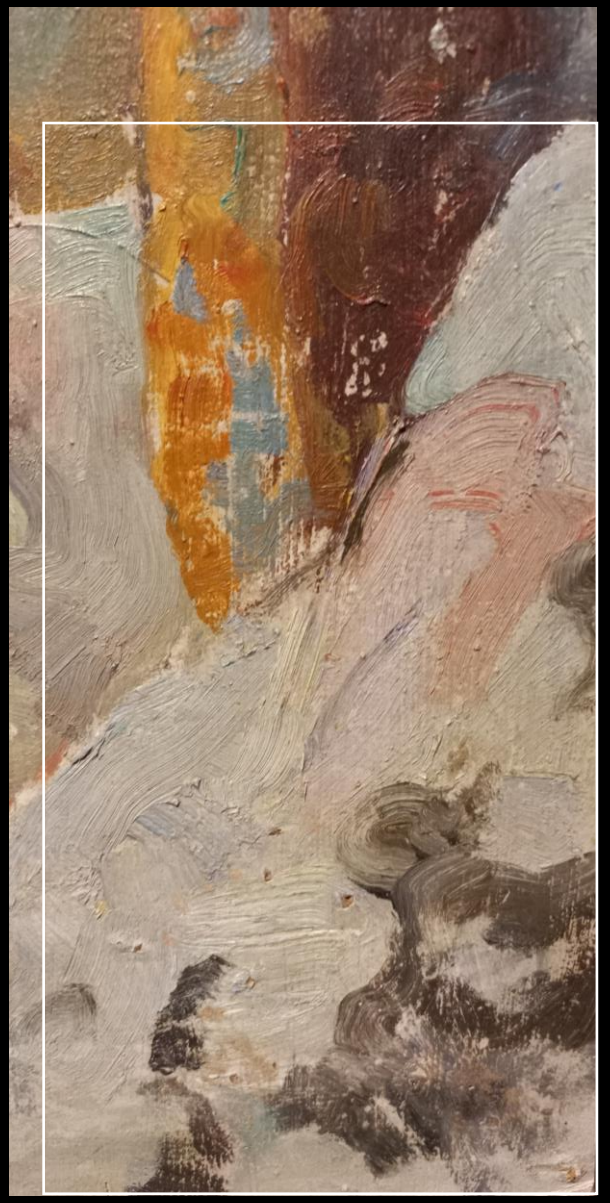
Optical





Detail – Pb & Zn

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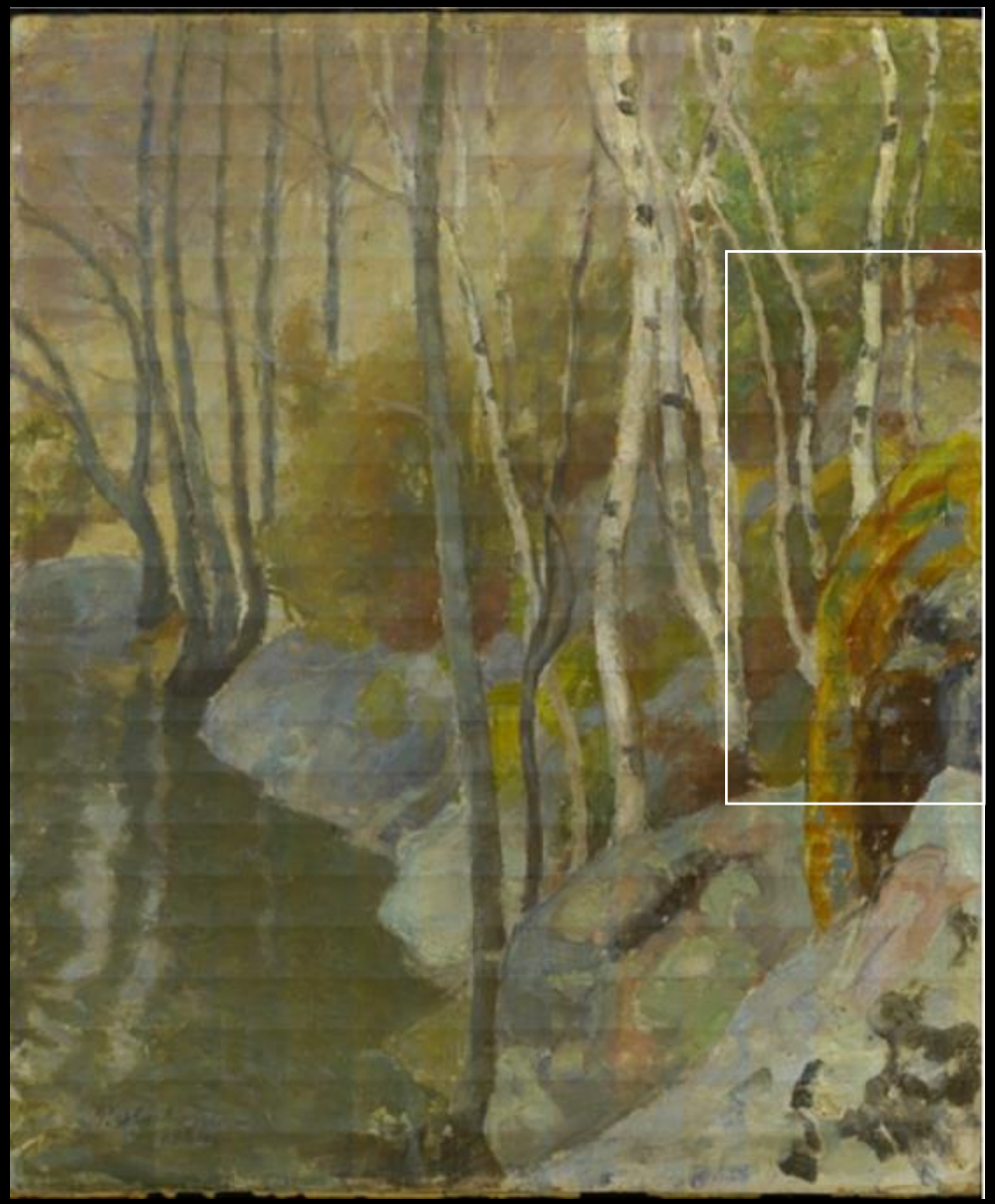
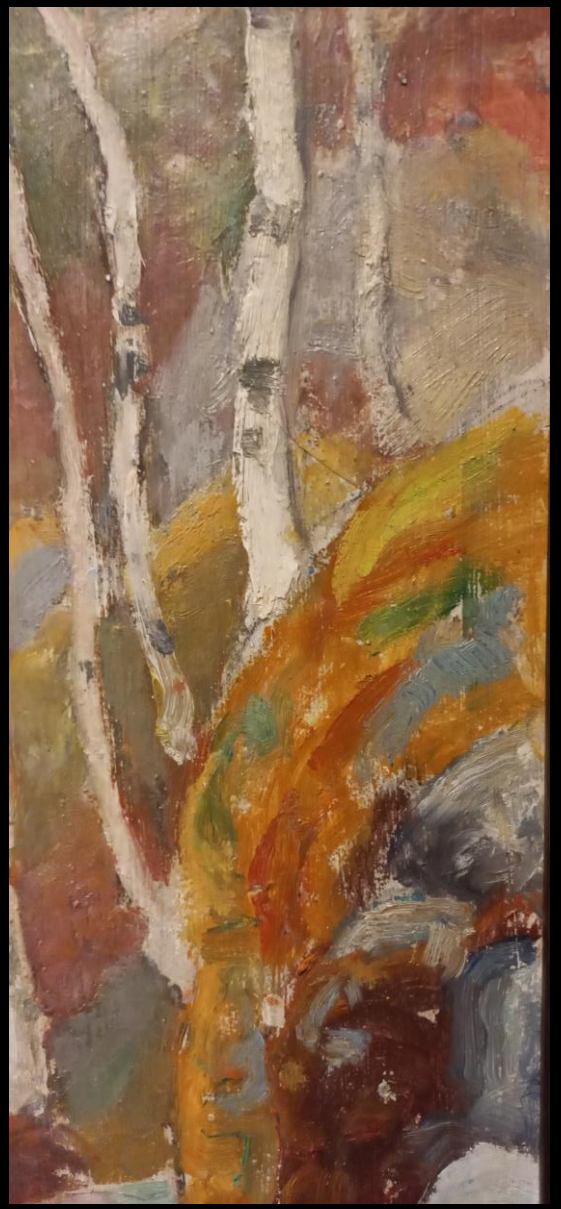
Detail – multi-elemental

