

Centre for Art Technological Studies and Conservation



SMK



Statens Museum for Kunst
National Gallery of Denmark



Nationalmuseet

 National Museum of Denmark



KADK The Royal Danish Academy of Fine Arts
Schools of Architecture, Design and Conservation

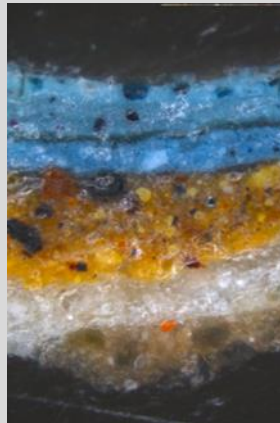


VILLUM FONDEN  VELUX FONDEN

CATS 
Centre for Art Technological
Studies and Conservation

The purpose of CATS is

- to advance ‘collections research’, which in present-day gallery vocabulary incorporates not only the long-established art historical research of the collections but also the technical research which have increasingly proved to be essential to a proper understanding *and* appreciation of works of art



The purpose of CATS is

- in-depth art historical and scientific research to explore the material nature of works of art and comparable objects in museums with which CATS is collaborating
- to provide analytical services to other institutions
- to conduct collaborative projects with conservation scientists, conservators and curators from around the world

A selection of **conservation science institutions**

- 1888 Chemisches Labor der Königlichen Museen zu Berlin, now Rathgen-Forschungslabor
- 1902 Versuchsanstalt und Auskunftsstelle für Maltechnik, München
- 1932 Laboratori di Restauri at the institute of Opificio delle Pietre Dure, Florence
- 1937 Reichsinstitut für Maltechnik, now Doerner Institut
- 1921 British Museum, London, founded its Research Laboratory
- 1928 Center for Conservation and Technical Studies, now Strauss Center for Conservation and Technical Studies at the Fogg Art Museum at Harvard
- 1930 research and conservation analytical laboratories at the Museum of Fine Arts, Boston.
- 1934 National Gallery, London
- 1948 Royal Institute for Cultural Heritage (KIK-IRPA), Brussels
- 1950 National Gallery of Art, Washington D.C.
- 1963 Smithsonian, Washington D.C.
- 1963 Centraal Laboratorium voor Onderzoek van Voorwerpen van Kunst en Wetenschappen, (later ICN, currently RCE), Amsterdam & Amersfoort
- 1965 Danmarks Nationalmuseum with dept. for Research, Analysis and Advice
- 1971 School of Conservation with labs for education and research
- 1985 Getty Conservation Institute, Los Angeles
- 1998 Centre de Recherche et de Restauration des Musées de France (C2RMF), Paris
- Scandinavia had no interdisciplinary research institution focusing on the visual arts*
- 2011 CATS undertook the challenge...

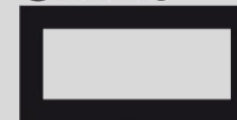
Work Packages CATS 2011-2017

- WP1: Management & International Collaboration
- WP2: Materials in Dutch & Danish 17th Century Paintings
incl. a PhD project
- WP3: Nicolai Abildgaard and 18th Century Painting Techniques
- WP4: 19th Century Painting Techniques and materials;
Danish Golden Age *incl. a PhD project*
- WP5: Works of Art on Paper
- WP6: Establishment of a Reference Collection Database &
Digital Documentation
- WP7: Dissemination/Conferences/Publications

Interdisciplinarity



SMK 



Statens Museum for Kunst
National Gallery of Denmark



CATS analytical equipment

(a selection)

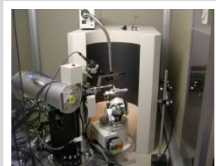
Internal

- FT-IR ATR
- FT-IR MIR and FIR
- PY-GC-MS
- Ion chromatography
- HPLC
- XRF ARTAX 400 + Mo and Rh tgt's
- pXRF
- RAMAN 514nm and 785nm
- SEM-EDX
- Spectroradiometer ASD (UV-VIS-NIR reflectance and radiance/irradiance analysis)
- X-ray
- UV-vis

- Osiris IR, InGaAs-array
- Inframetrics SWIR, PtSi-array
- VIL (IR luminescence)
- Div microscopes
pol / trans / UV / epi
- INSTRON tensile testing
- Colour measurement & micro fading analysis
- DNA sequencing

