

# MAALAAMINEN MINERAALEILLA / PAINTING WITH MINERALS

**Pekka Halosen alkuperäisten maalituubien & pigmenttien analysointi**  
*Analysis of Pekka Halonen's original paint tubes & pigments*

**ALAN R BUTCHER & SARI LUKKARI**

Geologian tutkimuskeskus / Geological Survey of Finland

**Yhteistyössä / In collaboration with**  
Johanna Rinta-aho, Päivi Ahdeoja-Määttä,  
Tarja Kärkkäinen & Lassi Kivikangas  
**Halosenniemi Tuusulan museo**

Halosenniemi







# Aims of the Project



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To determine the composition of the paints used by **Pekka Halonen**, and thereby establish which **minerals** & materials were used in their manufacture

# Painting

with minerals

Which minerals did Pekka Halonen use to create his colours?

Wood

Shawl

Carpet

Skin tone

Shirt

Trousers



# What is Oil Paint?

# Components of oil paint

## Natural primary minerals

Cobaltite -  $\text{CuCo}_2\text{S}_4$   
Carrollite -  $\text{CoAsS}$   
Gibbsite -  $\text{Al}(\text{OH})_3$

Galena -  $\text{PbS}$

Sphalerite -  $\text{ZnS}$   
Smithsonite -  $\text{ZnCO}_3$   
Willemite -  $\text{Zn}_2\text{SiO}_4$

# Cobalt is often substituted by zinc and/or chromium

\* Lead may be added to paint to accelerate drying, increase durability, maintain a fresh appearance, and resist moisture that causes corrosion

## Man made materials

$\text{Al}_2\text{CoO}_4$   
sintering of cobalt oxide with aluminum oxide at 1200 °C.

+

## Binders /additives

Linseed oil  
Walnut oil  
Safflower oil  
Poppy oil  
Egg yoke  
Turpentine  
Beeswax  
Chalk  
Aluminium stearate

Pb metal or oxides\*  
Zn metal or oxides#

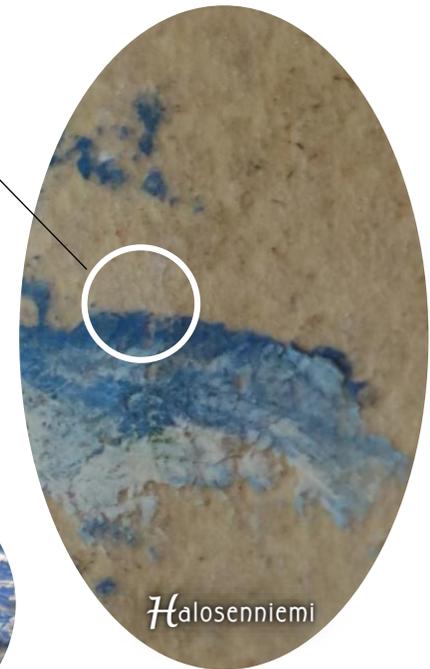
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## Oil Paint



Cobalt Blue

## Painting



Halosenniemi

# How Paint Tubes Revolutionised Art

Before paint tubes were introduced, most artists struggled with the storage of their oil paints.

Typically, they would use a **pig's bladder**, tied up with string, and when needing some paint, they would prick it with a nail.

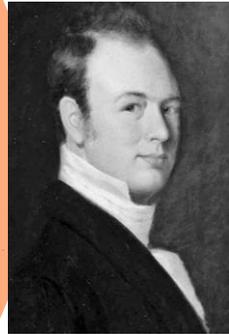
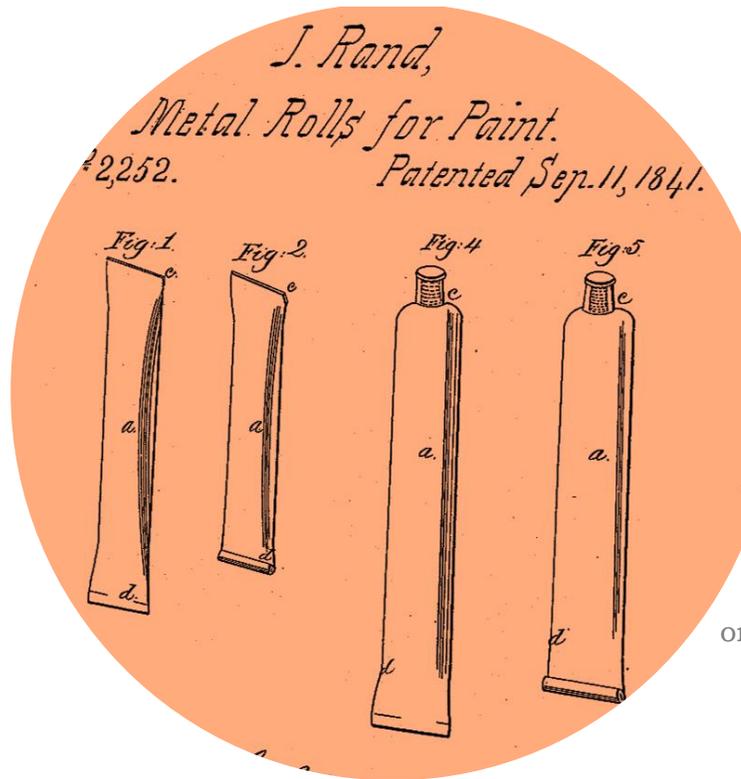
But the paint would often dry up, and the bladders were not very robust, often leaking during transportation.

