

MANUSCRIPTS in the MAKING: Art and Science
8-10 DECEMBER 2016

Book of Abstracts

SESSION 1

Dr Heather Pulliam, Edinburgh University

What do the multiple hands and colours of the Corbie Psalter, Book of Kells and Trier Gospels tell us about early medieval attitudes towards a 'finished product'?

The mixing and application of colours within three related manuscripts – the Corbie Psalter, Book of Kells and Trier Gospels – exhibit jarring differences in quality; and yet, the inferior applications of colour appear to be contemporaneous with the finely mixed and delicately applied colour that is sometimes found on the same page. This paper will invite a consideration of the multiple hands and colours in the three manuscripts and what they reveal about early medieval attitudes towards a 'finished product'?

Susie Bioletti and Dr Rachel Moss, Trinity College, Dublin

The Art and the Pigments: a Study of Four Insular Gospel Books in the Library of Trinity College Dublin

This paper presents the findings of an inter-disciplinary team carrying out the treatment, technical examination, analysis, digitisation and art historical study of four of the most important early Irish manuscripts in the Library of Trinity College, Dublin: *Codex Usserianus Primus* (possibly fifth century), the *Garland of Howth* (eight-ninth century), the *Book of Dimma* (late eight century), and the *Book of Mulling* (eight century). These, along with the *Book of Kells*, the *Book of Durrow* and the *Book of Armagh*, make up the preeminent collection of early Christian book art in Trinity College Library. The texts of the manuscripts have been the subject of scholarly study in the past; however, all have been relatively overlooked from a codicological and art historical perspective. The *Garland of Howth* in particular is almost unknown to art historians. Together with conservation work to stabilize *Usserianus Primus* and the *Book of Mulling*, and improve the binding structure for the *Book of Dimma*, the project will enable researchers to re-address questions around features that distinguish Insular manuscripts in general, and pocket Gospels in particular. The analytical results will be considered in the light of previous studies of the pigments used during this early medieval period in Ireland, and a possible tradition in the use of certain materials, along with the iconographical characteristics of the images and the inspired artistry of the manuscripts' creators.

Prof. Andrew Beeby and Prof. Richard Gameson, Durham University, and Dr Catherine Nicholson, Northumbria University

From Cairo to Canterbury: Pigments of English Illuminators from the Tenth to the Twelfth Century

The number of surviving manuscripts that are attributable to scriptoria at Canterbury from the tenth to the twelfth century offers an unrivalled opportunity to examine the evolution of pigments used for manuscript illumination in a major English centre in relation to a series of relatively well documented historical contexts, including the Norman Conquest. Particular attention will be paid to the most exotic of the materials identified – Egyptian blue.

Dr Lucia Pereira-Pardo and Dr Paola Ricciardi, The Fitzwilliam Museum

Revealing the Materials and Techniques of Gothic English Illuminators

The corpus of preserved illuminated manuscripts from medieval Britain is relatively scarce compared to that of France or Italy. Despite its uniqueness and interest, until recently it had not been subjected to extensive technical analysis in order to investigate the range and deployment of pigments and their evolution during the Middle Ages. Our research aims to shed light on the pictorial palette and technique of a set of thirteenth and fourteenth century English illuminated manuscripts from various production centres, including three outstanding examples from the Fitzwilliam Museum collection: the Peterborough Psalter (c. 1220), the Pabraham-Clifford Hours (c. 1315-1330) and the Macclesfield Psalter (c. 1330-1340). A completely non-invasive analytical approach was adopted, which comprised a combination of imaging and spectroscopic techniques, including infrared imaging, UV-vis-NIR reflectance spectroscopy and XRF.

This paper will discuss the overall results of the technical analyses, paying special attention to the evolution in the use of blue pigments. The analyses confirmed that ultramarine was widely used in the thirteenth century but temporarily disappeared from paintings from 1335 onwards. This can be tentatively associated with the contemporary spread of the Mongol Empire, which facilitated trade from Central Asia to Europe, and its disintegration with the consequent disruption of trade routes. Other interesting findings will be presented, concerning the particular approach to the use of yellows, the variety of hues obtained with organic dyes depending on their composition and manufacture, the introduction of purple in the fourteenth century and the modelling techniques of flesh tones and draperies. These results will be compared with those obtained by other researchers on English illuminated manuscripts of previous and later periods and in other contemporary media, such as wall paintings and panels.