External

- OCT
- NMR spectroscopy
- Dendrochronology





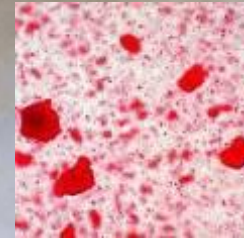
Cross section



**Lead ore for
lead white**
England



Ultramarine blue
(lapis lazuli)
Afghanistan



Carmine red
Latin America



Earth pigments
Germany & France



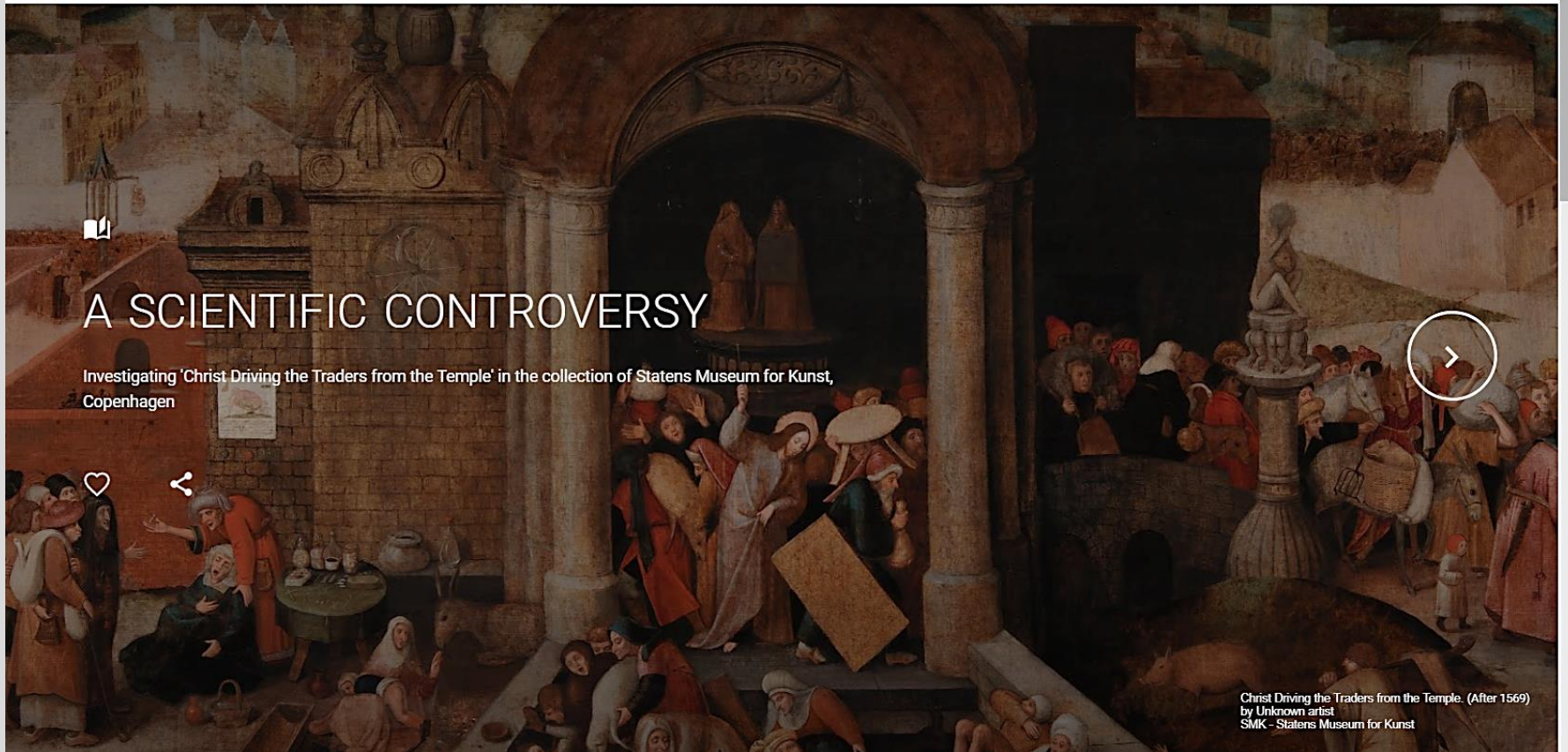
Cinnabar
Spain



Indian yellow
India



Oak