Optical





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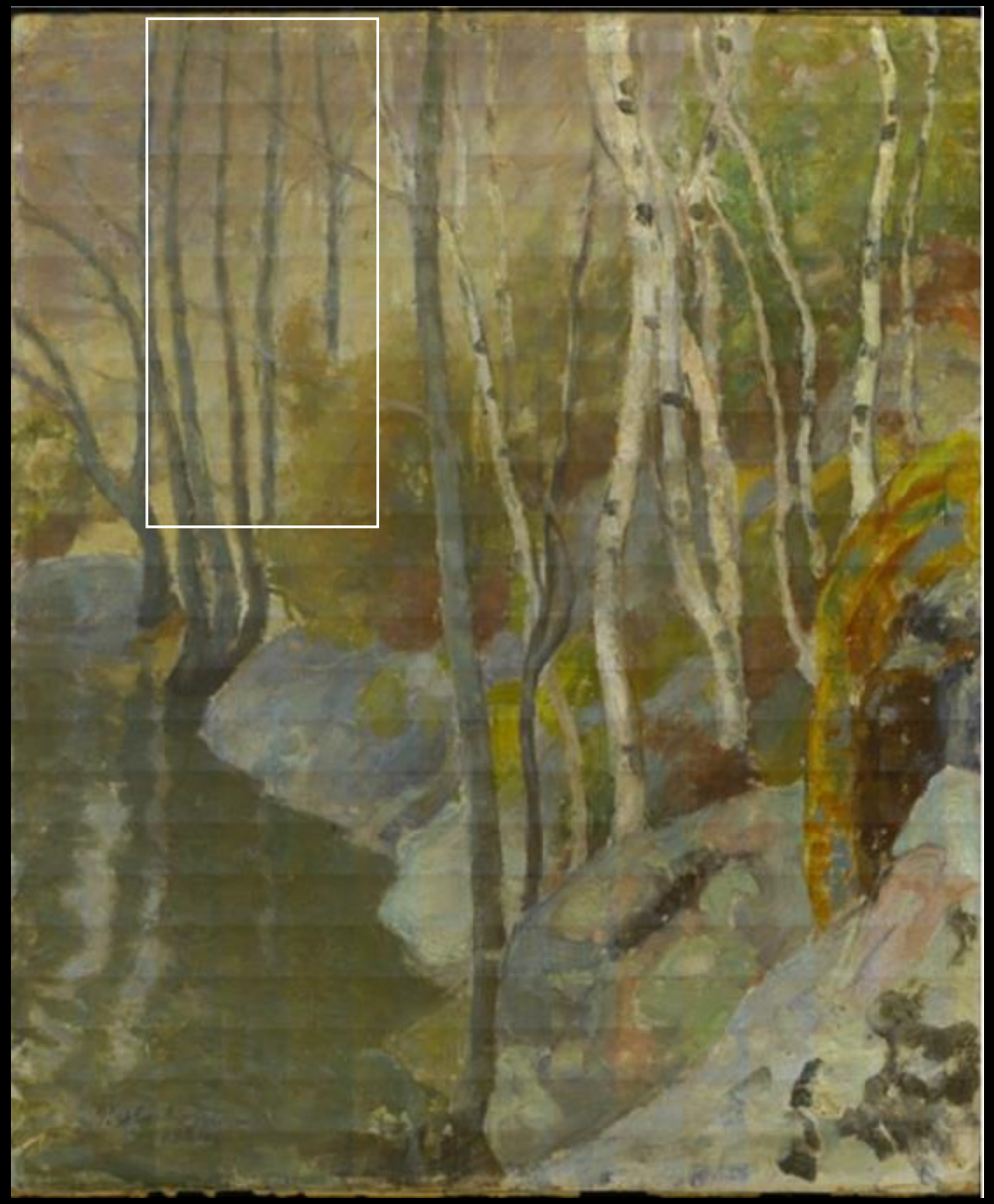
Detail

Optical



Optical

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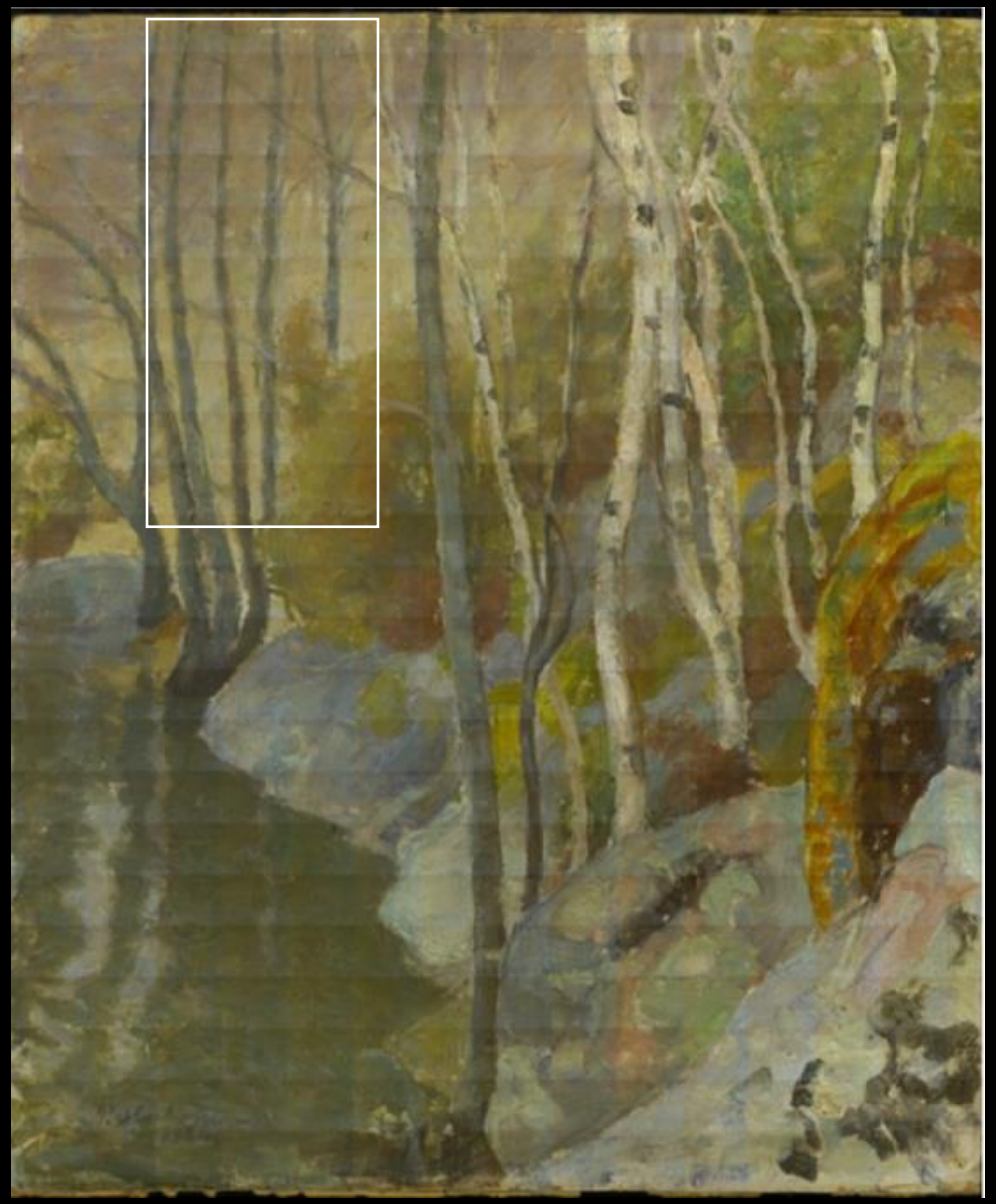
Detail

