

## Resumo

As iluminuras de *De Rijmbijbel van Jacob van Maerlant* são consideradas das mais importantes pinturas dos Primitivos Flamengos. O fol. 152v apresenta a seguinte inscrição: «*Doe men screef int iaer ons heren MCCCXXXII verlichte mi Michiel van der borch*»; i.e.: «Foi no ano de 1332 que fui iluminado por Michiel van der Borch». O que permite considerá-las como as mais antigas obras de arte flamenga datadas e com colofon.

Os aspectos estilísticos destas iluminuras estão de acordo com o idioma que era comum tanto na Flandres como no noroeste de França, sugerindo que a formação de Van der Borch pode ter aí decorrido.

Estas pinturas, de pequena dimensão, foram analisadas por reflectografia de infravermelho (IRR), microscopia óptica, fluorescência de raios-X dispersiva de energias ( $\mu$ -XRF), espectroscopia por reflectância no UV-VIS (FORS) e ainda por técnicas de imagiologia espectral.

As análises permitiram identificar as tintas e pigmentos bem como as diversas estratégias de aplicação da cor para organização da composição.

Comparam-se os resultados obtidos com as instruções presentes em tratados técnicos contemporâneos como o *Liber de Coloribus siue Pictorum* e o de Peter de Saint Omer, ambos provenientes do noroeste da França. ●

## Abstract

*The illuminations in De Rijmbijbel van Jacob van Maerlant belong to the most important Early Netherlandish paintings. On fol. 152v it has the inscription: «Doe men screef int iaer ons heren MCCCXXXII verlichte mi Michiel van der borch»; i.e.: «It was in the year 1332 that I was illuminated by Michiel van der Borch» This makes the illuminations the earliest signed and dated Netherlandish works of art.*

*Stylistic features of these illuminations fit quite well into the idiom that was current in Flanders and Northwest France, and suggest that Van der Borch may have been trained there.*

*These small-scale paintings were examined with infrared reflectography (IRR) and light microscopy, energy dispersive micro- x-ray fluorescence ( $\mu$ -XRF), fiber optic reflectance spectroscopy (FORS), and some (radio)spectral imaging techniques.*

*The analyses helped to identify paints and pigments and the different strategies that were employed to deal with colour in order to organise the composition.*

*Terminology and formulae in contemporary technical treatises such as the Liber de Coloribus siue Pictorum, and in the De Coloribus Faciendi by Peter of St. Omer, both from North-western France are compared with results of scientific examination of Van der Borch's illuminations. ●*

## palavras-chave

FLANDRES  
MAERLANT  
ILUMINURA FLAMENGA  
ANÁLISES CIENTÍFICAS  
DE COLORIBUS

## key-words

SOUTHERN FLANDERS  
MAERLANT  
NETHERLANDISH ILLUMINATION  
ANALYSES  
DE COLORIBUS

# EARLY NETHERLANDISH MANUSCRIPT ILLUMINATION: TECHNICAL ASPECTS OF ILLUMINATIONS IN THE *RIME BIBLE* OF JACOB VAN MAERLANT

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ARIE WALLERT

Rijksmuseum Amsterdam, Amsterdam  
(The Netherlands)

The *Rijmbijbel* (The Hague, Rijksmuseum Meermannno-Westreenianum, MS 10 B 21) is one of the most important historical texts in Netherlandish culture. It is a conflation of the *Historia Scholastica* by Petrus Comestor and the *Bello Judaico* by Flavius Josephus. But contrary to contemporary tradition, this text written in 35.000 verses by Jacob van Maerlant, was in the vernacular rather than in Latin. Maerlant was the most important Netherlandish author of the Middle Ages. He was the first to deal in the vernacular with such diverse matters as geography, politics and the arts of government, biology and the interpretation of dreams. He was also the first to put the whole Bible in rime in the Netherlandish language, and to write a complete world history. (Van Oostrom, 1996) Therefore, the *Rijmbijbel* has achieved a canonical status for its significance in the development of the Netherlandish language.

At the same time, the illuminations in this manuscript can be considered to be the most important Early Netherlandish paintings.

