



National Gallery Technical Bulletin

Volume 23, 2002

National Gallery Company
London

Distributed by
Yale University Press

This volume of the *Technical Bulletin* is published with the generous support of the Samuel H. Kress Foundation.

Series editor **Ashok Roy**

© National Gallery Company Limited 2002

All rights reserved. No part of this publication may be transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without the prior permission in writing of the publisher.

First published in Great Britain in 2002 by
National Gallery Company Limited
St Vincent House, 30 Orange Street
London WC2H 7HH

www.nationalgallery.co.uk

British Library Cataloguing in Publication Data
A catalogue record for this journal is available from
the British Library

ISBN 1 85709 941 9

ISSN 0140 7430

525039

Edited by Diana Davies
Project manager Jan Green
Design by Tim Harvey
Printed in Italy by Conti Tipocolor

FRONT COVER

Garofalo, *Saint Augustine with the Holy Family and Saint Catherine of Alexandria* (NG 81), (detail of PLATE 4, p. 23).

TITLE PAGE

Garofalo, *The Virgin and Child with Saints William of Aquitaine, Clare (?), Anthony of Padua and Francis* (NG 671), (detail of PLATE 3, p. 22).

Mixed Media in the Work of Charles-François Daubigny: Analysis and Implications for Conservation

LARRY KEITH AND RAYMOND WHITE

TWO PAINTINGS by Charles-François Daubigny, the *Landscape with Cattle by a Stream* (PLATE 1; NG 6324, signed and dated 1872) and the *View on the Oise* (PLATE 2; NG 6323, signed and dated 1873), were bequeathed to the Gallery in 1928 and have recently been considered for cleaning. Since entering the collection in 1961,¹ neither picture had received any major conservation treatment. However, in 1999, such was the extent of the degradation of the varnish on the *Landscape with Cattle* – its strong yellow tone suppressing the full range of Daubigny’s palette and the relatively poor saturation of the darker tones reducing its tonal range – that it was considered severe enough to warrant the cleaning of the picture. Interestingly, the varnish on the *View on the Oise* was noticeably less yellow in appearance, although both pictures shared a common provenance.

Preliminary cleaning tests on *Landscape with Cattle* were begun in the sky, an area painted with

colours containing a relatively high content of lead white pigment. This area was selected because oil paint containing a higher lead content is generally less soluble than many other paints as a result of the influence of the lead on the drying of the oil medium (PLATE 3).² The yellowed varnish was soluble in relatively weak solvents, but its removal showed more clearly what had already been suspected, namely that the underlying darker grey layers of the sky paint had previously been somewhat abraded. Parts of the cooler underpaint of the sky were visible through the overlying grey paint in a manner not intended by the artist, with scattered spots and streaks of the lighter colour corresponding to the physically raised portions of the brushwork, exposed by the abrasion of the cooler and darker upper paint layer (PLATE 4). This abrasion of the grey paint layer was also visible in the uncleaned parts of the sky, but was not so severe nor so visually prominent, as the yellowing of the



PLATE 1 Charles-François Daubigny, *Landscape with Cattle by a Stream* (NG 6324), signed and dated 1872. Panel, 35.6 × 66 cm.



PLATE 2 Charles-François Daubigny, *View on the Oise* (NG 6323), signed and dated 1873. Panel, 38.7 × 66 cm.



PLATE 3 *Landscape with Cattle by a Stream*, detail of sky at upper left showing initial cleaning tests. The abrasion of the darker grey scumble is visible both on the left side of the image, where the yellow varnish has been reduced, and on the right, where it has not.



PLATE 4 *Landscape with Cattle by a Stream*. Similar detail to PLATE 3, but at higher magnification. The abrasion of the darker grey scumble reveals the lighter blue sky colour beneath it; this abrasion is equally evident at the right half of the image, where the old varnish remains undisturbed.

varnish had suppressed and disguised the depicted variations in tone and value between the colours (PLATE 5).

Chemical analyses of the binding media of the paint confirmed what the revealing of the old abrasion from the preliminary cleaning tests had indicated: significant parts of the later stages of Daubigny's brushwork were carried out in a medium similar enough in composition and solubility to the subsequently applied natural resin for the safe removal of that varnish from the paint to be

highly problematic (FIGS 1–3, Table, p. 49). While the bulk of the sky paint was painted in walnut oil, the overlying grey scumbles were executed in a mixed medium of dammar and a benzoin-type balsam.³ This mixture would have been readily soluble and relatively quick drying, and therefore highly suitable for making changes and corrections in the latter stages of painting, particularly after the paint had already dried. While dammar alone, possessing a high refractive index, forms a very transparent, highly saturating, glossy film,⁴ adjustment and