Optical



Optical

Multi-elemental

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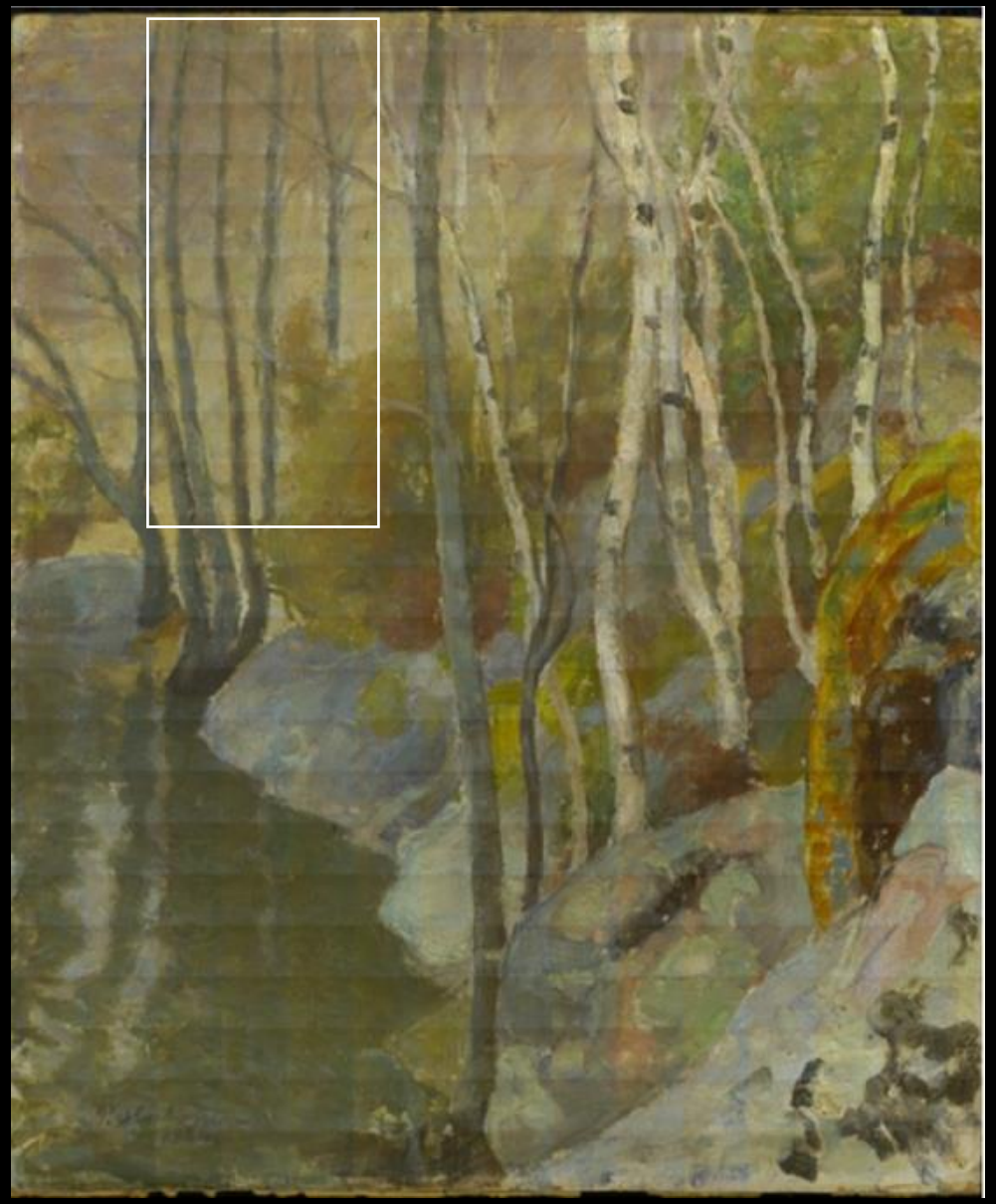
Optical