Stylistic features of these illuminations fit quite well into the idiom that was current in Flanders and Northwest of France. The execution of the illuminations in the Maerlant manuscript compares very nicely with the characteristics of either the miniatures

in MS. Lat. liturg. d.42, or those in the *Psalter* MS Douce 5, both in the collection of the Bodleian Library, Oxford, in a psalter in the Kongelige Bibliothek in Copenhagen (Ms. 3384.8°), or those in the so called *Ruskin Hours*, presently in the J. Paul Getty Museum, Los Angeles (Ms. Ludwig IX 3; 83.ML.99). These manuscripts all share the same stylistic features, compositional organisation, colour schemes, facial types, and patterned backgrounds that are characteristic for the gothic style that was current in Flanders and Northern France in the beginning of the fourteenth century. (Lyna, 1944, *Les Fastes Gothiques*, 1981, 276-362)

There is little documentary information on the production of those manuscript illuminations. Identified works of art of the period are scarce. If we can identify illuminations of the period and the region, we usually do not know the names of their makers. If we know the names of the illuminators, we generally do not have any certified example of their works. Only a few artists are known by name: Hennequin de Bruge, Girard de Hainault, and Jean de Saint-Omer. Only from documentary evidence do we know that Girard de Hainault worked for the dukes of Burgundy around the 1350s, and that Jean de Saint-Omer worked on one of the tombs of Jeanne d' Evreux. We do not know, however, what their art works looked like. The exception being Hennequin who was, and still is, famous for his impressive design of the stunning 'Angers Apocalypse tapestries'. (Calkins, 1979, 248-250) The drama and narrative of the figures, presented more than life size in the Angers tapestries, appears to be re-enacted, albeit in a very much smaller scale, in the miniatures of the *Rime Bible*. Under the full page painting in the Maerlant manuscript, of the *Destruction of Jerusalem* on fol. 152v is the inscription: «*Doe men screef int iaer ons heren MCCCXXXII verlichte mi Michiel van der borch*»; i.e.: «It was in the year 1332 that I was illuminated by Michiel van der Borch». This makes the illuminations the earliest signed and dated Netherlandish works of art. Even though this signature and the presence of his name in the archives strongly suggest a more Northern Netherlandish origin (Utrecht), it is generally agreed that the illuminator of the 'Rime Bible' must at least have had training in southern Flanders or northern France.

Terminology and formulae in more or less contemporary technical treatises such as the *Liber de Coloribus sive Pictorum* (British Library, MS Sloane 1754), and the *De Coloribus Faciendi* by Peter of Saint-Omer (collection Jehan LeBegue, Bibliotheque Nationale, Ms 6741), both from North-western France, may therefore provide relevant information on the making of Van der Borch's illuminations (*Liber de Coloribus, De Coloribus Faciendi*).

The *Liber de Coloribus* for instance, describes the manner in which red lead should be prepared and applied, and the colours that could be mixed with it: «*Minium molendum est cum aqua sicut uermiculum, et eiecta aqua de cornu, siccabis, et ita ponenda est glarea ovi, et sic illuminatur ex eo. Hoc minium cum nullo colore miscetur nisi cum albo et uermiculo.*»

«You grind minium with water, like vermilion; and when the water has been poured out of the vessel (horn), you dry the colour; and then add white of egg to it and use it for illuminating. This minium must not be mixed with any other colour except

1. Observations with the microscope were done with a Zeiss stereo microscope with 8, 12, 20, 32, to 50 x magnifications. Images were recorded with a digital Leica DFC 420 C camera. We also used a AM411T-Dino-Lite Pro digital microscope with 10x - 50x - 200x magnifications.

2. Infrared reflectography (IRR) was done with a Hamamatsu C 2400-07 camera, equipped with a N2606 IR vidicon, a Nikon Micro-Nikkor 1:2.8/55 mm lens, and a Wratten 87c (B+W 093) filter. Digitized documentation is done with a Pinnacle PCTV framegrabber. IRR-assemblies were made with Adobe Photoshop CS2.