Baltic region



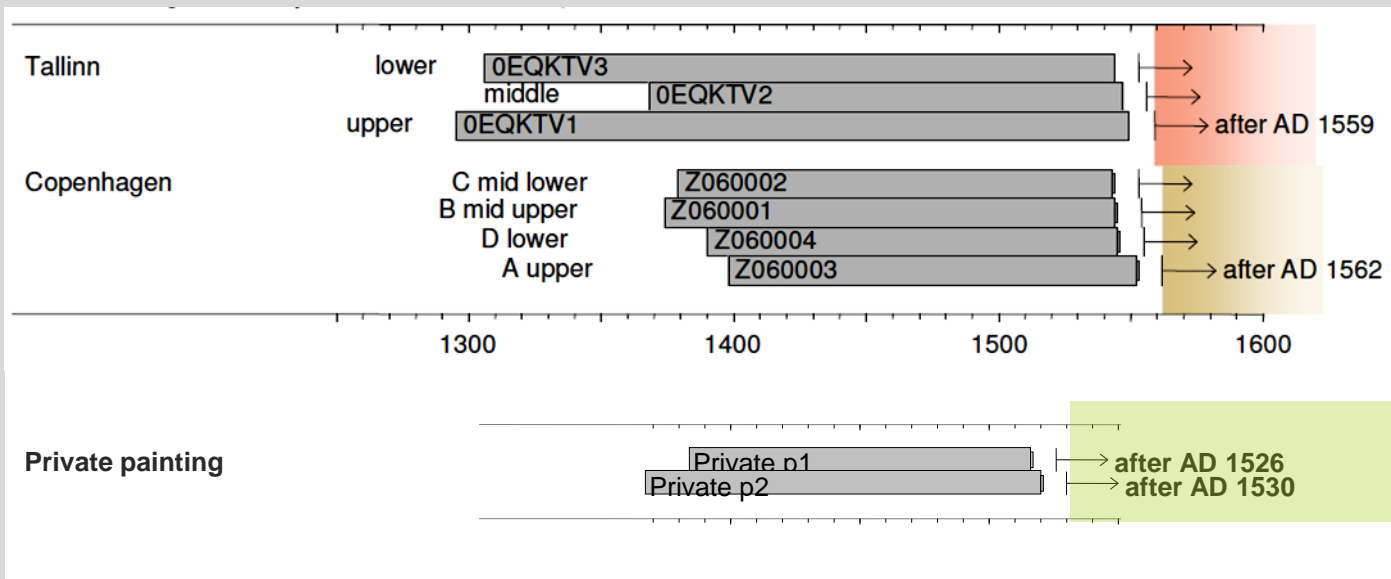
A SCIENTIFIC CONTROVERSY

Investigating 'Christ Driving the Traders from the Temple' in the collection of Statens Museum for Kunst, Copenhagen

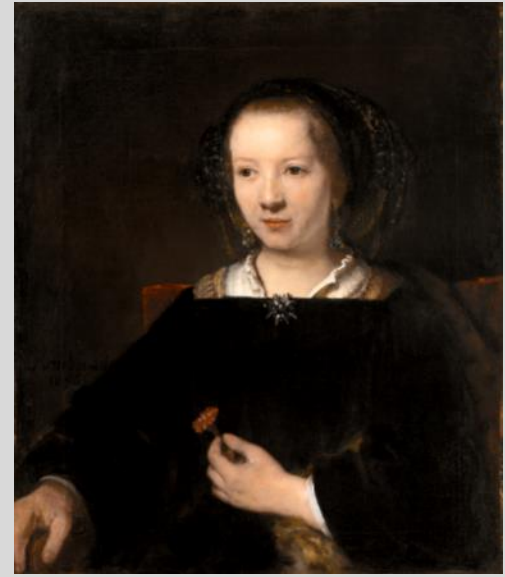
Christ Driving the Traders from the Temple. (After 1569)
by Unknown artist
SMK - Statens Museum for Kunst

