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Observations on the Painting Technique and Materials Used in the Painting of *Lake View*, by Akseli Gallen-Kallela

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Fig. 1. Akseli Gallen-Kallela, *Lake View*, 1901, oil on canvas, 84cm x 57cm, Finnish National Gallery / Ateneum Art Museum

Photo: Finnish National Gallery / Hannu Pakarinen

A museum visitor observes an artwork on a museum wall on average for a few seconds or minutes. The conservator quickly checks the condition of a painting before and after every exhibition to make sure the condition has remained unchanged during the exhibition. The condition report, with detailed drawings, descriptions and photos, takes perhaps half an hour to make. Would new and noticeable information come to light if one were able to look at the painting for hours with bare eyes, microscopes, in different electromagnetic wavelengths, with different instruments and cameras?

In our day-to-day work as a conservator and a materials researcher, we make observations of the structure and the surface of the paintings in more detail than a regular viewer. In this article we present some aspects regarding the painting technique and the materials of the Finnish artist Akseli Gallen-Kallela's (1865–1931) painting *Lake View*, from 1901¹ (Fig. 1). Usually, this painting is exhibited in the main collection exhibition in the Ateneum Art Museum and is a very popular work that draws in our museum visitors. In recent years it has often been loaned to exhibitions in Finland and around Europe. Every time it has returned to the Ateneum the research has continued and as a result the painting has been studied very carefully, especially over the past two years.

Originally, we decided to study *Lake View* more deeply because of its beautiful and informative radiograph (Fig. 2). We had already X-rayed a large number of Gallen-Kallela's works but as we were analysing the radiograph of *Lake View*, we started to recognise characteristic features in the brushwork, which appeared repeatedly in his paintings. The radiograph and other analytical photographs of the painting

were very illuminating and strengthened our understanding of the artist's painting technique. However, important new information was also found just by looking at the painting very

1 Akseli Gallen-Kallela, *Lake View*, oil on canvas, 84cm x 57cm, Finnish National Gallery / Ateneum Art Museum, A-2010-173.



Fig. 2. X-ray radiograph of *Lake View*.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde

closely with the naked eye. Markings on the edges and on the reverse of the painting gave us information which led us to visit the archives and to investigate his original painting materials.

Observation and research methods

Lake View is a part of the collection of the Finnish National Gallery (FNG) and therefore a part of Finnish cultural heritage that the institution has a responsibility to keep and to preserve. This responsibility also includes undertaking research and in recent decades there have been considerable advances in researching painting techniques and materials. The information gained through this kind of multidisciplinary research widens the knowledge of the process of how the paintings have been constructed.

The collection of the FNG includes almost 100 oil paintings by Akseli Gallen-Kallela covering the period 1880–1930 and these form a broad selection of references for this research. Most of the paintings in the FNG collection are painted on canvas, but there are also works on wood, cardboard and paper. Gallen-Kallela was an exceptionally skilled painter and achieved success in the early years of his career. His painting technique was confident and precise and the materials he used were permanent and of good quality – he used very few pigments that would fade rapidly. These carefully selected materials are a part of the reason his paintings have usually remained in good condition.

With regard to the materials research of Gallen-Kallela's pigment palette this study deepens our knowledge about the techniques the artist used to mix pigments in order to achieve particular hues. The basic palette of Gallen-Kallela has been revealed in extensive research made into 265 of his paintings, as well as 68 tubes of colour used by the artist that are preserved in the collection of the Gallen-Kallela Museum in Espoo. The results of this research were published in *Tahiti*, a web journal published by the Society for Art History in Finland.²