# Bladders

Image: Bladders of paint found in the attic of **Thomas Gainsborough's** former house in Sudbury, England

© Archant

# Invention of the metallic collapsible paint tube



Self portrait, oil on board, c. 1836

**John Rand** invented the paint tube in 1841.

He made them from tin metal, and they were sealed with a screw cap. Their design, whereby they were collapsible and could be repeatedly opened and closed, prevented the paint from drying up.

This allowed artists to practically paint on-site for the first time – such as outdoors in a garden, or in the countryside, or inside a house.

Source: <https://www.smithsonianmag.com/arts-culture/never-underestimate-the-power-of-a-paint-tube-36637764/>

# Paint tubes changed everything for artists

**John Rand's** tubes soon began to be filled with new coloured pigments, which revolutionized the way artists could paint

Last year (2021) was the 180<sup>th</sup> anniversary (11<sup>th</sup> September 1841) of his invention!



**Pierre-Auguste Renoir once said**

*“Without colours in tubes, there would be no Cézanne, no Monet, no Pissarro, and no Impressionism.”*

Claude Monet,  
Woman with a Parasol -  
Madame Monet and Her Son  
(Camille and Jean Monet), 1875

# Pekka Halonen made extensive use of paint tubes

*“Pekka Halonen spent most of his days painting. He never compromised at all on his requirement for authenticity. He would depart for his painting trips regardless of the weather and **even in extremely cold weather.**”*

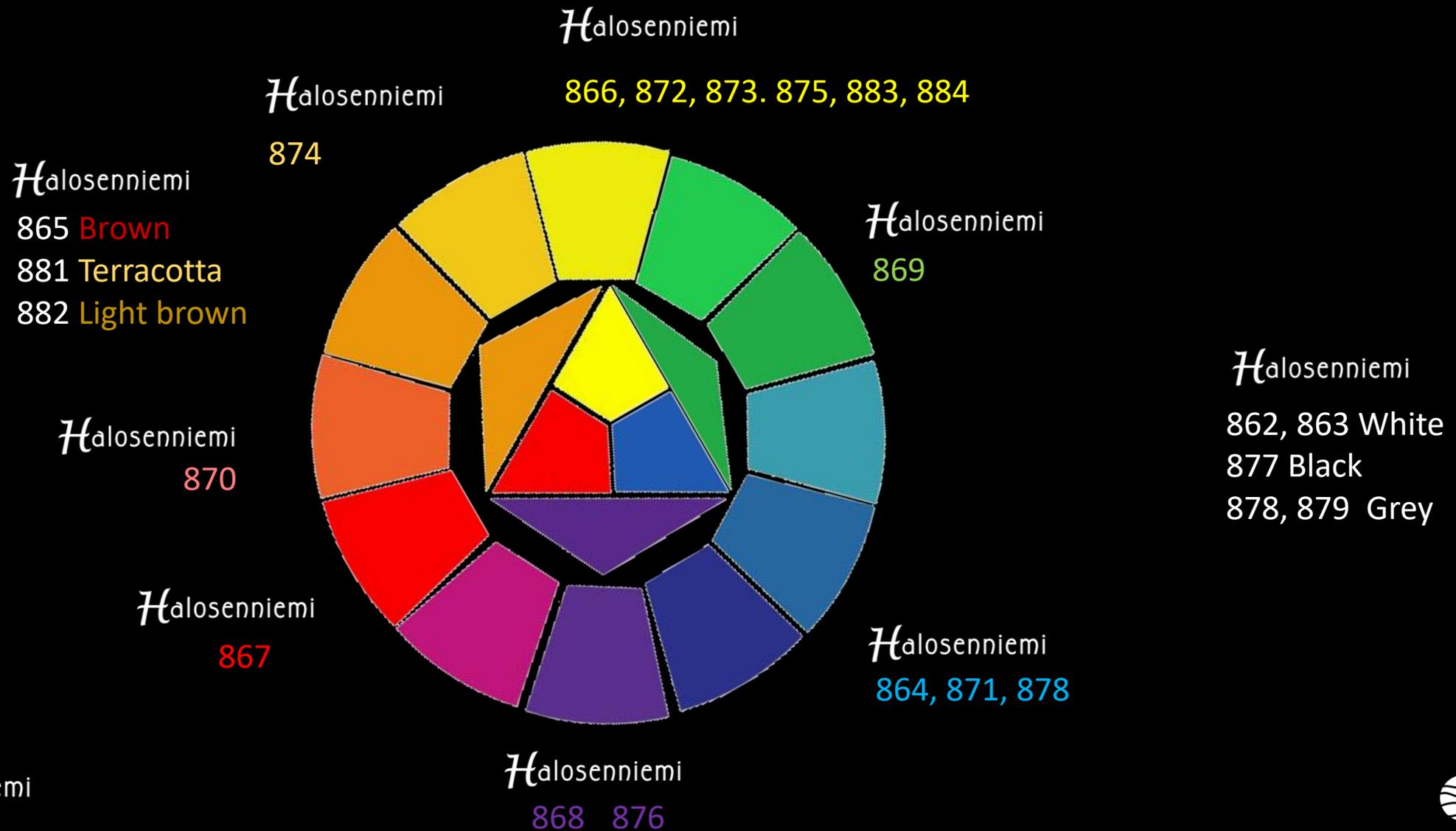
*Halonen painted persistently even when the **temperature was more than 30 degrees below zero.** At this degree of cold, **the oils he used for painting were unusable** and the color was then applied using the fingers and a palette knife.*