<https://artsandculture.google.com/exhibit/EgLCBVJZ1gD8Jg>



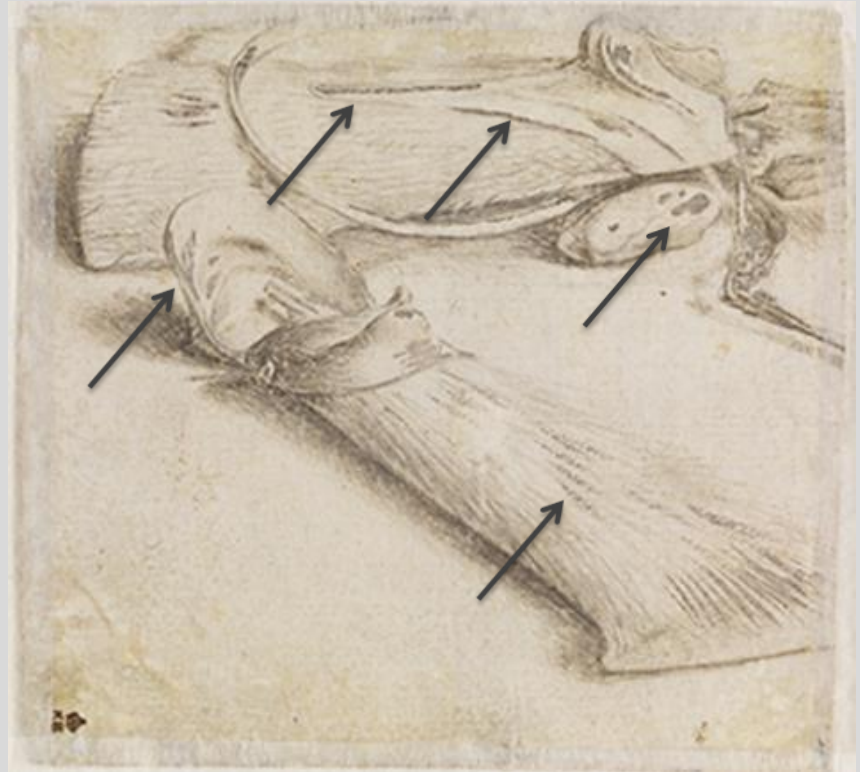








A Dark Future?



Before exposure of
3 types of lead white
to extreme values
of H_2S in a closed
desiccator



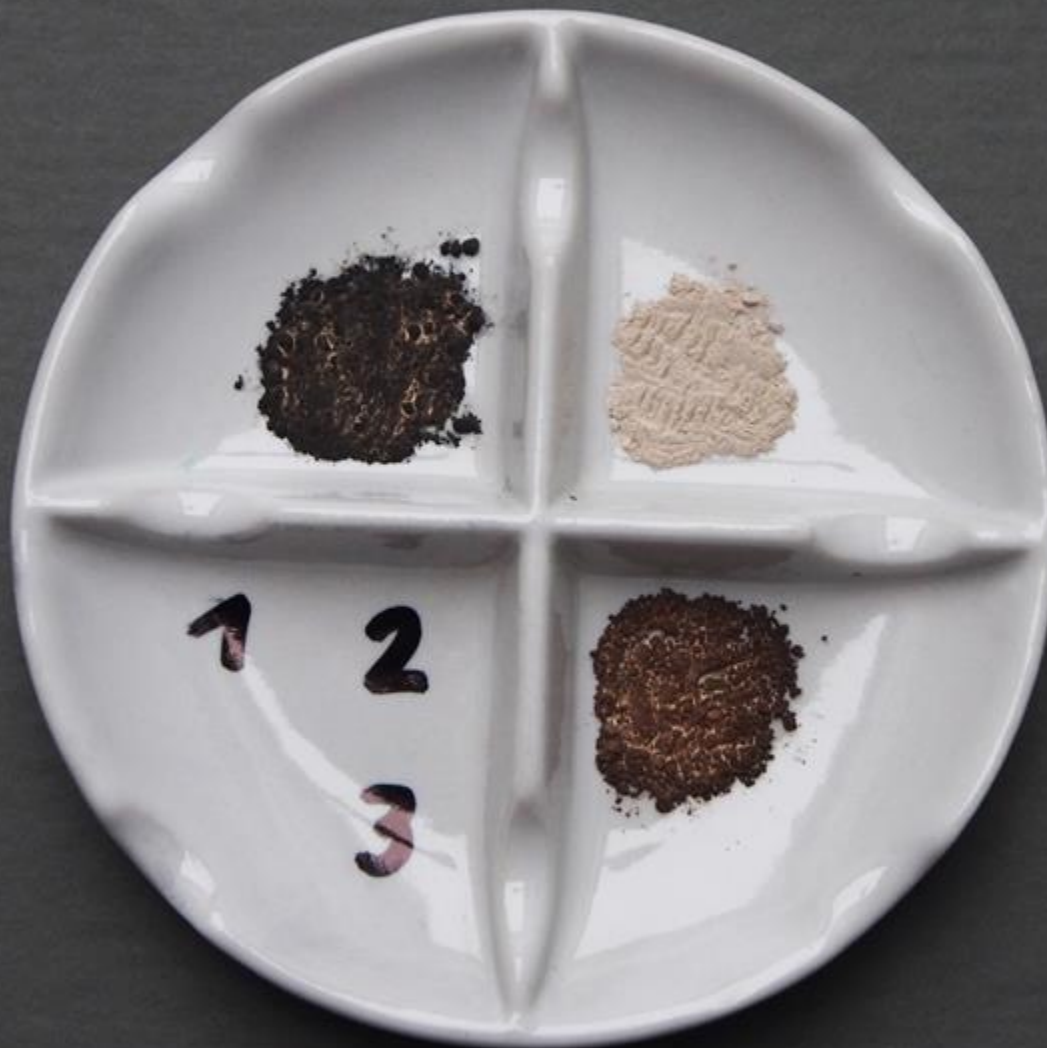
1. Neutral lead carbonate, Sigma Aldrich
2. Lead white pigment, Kremer
3. Basic lead carbonate, Merch

After 4 hours



1. Neutral lead carbonate, Sigma Aldrich
2. Lead white pigment, Kremer
3. Basic lead carbonate, Merch

After 24 hours



1. Neutral lead carbonate, Sigma Aldrich
2. Lead white pigment, Kremer
3. Basic lead carbonate, Merch

After 36 days



1. Neutral lead carbonate, Sigma Aldrich
2. Lead white pigment, Kremer
3. Basic lead carbonate, Merch

Drawing by Abraham Bloemaert (1564 – 1651), *Seated woman*. All of the lead white highlights have blackened.