SESSION 2

Prof. Dr Lieve Watteuw, Catholic University of Leuven

The Shape of Colour: Exploring the Surface of Paint Layers in Illuminated Manuscripts from the Low Countries

The preparation of the colourful paint used in miniature painting was the task of the illuminator and the workshop apprentices. Sources of the materials, the timing, the preparation modus and the manner of applying the thin liquid material to the smoothed parchment were highly important. All these considerations were the *conditio sine qua non* to build stable and vivid

colours in sophisticated compositions. Subtle differences in thickness of the brush and quill strokes determined the visual dynamics and were a characteristic of the illuminators' craftsmanship.

This presentation will explore the technical features of the topography and texture of the pictorial layers in manuscript illuminations. The differences in shape, thickness and contour will be illustrated with cases in manuscripts preserved in Belgian collections. The case studies include the Evangelists' portraits in an eleventh-century Mosan Gospels (kept in the Treasury of the Basilica of Tongeren), the twelfth-century Sawalo Gospels (made in Saint-Amands des Eaux), early fourteenth-century Ghent illuminations created in the area of the Abbey of Saint-Peter, and the exquisite miniatures of the early sixteenth-century Breviary of Mayer van den Bergh (made in Ghent-Bruges, c.1510).

To document the colour surfaces and contours, the study of written sources and the identification of the pigments obtained by micro-XRF will be combined with measurements acquired with the multispectral, multi-directional, portable and dome-shaped acquisition system that has been developed at the University of Leuven (RICH Project). The microdome extracts genuine 3D and shading information based on the principles of photometric stereo and allows to measure surfaces and brushstrokes in the X, Y and Z direction, with high accuracy. The research is relying on data obtained in the RICH Project (Catholic University of Leuven), the Laboratories of the Royal Institute of Cultural Heritage in Brussels and the University of Ghent.

Dr Paola Ricciardi and Dr Stella Panayotova, The Fitzwilliam Museum, *New Discoveries on the Fitzwilliam Book of Hours*

This paper will discuss the most interesting results of the non-invasive technical analyses which have been recently carried out on fifteen pages from the Fitzwilliam Book of Hours (Fitzwilliam Museum, MS 1058-1975).

The sumptuous illustrations of this early sixteenth-century Flemish manuscript had been recognised by scholars as the collaborative effort of four highly accomplished artists. Their respective contributions to the decorative programme range from the single miniature supplied by the Master of the Dresden Prayer Book – the Agony in the Garden on fol. 15r – to the numerous full-page and large miniatures, large and small historiated initials, as well as naturalistic, architectural and fully historiated borders attributed to the so-called painter of Add. MS 15677. The recent analyses have confirmed the overall homogeneity of the artists' rich and colourful palette, which includes azurite blue, lead white, vermillion and red lead, lead-tin yellow, realgar, brown and yellow earths, pink and purple dyes as well as a number of copper-based green pigments and mixtures. They have also, however, identified small but significant differences which help support – and at times challenge – the attribution of individual images to a certain artist. The paper will examine such differences and discuss them vis à vis the stylistic evidence.

The presence of unusual materials, such as silicates mixed with copper sulphates in green areas as well as clay minerals in passages painted with yellow-coloured earth pigments, will also be discussed in light of recent research on contemporary Netherlandish easel painting practice.

Dr Giulia Bertolotti and Dr Paola Ricciardi, The Fitzwilliam Museum,
Simon Bening's palette and painting techniques in the Hours of Albrecht of Brandenburg

The technical analysis of six full-page miniatures from the Hours of Albrecht of Brandenburg, illuminated by Simon Bening and his workshop in 1522-1523, helps support the notion that the Flemish master's work is fully embedded within the local artistic practice of his time.

The artist's palette was found to match that of sixteenth-century Flemish panel painters. Non-invasive analysis by X-ray fluorescence (XRF) and fibre-optic UV-vis-NIR reflectance spectroscopy (FORS) revealed that Bening favoured lead white, lead-tin yellow, vermillion, azurite, shell gold, brown iron-oxide and a copper-based green. Occasionally, the palette also includes yellow, red and blue organic colorants, such as indigo, and a broader range of iron-oxide pigments. Different pigments of the same colour are usually not juxtaposed, but rather used in different areas, while shading and highlighting in each area are obtained by diluting each pigment with different amounts of lead white. The copper-based green is often mixed either with an organic dye or with lead-tin yellow. The latter mixture is common in fifteenth and sixteenth century manuscripts illuminated in Belgium, Holland, France, Germany and Venice.

