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MATERIALS MATTER.
COLD AND CURRENT CASES IN THE CONSERVATION OF THE MODERN

TIM BECHTHOLD
EDITOR

DIE NEUE SAMMLUNG
THE DESIGN MUSEUM

LECTURE 021 RESIN BLEED ON A PAINTED WOODEN SCULPTURE BY NICHOLAS POPE. PROBLEM, ANALYSIS AND TREATMENT

BY WELMOED KREB, TIRZA MOL, SANNEKE STIGTER, MARCEL VAN DER SANDE, PAUL VAN DUIN

ABSTRACT

This research deals with the problem of resin bleed in the black and white painted wooden sculpture *The Church, the Village and Myself* (1986) by the British/Australian artist Nicholas Pope (1949) from the Kröller-Müller Museum collection. Resin from the wooden substrate has emerged on the surface of the object, leading to stains, drops, drippings and disruption of the paint. The leaking substance was identified by Gas Chromatography/Mass Spectrometry (GC/MS) and Atmospheric-Solid-Analysis-Probe High-Resolution Orbitrap Mass Spectrometry (ASAP-HRMS) to be a resin from a tree of the *Cedrus* genus, consisting of mainly sesquiterpenes. This rare case of excessive bleeding, which will likely continue until the wood runs out of resin, was considered disturbing. The artist was interviewed twice, first on his working methods, the idea behind the work and his opinion on the work's appearance, which changed from opposing to the visibility of the resin bleed to embracing it as part of the artwork's life in the second interview. Based on the findings of this combined research, the sculpture could be treated non-invasively, and in accordance with both the artist and the owner.

KEYWORDS

Artist interview, resin bleed, cedar, art conservation, Nicholas Pope

INTRODUCTION

Resinous wood types may bleed resin, a phenomenon where natural resin from the wooden substrate emerges to the surface of the object forming distinctive yellow to black stains, drops or drippings. During this process, the resin can interfere with finishing layers, if present, dissolving them or physically disrupting them. This can occur even decades after the wood has been processed. It is most often encountered on softwood surfaces that are exposed to sunlight, such as outdoor wall panelling or decks, but also indoors on structural timbers, wall panelling, furniture and sculptures. (1) This phenomenon was suspected to occur on the wooden painted sculpture *The Church, the Village and Myself* (1986), from Nicholas Pope. The work was meant to be a centrepiece of a large exhibition, *The love of art comes first. Art & Project at the Kröller-Müller Museum*, at the Kröller-Müller Museum in the Netherlands. The unusual staining was considered disturbing and possibly undesired *(Figure 1)*.

Remedies for resin bleed recommended by the paint industry and wood workers are generally too invasive to apply on cultural heritage objects. However, to our knowledge, resin bleed has not yet been studied in the field of conservation. Because of the expected complexity of both the material phenomenon and ethical decision-making, the desire to investigate causes and possible treatment of *The Church, the Village and Myself* called for interdisciplinary research to better understand the problem of resin bleed in general, and to assess the conservation problem of Pope's sculpture in particular. (2)

NICHOLAS POPE AND *THE CHURCH, THE VILLAGE AND MYSELF*

British/Australian artist Nicholas Pope (1949) started his career with large minimalist chalk and wooden works, gradually evolving towards organic and colourful sculptures with themes of family, life, sex, death and religion *(Saltoun n.d.)*. *The Church, the Village and Myself* belongs to a series of nine works that are more expressionist with a rougher surface structure than previous works. (3) The larger than life-size sculpture consists of three freely shaped wooden legs, held together by two horizontal rings, all finished with a matte white paint. The surface structure is rough, showing coarse saw marks. On the inside of the rings, black painted wooden oblong organic shapes are attached, showing wide parallel gouge marks. The black paint has a satin shine.

Figure 1
Nicholas Pope (1949), *The Church, the Village and Myself*, 1986, wood and paint, 226 x 97 x 94 cm. Kröller-Müller Museum KM 133.451. Photo by Marjon Gemmeke (2021).