with white and vermillion.» (Liber de Coloribus, 282-283) Analyses of red areas in the Rime Bible do indeed reveal those admixtures, and the crack pattern is indeed typical for a binding medium based on glair.<sup>1</sup> Similarly, the finding of a strong presence of Ca, Fe, and S in a tan-coloured pigment mixture, visible in abraded areas of the gilding could be related to a passage in the *Liber de Coloribus*: «*Ocrum si necessarium tibi fuerit in percamento, ... de ocro siue de gipso*» «If you need ochre on parchment, grind it well with water, and when this has been done, add strong white of egg to it. But you must know that ochre is needed only by painters of murals, except that, when you wish to make a letter of gold, you lay it in first with ochre and gypsum.», and: «Gypsum is ground like ochre, but you will not have any use for it except when you wish to lay gold in books. And then you put on the gold as we have described in speaking of ochre.» (Liber de Coloribus, 284-285) The finding of those elements is perfectly fitting for the use of a mixture of yellow ochre, a hydrated iron oxide ( $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ), and gypsum, a calcium sulphate dihydrate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ). The *Liber de Coloribus* is very explicit that these pigments can only be used for laying a gold ground. And indeed, those were the only instances where that combination of elements could be found.

All the illuminations and small figures in the borders of the texts were begun with a fine brush dipped in a carbon black. These drawings define the outlines of the figures. No attempts to indicate shading or volume were made at this stage. The underdrawings often show uncertainties in elements that went beyond typically formulaic figures and shapes like the faces of Christ, or conventions for trees or draperies.<sup>2</sup> Van der Borch especially seems to have had difficulties in defining a correct anatomy for the human figure. This would suggest that these, sometimes very complex illuminations were not based on, or copied from precedents in modelbooks, but 'invented' on the parchment. (figs. 1 and 2) These drawings were made after



FIG.1 A. EXPULSION FROM PARADISE (DETAIL), NORMAL LIGHT  
B. INFRARED REFLECTOGRAM ASSEMBLY



FIG.2 A. CREATION OF MAN (DETAIL), NORMAL LIGHT  
B. INFRARED REFLECTOGRAM ASSEMBLY

the text was written, the scribe writing in iron gall ink, leaving specific spaces open for the illuminator to work on.<sup>3</sup> This is evidenced by the fact that sometimes the illuminator made corrections in carbon black to the texts written in ink. This correction process also corresponds with contemporary recommendations: «*Sed si in pergamenis... cum ovo distemperatos assumes*», «If you wish to lay black over other colours on parchment, you must not put incaustum, but know that you must take charcoal distempered with egg» (De Coloribus Faciendi, 138-139) (fig. 3).



FIG.3 A. ILLUMINATION WITH TEXT (DETAIL), NORMAL LIGHT  
B. INFRARED REFLECTOGRAM ASSEMBLY

The outlines in carbon black provided the basis for painting. This was continued in a fairly limited palette. Larger areas appear to be blocked in with single unmixed colours. Modulation of drapery folds was accomplished by laying thin translucent washes over these colour fields. This was further emphasised in the shadow areas with emphatic strokes of carbon black and in the highlights with linear contour strokes of pure and unmixed lead white. Definition of forms is still largely dependent on the elongated contours and strokes in carbon black paint.

In general, Van der Borch seems to have had a preference for the use of single, unmixed colours. The exception being the flesh tones where admixtures of vermilion in lead white frequently occur. This can be demonstrated quite nicely in the elemental distribution images of the head of Christ.<sup>4</sup> (fig. 4) In this image the area for the gold ground is indicated by the distribution of calcium, present in the gypsum. The (abraded) gilding is shown by the distribution of the  $M\alpha$  lines for gold. The vermilion, HgS (here indicated by the distribution of mercury  $M\alpha$  lines), is shown to be mixed throughout the flesh tone with lead white (Pb  $L\alpha$ , and Pb  $M\alpha$ ).

Otherwise, vermilion appears to have been very sparsely used. This practice corresponds to warnings in the treatises: «*Si vero minium... est in minio*»: «If the vermilion is very good and new, I put two parts of it, and scarcely the third part of minium. But if the minium is dusky and very old, put a half or a third part of the vermilion, and make the remainder of minium; and you must know that the older the vermilion is by nature, the darker and less useful it is; and the darker it is, less of it must be

3. Analyses of the writing ink showed a strong presence of Fe, Ca, smaller amounts of Mn, K, Pb, and S, but also traces of Cu and Zn. This might suggest that the ink could have been made or stored in a brass vessel, or more likely, that the iron vitriol needed for the making of the ink also contained traces of zinc vitriol and other associated minerals.