Interestingly, characteristic absorption features identified in the FORS spectra suggest that the green pigment is a mineral copper sulphate, of the type that is increasingly being identified in sixteenth-century Netherlandish paintings. These results contribute to previous research on the relationship between this artist's work and panel painting, which includes the possibility that he was an easel painter himself.

SESSION 3

Marcus Fraser, independent scholar

Origins and Modifications in the Blue Qur'an and Other Early Islamic Manuscripts

A number of Qur'an manuscripts written in Kufic scripts on parchment during the first centuries of the Islamic era exhibit evidence of early medieval alterations to their layouts, marginalia and decorative schemes. Some are relatively minor changes that could be associated with refurbishments over time, but others are more radical and indicate more thorough programmes of modification. Among the manuscripts concerned is the well-known Blue Qur'an, which appears to have at least two stages of medieval modifications. Further changes have occurred due to the decay of pigments over time and other natural effects. This paper will provide analysis of these modifications and natural changes and will discuss their contexts, as well as re-imagining the original aesthetic display of the manuscript. The paper will also look at the wider phenomenon of early manuscripts written on coloured parchment and will discuss early Qur'ans within the framework of related manuscripts produced in the Byzantine Empire and Europe, proposing new thoughts relating to their origins and production.

Prof. Robert Hillenbrand, Edinburgh University

The many uses of colour in the Great Mongol Shahnama

The paper will consider the innovative use of colour in the Great Mongol Shahnama, by general consent the finest illustrated Persian manuscript produced under Mongol rule. After examining

the changing balance between line and colour in earlier illustrated Persian manuscripts in the period 1250-1320, the discussion will move to the ways in which this Shahnama dramatically expanded the expressive potential of Persian painting through the medium of colour. This analysis will embrace such topics as metaphor, symbolism, naturalism, atmosphere, composition and the expression of emotion. Finally the paper will touch on some technical aspects of the palette deployed by the painters who worked on this manuscript.

Dr Sonya Rhie Quintanilla, Cleveland Museum of Art

Drama in Repetition: Narrative Strategies in Serial Paintings from Sultanate and Early Mughal Manuscripts of India

With the dispersal of folios from many illustrated Indian manuscripts, the narrative drama that artists and patrons achieved through serial imagery is often lost. As a result, scholars have generally viewed individual paintings and compositions without reference to their place in a sequence of images and without noting the strategies artists used to emphasize topics and ideas through repetition or counter-intuitive scene selection. In this paper, I will introduce a group of paintings in series from four illustrated narrative manuscripts of the mid-sixteenth century: the *Chandayana* of c.1550 in the John Rylands Library, Manchester; the *Tuti-nama* of c.1560 in the Cleveland Museum of Art; the dispersed *Hamza-nama* of c.1570; and the *Tuti-nama* of c.1580, which is dispersed, but a large part is now in the Chester Beatty Library, Dublin. This study will examine how narrative emphases were created through scene selection and repetition, and how they foreground changing interests and areas of key importance for patrons during the formative years of Mughal painting. In addition, the paper will note the role of palette and pigment use in identifying and dating manuscripts of this transitional period.

SESSION 4

Dr Doris Oltrogge and Dr Robert Fuchs, Cologne Institute for Conservation Sciences

The Vadiana Rudolf von Ems: Collaboration and Painting Technique in a Fourteenth-century Upper Rhenish Illuminators' Workshop

The World Chronicle of Rudolf von Ems in the Vadian Collection in Saint Gall is one of the most important illuminated vernacular German manuscripts. Written about 1300 for an unknown commissioner, it was lavishly illustrated with fifty-eight large miniatures presumably in Zurich in the workshop which was also responsible for the core miniatures of the famous Codex Manesse. A recent investigation of the painting technique of the Vadiana Rudolf von Ems offered important insights into the working methods of the illuminators and the complex collaboration inside the workshop. Furthermore, the analysis of the painting materials proved that the quality of pigments and metals matched the luxury character of the illustration. This paper will present the most important results of the research project on the Vadiana Rudolf von Ems.