CONDITION

During condition assessment, the sculpture was found to be structurally sound. The black and white paint layers were generally in good condition but might respectively have lost some gloss and have slightly yellowed. On the surface of the white parts of the sculpture, various manifestations of the presumed resin bleed were visible. On the legs, hard black droplets were present in combination with cracks in the paint, suggesting that the drops had been forced out *(Figure 2a)*. The horizontal rings showed a light beige to ochre staining, often in curving parallel lines *(Figure 2b)*. In some areas, a brown substance seemed to have partially dissolved the paint, which is now sagging down *(Figure 2c)*. On one of the legs the staining was excessive, in the form of long black drippings with a wrinkled texture *(Figure 2d)*. Some of these drippings were previously painted over with white paint. Some of the manifestations were solid, while others were soft, sticky, or still leaking, evidenced from drops on the storage material. As a result of the stickiness of the object, packing material, such as wrapping paper and textile fibres, was stuck onto the surface. Storing the separate parts randomly horizontally and vertically, resulted in drippings on the surface running in different directions according to gravity, causing an unnatural effect on the assembled sculpture.

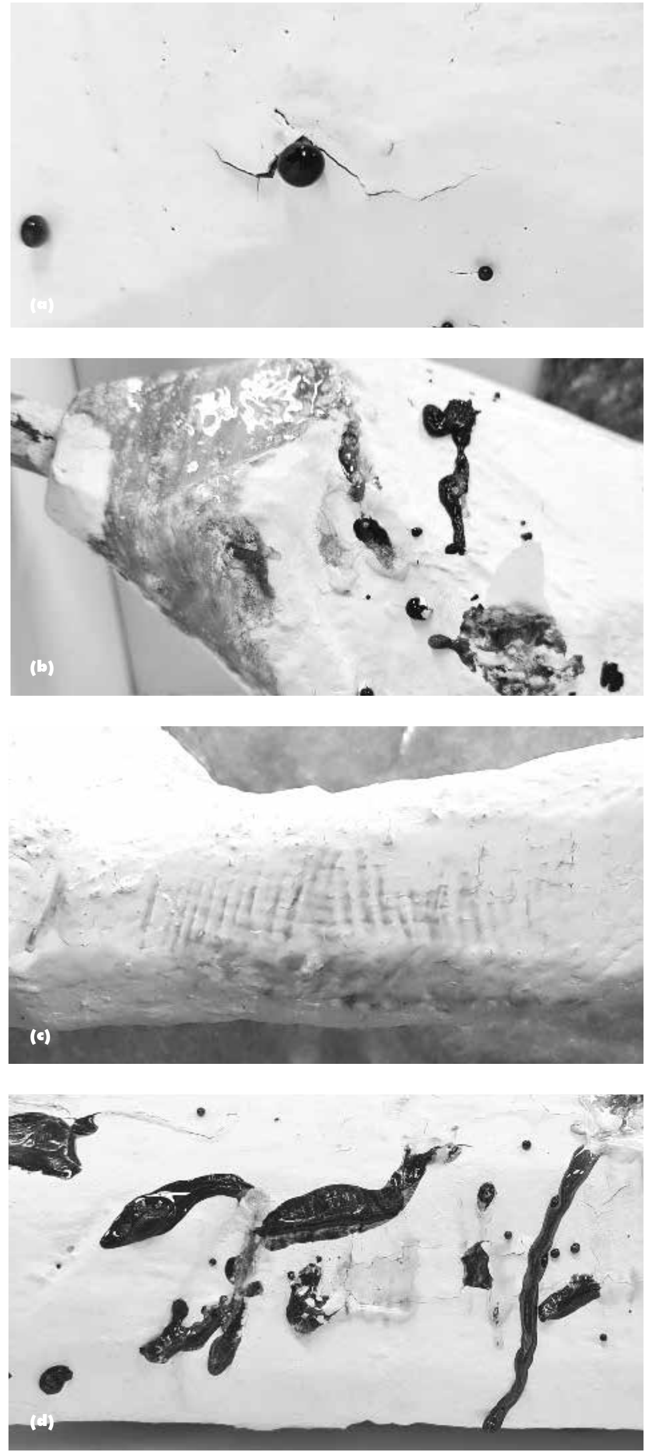

Figure 2 (left)
a-d. Resin protruding through the paint (2a); shimmering through the paint (2b), dissolving and mixing with the paint (2c), drippings in different directions (2d). Photo by Welmoed Kreb.