*When painting outdoors, Halonen often lingered well into the evening or dusk. Maija often wondered, how he could return intact and uninjured in the dark.”*

Source: <http://www.alternativefinland.com/art-pekka-halonen/>

# Imaging of Pekka Halonen's original paint tubes

# Paint tubes and their relation to the colour wheel



# Images of the Paint Tubes analysed

862



White  
Zinc-white

863



White

864



Blue  
Cobalt-blue

865



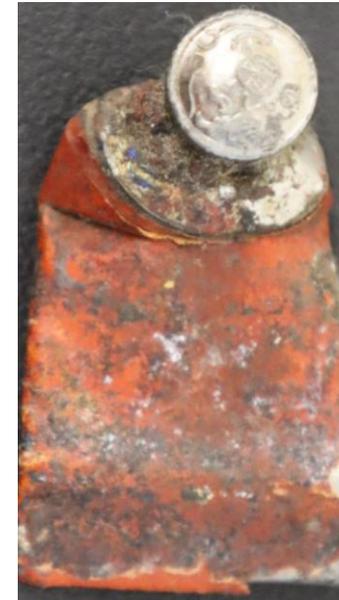
Brown

866

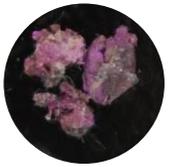


Yellow

867



Red



868



Violet  
Cobalt-violet  
Cobalt arsenate

# **X-ray Computed Tomography (X-CT)**

## **Images of the paint tubes**

**862**  
**White paint**  
**tube** with screw  
cap intact



Optical



X-ray tomography images (X-CT)



Optical

## 862 White paint tube



Optical



\*LUCIEN LEFEBVRE-FOINET  
X-ray tomography image (X-CT)