Optical

Fe, Pb & Ti

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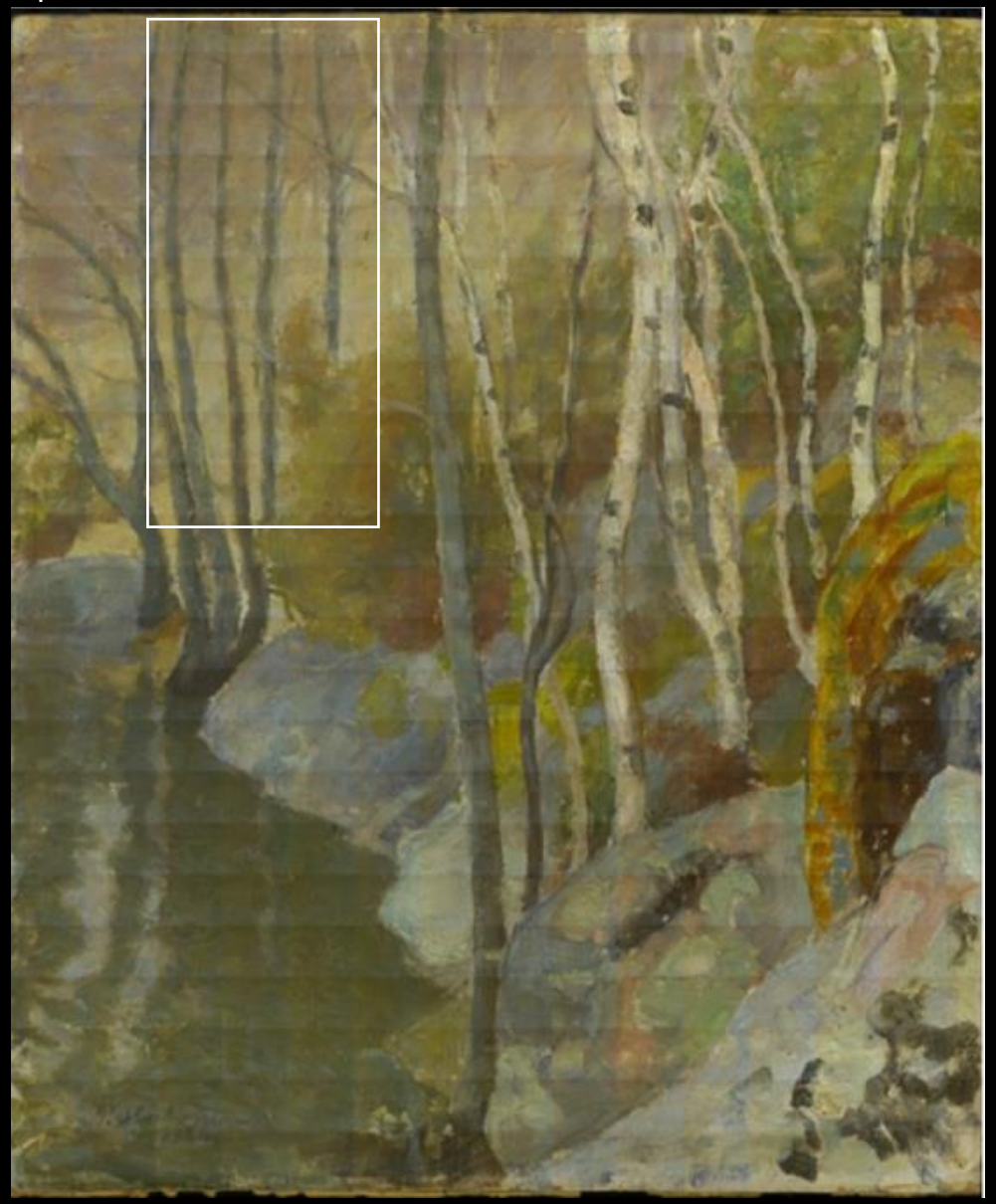
Detail

Optical



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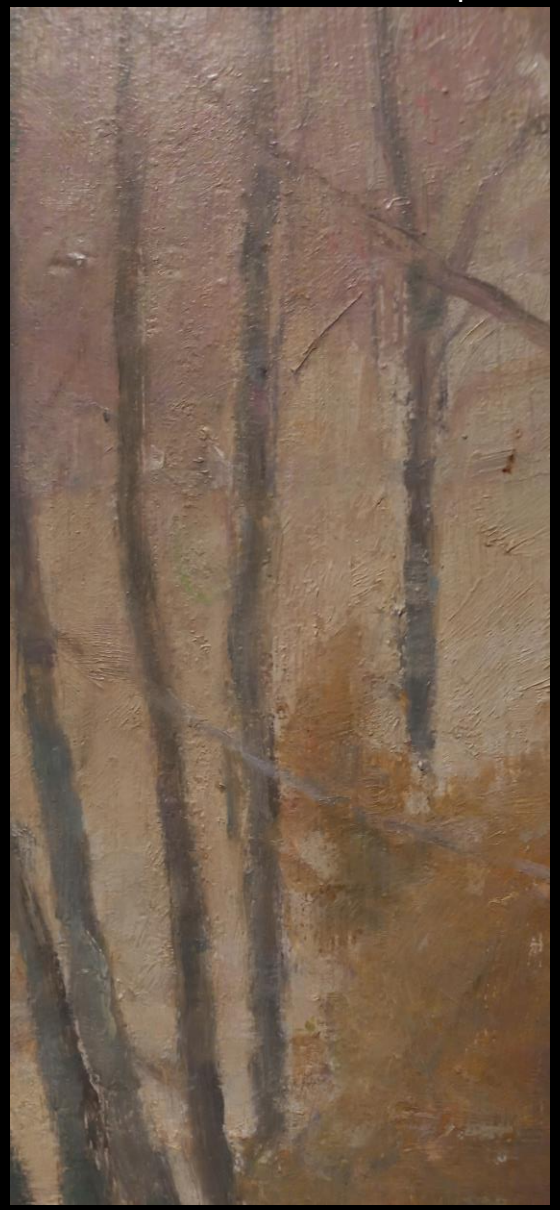

Fe, Pb, Zn & Ti

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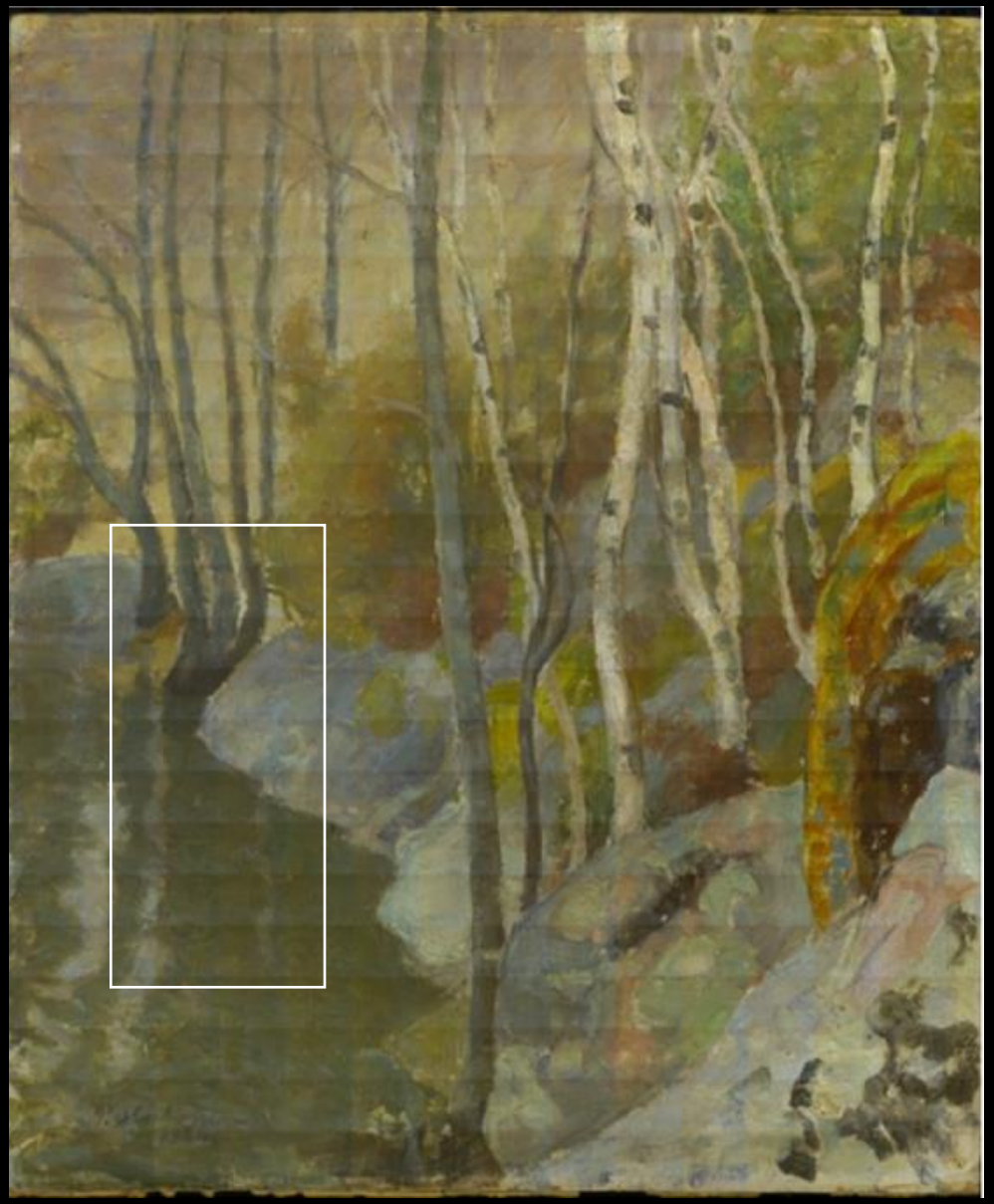
Optical