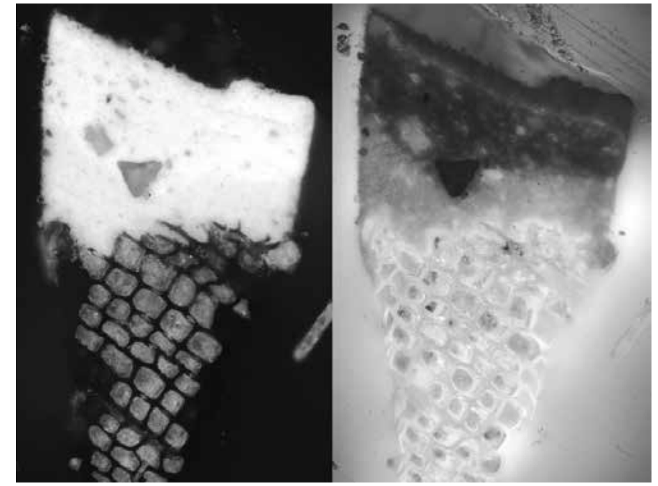

Figure 3
Cross-section of the most affected part where the paint is applied directly onto the wood in visible light (left) and in UV-light (right). Magnification 100x. Photo by Welmoed Kreb.

In addition, there was some mechanical damage to the paint; white paint had contaminated the black surface and vice versa, likely resulting from assembling and disassembling the object.

MATERIAL ANALYSIS

Determining the nature of the dark substance was imperative for devising a possible conservation treatment, storage advice and a prognosis for further drippings. The initial assumption that the substance was natural resin bleeding from the wood was debated by wood experts because of its sheer volume and dark colour. Other suggestions were the possibility of an underlying black paint or creosote layer leaking through; or that the white paint layer itself was heavily deteriorating. Cross-sections were taken to determine whether a black paint layer was present underneath the white paint *(Figure 3)*. At one location, a thick, sticky brown substance was present underneath the white paint. At another location, the white paint was applied directly onto the wood. On both samples multiple white layers were present, suggesting that these areas had been overpainted at some point.

With Pyrolysis-Gas Chromatography Mass Spectrometry (Py-GC/MS) the white paint was identified as an alkyd resin with a large amount of fatty acids and a large amount of inorganic material. This might either indicate an oil rich alkyd paint, or alkyd resin with extra oil (paint) added. (4) Atmospheric-Solid-Analysis-Probe High-Resolution Orbitrap Mass Spectrometry (ASAP-HRMS) also indicated the presence of triglycerides from oil. (5) The identification of alkyd resin and fatty acids was unexpected, as Pope had indicated that he had used an emulsion paint for the white parts. In the overpaint, a drying oil and proteins were detected. It is possible that these originate from two separate paint layers. X-ray fluorescence (XRF) analysis revealed the presence of calcium, titanium and iron in the paint, and chlorine and potassium in the leaking substance. (6) The leaking substance was also analysed by Py-GC/MS (7) and GC/MS (8), revealing a high amount of the sesquiterpenes (E)-α-atlantone and β-himachalene. This clearly indicated a natural resin from the *Cedrus* genus from the Pinaceae family *(Skanderi and Chouitah 2020)*. This result was backed up by ASAP-HRMS, identifying a natural resin of mainly sesquiterpenes. Based on the presence of scalloped tori, the wood species was microscopically determined to be of the *Cedrus* genus. The fact that the tree grew in West-England leaves three possible cedar varieties: *Cedrus libani, Cedrus deodara* or *Cedrus atlantica*.(9) The leaking phenomenon could thus be identified as resin bleed from the cedar wooden substrate.

RESIN BLEED

Tree resin is a viscous substance produced by many coniferous tree species. It is a complex mixture of volatile, solid and semi-solid components, insoluble in water *(Cown et al 2011)*. It contains mostly terpenes and terpenoids which play a large role in plant defence against threats like herbivores, insects, viruses, fungal and bacterial infections *(Peter 2018)*. The mixture of components varies among different softwood species. Pine resin for instance, contains both smaller volatile and larger solid terpenes *(Browne and Rietz 1959)*. Cedar resin is predominantly composed of smaller sesquiterpenes such as himachalene and atlantone *(Skanderi and Chouitah 2020)* that are viscous, volatile liquids at room temperature. Resin is produced either in specific resin cells, or in resin canals that provide the containment and transportation of large amounts of resin in longitudinal and radial direction *(Peter 2018)*. Certain timber producing species such as spruce and pine, routinely make resin canals. Other species, such as cedar, only form traumatic resin canals when under stress, for instance from severe climatic conditions, physical damage, or one of the plagues mentioned above. Traumatic resin canals tend to be larger and more numerous than normal resin canals, and are concentrated around the affected area. Under specific circumstances, a resin pocket, a large resin filled cavity, can be formed. The presence of resin pockets, resin canals and heartwood are all mentioned as potential risk factors for resin bleed *(Cown et al. 2011)*. Resin bleed is typically triggered by