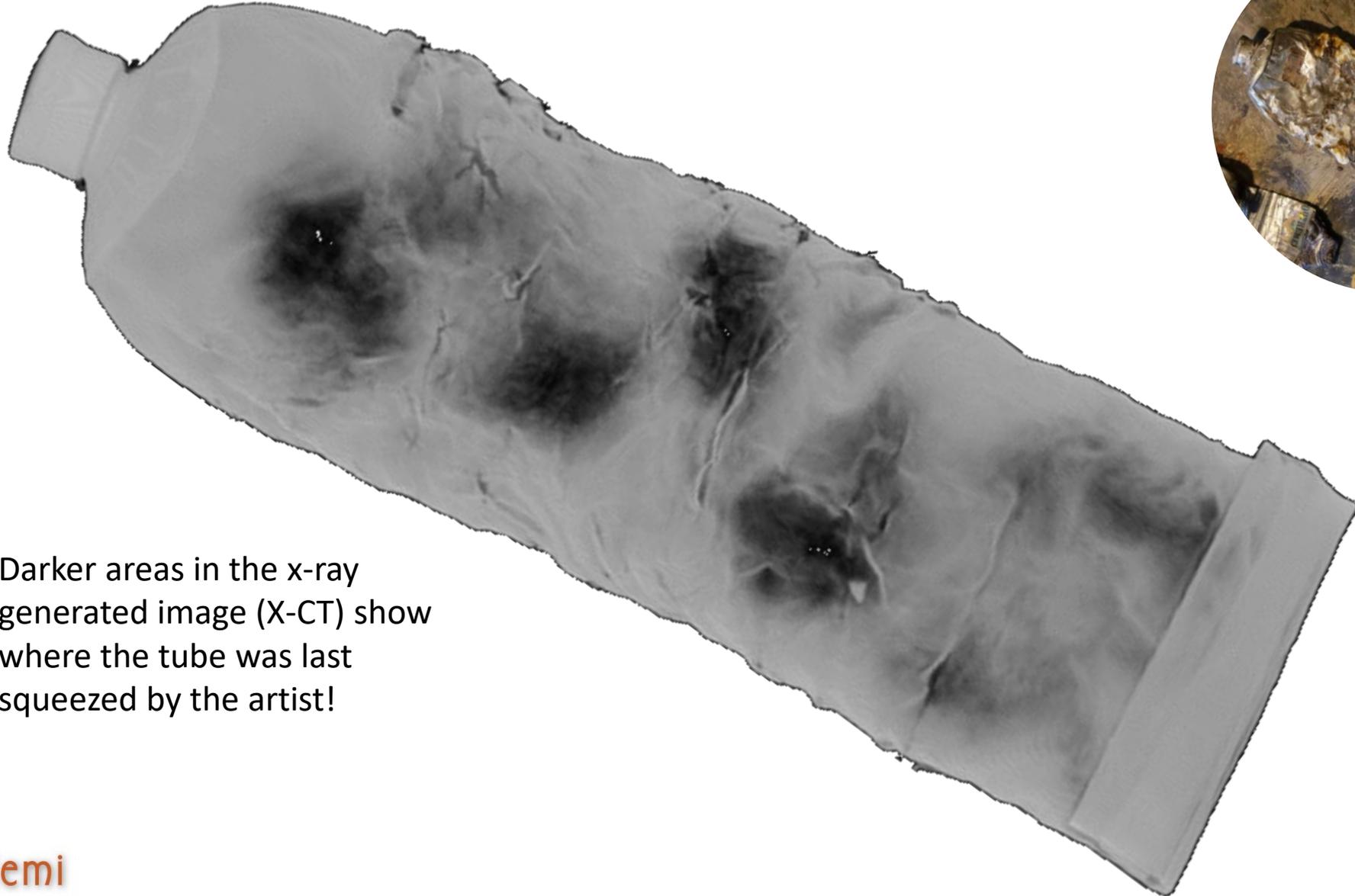
\***Lucien Lefebvre-Foinet** was a famous manufacturer and dealer of artists' material, and a shipping company.

*"In the 1880s, a Parisian called **Paul Foinet** was making oil paints, following a secret recipe. Carefully selecting **natural pigments** and crushing them by hand, Monsieur Foinet achieved rich nuances that dazzled painters. The shopkeeper who also made canvases and paintbrushes went around artists' studios, peddling his wares door-to-door."*

His son-in-law **Lucien Lefèbvre** took over the business in 1902 and named their products **LUCIEN LEFEBVRE-FOINET**.

Source: <https://www.nytimes.com/>

## 862 White paint tube



Darker areas in the x-ray generated image (X-CT) show where the tube was last squeezed by the artist!