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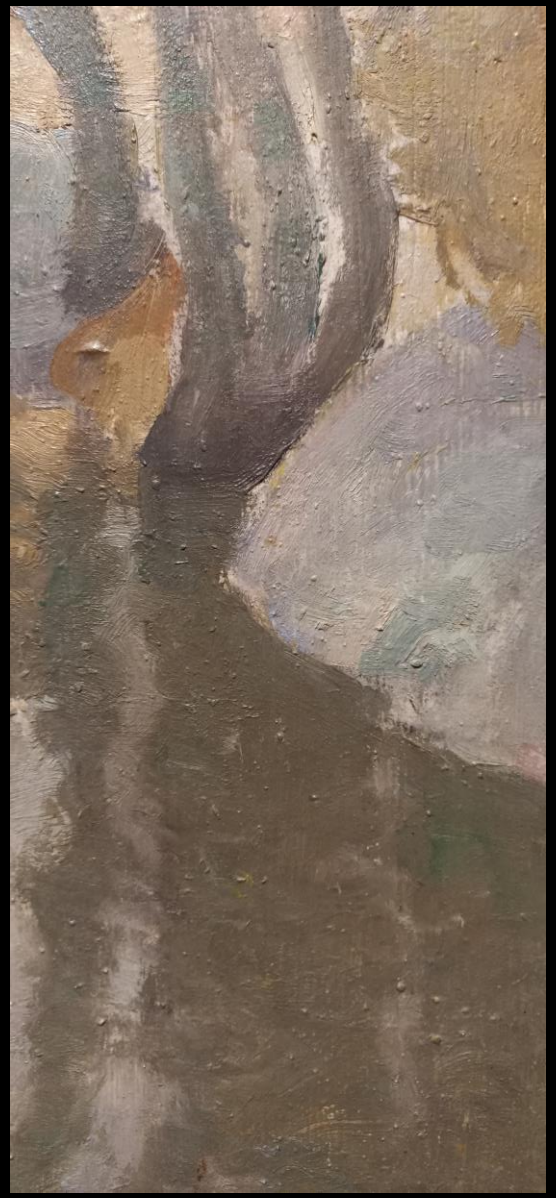
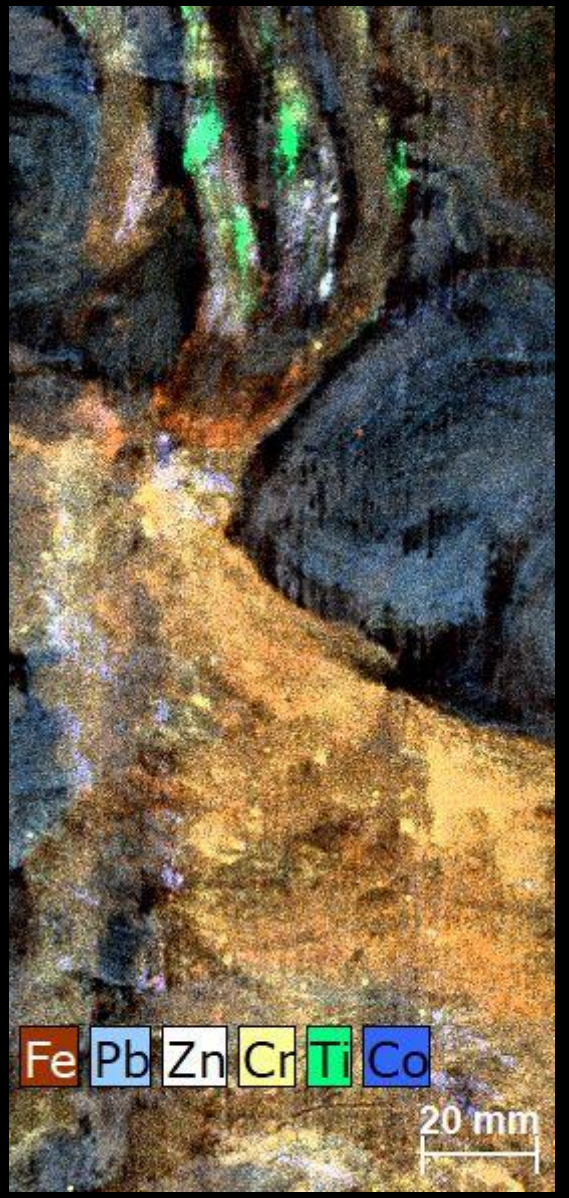