Figure 4
The most affected part of *The Church, the Village and Myself* in X-ray illumination (left), visible light (middle), and UV-light (right). Stitched X-ray picture: Arie Pappot, photos VIS and UV: Welmoed Kreb.
see colour plates

raised temperatures, for instance from direct sunlight or indoor heating sources, which will make viscous resin more fluid *(Dawson et al. 2002)*. Seasoning of the wood prior to paint application will reduce the risk. During the process of wood seasoning the resin solidifies either by evaporation of the volatile components *(Browne and Rietz 1959)* or by oxidation of resin acids *(Dawson et al. 2002)*. The higher the temperature during seasoning, as in kiln drying, the less likely it is that exposure to heat at a later time will trigger resin bleed *(Browne and Rietz 1959)*.

RESIN IN THE SCULPTURE

In the case of *The Church, the Village and Myself*, several circumstances may have contributed to the resin bleed: the artist's choice of resinous wood from a cedar tree that may have developed large quantities of traumatic resin canals; the fact that the wood was probably not seasoned, and the liquid resin had no chance to solidify prior to paint application; and finally, that the cedar resin is a volatile liquid at room temperature. The sculpture's history did not reveal specific episodes of excessive heating, although it could not be ruled out that it was stored or exhibited next to a sun facing window or near central heating.

To gain insight into the presence and orientation of possible cavities in the sculpture, X-radiographs were made of the most affected part of the sculpture. (10) No cavities or resin pockets were found, but the images clearly revealed the grain direction. Comparison of the X-radiographs with photographs in visible light and ultraviolet light showed that the most severe brown staining, stickiness and merging with the paint occur in areas with end grain, where the resin canals are cut perpendicularly *('a' in Figure 4)*. In the areas where the resin canals are cut lengthwise *('b' in Figure 4),* the resin has protruded through the paint forming small black droplets.

In addition, the different manifestations of the resin were investigated. A soft and a solidified resin drop was measured with Differential Scanning Calorimetry (DSC) to determine their Glass Transition Temperature (Tg). The soft drop had a Tg around -12 °C while the cured drop had a Tg above 30 °C – or none at all. (11) This indicates that the soft resin is capable of flowing at very low temperature and that the solidified resin will not run again under museum conditions. To investigate why some of the resin has indeed solidified, ASAP-HRMS was performed on a soft and on a solid drop to determine possible differences in their composition. (12) This revealed that in the soft drop many unaltered sesquiterpenes were still present, while in the solid drop oxidation products were also present. It is possible that also some polymerisation had occurred in the solid drop. Whatever the processes are that cause the resin to solidify, they are limited or very slow, as most of the resin is still soft, sticky, or dripping. Possibly, the paint on the surface has prevented evaporation of the volatile components and oxidation of the resin within the wood, allowing the unaltered liquid resin to slowly ooze from the resin canals to the surface.

ARTIST INTERVIEW

It was important to determine to what extent the object's condition had affected the artwork's meaning. An artist interview was considered appropriate, to also give insight into the making process and the exact materials used for *The Church, the Village and Myself*. Archival research made clear that the artist had been asked about the resin bleed on this work before; in 2001, Pope was reported to have said that the condition of the surface was *"not a big problem, but please do something about it."* (13) He then suggested to overpaint it, and mentioned that the work had been already overpainted in 1995.

On 8 February 2023, four members of the research team visited Nicholas Pope in his studio in Much Marcle, Herefordshire, to conduct and record an interview *(Figure 5)*. Pope has been living and working in Much Marcle for more than 40 years. The interview was conducted amidst new ceramic work that he was working on with an assistant, artist Thomas Lyons. We had prepared the interview to first address the making process of *The Church, the Village and Myself*, use of materials and techniques, and the meaning of the work. At this stage, we deliberately refrained from showing any pictures or discussing the current state of the artwork.