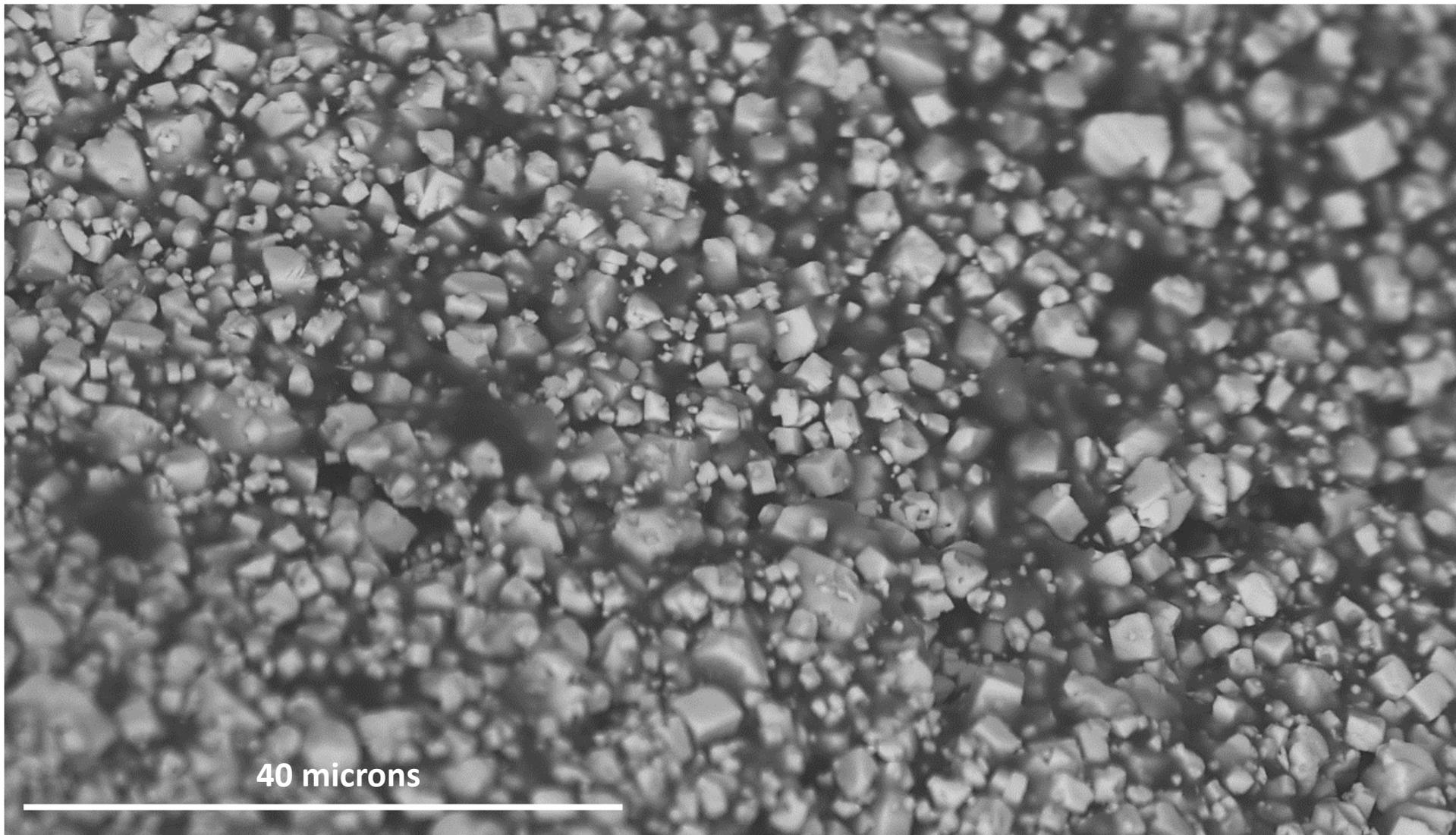
# **Results of Analysis of Pekka Halonen's paint & pigments**

# Pigments up close!

867 Red

All the grains in this paint are made of **mercury sulphide!**

Likely to be the mineral **cinnabar** with a composition of **HgS**.