We now know that hydrogen sulfide (H_2S) is the chemical compound that causes the blackening of *some* lead white pigments, but far from all.

Why?

A combination of factors that involves the

- geological provenance of lead (lead ore)
- its production methods, including processing and refining methods, which will have varied from one region to another and during different periods
- type and quantity of binding medium



Fading of pigments



Christen Købke, 1838 "View of Lake Sortedam", KMS359

'As time passed by came sunset. Christen Købke's 'View of Lake Sortedam', its genesis and colour changes',

by
A. Vila, T. Filtenborg,
K. Monrad, J. Wadum
in:

Science and Art
The Painted Surface

Royal Society of Chemistry, UK



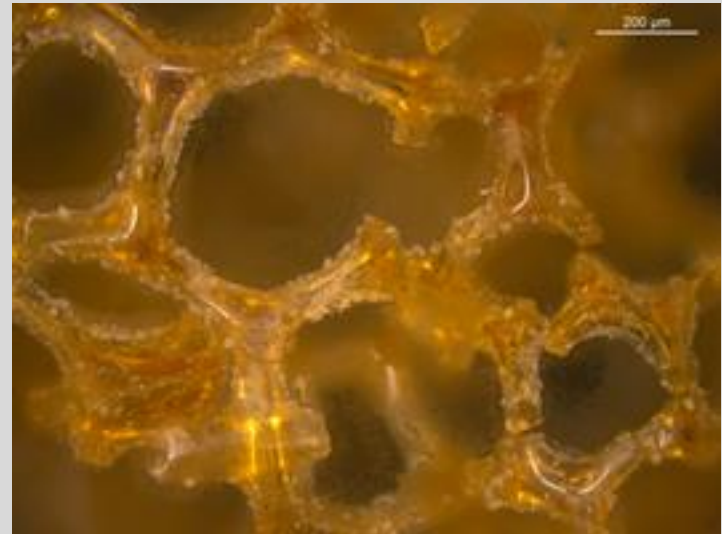
CATS



Centre for Art Technological
Studies and Conservation

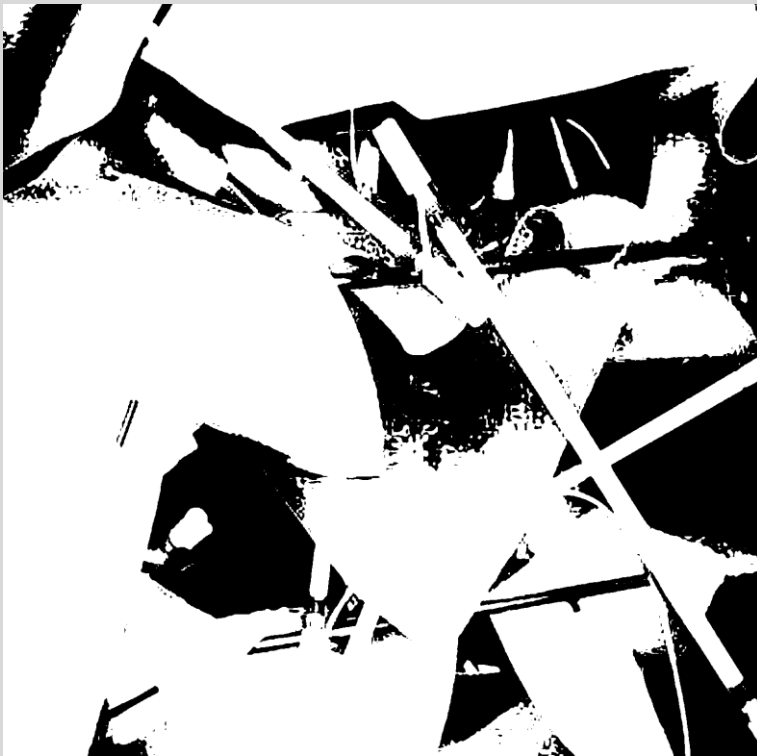


Gunnar Aagaard Andersen, *Ord*, 1964.