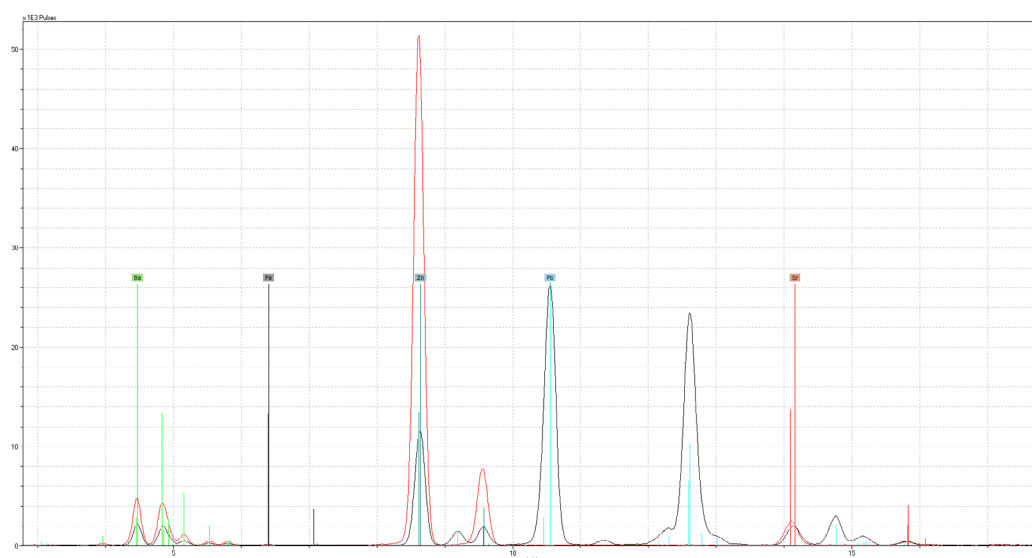
Pigments were analysed with a portable energy dispersive X-ray fluorescence spectrometer (EDXRF) and polarised light microscope (PLM).³ The painting technique was studied with several analytical photography methods. Underdrawings were visualised with infrared reflectography (IRR). Brushwork was analysed in visible light, as well as studying the X-ray image and comparing it with other X-ray images of the artist's paintings⁴. In addition, the structure of the paint layer was examined with stereo microscopy, using magnification 10–40 x⁵. The presence of organic pigments and resins were observed by using ultraviolet light (UV).

2 Hanne Tikkala & Seppo Hornytzkyj. 'Luonnontieteellisin analyysimenetelmin tunnistettu Akseli Gallen-Kallelan väripaletti', *TAHITI*, 10(1), 5–55, <https://doi.org/10.23995/tht.90554>.

3 Analytical methods: Two different instruments of the EDXRF: Portable Bruker S1 Titan – spectrometer and portable Bruker Tracer 5g-spectrometer. Microscopes: Olympus BH-2 polarised light microscope and Leica MZ 12 stereo microscope.

4 Infrared imaging instrument: Artist's Multispectral Imaging (900–1100 nm). X-ray imaging instrument: Eresco 200 MF4-R, scanner General Electric CRXFlex Type 5176/100.

5 Leica MZ 12 stereomicroscope.



Spectrum 1. EDXRF spectras of the ground layer measured from stretched canvas (GKM-6424-5) in red and a canvas roll prepared by Gallen-Kallela (GKM-5682-1) in black.

Photo: Finnish National Gallery / Conservation Unit, Hanne Tikkala

The canvas, ground layer and the stretcher frame

To gain a wider understanding of the physical structure of Gallen-Kallela's paintings, we visited the Gallen-Kallela Museum and studied some of the artist's painting materials, including unused canvases. The materials we studied consisted of big rolls of linen, some with a ground and some without, as well as several small, stretched canvases, which had been purchased from an art supply store located in Helsinki⁶. The ground layer in the stretched canvases consists of zinc and lead white, barium sulphate and/or lithophone and a small amount of iron (Fe). The amount of zinc white in these canvases is higher than in the ground on the large rolls of canvas in which the ground consists of mainly lead white added with zinc white and barium sulphate and/or lithophone (Spectrum 1). Zinc white has allegedly been added to the ground in the late 19th century and beginning of the 20th century to prevent the darkening of lead white. The darkening was caused by the high content of hydrogen sulphide in the air due to industrial pollution.⁷