# Pekka Halonen's paints are highly **toxic!**



869



Emerald Green

Ba



870

Lead White

Pb



864



Cobalt Blue

Co



868



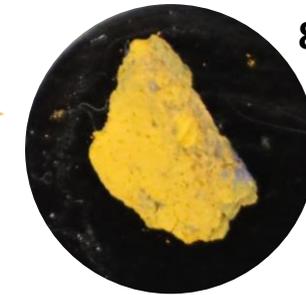
Cobalt Violet

As



Chrome Yellow

Cr



872

Cd

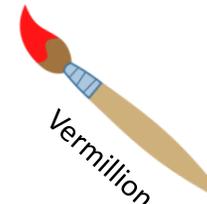
Hg



866



Cadmium Yellow



Vermillion



867

Neurotoxic

Genotoxic

Metal Poisoning

Pb, Hg

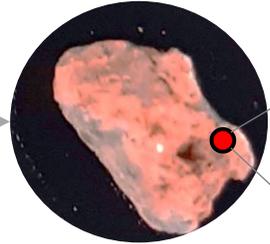
Ba, Cr

Hg, Co, Cd, As, Pb



# Painting with fossils!

Actual pigment fragment  
from Halosenniemi



880

Example painting where  
the artist may have used  
this pigment colour



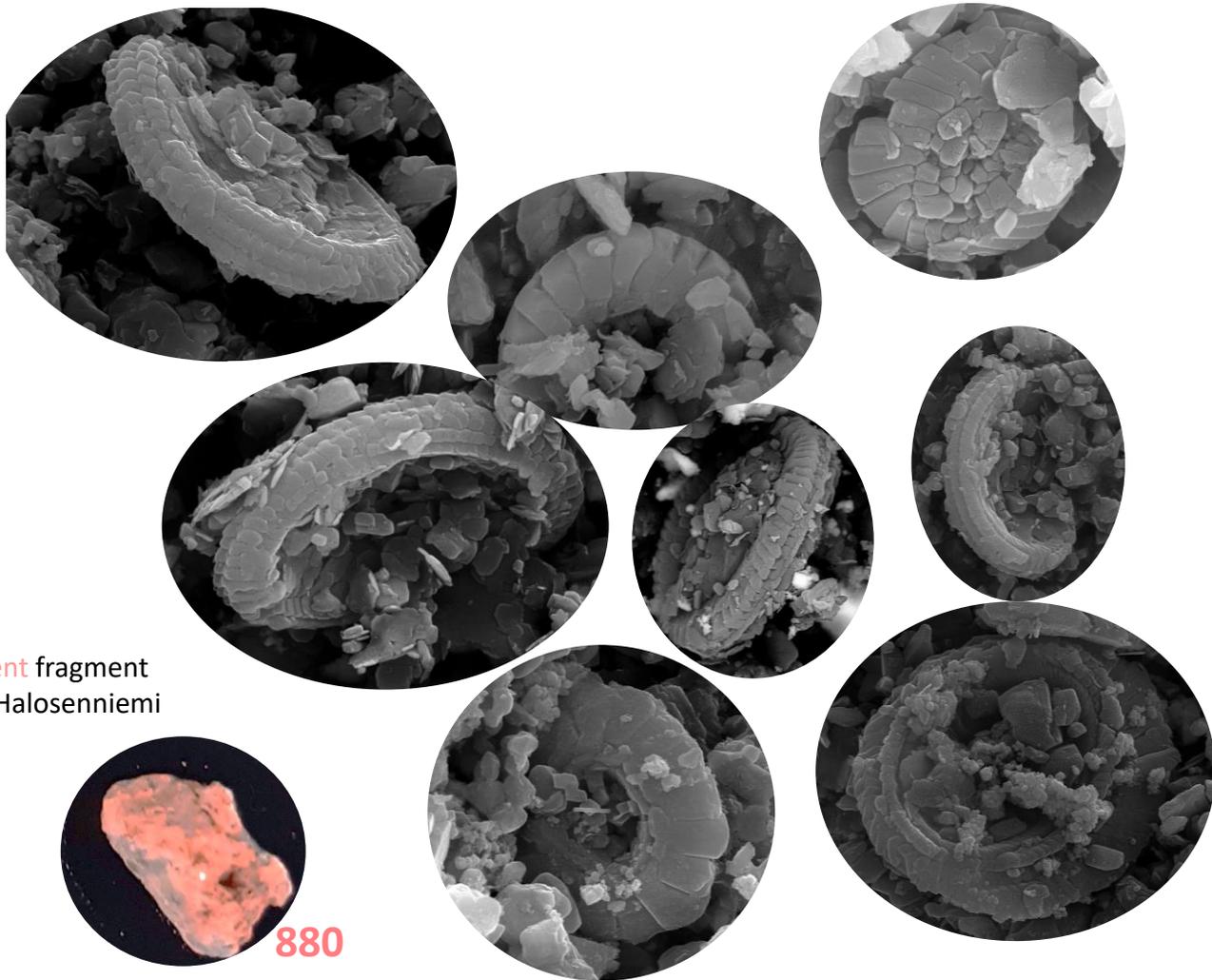
Extract from *An Autumnal Landscape* 1910

**Halosenniemi**  
Taiteilija Pekka Halosen ateljeekatimuseo

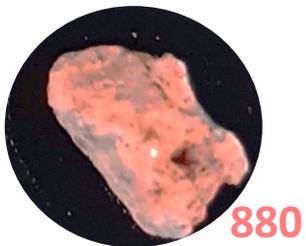


Imaging of this pigment under the SEM revealed it to contain **coccoliths** - micro-fossils made of minute disaggregated rounded calcareous platelets. This particular type of **coccolith** is believed to represent single-celled algae (**phytoplankton**) that built their shells from calcium carbonate and lived in the oceans during the **Cretaceous** era (100-60 millions years ago). Because **chalk** is mostly made up of **coccoliths**, it would appear, therefore, that **chalk** was an additive to this pigment