Dr John K. Delaney, Dr Kathryn Dooley, Dr Damon Conover, Dr Lisha Deming Glinsman, Dr Giorgio Trumpy and Michelle Facini, National Gallery of Art (Washington DC)
Use of Multi-Modal Chemical Imaging Spectroscopy to Study Illuminated Manuscripts on the Macroscale

This paper will discuss identification and mapping of artists' materials obtained by using visible and near-infrared reflectance imaging spectroscopy, visible-induced fluorescence imaging spectroscopy as well as X-ray fluorescence imaging spectroscopy on several manuscript leaves, including Pacino di Buonaguida's "Christ in Majesty with Twelve Apostles" (c. 1320). Using this approach, high-resolution maps showing the spatial distribution of azurite, lead-tin yellow, red lead, two organic red dyes, a copper-containing green, brown iron oxide, and lead white were obtained. The material maps show that small amounts of ultramarine were used to enhance the azurite blue areas around Christ and to highlight his robe as well as those of a few Apostles. The imaging methods also provided information about the reverse side of the page, currently hidden by the presence of a paper support. Specifically, reflectance imaging identified Latin text on the *verso* and elemental imaging showed mercury-containing music lines, most likely painted with vermilion.

The paper will also include a discussion of how such a combined imaging approach on the macroscale provides a more comprehensive understanding of works of art than point measurements alone, even when the latter are guided by prior multispectral analysis. The examples presented here will show that macroscale imaging methods can successfully be used to examine illuminated manuscripts, despite the stricter practical requirements due to their fragility and light sensitivity, if the imaging systems are sensitive enough.

SESSION 5

Dr Elizabeth Morrison, J. Paul Getty Museum
Seeing a Pink Elephant: Creating Meaning through Color in the Medieval Bestiary

There are three aspects characteristic of the medieval bestiary that make it an ideal case study for the use and meaning of color in medieval manuscripts: it is one of the few high medieval textual traditions which in several of its recensions are almost always associated with images; the balance between text and image is more equal than in most illuminated texts; and significant portions of the bestiary's iconography were extraordinarily stable over time. Almost identical compositional strategies spread over hundreds of years were rendered in ink drawings, colored washes, or full color with frames. Often the choice of the use of color dictated how the images interacted with the text. In the manuscripts featuring line drawings, irregular spaces within the text block meant that the illuminations could overlap or intermingle with the words of the text, whereas animals set against solid backgrounds and surrounded with set frames were more likely set off in regulated areas, creating a situation where the images seem to be in conflict with or overwhelm the text. Moreover, the ways in which colored tails, heads, wings, and claws often extend beyond the bounds of the illuminations created intentional links with the manuscripts' text or secondary decoration. This paper will address how color, in terms of the choice of medium, the layout of pages, and the way the images were integrated, could significantly alter the reader's experience of the text, as well as an understanding of the relationship between text and image.

Dr Deirdre Jackson, The Fitzwilliam Museum
The Colours of Fortune

Capable of granting riches and honours and abruptly withdrawing her favours, the capricious figure of Fortune, inspired by the pagan goddess, was one of the most alarming constructs inherited by medieval thinkers from their Roman predecessors. From Boethius onwards, writers and artists sought to describe the paradoxical nature of Fortune, personified as a female figure whose only stable characteristic was her mutability. Among the attributes assigned to Fortune were a crown signalling her sovereignty over mortal affairs, a blindfold underscoring her indifference and disregard for merit, multiple hands ready to reward or ruin, and, above all, her perpetually turning wheel. As argued in this paper, in addition to these overt emblems, colour played a major part in medieval conceptions of Fortune. To signal her variability, artists sometimes depicted her with two faces (one light and one dark), painted one side of her face black and the other white, and clothed her in bi- or multi-coloured gowns. In these startling depictions of Fortune, meaning is dependent on combinations of colours, rather than attributes alone. Focusing on fifteenth-century France, this paper will examine the strategic deployment of colours by leading illuminators who transformed and reinvigorated the venerable symbol of Fortune, including the Luçon Master (fl. c.1400-1415), Jean Colombe (c.1430-1493) and Jean Bourdichon (1457-1521).