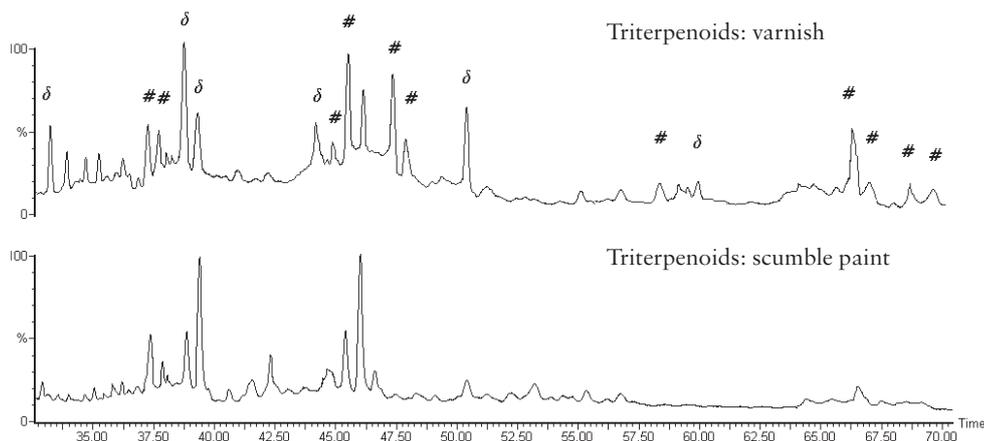


FIG. 1 Lower chromatogram: Gas chromatogram (Total Ion Chromatogram (TIC)) showing general triterpenoid region of ‘grey’ scumble paint from Daubigny’s *Landscape with Cattle by a Stream* (NG 6324), following thermolytically assisted methylation with 3-(trifluoromethyl)phenyltrimethylammonium hydroxide (TMTFTH), 5% in methanol at 250°C.

The upper chromatogram (TIC) in the figure shows the same triterpenoid region for the varnish itself. Note the more pronounced presence of 11-keto-pentacyclic oxidation products and other more highly oxygen-functionalised, and so more polar, triterpenoids. Such components are marked with the symbol ‘#’. Those effectively enriched in oxygen by ring/chain scission are marked with the symbol ‘δ’.

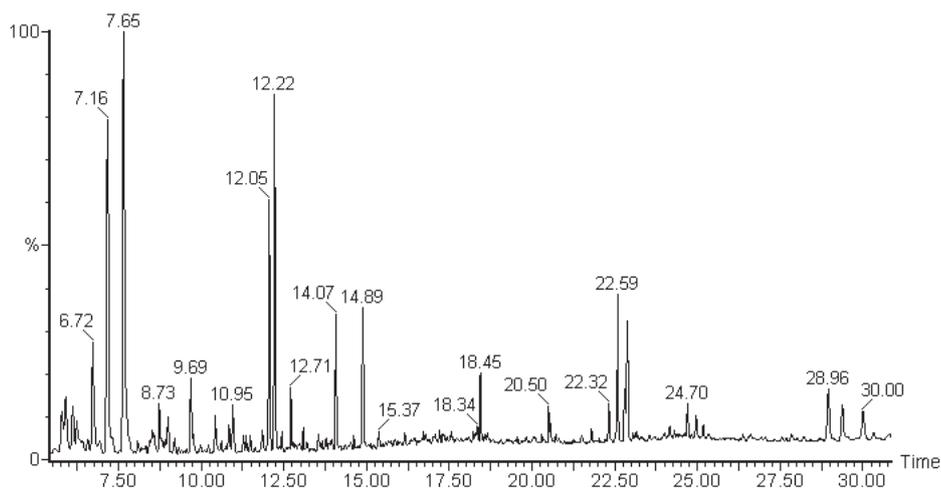


FIG. 2 TIC of a sample of the toning scumble paint, following mild pyrolysis in the presence of TMTFTH reagent, to break up some of the coniferyl ester-based polymer present in the benzoin-type balsam.

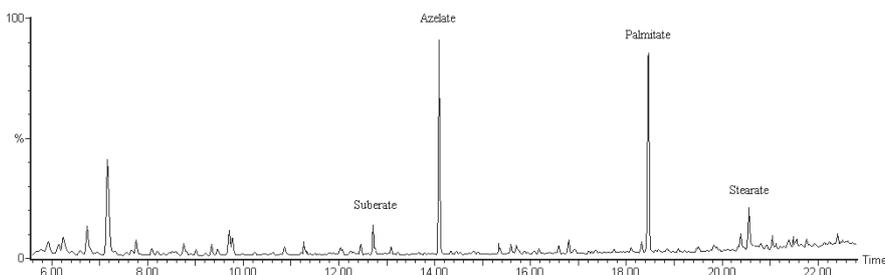


FIG. 3 TIC of a sample of the white paint of a cloud in the sky, from beneath scumble paint. This was identified as walnut oil. There was no evidence for the heat pre-polymerisation of this medium.