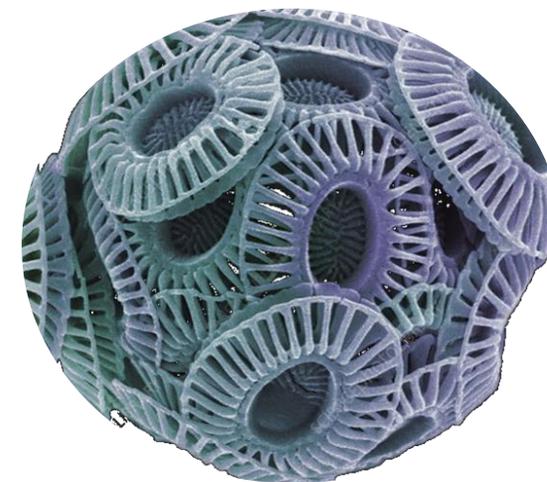
# Coccolith types found in pigment 880



Pigment fragment from Halosenniemi



A modern coccolithophore



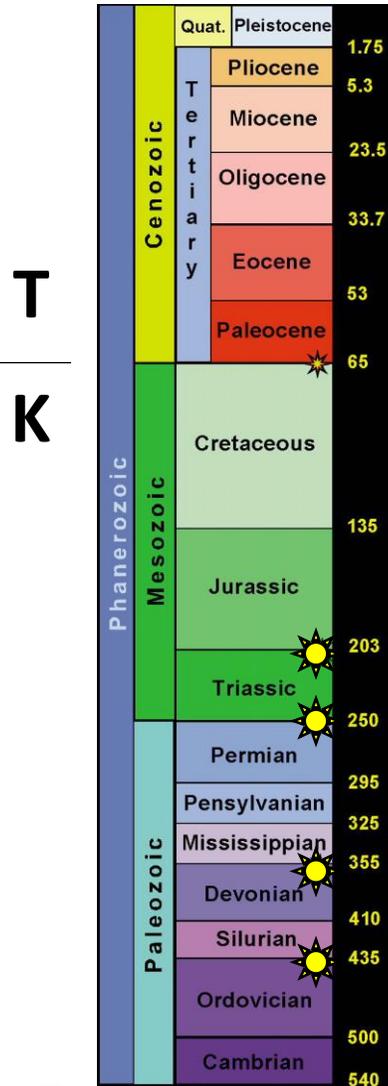
Coccoliths are platelets that once formed a coccolithophore. Upon dying, they separate.

Ancient accumulations on the sea floor led to chalk deposits

Credit: STEVE GSCHMEISSNER / SCIENCE PHOTO LIBRARY

# Coccoliths in the geological record were much reduced *after* the **Cretaceous**

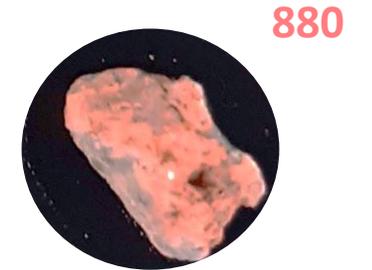
90 percent of coccolith species became extinct after an impact



☀  
Mass extinctions



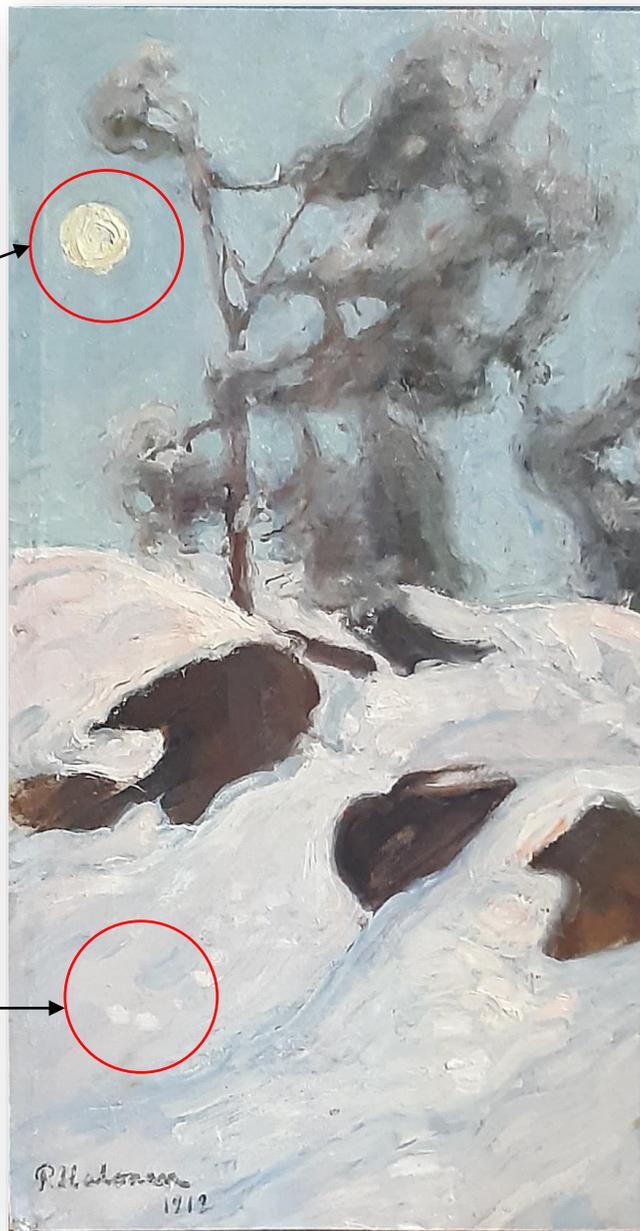
Source: mark garlick SPL getty images



This small pigment fragment from Halosenniemi therefore connects Pekka Halonen to dinosaurs, meteors, ancient chalk seas, & mass extinctions!

**Coccoliths** were largely wiped out by the same meteorite that killed off the **dinosaurs** at the *Cretaceous-Tertiary* boundary (so-called **KT boundary**). Around 90 percent of all plant and animal species on Earth died out at this time!

**Moonlight**  
(Winter Landscape)  
1912



Zinc white?

Titanium white?

## What Next?

To what extent did Pekka Halonen use different white pigments in his paintings?