PRIMI

Plastics Research and Innovation for Museums and Industry



Anita Jørgensen,
Angel Figure I, 2002



2007




Claus Carstensen
Ether body, 1986



2014

© Claus Carstensen
<http://www.smk.dk/en/explore-the-art/search-smk/#/detail/KMS7403>

Reference Collection Database

CATS  Reference Collections

Log in

Enter search term

< 42 of 57 >

Paint Cross Section 477d

Sample metadata

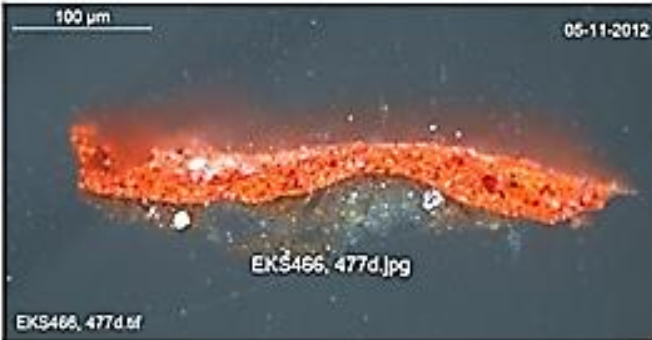
Sample origin	red from feathers in hat
Sample date	27/09/2012
Institution	Statens Museum for Kunst (SMK)
Employee	JMN
Sample location	CATS Laboratory
Remarks	Path to document .:SCIENCE\ANALYSIS\Painting conservation\EKS466 Pieter Isaacsz\X-sections and samples\X-section_reports\X- section_EKS466_477d.docx

Analysis description(s)

Analysis 1 : Microscopy

Artwork metadata

Inv. number	EKS466
Title	Christian den udvalgte prins 1 af 2
Artist(s)	Pieter Isaacsz
Artist nationality	Dutch
Technique / Material	Olie på lærred
Dimensions	119 x 60 cm
Owner	Frederiksborg slot, Det Nationalhistoriske Museum



100 µm 05-11-2012
EKS466_477d.jpg
EKS466_477d.tif

Wooden Supports in 12th–16th-Century European Paintings

A New English Translation with Commentary of Jacqueline Marette's
Connaissance des Primitifs par l'étude du bois du XII^e au XVI^e siècle



Ambrogio Lorenzetti (1285–ca. 1348), *St. John the Baptist*, ca. 1337–1342.
Tempera on poplar, 52.3 x 47 cm. Statens Museum for Kunst (SMK) inv. KMS8314.

Edited by Jørgen Wadum, Christina Currie, Noëlle Streeton, Jean-Albert Glatigny and Nicole Goetghebeur