Fe, Pb, Zn, Cr, Ti & Co



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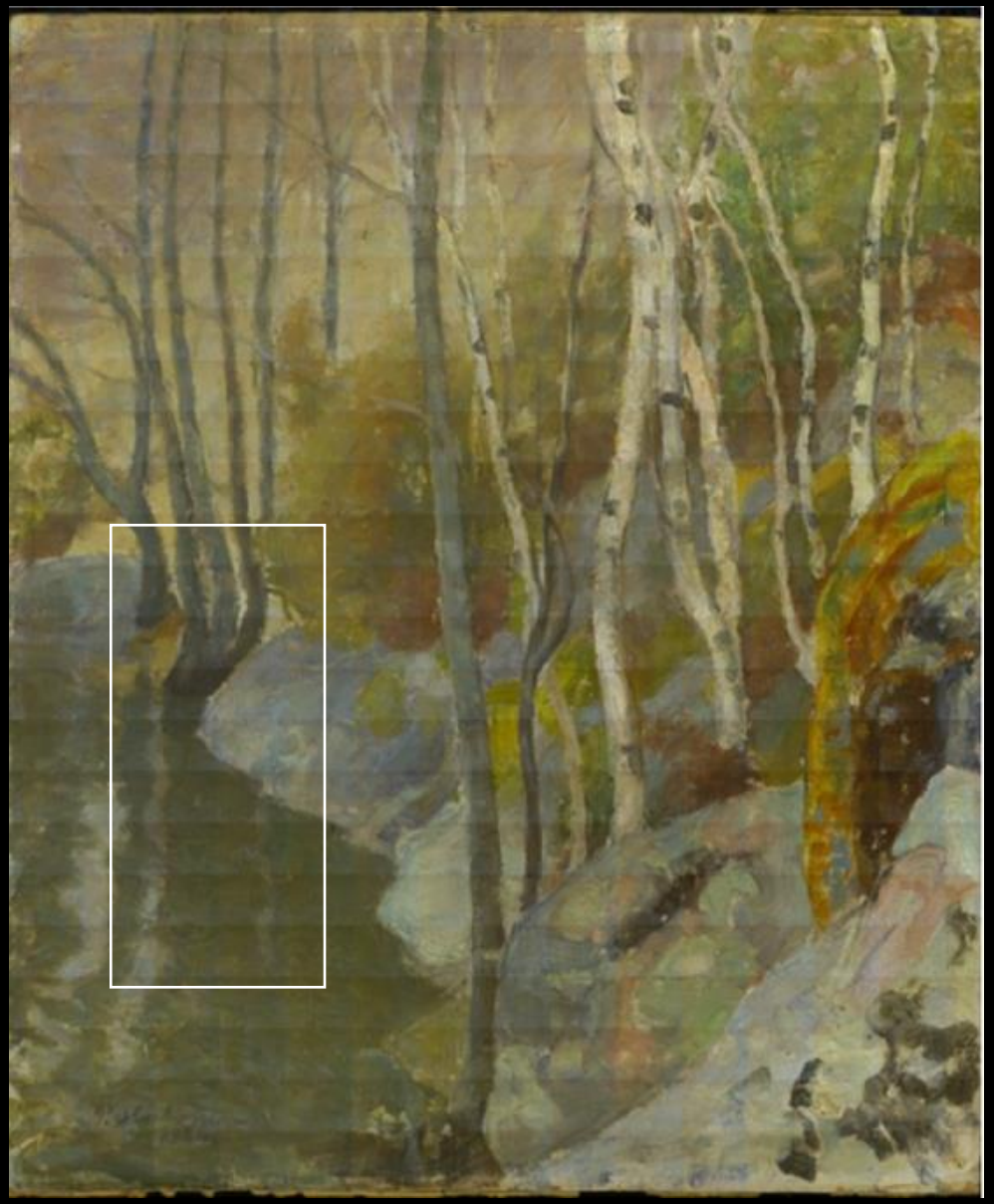
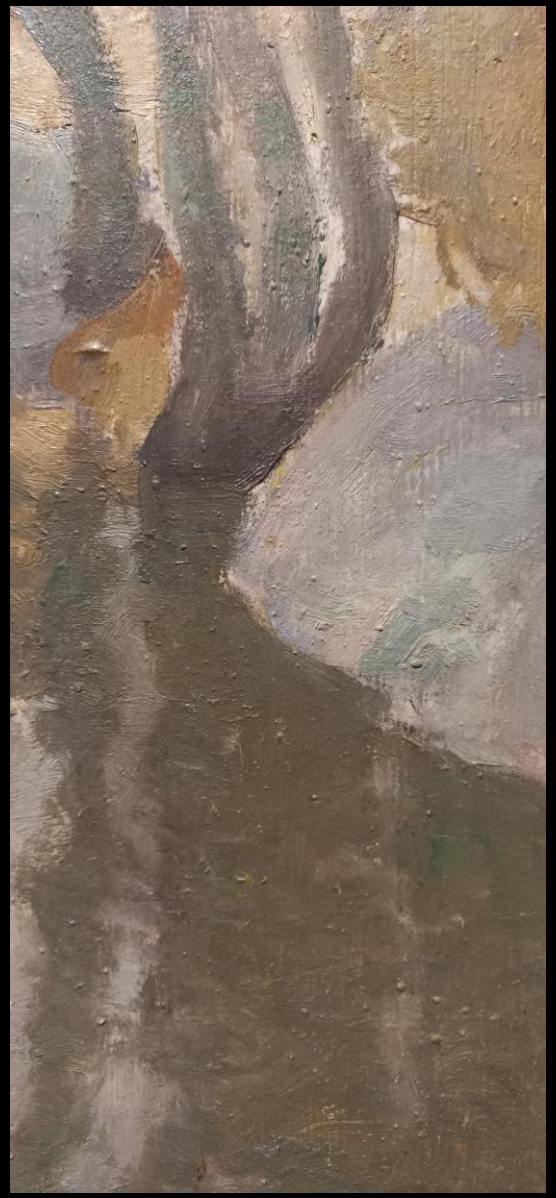
Detail

Optical



Optical



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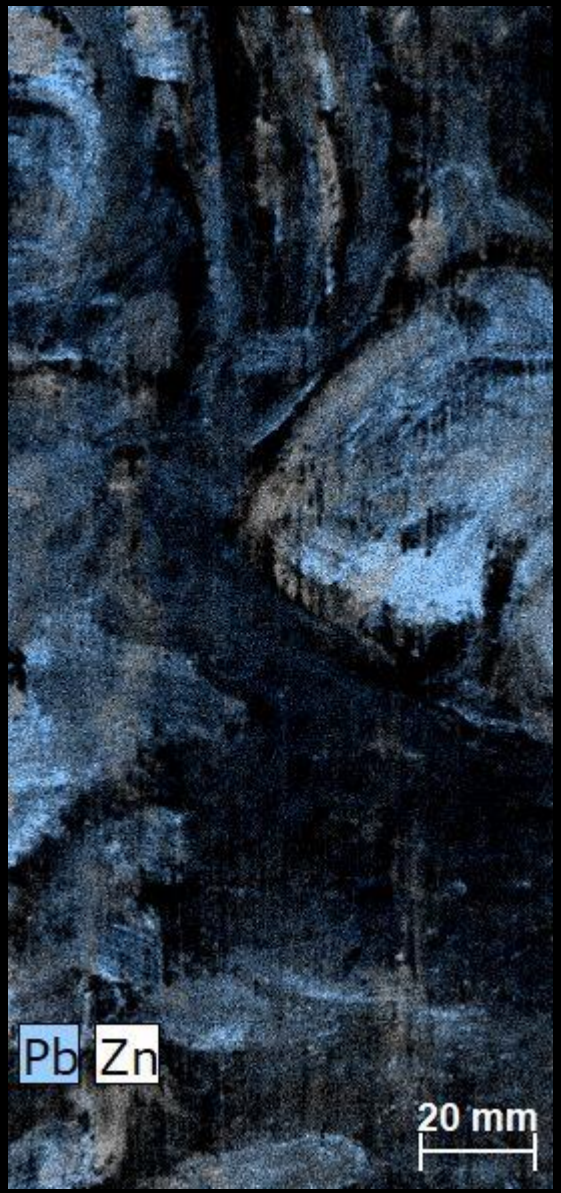