The ground used on *Lake View* consisted of a mixture that includes mainly lead white together with a smaller amount of zinc white and barium sulphate and/or lithophone. The canvas is made from a good quality, thick, plain-weave linen. One of the big canvas rolls has a similar visual appearance to the ground and canvas used in *Lake View*. At the top of this roll there is a ripped paper with a handwritten text: 'prep(...) by father', presumably written by Gallen-Kallela's son Jorma (Fig. 3).⁸ When we analysed the inorganic materials in this ground it proved to be quite similar to the ground in *Lake View*, with lead white as a main component added with zinc white and barium sulphate and/or lithophone. The appearance of both grounds is smooth with an even surface texture and it is only from the edges of the canvas on

6 On the metal plate in the stretcher frames: 'Finska Färg- & Ferniss- Fabriks- Aktiebolaget, Helsingfors'.

7 Leslie Carlyle. *The Artist's Assistant. Oil painting instruction manuals and handbooks in Britain 1800–1900 with reference to selected eighteenth-century sources*. London: Archetype Publications, 2001, 172–73; Maartje Stols-Witlox. 'Grounds, 1400–1900', in Joyce Hill Stoner & Rebecca Rushfield (eds.), *Conservation of Easel Paintings*. London and New York: Taylor & Francis Group, 2012.7, (161–88) 172–73.

8 Inventory number GKM-5682-1. Notification of Salla Tiainen, Head of museum collections, Gallen-Kallela Museum, 24 June 2020.

Fig. 3. Canvas roll prepared by Akseli Gallen-Kallela. Gallen-Kallela Museum (GKM-582-1)

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde.



the roll and the text on the ripped paper that we can deduce that the ground was self-made. In *Lake View* all the edges of the canvas have been cut, so the selvage could not be seen. When comparing these two together one could conclude that the ground layer in *Lake View* is also self-prepared even though during this period it was very common to buy pre-prepared canvases from artists' materials suppliers.⁹ However, this is just a hypothesis and needs further research into his canvases and ground methods.

The stretcher frame for *Lake View* is made of pine and is exceptionally deep – usually it is around 2cm but in this case it is 3.5cm – with a steep bevel. A price note of '1500 mk'¹⁰ on the back side of the stretcher frame, and the number of nail holes on the tacking edge prove that the stretched frame is most probably original. There are no stamps or markings on the stretcher to indicate it would have been industrially produced, but instead there are some handwritten marks and other signs of craftsmanship such as traces of hand-tool markings. Similar high-edged stretcher frames can also be found in other paintings by Gallen-Kallela, for example *Lemminkäinen's Mother* (1897, A I 640) and *Portrait of Edvard Munch* (1895, A III 2605), both also in the Ateneum Art Museum. The corner joints are also similar to *Lake View*, so it is likely that they have been made by the same person¹¹.

9 Stols-Witlox, 'Grounds, 1400–1900', 139.

10 Gallen-Kallela often sold his landscape paintings through Hagelstam Bookshop (Onni Okkonen. *A. Gallen-Kallelan elämä ja taide*. Suomalainen tiedeakatemia. Porvoo: Werner Söderströmin osakeyhtiö, 1949, 471). A painting was purchased from the shop in 1901 with the price of 1500 mk (Finnish marks). On the basis of the provenance information, the painting is the same *Lake View*, now under study. The painting has been in the possession of the same family until it was donated to the Finnish National Gallery in 2010.

'Den af Axel Gallen till grefvinna Aina Mannerheims fond donerade taflan, som exporensats i Hagelstams bokhandel, har i går för ett pris af 1,500 mk blifvit inköpt af ett större antal medborgarinnor och medborgare, hvilka velat öfverlämna taflan till grefvinna Mannerheim såsom en gård af erkänsla för hennes vackra initiativ ock uppoffrande inlägg i den fosterländska arbetet.' *Hufvudstadsbladet*, 21 October 1901. The Press Cuttings Collection. Archive Collections, Finnish National Gallery, Helsinki.