Figure 5
Interview in the artist's studio.
From left to right: Welmoed Kreb, Nicholas Pope, Marcel van der Sande and Tirza Mol.
Photo by Sanneke Stigter.

Pope explained how the wood that he had used was obtained from the same tree as the wood for eight other sculptures from the series mentioned earlier. (14) He described the tree as a large coniferous tree on the lawn of *Homme House*, his grandfather's manor house in Much Marcle. The tree had died and had to be cleared away. For Pope, this meant readily available wood. He indicated that in this period he was changing his sculpture style, *"from more refined to more direct work"*. (15) He worked the wood roughly with a chainsaw and gouges and deliberately left the toolmarks visible. He did *"not bother"* with seasoning the wood, and he might have used all parts of the tree according to his need. Pope explained that The Church, the Village and Myself depicts the relationship between the villagers of Much Marcle, the church of the village, and Pope himself. The white parts depict the church of the village in the form of the Trinity; the black parts are the villagers going to church, *"not quite believing, but going to church just in case."* Pope himself is one of the black parts, *"This ugly bit here. […] I'm an observer."*

After his explanation of the meaning of the sculpture, the interview moved on towards its condition. Pope knew about the visibility of the resin already. Before seeing any pictures, he said, *"Not a problem. That's life. […] It doesn't bother me."* He went on referring to resin on one of the other sculptures, *"I do remember cutting some off with a Stanley knife."* Only after seeing a close-up picture of the worst part of the resin bleed did he completely turn around. He expressed being shocked by the manifestations, and to have never seen anything like it. He would like to have it overpainted. *"This has changed the whole feeling of the sculpture. […] It looks painterly. It looks as though I could have done it."* This may suggest that the resin bleed would be acceptable to him as long as the viewer would understand that the bleeding is not part of the artistic process.

The stakeholders at the Kröller-Müller Museum, the owner of the object, were consulted to discuss the possible course of action based on the outcomes of the preliminary research. The opinions on the impact of the different manifestations of the resin bleed and eventual treatment varied. After deliberation, the museum expressed that they wanted to honour the wishes of the artist. For the purpose of the discussion, the sculpture had been assembled. It was for the first time that the research team saw the work as a whole. The extent of the damage could now be viewed in relation to the sculpture in its entirety. The part with the most severe resin bleed turned out to be positioned at the bottom of the sculpture facing inward. To gauge whether this would make a difference in the perception of the degree of damage, it was decided to consult the artist once more. In the meantime, options for treatment were tested.

OPTIONS FOR TREATMENT

In the woodworking industry and the paint industry, the following remedy is recommended for resin bleed: stripping the paint and allowing the resin to flow until the object is empty, and then mechanically or chemically removing all resin before repainting. The process can be accelerated by applying heat *(David 2022)*. To prevent or reduce resin bleed, a barrier layer is suggested, ideally an acrylic dispersion paint *(Dawson et al. 2002)*. In a conservation-restoration context, stripping paint and heating up objects is obviously too invasive. Removal of resin drops from the surface could be executed for aesthetic reasons but is irreversible and will not halt the bleeding. Cold storage will likely halt exudation as the resin will become more viscous or solidify. However, it might not halt the staining of the paint. Applying a barrier layer may be effective, and hide the stains from view at the same time. Although, the previously mentioned overpaint from 1995 has not proven effective as a barrier layer. Nevertheless, considering the initial wish of the artist and of the museum to whiten the work, tests were executed for removal of resin and for retouching.

Mechanical removal of entirely cured droplets proved possible, but removal of semi-cured resin left a sticky residue on the

Figure 6
Areas with paint damage before and after treatment. Photo by Welmoed Kreb.

surface. Solubility tests learned that the solubility of the resin and the paint layers was similar, indicating that removal of disturbing resin with solvents was not feasible. Retouching was tested with several water-based retouching mediums, including watercolours, gouache, and Aquazol paints. They all adhered well to the resin, were sufficiently opaque, and remained flexible enough to follow possible movement of the resin.