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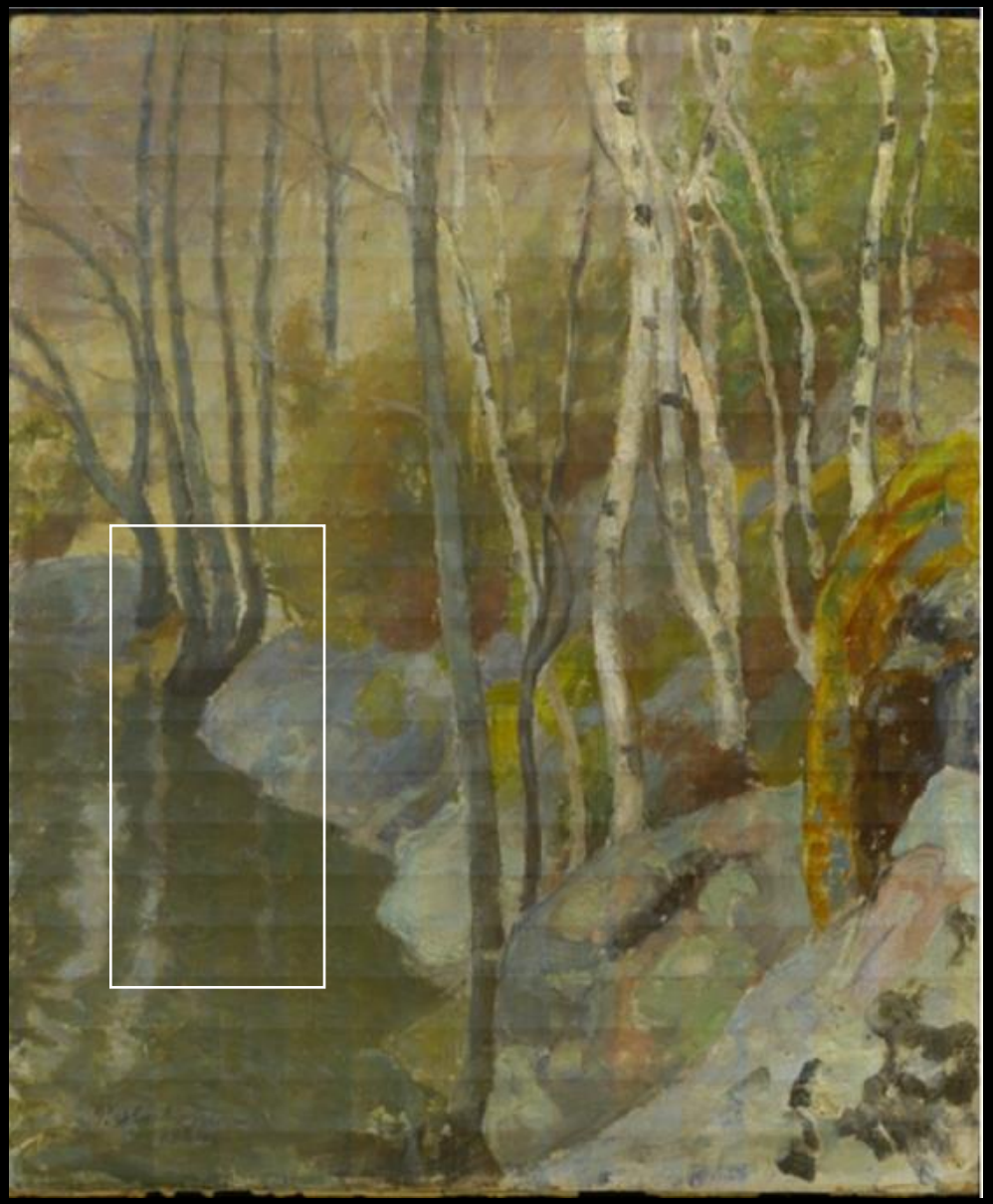
Detail

Optical



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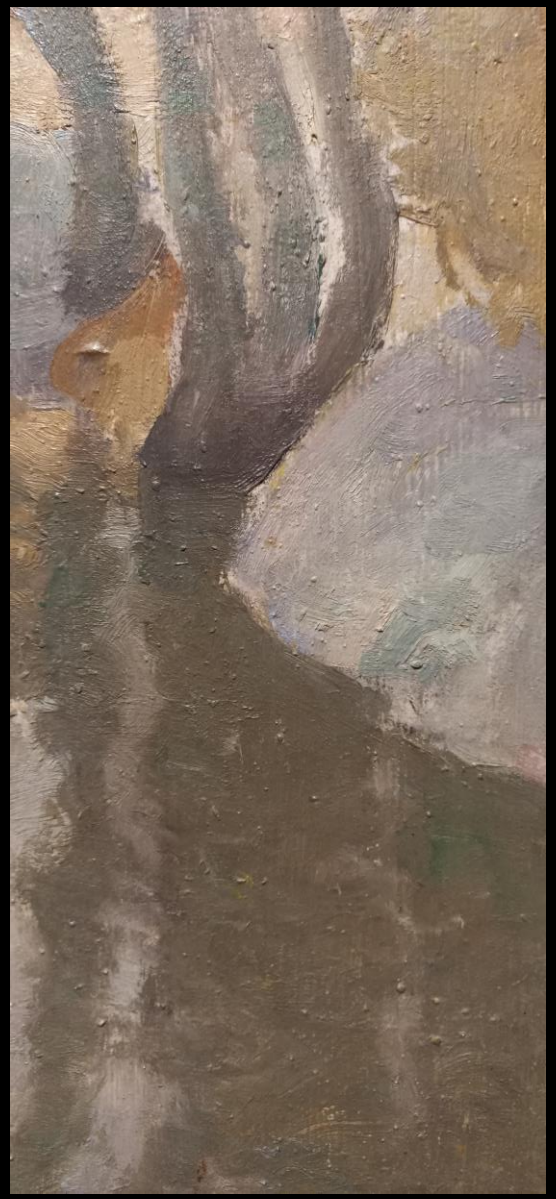

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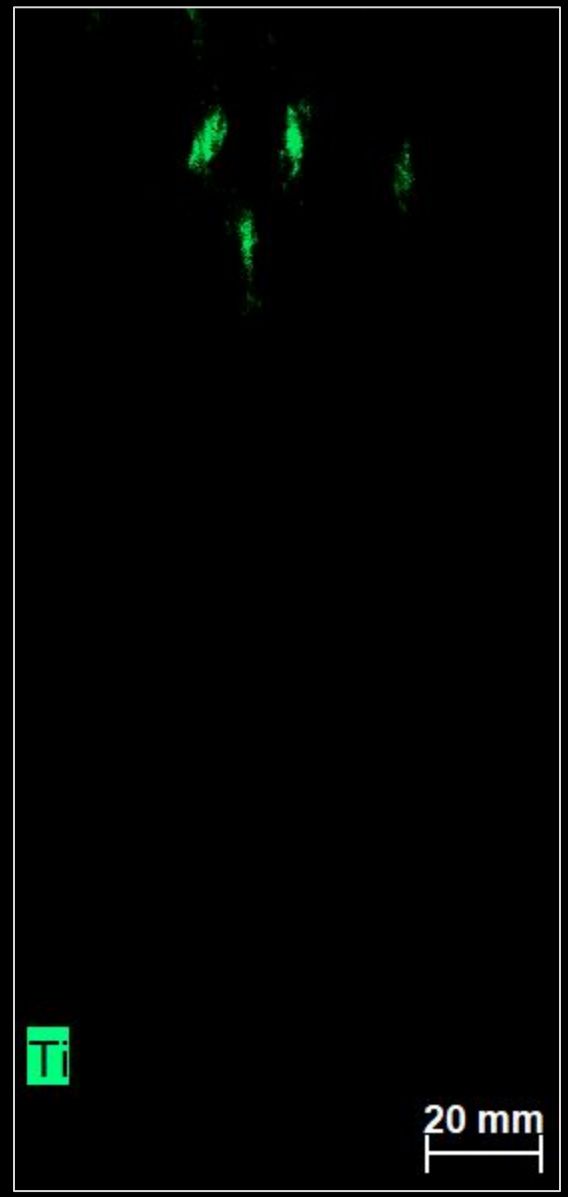