11 The corner joint on the stretcher frame of *Lake View* is a combination of two types: half-lap and bridle joint.



Fig. 4. Infrared reflection photograph of *Lake View* showing evidence of underdrawing.

Photo: Finnish National Gallery / Conservation Unit, Hanne Tikkalä

The sketching and the composition

Gallen-Kallela painted *Lake View* in Kalela, his wilderness home and studio in Ruovesi in central Finland. The painting depicts a lake viewed from a great height and the water covers more than half of the painted surface. The sun's rays glimmer on the rippling water and the blue horizon looms in the distance. There are two forested islands in the middle which are reflected in the lake water. The sparkle of sunlight in the water is painted very realistically as the sky is wild and expressive. The brushstrokes are clearly visible and the academic style which the artist was known for is here disappearing. However, the young trees in the foreground are still painted very meticulously.

The paintings that Gallen-Kallela made in Africa about ten years later give some indication of his sketching methods. An unfinished version of *Hippos in the Tana River* (1909–10)¹², which belongs to a private collection, has a grid drawn on the canvas with a pencil. It has been used for the magnification of the subject from a sketch to the scale of a large canvas. There is no grid visible in *Lake View*, which indicates it has been sketched outdoors straight onto the canvas. The drawing technique used seems to be quite similar in both paintings, the main subjects have been drawn with care and the sketch lines have been followed faithfully while painting. The underdrawings have not been worked too extensively and for example the young trees in the foreground have not been drawn at all (Fig. 4).

Lake View was originally larger in size. This can be deduced from examining the tacking edges – on the top and right edges there is an extra row of nail holes used for stretching. On these two edges the motif reaches almost to the edge of the painting and on the tacking edge only the white ground layer is visible. On the lower and left edges there are no extra nail holes and black lines have been drawn on top of the painted surface near the edge. This means the artist has outlined the painting again regarding the lower and left edge, removed the canvas from the stretcher, cut off the extra canvas and stretched it again onto a smaller stretcher. Finally, he has painted the new tacking edges white to cover up the original painted surface.

Similar painted tacking edges can be found on *Conceptio Artis*¹³ (1895), which is a central section of a painting Gallen-Kallela had cut into smaller pieces. In addition, this painting has a small strip of canvas attached to the top edge. This grounded and painted strip is originally cut from the lower edge of the original painting¹⁴.

Gallen-Kallela also changed the measurements and composition in his painting *Cheetah* (1910–14), which belongs to the Mannerheim Museum collection¹⁵. The original stretcher frame and remains of the canvas edges belong to the collection of the Gallen-Kallela Museum¹⁶. The artist had cut the painting to reduce its size while it was attached to a stretcher frame and was already in quite a late and finished state. Also, in this painting two of the edges remained unaltered and the other two were outlined again.

12 Private collection.

13 Private collection.

14 The signature of the original painting is visible on the added canvas strip. The signature can be found on the top tacking edge of *Conceptio Artis*.

15 Inventory number 73 in the Gallen-Kallela Museum.

16 Inventory number GKM-7874 in the Gallen-Kallela Museum.



Fig. 5. UV fluorescence photograph of *Lake View* showing the pink fluorescence of red organic pigments.

Photo: Finnish National Gallery / Conservation Unit, Hanne Tikkala

Pigments used in *Lake View*

At the beginning of the 20th century, around the time that he painted *Lake View*, Gallen-Kallela started to experiment with light and lucid colours. His pigment palette brightened and the use of vivid pigments, such as organic reds, cerulean blue, cobalt violet and cobalt green (Rinnmann's green) started to emerge in his paintings. Sombre shades like blacks and dark browns, are used in smaller areas and the overall light in the paintings is brighter. Also, the use of Prussian blue decreased. In *Lake View* the phenomenon of a bright pigment palette appears especially in the use of organic red in the sweet pink and light orange colours of the sun's rays of the early summer evening.