4. Energy dispersive x-ray fluorescence (XRF) analyses were generally done with a Bruker Artax  $\mu$ -XRF spectrometer, 40kV, 500 $\mu$ A, 60 sec., Mo-anode, 0.090 $\mu$ m capillary lens, Helium flush (1.7 L/min), over 50keV energy range. For the distribution images a dwell time of 10 seconds was allowed.

5. A remarkable feature of the azurite used in this manuscript was the notable presence of barium and potassium. As in some regions barium salts are paragenetic with azurite, this may provide an indication for geographical origin of pigment.

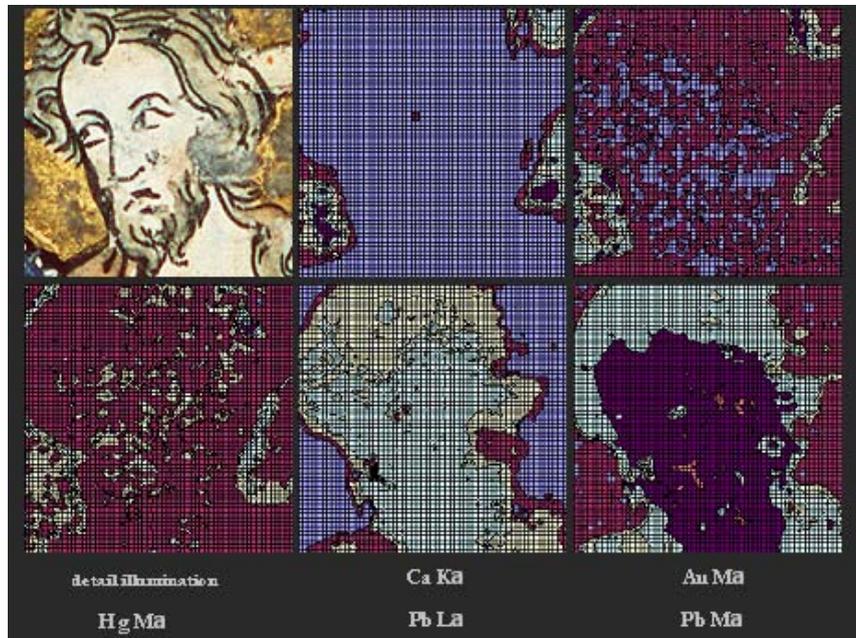


FIG.4 DISTRIBUTION OF ELEMENTS, FACE OF CHRIST (DETAIL)

added to the minium» ( *De Coloribus Faciendi*, 142-143) The vermilion must have been very old indeed! Only a slight admixture was very occasionally found in areas that were otherwise done in red lead. Most red passages, even the blood on the face of Goliath, or dripping from the wounds of Christ, are done in red lead.

Similarly, the blue areas appear blocked out only in pure azurite, a copper(II) carbonate mineral ( $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$ ). Azurite is a difficult pigment to work with. To prepare it for painting, the mineral needed to be broken up and reduced to powder. The coarser the powder, the darker and nicer the blue. If it was ground too fine, it tended to look rather pale greenish sky-blue. The separation of the coarser, darker particles from the finer, paler ones was accomplished by a process of levigation. The mineral was ground to powder while wet. As a turbid liquid, the slurry was transferred to a bowl in which the powdered substance remained suspended by continuous stirring. Then it was allowed to settle for some time, before being poured off to a second basin. This affords for the subsequent separation of the mineral into various grades of fineness, because of the slower subsidence of the finer particles from suspension. The turbid liquid, was poured into the first of a series of bowls, and was allowed to stand for a certain time. The coarsest and heaviest particles quickly subside, leaving the finer material suspended in the water, which was drawn from above the sediment into the next bowl. The liquid is passed from bowl to bowl, remaining in each subsequently longer than in the preceding one, since the finer and lighter the particles, the more time is necessary for their deposition. In the illuminations, in particular for the patterned backgrounds, a very powerfully deep blue azurite of good quality was used.<sup>5</sup>

Observation of blue passages under the microscope clearly demonstrated that the artist exploited a finer grained – and thus paler blue – azurite for the lighter passages. It is notable that in order to obtain a lighter blue, choosing finer grade particles was apparently preferred over admixture with white. Darker, sometimes almost black accents, in particular on the background patterns, seem to be of organic nature and may very well be woad indigo.<sup>6</sup>