ARTIST'S OPINION, DECISION-MAKING AND FINAL TREATMENT

The follow-up interview with Pope, planned as a video call next to the object, turned out to be crucial. In preparation, Pope had received a series of pictures and a short video showing the sculpture and the damage from all sides in its entirety. This is, of course, different from seeing photographs of isolated details. Unfortunately, the connection during this interview was poor, but Pope's message was clear. He indicated repeatedly: *"do nothing."* He now indicated that the village and the villagers had changed, and so had the artwork. It was alright like this. (16) In an email, he explained once more that to his own surprise, he liked how the artwork had intervened on itself: *"In detail I like the intervention of the dark resin marks on The Church. […] I particularly like the softer intervention of the resin on Trinity's horizontal trinity and the sharp black dribbles of resin on the columns. The thought of masking this unexpected detail was too much."* (17)

Following the artist's change of opinion, the museum expressed their wish to not treat the resin bleed. This new direction would also honour the history of the object. Early pictures suggest that the resin bleed had already started within a year after making. This means it has been part of the work for 36 years. After the initial overpaint in 1995, the resin stains were accepted, judging from several exhibitions of the work in this condition. The decision to refrain from interference also affects the eight other works from the series that are made out of the same tree. Most of them show signs of presumably resin bleed. (18) The decision to leave the drops and stains intact may set a precedent for the other works.

In line with the artist's wishes – and ours – the conservation treatment of the artwork was minimal; the manifestations of the resin bleed were not treated and are left visible. The museum did wish to remove surface dirt and reduce visible damage from handling and storage. Surface dirt was removed with a soft brush. Foreign materials, such as pieces of paper and textile fibres, were carefully removed with tweezers, or were left in place where they had merged with the paint. The damage caused by handling, which consisted of small white paint chips on black surfaces and vice versa, was retouched with respectively black gouache and with matted gouache and watercolours in different shades of white to brown *(Figure 6)*. These retouches are reversible and can be discerned under UV-light.

CONCLUSION

Material analysis of Nicholas Pope's painted sculpture, *The Church, the Village and Myself*, suggests that the bleeding and resulting staining was caused by a combination of several factors: the choice of wood species, the presence of traumatic resin canals in the wood, the use of unseasoned wood and the nature of the cedar resin. Storage and handling have caused additional damage. If desirable for aesthetic reasons, removal of resin from the surface is possible, as is retouching with water-based paint. However, this will not prevent further bleeding or staining entirely. It is expected that the bleeding will continue until the sculpture has run out of resin or the resin has sufficiently solidified. *The Church, the Village and Myself* is ideally stored in the coldest storage available to hinder the bleeding. Placing the different parts in an upright position will furthermore prevent possible additional drippings following an 'unnatural' direction as a result of gravity. Direct contact of the surface with packing material is to be avoided. In accordance with the wish of the artist, the manifestations of the resin bleed have not been treated. The damage caused by storage and handling was retouched with gouache and watercolours.

This project witnessed a crucial change in the artist's opinion on the alteration of his work. Initially, Nicholas Pope preferred the artwork to simply look black and white. The stains from the resin bleed were disturbing to the idea of the sculpture, and he preferred to have them overpainted. However, during the course of the project, Pope embraced the change as an addition to the meaning of the work. The filmed visual documentation showing the artwork in its entirety from all sides, sent to the artist preceding the second interview, must have contributed to Pope's new view on the case. In addition, our own interview strategy of enquiring about the content and the context of the artwork first before focusing on the work's physical condition, and the time to digest the first interview could have added to the artist's reconsideration. We do not know exactly what has made Nicholas Pope change his opinion about the appearance of the artwork; he said that he was surprised by it himself. Apparently, the passing of time has not only changed the artwork, the church and the village, but also caused a change in the artist himself.

ACKNOWLEDGEMENTS

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ENDNOTES

(1) In an informal survey as part of the project, six other objects with resin bleed were found or reported, two of them being 19th and 20th century furniture, one an artwork from 1986, a 17th century roof structure, 19th century wall panelling and 20th century flooring, all made of softwood.

(2) The project was funded by the Netherlands Institute for Conservation+Art+Science (NICAS), and financial and in-kind contributions from the Kröller-Müller Museum (KMM), the Rijksmuseum Amsterdam (RMA), the University of Amsterdam (UvA) and the Cultural Heritage Agency of the Netherlands (RCE).