**This will be the subject of our next research project!**

# **Making your own paints from natural minerals!**

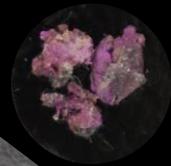
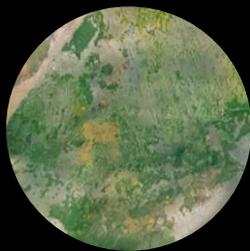
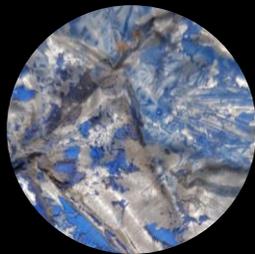
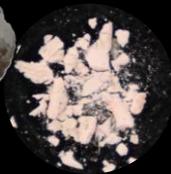
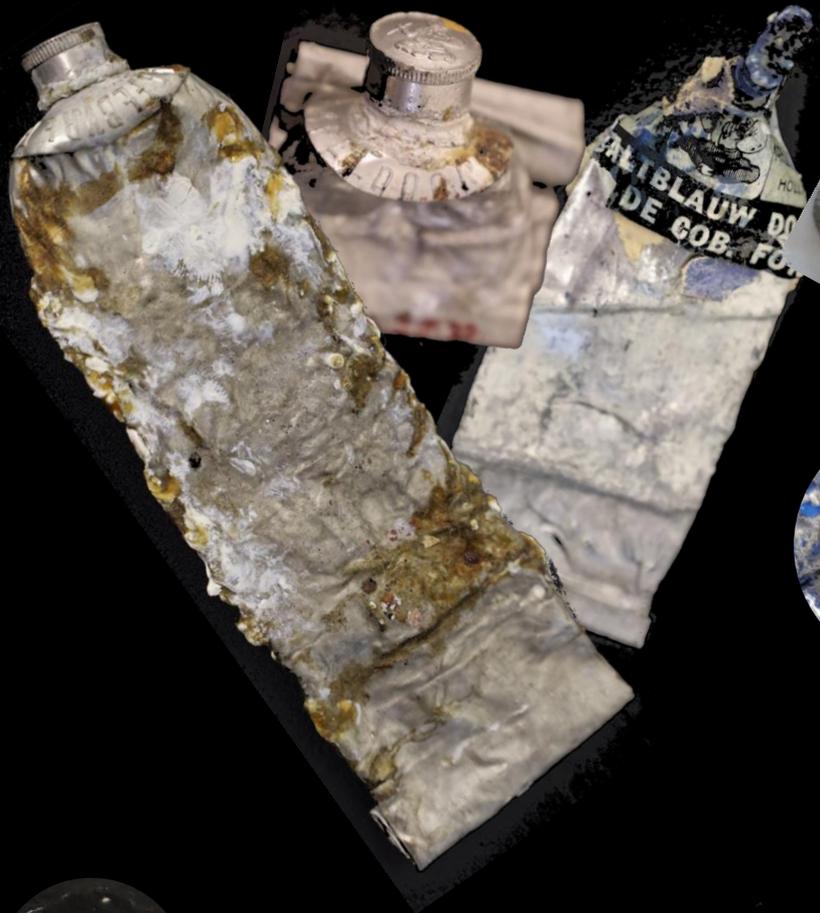
# GTK's Mineral Pigment Collection



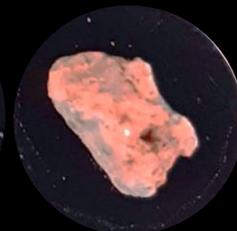
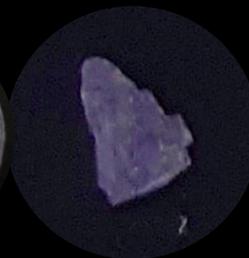
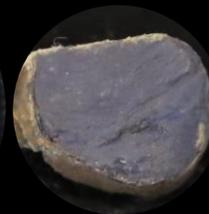
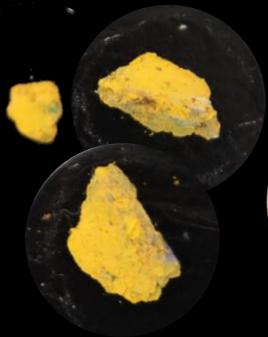
Pekka Halonen's original palettes



GTK's demonstration Mineral Pigment Collection is on view at the 2022 Exhibition



# Painting with minerals





218:40

201812

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Schweik...  
mischen...  
von Prof. Koronzo  
DORP

WINE

BERONIA

# Painting with minerals

## A case study based on Pekka Halonen's iconic art

In collaboration with  
Johanna Rinta-aho, Päivi Ahdeoja-Määttä,  
Tarja Karkkainen & Lassi Kivikangas  
Halosenniemi Tuusulan Museum





# TAITEILIJAELÄMÄÄ Halosenniemessä

Halosenniemi

8.3.–28.8.2022

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