An equally strict adherence to the use of unmixed pigments in the Rime Bible was encountered in the application of copper-based greens, i.e. verdigris ( $\text{Cu}_2(\text{OAc})_4(\text{H}_2\text{O})_2$ ), again much as recommended in the texts: «*Viride de Gretia in uase...operari poteris.*», «Put verdigris in a dish made of bronze or electrum and pour wine upon it, so that the wine may become green. Pour the liquid portion of this mixture into another bronze vessel, and pour wine once more into the first vessel from which you remove the liquid. And when this too has been saturated and removed, add wine a third time. Then you may leave off.» And: «*Pone uiride in uino...et sic bonum erit.*», «Put some green in wine, and rub it well with your finger; when it has settled, take the liquid part and put it in moderate sunlight, or elsewhere, to thicken. When it is fit for writing, put it in a vessel made of glass or wax, and you will be able to keep it in a good condition for a long time. If it is too dark, add a little saffron and the powder of calcined bones. If you wish to illuminate more easily, take some yolk of egg, and mix the green wine with it, and grind the green pigment with this mixture upon the stone, and temper it with the same; and thus it will be good.» (Liber de Coloribus, 282-285)

By treating copper acetate in this manner and making an almost saturated solution of it, the pigment dissolving into the wine converts into a very dense, syrupy, copper carboxylate substance. The pigment thereby loses its 'grittiness' and acquires much more pleasant working properties. The illuminator obtained a splendidly deep emerald green paint that flowed easily from the brush. It was applied in relatively thick opaque layers but also in thinner, quite translucent paint films, allowing the reflective brightness of the parchment – or better still, gold leaf – to shimmer through. (fig. 5) The smoothness of the thin, translucent green accords beautifully well with the grainy, particulate texture of the deep blue azurite.

We also found frequent passages executed in a light, opaque, pink colour, which were often glazed over with darker, deep red, sometimes purple or maroon, translucent strokes. The organic colorant for both the opaque pink as well as the translucent purple was tentatively identified as a brazilwood lake.<sup>7</sup> Brazilwood lakes were the most important organic reds in the Middle Ages (Wallert, 1986, 52-70, Roger, et al, 2003, 155-170). The *Liber de Coloribus* advised: «*Lignum brasilii accipitur... purpureus color*», «Take brazil-wood and scrape it down with a knife into a dish. And after it has all been reduced by scraping, cover it with white of egg. And when it has steeped and commenced to grow ripe, let alum be added in proportion to the quantity of the brazilwood. When the brazil has saturated it, the liquid should be drawn off and kept in another vessel; and when this has been done, add white of egg again, and when it has become saturated, draw it off»... «If you mix white with brazil, it makes rose-

6. As no samples could be taken, a proper identification by chromatography was not possible. The optical features under the microscope and behaviour of the dark blue in infrared, were found to be consistent with indigoid colorants.

7. Fiber optic reflectance spectroscopy (FORS) was done with an Avantes AvaSpec-2048 Fiber Optic Spectrometer, based on symmetrical Czerny-Turner design with 2048 pixel CCD detector array. 200-1100nm. Mikropack HPX-2000 xenon light source.



FIG.5 MICROGRAPH OF GREEN TRANSLUCENT GLAZE OVER REFLECTIVE BACKGROUND (MAGNIFICATION 20X)

8. Canon EOS 400D, with 24-105mm 1:4L lens and Nikon D70 with Micro Nikkor 60mm 1:2.8D lens were used. Frequently 81A, and 85B-2B filters were used. Image processing was done with the use of digital filters and Adobe Photoshop CS2.

colour; and with azure it makes purple». (Liber de Coloribus, 284-285) In the Rime Bible, the white added to the brazil wood extract was a simple calcium carbonate white. This imparted opacity to the mixture and served as colour-stabilising substrate for the organic colorant.

Images taken in ultraviolet light give a good impression about the extent of the use of this organic colorant<sup>8</sup>. (figs. 6 and 7) It appears to have been applied quite generously in remarkably swift and open touches.

The analyses of the illuminations helped to identify paints and pigments and the different strategies that were employed to deal with colour as a means to organise the composition.