(3) Pope said to have made nine wooden works out of the same tree: *Mr and Mrs Pope with Holes* (1985); *The Oxford Conversation* (1985); *Under African Skies* (date unknown); *The Church, the Village and Myself* (1986); *Nicky and Stephen* (1986); *Norman, Virginia and other Members of the Congregation* (1986); *Myself in Difficulty* (1986); *The Vicar* (1987); and *Mr and Mrs Pope Spiked and Holed* (1987). Nicholas Pope, e-mail to Marcel van der Sande on 9 August 2022.

(4) Saskia Smulders-de Jong (RCE) performed Py-GCMS analysis on two samples of soft resin; a sample of bare wood; and two samples of the first paint layer on 5 January 2023; and on a sample of overpaint on 6 June 2023. Instrumental: Py at UTD, SLB5ms 20m 0.18 0.18, 35 °C - 315 °C, FA-C13 int.st.

(5) Art Proaño Gaibor (RCE) performed ASAP-HRMS analysis on a sample of soft resin; two samples of solidified resin; and on a sample of the first paint layer on 9 March 2023. The analysis was interpreted by Klaas Jan van den Berg (RCE). Equipment: Q Exactive Focus (Thermo Fisher) with APCI ionization and polarity switching. Parameters: spray voltage ±5000 V, capillary temperature 40 °C to 600 °C, resolution 35,000, m/z range 125–1875. Using Kendrick mass defect plots.

(6) Jan Dorscheid (RMA) performed XRF analysis on a dark resin drop; a light-coloured resin drop; and on two locations of the white paint on 15 February 2023. Instrument: Bruker XRF Artax. Method: Anode Mo, no filter, atmosphere air, live time 60s. Voltage: 50kV, Current: 600 µA.

(7) See note 4.

(8) Erika Ribechini (Università di Pisa) performed GC/MS analysis on a sample of the resin on 17 July 2023. Around 2 mg of the sample was dissolved in 1 ml of a dichloromethane:hexane (3:2 v/v%) mixture and sonicated for 10 min. The extract was then dried and redissolved in 1 ml hexane. 2 µl were analysed by GC/MS.

(9) Frederic Lens (Naturalis) performed wood identification on wood samples from two different parts of the object, one excessively bleeding, and one not bleeding on 9 May 2023.

(10) Arie Pappot (RMA) performed X-ray illumination on the most affected part of the object on 13 April 2023.

(11) DSC analysis was performed at UvA on 2 may 2023, by subjecting resin samples to two heating/cooling cycles between -50 and + 30 ºC at 5 ºC/min on a PerkinElmer Jade calorimeter.

(12) See note 5.

(13) An informal interview with Nicholas Pope was conducted by Ingeborg Smit and Claartje van Haaften in the depot of Rijksmuseum Twenthe in November 2001, documented in notes by Claartje van Haaften.

(14) See note 3.

(15) Unless indicated differently, this and all further quotes from: *Stigter et al. 2023*.

(16) Interview with Nicholas Pope via Zoom and telephone on 5 July 2023, by Welmoed Kreb (online), Marcel van der Sande and Jannet de Goede, near the assembled sculpture in the Kröller-Müller Museum, filmed by Dienke van der Kuijl. Unfortunately, the internet connection was poor, which was partly solved by using a telephone. Still, the recordings are difficult to understand; native speaker Jennifer Green helped decipher the audio. The data is kept in the museum archive.

(17) Nicholas Pope, e-mail to Marcel van der Sande on 12 July 2023.

(18) Three of these eight works are in the Kröller-Müller collection and three in the artist's storage. Brief visual examination of these six sculptures revealed several stains, discolouration and drippings, but no analysis was performed to confirm resin bleed.

Lecture 021 / Figure 4
The most affected part of *The Church, the Village and Myself* in X-ray illumination (left), v isible light (middle),and UV-light (right). Stitched X-ray picture: Arie Pappot, photos VIS and UV: Welmoed Kreb.

LECTURE 021

RESIN BLEED ON A PAINTED WOODEN SCULPTURE BY NICHOLAS POPE. PROBLEM, ANALYSIS AND TREATMENT

SUPPLIERS

Acematt HK 125 amorphous silica acid
Kremer® Pigmente
Watercolours: Cadmium yellow medium, Gouache: titanium white, talens gouache: neutral black
Schmincke® Horadam
*Water colours: Burnt sienna, burnt umbe*r
Winsor & Newton® Cotman

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