PLATE 5 *Landscape with Cattle by a Stream*, detail of sky. The continuous film of yellowed varnish across the surface suppresses the depicted range of colour and tone within the sky; it also reduces the visual impact of the abrasion of the top layers of paint.



PLATE 6 *Landscape with Cattle by a Stream*, detail of sky at the right of the horizon. The orange glaze is visible laid across the cooler colours of the sky. It has pooled somewhat in the hollows of the underpaint, and is also slightly abraded across the raised areas.

subtle modification would be afforded by the addition of gum benzoin; the latter, alone, tends to form a film with slightly hazy and 'flat' optical properties, approaching those of a watercolour medium. Combining the properties of the two in an essential oil carrier would provide a very quick-drying medium with a measure of translucency and without excessive colour saturation, amenable to selective, multiple applications in those areas requiring additional 'toning down', with minimal delay between each stage. In this context, it is worthy of note that a benzoin-containing formulation had been identified in *The Fighting 'Temeraire' tugged to*

her last Berth to be broken up, 1838 (NG 524), by Joseph Mallord William Turner; Turner was noted for carrying out last-minute modifications to his exhibits on 'Varnishing Day' and would certainly have required a quick-drying medium.⁵ Significantly, the mixed medium scumble paints which Daubigny employed seem to have been restricted to the relatively opaque grey scumbles in the sky. Other areas in which Daubigny used a mixed medium technique for the later painting stages employed a different mixture: both the darkest green glazes used in the foliage and the translucent orange glaze depicting the sunset are painted in a mixture of walnut oil,



PLATE 7 Charles-François Daubigny, *The Garden Wall* (NG 2624), c.1860-78. Panel, 18.7 × 35.9 cm.



PLATE 8 *View on the Oise*, detail of the sky. The warm yellowish-grey scumble laid over the cooler underpaint of the sky has been broken up into isolated patches of colour.



PLATE 10 *View on the Oise*, transition between the lit and shaded part of the left bank of the river. The dark green glaze that had been placed over this area has been largely removed, revealing the lighter paint beneath.



PLATE 9 *View on the Oise*. Similar detail of sky, with higher magnification. The relatively blue central area had originally been covered with the same grey scumble now only visible around the edges of the image.



PLATE 11 *View on the Oise*, detail of the right side of the river. The more soluble dark green paint used in the earlier version of the composition has been eroded, taking parts of the lighter overlying paint with it.

dammar and pine resin (PLATE 6). It seems reasonable to assume that the specific optical properties of the different finishing media were deliberately exploited; the walnut oil, dammar and pine resin mixture has a higher refractive index than the benzoin-type balsam and dammar mixture, and therefore is better suited to the more transparent glazes on which it was used.

Resinous paint media had previously been discovered on other paintings by Daubigny in the collection,⁶ but they had all been glazing mixtures containing pine resin or fir balsam of the type found in the foliage and sunset of the *Landscape with Cattle by a Stream*. Prompted by the new discovery of the benzoin-containing medium used in the grey scumbles in the sky of *Landscape with Cattle*, analogous passages from other Daubignys in the collection were re-examined. The same medium of benzoin-type balsam and dammar was found in

grey scumbles in the sky of both the *Garden Wall* (PLATE 7; NG 2624) and the *View on the Oise*, and would seem to indicate a more general use of that medium for final toning layers in the paint of the sky.

Neither the *Garden Wall* nor the *View on the Oise* have had any conservation treatment since entering the Gallery, although the varnish on the *View on the Oise* is markedly less yellow than that on both the *Garden Wall* and *Landscape with Cattle*. The apparent difference between the *View on the Oise* and the *Landscape with Cattle* is all the more puzzling considering their common provenance, although circumstantial documentary evidence suggests that the *View on the Oise* had some sort of private conservation treatment sometime in the decade before the two paintings entered the collection.⁷ In the light of the new understanding of the materials and techniques employed by



PLATE 12 *View on the Oise*, detail of the right bank of the river. The original placement of the washerwoman is now revealed by the subsequent erosion of the overlying paint.