The white in the painting is mainly lead white, the zinc white has been used only as an additive and/or filler of the colour, either together with barium sulphate (litophone) or alone as a brightening or protective element. The use of lead white as the 'main white' is typical of the time period.

The pigment palette in the painting is not very broad, but it contains many pigments typically used by Gallen-Kallela, such as cobalt blue, synthetic ultramarine, cadmium yellow, emerald green, organic reds and different shades of iron oxide pigments. What is unusual is that cinnabar and viridian are absent from this painting, even though these colours are a definite part of Gallen-Kallela's basic pigment palette.

One of the dominant pigments used in the painting is emerald green, a copper acetate arsenite that has been used in almost every element, from the dark brown shades of the horizon's forest to the bright

lustrous glimmer of the sun bridge in the water. At this time, at the turn of the century, this pigment was fairly popular in oil painting, but because of its hazardous elements its use started to decline quite quickly. Likewise, from studies of Gallen-Kallela's pigment palette it disappears almost entirely just after 1910¹⁷.

In *Lake View* Gallen-Kallela has created the greenish tones of the sun bridge in the water not only by mixing blues and cadmium yellow but also by adding some emerald green to the shades. In the areas of water and sky where the sun's rays shimmer he has added organic red to bring a certain glow to the painting. This glow can be observed when the surface of the painting is illuminated with UV-light. The organic red then fluoresces in a bright orange colour, which might indicate the use of madder and/or alizarine (Fig. 5)¹⁸.

The blue shades in the sky Gallen-Kallela has created with cobalt blue, synthetic ultramarine and lead white. In the yellow, orange and pink rays of sunlight in the sky he has used different mixtures of cadmium yellow, organic reds and lead white. In the greyish tones of the background to the richly coloured water he has used cobalt blue, iron oxide colours, emerald green and lead white in a ratio that makes the mixture more sombre than in the blue areas of the water. The greyish background adds contrast to the bright shimmer of sunlight on the surface of the water, an element he has created with an impasto technique with thick lead white paint together with cadmium yellow. The young brushwood in the foreground consists

17 Tikkala & Hornytzkij, 'Luonnontieteellisin analyysimenetelmin tunnistettu Akseli Gallen-Kallelan väripaletti', 29

18 The characterisation of the specific compound of organic red has not yet been performed.



Fig. 6. Detail of the painting's surface showing the cross-waves painted with a thin-tipped brush.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde



Fig. 7. Detail of the painting's surface. Gallen-Kallela used flat-headed brushes to make long meandering strokes in the sky and on the horizon.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde



Fig. 8. Detail of the painting's surface. The heavily built-up surface structure in this section of the work highlights the glimmer of the sun's rays in the water.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde

of emerald green and different iron oxide pigments. Iron oxide pigments might include different shades of yellow and red ochre and brownish umber. The signature has also been painted with this mixture. The water glittering behind the young trees has been painted with cobalt blue and lead white. This is the last element added to this part of the painting.

The dark green forest on the horizon and its reflections on the water Gallen-Kallela has created with emerald green toned with iron oxide pigments and cobalt blue. With this mixture the colour of the forest is almost black, varying with different shades of green and blue. There were no black pigments identified in *Lake View*, instead all the black areas seem to be created with mixtures of different pigments.

The painting technique

There are several painting techniques used in *Lake View* that can also be found in the artist's later paintings: vivid cross-waves have been painted with a thin-tipped brush (Fig. 6); a flat-headed brush has been used to make long meandering strokes in the sky and on the horizon (Fig. 7); thin vertical lines have been lightly painted on top of the waves to highlight the glimmer and an almost relief-like surface has been built up in the brightest spots (Fig. 8). The brushstrokes are clearly visible throughout the painting. A light, wedge-shaped area of calm water, which is most well known from the artist's *Keitele* (1904) series of paintings, is presented in *Lake View*, reportedly for the first time. Also, the rippling waves in the *Keitele* series resemble those in *Lake View*, although they are executed in an even more reduced way in the *Keitele* works.