SESSION 6

Prof. Maria João Melo and Prof. Maria Adelaide Miranda, New University of Lisbon
Between tradition and innovation: the Lorrvão Apocalypse in the Portuguese monastic scriptoria

To understand the absence of narrative cycles and the desire for abstraction as a representation of spirituality, which distinguishes illuminated Portuguese Romanesque manuscripts, it is necessary to consider that from the fourth century to eighth century, art was primarily produced as portable works. The Suevi and the Visigoths who converted to Arianism, when they settled in the north-western region of the Iberian Peninsula, were part of a tradition that did not favour the representation of the sacred. The Muslim occupation intensified these characteristics of artistic creation, where human figuration is absent from sacred contexts. This explains why the illuminated manuscripts produced in the monastic libraries of the Kingdom of Portugal, are focused on historiated and decorated initials, with some exceptions such as Hugh of Fouilloy's *De Avibus* (1184) and the work known as the *Lorrvão Apocalypse* (1189) [1]. These books were produced in the *scriptoria* of the three important monasteries of Lorrvão (Iberian monachism), Holy Cross of Coimbra (Canons of Saint Augustine) and Alcobaça (Cistercians). Our interdisciplinary studies have proved that although the characteristics of these orders were based on principles relating to simplicity, they used a diversified and luxurious colour palette that shows local specificities.

In this paper we invite the audience to discover the beauty and identity of Portuguese Romanesque illuminations. Colour will be our prime material for reflection. We will focus on the exceptional *Lorrvão Apocalypse* because the production of the Lorrvão *scriptorium* beautifully reflects the dialogue and confrontation of the Hispanic tradition with innovation which took place during the Romanesque period. Lorrvão's *Apocalypse* is unique as it is the

only manuscript that presents an extensive and coherent iconographic program, expressed in pictures of great artistic quality. This masterpiece was recently recommended for inclusion in the Memory of the World Register.

Dr Catarina Pereira-Miguel, Évora University

Scientific Study of Cistercian Illuminated Manuscripts – Techniques, Aesthetics and Religion

The *SCISTER* project (*SCientific Study of Cistercian Illuminated Scripts – Techniques, Esthetics and Religion*) is a joint research project between the HERCULES Laboratory (Évora University), the Laboratory for Instrumentation, Biomedical Engineering and Radiation Physics, (LIBPhys, New University of Lisbon) and the Vatican Library. It is undertaking a unique comparative study of three outstanding Cistercian collections of medieval illuminated manuscripts: Alcobaça – the most important Portuguese collection; the Vatican collection – the best high-quality collection; and Troyes – the worlds’ largest collection which includes manuscripts from Clairvaux. This paper will discuss the first results of the analysis of the codicology, materials, paint formulations and extent of colour use of a selection of comparable manuscripts from the twelfth and thirteenth century (the *Hagiographic readings*) from the three collections. It will present a new view about the sharing of materials and the transfer of knowledge for the production of painting materials for illumination between Christians and Muslims who were, at the time, occupying the Southern territory of Europe. The analytical results obtained on comparable manuscripts from the Troyes and Alcobaça collections will also contribute to clarify the relations between Alcobaça Monastery and its Mother Abbey of Clairvaux, which might well have exceeded the mere influence on the iconography and type of ornamentation and extended to the use of painting materials and paint formulations in Alcobaça.

SESSION 7

Dr Nicholas Herman, University of Montreal

Colour versus Gold: Disgruntled Digressions in a Late Medieval Workshop

While a growing body of research provides us with increasingly detailed knowledge regarding the materials and techniques of manuscript illumination, it is often difficult to ascertain how artists themselves considered their own working methods. However, a neglected corpus of miniscule inscriptions hidden in miniatures painted by assistants of the Bourges-based book illuminator Jean Colombe (c.1430-1493) allows for an unprecedented glimpse into the concerns, grievances and preoccupations of workshop employees whose voices are otherwise undocumented. As part of a larger study of these puzzling inscriptions, which repeatedly complain to the viewer about ‘temps perdu pour vous’ and ‘oeuvre sans profit’, this paper will examine a single manuscript from the group, the *Fleur des Histoires* (Paris, BnF, MS fr. 53). The illumination programme for this French-language history text was, evidently, not without problems. Like many ambitious late-fifteenth-century secular manuscripts, the book never had all of its planned miniatures completed. The initial high-quality illustrations gradually become rougher in form, then are without frames or lack certain zones of colour, and finally are completely blank. Despite this incompleteness, however, a decision was made mid-campaign to erase large areas of the already carefully painted miniatures so that they could be laboriously

re-laid with extensive and garish areas of gold. This ‘upgrade’ would be unusual enough, but the top-down instructions seem to have prompted the workshop members to inscribe complaints about wasted time and effort atop these areas in particular, understandably angry at having to re-do perfectly good work while lacking the resources to complete the rest of the programme. The result is a fascinating, and perhaps unique, witness to the artisanal frustration engendered by a hasty change of plan imposed from above.