Translated by Ted Alkins and Paul van Calster

Archetype Publications

1 Birdcage Walk, London SW1H 9JJ

Email: info@archetype.co.uk

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The Getty Foundation

CATS

Centre for Art Technological
Studies and Conservation

<http://www.wooden-supports-marette.com/>

Dendro4Art database *(in preparation)*



```
HEADER:
KeyCode=NMKV01A
Length=92
DateEnd=1791
DATA: Tree
  374  442  364  406  539  387  254  176  147  145
  179  188  198  204  210  190  142  103  85  55
  96   79  118  118  160  147  156  139  119  103
  68  135  152  61  58  37  46  55  81  75
  70  48  79  67  90  95  92  50  7  7
  19  18  21  22  20  32  36  25  22  28
  37  36  34  31  36  40  43  45  49  46
  56  31  39  41  41  41  48  46  36  17
  18  25  27  23  36  36  21  27  14  12
  19  19  0  0  0  0  0  0  0  0
HEADER:
KeyCode=NMKV01B
Length=62
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Measurements from more than 7.000 paintings including more than 16.000 chronologies from the 15th - 18th centuries



Marks on Art database *(in preparation)*



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RKD

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MARKS ON ART database



Gangy Inc

Margie Benoit's Fugitive Bonding and more

Jacques Luythens	Gangy Inc	Hand van Breda	XX
Hand van gangy		Guillaume gabroy	GG
Jacques van gangy		Hand cenerly	✿
francoys van gangy	F.T.	francoys maad	♥
francoys de Noes	NP	lyees de Bond	DP.B.
Lambert de Bond	EL	francoys kerbo	✿
francoys de H.A.L		francoys de Bond	□
francoys de V		Hand mander	M
Mantma de Srijes	ME	Margie Vincent	W
francoys de V	NP		
Lambert de Bond	L.K.		
Guillaume de Bond	A		

Dec 3 Novbr 1617.



1621



1612



1634



1659

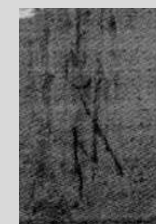


1619



1640

1598 - 1637



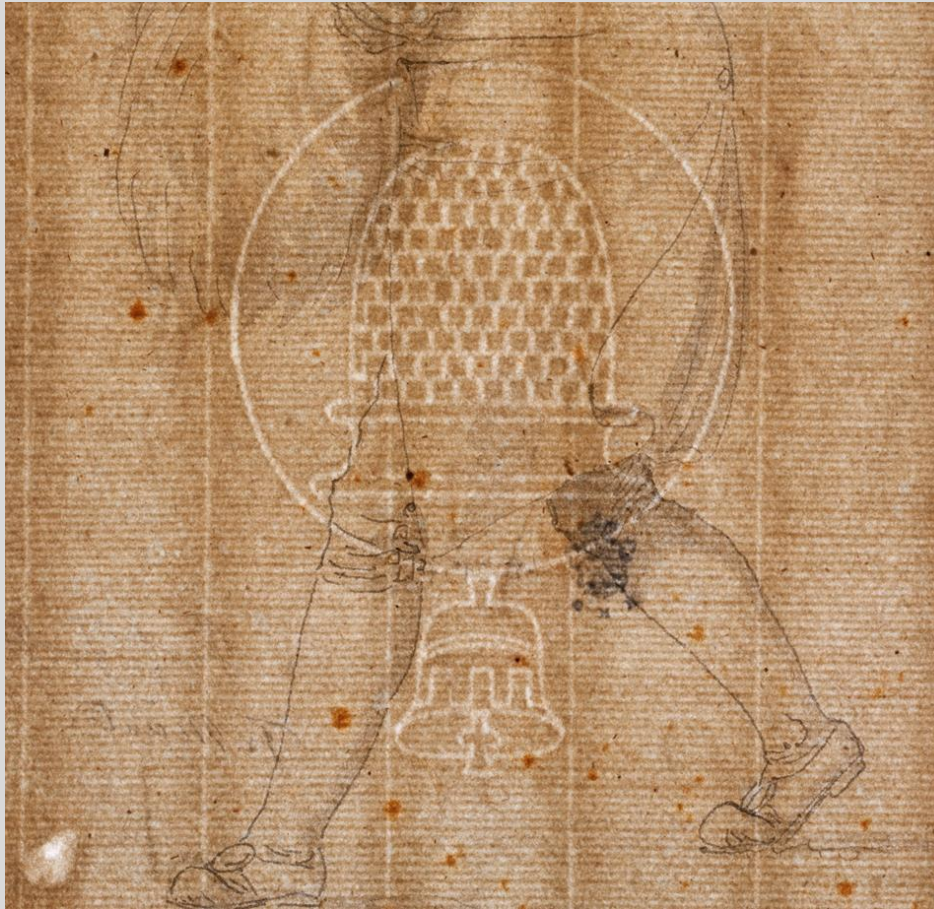
A dozen different marks – thousands of repetitions

Which match with which?

Can we establish a production chronology?

We will online create order for art historical evidence and authentication?

Watermarks database *(in preparation)*



@conservationSpace



ConservationSpace is a web-based digital document management system developed specifically for conservators. It allows users to write, store and retrieve conservation information.



National Gallery of Art



DENVER
ART MUSEUM

SMK

<http://conspace.wixsite.com/conservationspace>



THE
MET

Yale

Integrated Platform for the European Research Infrastructure ON Culture Heritage

The consortium joins together major centres of research in Heritage Science, including outstanding research institutes, as well as prestigious research laboratories and conservation centres in both museums and universities.

IPERION CH is affiliated to the *Digital Research Infrastructure for the Arts and Humanities*, DARIAH ERIC.

1. National Research Council of Italy (CNR)
2. Koninklijk Instituut voor het Kunstpatrimonium – Royal Institute for Cultural Heritage (KIK-IRPA)
3. Doerner Institut, Bayerische Staatsgemäldesammlungen (DI-BS)
4. Rheinisch-Westfaelische Technische Hochschule Aachen – RWTH
5. Stiftung Preußischer Kulturbesitz (SPK)-Staatliche Museen zu Berlin – Rathgen Forschungslabor (Rathgen Research Laboratory)
- 6. Statens Museum for Kunst - CATS**
7. Agencia Estatal. Consejo Superior de Investigaciones Científicas – Superior Council for Scientific Research (CSIC)
8. Museo Nacional del Prado – Prado National Museum (PRADO)
9. Centre National de la Recherche Scientifique (CNRS)
10. French Institute for Research in Computer Science and Automation (INRIA)
11. Societé Civile Synchrotron SOLEIL – Synchrotron SOLEIL (SOLEIL)
12. Ίδρυμα Ορμύλια-Το Διαγνωστικό Κέντρο Έργων Τέχνης – Idryma Ormylia-Art Diagnosis Centre (Of-ADC)
13. Ίδρυμα Τεχνολογίας και Έρευνας – Foundation for Research and Technology Hellas (FORTH)
14. Magyar Tudományos Akadémia Atommagkutató Intézet (MTA Atomki)
15. Magyar Tudományos Akadémia Wigner Fizikai Kutatóközpont - (BNC-WIGNER)
16. Agency for the Promotion of European Research (APRE)