The formation of a brushstroke on a paint medium is a combination of several factors. The composition of the paint, the absorption of the ground layer and the speed and the force of the artist all affect the end result. Also the type of the brush used makes a difference (Fig. 9). The determined, long and wide brushstrokes in the sky are very characteristic of the artist. A small, oval reticulated imprint can also often be found in his paintings. It is formed when a brush containing a generous amount of paint is lifted straight upwards from the paint surface (Fig. 10). In *Lake View* this imprint can be found, for example, in a cloud above the island on the right.

The sky is predominantly painted in one session, since the paint layers are blended in together in most areas. The paint layers follow the sketch lines with precision: the drawn areas have been systematically coloured with a particular paint (Fig. 11). This can be deduced from the X-ray image where the outlines of the clouds appear dark. This means the paint layer in the area is very thin and in places missing entirely. The lake water, on the other hand, appears to be painted with



Fig. 9. A selection of Gallen-Kallela's brushes.
Gallen-Kallela Museum

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde

more layers. These layers have dried between applications, at least in some places. Short horizontal brushstrokes depicting the cross-waves have been painted wet-on-wet but the finishing strokes have been added to a dried surface, especially in the light areas. Presumably the sky and the water have been painted almost ready at one go and then finally the painting has been finished as a whole. The young trees in the foreground have been painted on top of a dried surface in the final stages.

The painting has been signed using a similar dark green paint to that found in the wooded islands and on the young trees in the foreground.¹⁹ The paint used for the signature's date is blended in with the light blue paint layer found in the lake water. Presumably the light blue brushstrokes were one of the last additions to the painting and were still wet when signed. Similar blue strokes can be found especially around the lower right corner in the glimmer. In the

final stages the artist has also added the small spruce sapling next to the signature since there the paint layers have also blended (Fig. 12). Other young trees have been painted in more detail on a dried paint surface. On the top a thin layer of varnish has been added.



Fig. 10. Detail of the painting's surface. The lifting of the brush from the surface during the painting process has left an oval reticular imprint.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde

Conclusion

The painting technique the artist has adopted in the early years of his career usually turns more definite as experience accumulates. In addition, new materials come on the market and new techniques are developed. Some are more popular than others. Also, styles and painting trends change, as time passes. In Gallen-Kallela's artistic development *Lake View* marks the stage where his artistic expression becomes more free and the painting style is liberated to support this

expression. The young trees and brushwood in the foreground are like a breeze from the past and they appear very different compared to the expressive style of the sky and lake water.

Several new aspects to the painting technique of Gallen-Kallela have been revealed during the observation process that has been described in this paper – how he prepared his canvases, what pigments he preferred and how the painting was constructed. After *Lake View*

¹⁹ Signature on lower right corner: Gallén/Kalela/1901.



Fig. 11. Detail of the painting's surface. The underdrawings around the clouds are partly visible to the naked eye.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde



Fig. 12. Detail of the painting's surface. Gallen-Kallela used a similar mixture of pigments for the signature to that used in the young brushwood in the foreground. The paint has in places blended in with the light blue paint of the background.

Photo: Finnish National Gallery / Conservation Unit, Katariina Johde

Gallen-Kallela continued with the motifs of *The Kalevala* and Lake Keitele. His oeuvre reaches its colourful and vivid peak under the sun of Kenya, where he painted scenes full of bright colours that are entirely without any sombre timbre. The glorious light of these paintings and the honed skill of painting wide, confident and strong brushstrokes flourish. The pigment palette is also at its brightest, containing pigments from the basic palette but also cerulean blue, cobalt violet, Rinmann's green and organic reds – some of them the same as those used in *Lake View*. In *Lake View* the colours of a Finnish summer evening are created with cobalt blue, ultramarine blue, emerald green, cadmium yellow, organic red, iron oxide pigments and lead white. Surprisingly, the colours of the Finnish lake landscape are the precursors for the palette used in the bright African light.