PLATE 13 *Landscape with Cattle by a Stream*, detail of the sky above the trees at the right. An accidental vertical scratch made into the wet paint of the sky is partially covered by Daubigny's reworking of that area, presumably done during a separate phase of revision of his *plein-air* work that was carried out in the studio.

Daubigny in paintings like the *Landscape with Cattle* and the *Garden Wall*, it now appears that an earlier restoration of the *View on the Oise* undertaken before it came to the Gallery was not particularly successful, and probably resulted in the loss of considerable amounts of the artist's finishing scumbles and glazes.

The grey scumbles present in the sky of the *View on the Oise* in general do not form a continuous, comprehensible modelling layer, but instead appear as localised and somewhat isolated patches on top of the cooler tones of the underpainting (PLATE 8). This broken-up quality of the grey toning is especially apparent under higher magnification, where the extent of the erosion of the scumble layer is readily visible (PLATE 9).

Other aspects of the condition of the *View on*

the Oise are also visually unsatisfying, and provide strong evidence of an earlier overcleaning of the picture. The shift between the lit and shaded part of the left side of the river looks awkward because of the patchy and abraded quality of the damaged dark green glazes which originally softened the transition between the two areas (PLATE 10). Daubigny extensively altered the right bank of the river: the earlier composition depicted this bank considerably further to the left, with the large tree and the figure of the washerwoman also placed further to the left.⁸ The darker colours of the foliage used in this earlier version may have been more soluble than the brighter tones of the sky and water that were ultimately painted over them, for these lighter areas have suffered from cleaning in spite of their higher lead-white content. The shape of the first version of the tree is now legible as a result of its dark tones appearing through the abraded ridges of the brushwork of the sky. The right riverbank at middle distance is severely abraded: not only has the water lost its modelling and brushwork, but the figure of the washerwoman from the first composition is visible on close inspection (PLATES 11–12).

The compelling visual and scientific evidence on the condition of the *View of the Oise* gave further weight to the decision not to proceed with the restoration of *The Landscape with Cattle*; as analyses of the paint media had already suggested, conventional solvent cleaning could not safely separate the old dammar resin from the resin-containing paint media used by Daubigny in the final stages of his work, and the cleaning was therefore not carried out. While there is little doubt that a reduction of the yellowed varnish would allow a fuller appreciation of Daubigny's use of colour, its discoloration is not so severe as greatly to impair the legibility of the image.

The new evidence of the variety of paint media used by Daubigny would seem to fit with the general understanding of his working method as a combination of both *plein-air* and studio work, a practice common to a number of Barbizon painters.⁹ The *Landscape with Cattle* was almost certainly painted in at least two distinct phases. A scratch made in the wet paint of the sky, now made more visible by the pooling of the discoloured varnish within it, has been covered with a relatively thick impastoed paint applied after the scored underpaint had dried significantly (PLATE 13). Furthermore, the resin-containing media found on the painting were used both for the final revising and for the retouching stage of the work, which

presumably would have been carried out in the artist's studio after the initial recording of the scene *in situ*.

The contrast in the appearance and condition of the *Landscape with Cattle* and the *View on the Oise* is largely explained by the difference in their conservation history, which is all the more remarkable given the similarity of their provenance. The understanding of that difference is greatly improved by the new information provided by the medium analysis carried out in the Scientific Department. As well as providing a cautionary tale in the history of conservation, this investigation shows how the appropriate application of analytical work can help not only with specific conservation problems but also with the understanding of larger issues relating to an artist's technique. Complex combinations of mixed binding media, often partially resinous, are found with increasing frequency in painting of the later nineteenth century. A thorough analytic investigation of the paint medium can be invaluable in providing supplementary assistance to contemporary restorers in the formulation of their approach to any treatment or cleaning. Thereby they, unlike their predecessors who lacked such resources, may be better prepared to overcome or avoid the difficulties which otherwise might ensue.

Acknowledgement

The authors wish to thank Sarah Herring, National Gallery Isaiah Berlin Assistant Curator of Nineteenth-Century Paintings, for her invaluable advice and assistance with matters of provenance.