Roger Wieck, Morgan Library & Museum
Tours 1500

Jean Bourdichon (1457-1521), Jean Poyer (fl. 1483-1503), and the Master of Claude de France (fl. c.1508-1520) were roughly contemporary artists living and working in Tours – a triumvirate, of sorts. Bourdichon has been long known and admired by scholars and the public, while Poyer and the Claude Master have only emerged from obscurity in the last thirty or so years. While Bourdichon and Poyer were rivals, their styles and palettes were similar – and indeed, in the past, they were often confused. The Claude Master was trained by Bourdichon, but was also influenced by Poyer; his style and palette emerged from his contacts with the two older artists. Can the naked eye indeed see a difference between the manner of painting and use of colour by Bourdichon and Poyer? What influence did the art of Italy, which Poyer visited but Bourdichon did not, have on the two men? Both older artists painted both panels and illuminations, while the Claude Master confined himself to vellum; did this influence how the Claude Master painted? This paper examines these and other questions relating to both the similarities and differences between the styles of these three interconnected artists.

SESSION 8

Nancy Turner, J. Paul Getty Museum, and Dr Catherine Patterson, Getty Conservation Institute
Materials of Byzantine Illumination: ‘Center’ and ‘Periphery’

Byzantine painters, whether of icons or manuscripts, were tasked with bringing forth with their painting materials the presence of the divine. With golden backgrounds to convey heavenly light and a range of pigments to paint holy personages, illuminators aimed to transform their raw materials – be they the most ordinary of colorants or the most costly – into ‘living paintings’ and portals to the divine.

It is often assumed that the highest quality materials or widest range of pigment were reserved for use by the most important ateliers in the major centers of production, while lesser quality or fewer materials were available in the outlying regions. This paper will present the results of new technical analyses of a group of manuscripts from the Byzantine world, including objects from the Getty Museum’s permanent collection and loan manuscripts, ranging in date from c. 1000 to c. 1300. With examples made in the Byzantine capital Constantinople as well as regions of the Empire beyond, such as Sicily and Armenia, this study allows to more broadly characterize the materials available to Byzantine illuminators during this three hundred year period. By focusing upon the pigments and parchment-preparation methods employed in the manuscripts studied, the notions of ‘center’ and ‘periphery’ will be explored as they relate to the transfer of materials technology and artistic practice. Scientific investigation methods

including X-ray fluorescence spectroscopy (XRF), Raman micro-spectroscopy, fiber optic reflectance spectroscopy (FORS) and multispectral imaging (MSI) have been used, allowing the examination of the selected manuscripts to be completed in a fully non-invasive manner. Preliminary results suggest that materials such as ultramarine blue, yellow pigments (including lead-tin yellow and arsenic-containing yellows), and gold application methods may be of particular interest.

Dr Costanza Miliani, Dr David Buti, Prof. Antonio Sgamellotti and Prof. Brunetto Giovanni Brunetti, CNR-ISTM & SMAArt Perugia, and Dr Davide Domenici, University of Bologna
Colourful memories: Non-invasive investigations of Mesoamerican Pre-Columbian and early-colonial Codices

The term ‘Mesoamerican codex’ refers to manuscripts written in Mesoamerica during the pre-Columbian period and the first part of the colonial period. These codices represent the religious and historical legacy of pre-Columbian people. They were produced to record, by means of hieroglyphs and ideographs, historical and religious matters. Before the Spanish conquest of Mexico, there must have been a large amount of such manuscripts, but due to the colonial persecution and destruction, only fifteen are known to have survived. The majority, sent to Europe by the *conquistadores* in the 16th century as gifts or bizarre objects, is today located in European museums and cultural institution.

Nowadays, thanks to the availability of a variety of non-invasive analytical methods and portable spectroscopic instrumentation, the scientific study of Mesoamerican codices can be carried out, revealing information on the constituting materials and painting techniques, while fully respecting their physical integrity.