FIG.6 A. TOBIT HEALING HIS FATHER'S EYES (DETAIL), NORMAL LIGHT  
B. DISTRIBUTION OF ORGANIC LAKE IN ULTRAVIOLET FLUORESCENCE

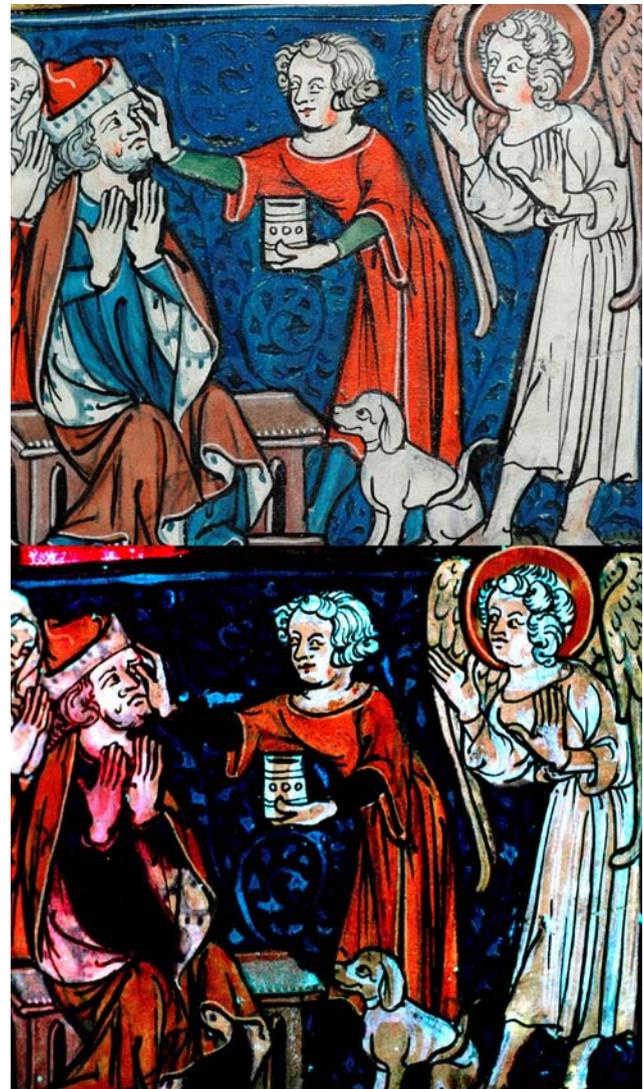


FIG.7 A. TOBIT SETTING OUT ON HIS JOURNEY (DETAIL), NORMAL LIGHT  
B. DISTRIBUTION OF ORGANIC LAKE IN ULTRAVIOLET FLUORESCENCE

According to the historical technical treatises compositions should be formed on the basis of a three-step system of colour application. The points of departure are the individual fields of colour. Each of these fields of colour tends to be provided with a specifically prescribed colour for darker shades: *incidis*. In the next step, each field of colour is provided with its own fixed colour of a much lighter nature: *matizatura*. In the technical treatises of the time, such as the *Liber de Coloribus siue Pictorum* and *De Coloribus Faciendi*, this rigidly ordained system of operative forms seems to have been strictly prescribed.

In the making of the Rime Bible miniatures, however, all the procedures described in the treatises seem to have been followed, **except** for the application of the *incidis* and *matizatura* system. There the artist allowed himself considerable liberties. Especially in his use of washes with organic colorants, consciously exploiting effects of opacity and translucence, Michiel van der Borch went beyond the rules of tradition<sup>9</sup>. In his lively brushwork he added a remarkable sense of freedom and liveliness to the functionality of the mediaeval method. ●

9. In this development towards techniques that allowed greater flexibility, alternative approaches induced by the work of the great encyclopaedists may have played a role. Especially Book XIX: De Coloribus, odoribus et saporibus (pp. 848-871) of Bartolomeus Anglicus' *De Proprietatibus Rerum* must have been influential. (Meier-Staubach, 2000, 451-469).

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## Biography

Arie Wallert holds a PhD from Groningen University. Since 1996, he has been curator for the Scientific Examination Department of Paintings of the Rijksmuseum Amsterdam, senior scientist in the Department for Conservation RMA. His principal interests are the analysis of museum objects, the characterisation of pigments, the study of art technical historical sources and the scientific examination of mediaeval manuscript illumination. Address: Department of Conservation, Rijksmuseum, Hobbemastraat 22, 1071ZC Amsterdam; [a.wallert@rijksmuseum.nl](mailto:a.wallert@rijksmuseum.nl).