Halosenniemi

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GTK

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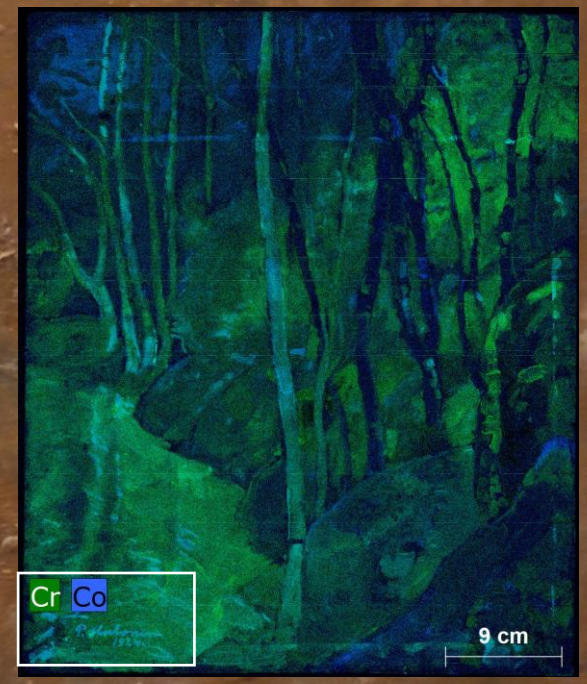
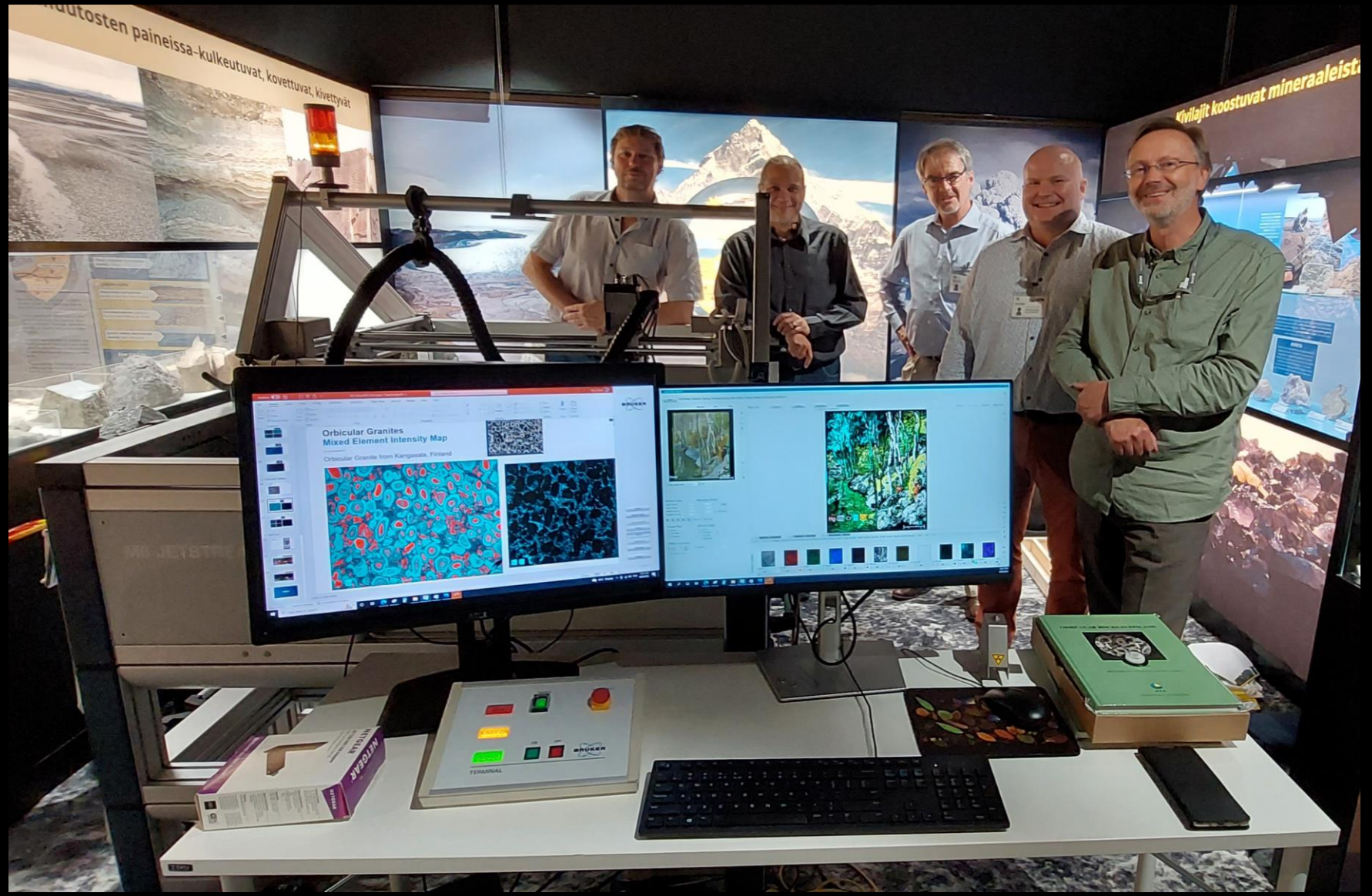
Detail of signature



Extra Highlights

The Team – Andrew, Roald, Andreas, Antti, Alan



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Meetings and discussions with GTK's Director General, Kimmo Tiilikainen

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Meetings and discussions with GTK's Director General, Kimmo Tiilikainen

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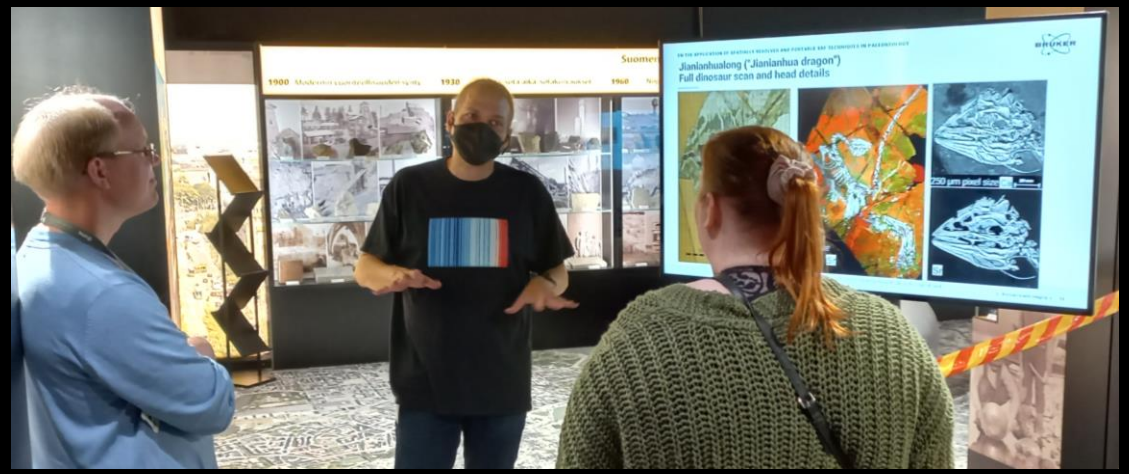
Meetings and discussions with visitors and GTK staff



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