Ten pre-Columbian manuscripts have been thoroughly analysed so far: one in Mexico and nine in Europe, the latter thanks to the MOLAB transnational access offered by the Eu-ARTECH and CHARISMA EU-funded projects. The present work shows the results of the multi-technique integrated approach of the mobile laboratory MOLAB which revealed the composition of coloured materials as well as their use on the codices’ pages. The analytical results are compared with historical references found in early colonial Mexican documents and in modern texts devoted to the use of colours in ancient Mesoamerica. Furthermore, through technical comparisons among the data collected on the different codices, new assumptions and hypothesis on their provenance and interrelationship can be put forward.

SESSION 9

Bryan Keene, J. Paul Getty Museum

Dyers, Weavers, and Illuminators: Evidence from the Florentine Ordinamenti e Matricola della Compagnia di Sant’Onofrio (1338)

The Horne Museum in Florence is home to a little published manuscript, written and illuminated in 1338 and containing the statutes and registry for the Compagnia di Sant’Onofrio, the patron saint of the Dyer’s Guild. The painter-illuminator known as the Master of the Dominican Effigies was responsible for the book’s illuminations, which although damaged from the flood of 1966 still preserve numerous visualizations of the Compagnia’s members in acts of veneration and of scribes and illuminators at work. This paper considers the Dyer’s

Guild statutes in terms of other *ordinamenti/statuti* illuminated by the anonymous master (such as those for the Arte della Lana or the confraternity that met at Orsanmichele), and discusses instances of material borrowing by the illuminator in terms of pigments/dyes and textile patterns. Specifically, I address the ways in which the Master of the Dominican Effigies and other artists from the orbit of Pacino di Bonaguida simulated textile patterns to frame their miniatures, which often include representations of patterned fabric (which correspond to surviving fragments from the period) and in some instances evidence suggests that these illuminations were covered by veils (perhaps of silk). The paper ends with a discussion of the unusual phenomenon of pricking certain miniatures attributed to the Maestro Daddesco, most likely in an attempt to transfer the design to other manuscripts but also perhaps in relation to contemporary embroidery.

Magnolia Scudieri, Museum of San Marco (Florence), and Dr Marcello Picollo, CNR-IFAC
Fra Angelico and his circle: the materials and techniques of book illumination

Guido di Pietro, better known as Beato Angelico or Fra Giovanni da Fiesole (c. 1400-1455), was one of the most important painters of the fifteenth century. He was a versatile artist who excelled in illumination, fresco, and panel painting techniques. Initially trained as an illuminator, he may have been a pupil of Lorenzo Monaco. The influence of the Sienese school is also discernible in his work. Among Angelico's collaborators and followers, some of the most preeminent figures were Battista di Biagio Sanguigni and Zanobi Strozzi.

Angelico's talent was celebrated in 2007-08 at the San Marco Museum in Florence with the exhibition "Fra Giovanni Angelico. Pittore miniatore o miniatore pittore?" in which the techniques and materials used by the artist for painting on manuscripts and panels were investigated and comparisons between these two different forms of art were made. Subsequently, this comparative study was also extended to some of his frescoes in the San Marco Museum in order to further our understanding of his materials and working methods.

This paper will report the main results obtained during a multidisciplinary research project on Angelico's illumination techniques, which merged the point of view of curators, conservators and scientists. The presentation will focus on one of the artist's most stunning works, located in the permanent collection of the San Marco Museum, the Graduale n. 558. Additionally, a comparison between the results of this project and the data obtained on two other manuscripts (the Antifonario by Battista di Biagio Sanguigni and the Graduale by Zanobi Strozzi and Filippo di Matteo Torelli, San Marco Museum, n. 10073 and n. 515, respectively) will be presented.

Eowyn Kerr-Di Carlo, Courtauld Institute of Art
Making the Cardinal's Missal: Looking anew at the Circle of Lorenzo Monaco and the Illuminators of Fitzwilliam MS 30

The beginning of the fifteenth century is discussed as a transitional period appreciated for its cultural development and artistic innovation. These qualities were often reflected in works of art commissioned for the growing merchant classes, and within this environment the Florentine scriptorium of Santa Maria degli Angeli flourished as an important centre of artistic production. The distinctive style of the monastery's illuminators has long been considered the pinnacle of Italian manuscript decoration and their liturgical books are among the most ornately decorated

objects to survive from the period. Not only did the scriptorium produce a large number of manuscripts but it also trained a generation of painters and illuminators, including Lorenzo Monaco. In 1404 records indicate that the illuminated elements and historiated initials of Cardinal Angelo Acciaiuoli's personal Missal were nearing completion. This ornate luxury item (Fitzwilliam Museum, MS 30) has been attributed to four artists associated with the Angeli who worked within Monaco's circle. While stylistically MS 30 is consistent with other works produced within the monastery, a new study of the manuscript suggests it may have been made elsewhere.