Notes and references

- 1 M. Davis and C. Gould, *National Gallery Catalogues, French School*, London 1970, p. 45. Although bequeathed to the Gallery in 1928 by Panedeli Ralli, he left a life interest in both paintings to his niece, Viscountess Byng of Vimy; as a result the paintings did not come to the Gallery until 1961.
- 2 K.R. Sutherland, *Solvent extractable components of oil paint films*, FOM Institute for Atomic and Molecular Physics, Amsterdam 2001.
- 3 Benzoin, commonly referred to as gum benzoin, is a complex mixture of acids and alcohols, their esters and minor amounts of triterpenoid resin components. Primarily containing saccharides, monomeric and oligomeric aromatic and phenolic acids and styrene-related components, these materials derive from various *Styrax* species. Typically these include *Styrax tonkinensis* (Pierre) Craib ex Hartwich (furnishing Siam benzoin), *Styrax benzoin* Dryander (affording Sumatra

benzoin) and possibly *Styrax officinalis* Linnaeus. Of the three, the Siam benzoin is most likely to have been available in France in the nineteenth century, given the trading access with French Indo-China. It would usually have been applied as a spirit varnish in either alcohol or essential oil – the oxygenated sweeter smelling types, derived from flower oils (for example lavender oil), being well-suited – or a mixture of both types of solvent would have sufficed. Equally, such solvents would also have been suitable for the dissolution of dammar resin. Though quite translucent, there is a slight lack of gloss and lustre – a hint of 'flatness' and haziness – associated with benzoin; when balanced against the tendency for dammar to saturate colours heavily, a combination of the two might seem reasonable if there was a desire for a light 'scumble' effect to lessen dramatic transitions in toning of adjacent passages of paint which had become apparent on drying. In addition, the resulting layer would tend to dry quickly and be relatively free of blemishes. Other balsamic products such as *balsamum toltanum* and *balsamum peruvianum* (*Myroxylon balsamum* (L.) Harms. var. *balsamum* and *Myroxylon balsamum* (L.) Harms. var. *Pereira* (Royle) respectively (Fabaceae)) are dark brown products with very heavy tinting strength and, as such, their use in this instance is contra-indicated.

- 4 R. White and J. Kirby, 'A Survey of Nineteenth- and Early Twentieth-Century Varnish Compositions found on a Selection of Paintings in the National Gallery Collection', *National Gallery Technical Bulletin*, 22, 2001, pp. 64–84.
- 5 See R. White and J. Pilc, 'Analyses of paint media', *National Gallery Technical Bulletin*, 17, 1996, pp. 98–9, 103, and J. Egerton, *Making and Meaning: Turner's 'The Fighting Temeraire'*, with a technical examination of the painting by M. Wyld and A. Roy, exh. cat., London 1995, pp. 121–3, 132.
- 6 See R. White, J. Pilc and J. Kirby, 'Analyses of paint media', *National Gallery Technical Bulletin*, 19, 1998, pp. 81, 92–3.
- 7 Curatorial files, National Gallery.
- 8 A composition very similar to the earlier version of the National Gallery *View on the Oise* is illustrated in R. Hellebrandth, *Charles-François Daubigny 1817–1878*, Morges 1967, p. 124, fig. 379.
- 9 See G. de Wallens, 'Corot as a copyist at the Louvre, and new evidence on his technique', *Burlington Magazine*, 153, 2001, pp. 685–6; and also *The Barbizon: Malerei der Natur – Natur der Malerei, Im Auftrag der Bayerischen Staatsgemäldesammlungen, des Doerner-Institutes und des Zentralinstitutes für Kunstgeschichte, München*, Andreas Burmester, C. Heilmann and M.F. Zimmermann eds, Munich, 1999.

RESULTS TABLE OF PAINT MEDIUM ANALYSIS

Charles-François DAUBIGNY

View on the Oise

NG 6323

Date: 1873

1	White sky paint, right-hand side	Walnut oil
2	Glossy green foliage, right-hand side	Heat-bodied linseed oil + fir balsam
3	Warm, glossy green reflection of trees in water	Heat-bodied linseed oil + fir balsam
4	Greenish-black impasto from dress of washerwoman at river's edge	Heat-bodied linseed oil + fir balsam
5	Remnant of grey layer over sky paint, top left-hand corner	Benzoin-type balsam + dammar resin toning glaze

Landscape with Cattle by a Stream

NG 6324

Date: 1872

1	Olive-green grass impasto paint	Walnut oil + dammar + a little pine resin
2	Orange impasto of sunset	Walnut oil + dammar + pine resin
3	Toning glaze, above sunset	Benzoin-type balsam + dammar
4	White cloud, top edge	Walnut oil

The Garden Wall

NG 2624

Date: 1860–78

1	Pale blue sky	Linseed oil
2	White of sky, mid-right-hand edge	Heat-bodied poppyseed oil
3	Darker green of bushes, lower left-hand edge	Partially heat-bodied linseed oil + a little pine resin
4	Brown of foliage of tree, upper left-hand edge	Partially heat-bodied linseed oil + pine resin + ?
5	Greyish toning glaze or scumble from sky	Benzoin-type balsam + a little dammar
6	Varnish, above toning layer	In part: mastic/partially heat-bodied walnut oil