17. University of Bologna (UNIBO)
18. Opificio delle Pietre Dure, Ministero dei Beni e delle Attività Culturali e del Turismo (ODP)
19. Dutch Cultural Heritage Agency, Ministry of Education, Culture and Science (RCE)
20. Nicolaus Copernicus University (NCU)
21. National Laboratory for Civil Engineering, Portugal (LNEC)
22. The British Museum (BM)
23. The National Gallery (NG)
24. The J. Paul Getty Trust – The Getty Conservation Institute (GCI)



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THE ROYAL COLLECTIONS

X-RUMMET

ART STORIES

VISIT THE CONSERVATOR

Stories from the Conservators

YOUNG PEOPLE'S ART LAB

RESEARCH

SMK BLOGS



Stories from **the conservator**

Read more about Rubens' preparations for a journey, the restoration of the smallest work of art in the museum and see x-rays with unexpected details.

Follow the conservators' work and learn about how the artworks are cared for • [A Monarch in Madrid](#) • [Cie](#)

Tweets by [@smkconservators](#)



SMK Conservators

@smkconservators

Weather is clearing up.
Springtime, please come soon!
#knudagger
#paintingconservation
#smkmuseum



Visit the conservator

The conservators work with documenting, conserving and restoring all kinds of art from the collection.

We treat works created on paper, canvas, parchment, vellum, wood, and copper, as well as, sculptures made of plaster, plastic, and bronze. In addition to this, we also care for the gallery's collection of contemporary art, which can challenge the conservators due to the combination of numerous materials.

Conservation stories, projects, and films

In our [conservation stories](#) section, you can gain insight into the conservator's everyday work and routine tasks. You can browse our [project descriptions](#) to get more detailed information on how conservators work on major restoration projects that include in-depth studies, research, and technical analysis.

You can also watch a number of short films about conservation.



PRIMI

Plastics Research and Innovation for Museums and Industry - a project about plastic



Dissemination 2011-2018

- ✓ CATS home page www.cats-cons.dk
- ✓ **Exhibitions:**
 - ✓ **Illuminated – on the trail of Bosch og Bruegel** (4 May – 21 October 2012)
 - ✓ **Flower Paintings – Open Studio** (22 March - 20 October 2013)
 - ✓ **Åbent Atelier: Dürer under kniven!** (5 September - 19 December 2014)
- ✓ **Publications:**
 - ✓ **On the trail of Bosch and Brueghel - Four paintings united under cross-examination**
 - ✓ **Conservation in the Nineteenth Century**
 - ✓ **PRIMI, Plastics Research and Innovation for Museums and Industry**
 - ✓ **European Paintings 15th-18th Century – Copying, Replicating and Emulating. CATS Proceedings No. I**
 - ✓ **Nicolai Abildgaard – his paintings techniques seen in an European context**
 - ✓ **Studying 18th-Century Paintings and Works of Art on Paper, CATS Proceedings No. II**
 - ✓ **Studying the European Visual Arts 1800-1850 CATS Proceedings No. II**
- ✓ **Conferences:**
 - ✓ **2012: Copying, Replicating & Emulating Paintings in the 15th-18th Century**
 - ✓ **2013: C/NC - Conservation in the 19th century**
 - ✓ **2014: Studying 18th-Century Paintings & Art on Paper**
 - ✓ **2016: Studying the European Visual Arts 1800-1850 - Paintings, Sculpture, Interiors and art on Paper**
 - **2018: Trading Paintings and Painters' Materials 1550-1800**



Trading Paintings and Painters' Materials 1550-1800



On 21 and 22 June 2018, this two-day Technical Art History conference will be held by CATS, Copenhagen.

The focus of the conference will be on the emerging international markets and their implications for the artistic production in Early Modern Europe (1550-1800), in particular in relation to the trade in paintings and artists' materials.

<https://www.cats-cons.dk/conference-2018/>

MØBELTRANSPORT DANMARK
FINE ART LOGISTICS



*The conference is
associated with:*

2018 
EUROPEAN YEAR
OF CULTURAL
HERITAGE
#EuropeForCulture



INTERDISCIPLINARY RESEARCH INTO ARTISTS' MATERIALS AND TECHNIQUES