This paper explores the decoration of MS 30 and the relationship between its construction and Cardinal Acciaiuoli's professional career. In particular, his association with the Florentine Badia will be considered in connection to the Missal's commission. Key documents will be presented to support its production dates and confirm the attribution to brothers Matteo and Bartolomeo Torelli, Bartolomeo Fruosino, and Bastiano di Niccolò. As the manuscript is largely intact it allows for a complete study of the decorative schemes, and recent technical examinations of the materials used in its construction offer different working models for consideration. Collectively this material provides potential for a revision of the entire 'school' of the Angeli, suggesting a new model for how the artists may have worked and collaborated.

SESSION 10

Dr Maurizio Aceto, Università degli Studi del Piemonte Orientale and Cheryl Porter, Director of the Montefiascone Project and Consultant to the Conservation Department at the Library of Alexandria in Egypt

Looking for lichen, fooled by folium and tricked by Tyrian. A brief tour, and new research on purple in manuscripts

In spite of the criticisms of St Jerome and others, manuscripts with purple parchment and silver and gold letters were frequently produced in Byzantium and in Western Europe for Charlemagne and other monarchs, and for princes and prelates throughout the Middle Ages.

The paper will outline the continued search to identify the purple colourants being used in the production of these manuscripts, starting with the certainty of Diringer, "Tyrian purple, derived from the murex ... was employed... especially in Byzantine manuscripts," and Thompson, "Whelks produced the purple of Byzantium. Parchment was dyed with shellfish purple in France as late, perhaps, as the tenth century".

New research combines the expertise of historians, conservators and chemists. Thanks to advances in chemical analysis, scientifically sound verification can now supplement the discovery, translation and re-creation of relevant historic recipes, the study of trade routes and scholarly research into materials and the history of technology.

The paper will document this collaborative process and outline new research done on other purple dyes used in manuscripts. Folium from *Chrozophora tinctoria* as well as dyes from *Rocella tinctoria* and many other lichen species have been the main objects of this research, because their presence on purple manuscripts from the sixth to the tenth century has been systematically evidenced by means of chemical analysis in place of the expected Tyrian purple. In order to have reliable information, historical reconstructions of these dyes have been carried out following ancient recipes. The research focuses both on the diagnostic side and on the characterisation of the main compounds present.

Dr Lea Olsan, University of Louisiana at Monroe
Pigmenta: Materials for Painting and Healing

In the English Middle Ages, the Latin plural *pigmenta* designated two kinds of substances. It commonly designated substances used for medicines and drugs, but it also signified colours for painting. This paper explores the interplay of these two kinds of recipes as found in one compilation of artisanal and medical recipes copied into a late medieval medical commonplace book, Cambridge University Library, MS Dd.5.76. It will foreground the ingredients and technological processes common to the two types of recipes as a possible foundation for the compilation; it will evaluate the influence of the *Secretum secretorum* tradition, represented in the manuscript by the Latin pseudo-Aristotelian *Epistula*; and it will explain the medical conditions implicated by the remedies, especially as they relate to colour and evoke new technologies in traditional healing practices. The point is to demonstrate, using MS Dd.5.76 as a case study, how artisanal recipes relate to pharmaceutical recipes and medical remedies in the late fifteenth-century crafts of book decoration and healing.

Prof. Dr Mark Clarke, New University of Lisbon
Recipes and Reception: Mediaeval English Amateur Illuminators

A surprising number of fourteenth- and fifteenth-century Middle English technical craft ‘recipes’ for painters, stainers, scribes, and illuminators survive: 126 distinct sets, the largest such corpus in any language.

Introducing this corpus and its contemporary reception, it will be demonstrated that while these recipes were clearly professional in origin (some containing unique and informative ‘tricks of the trade’), they were subsequently appropriated by amateurs and by encyclopaedists. Characteristic types of textual emendations, interpolations, inappropriate conflation, and errors of comprehension, taken together with certain codicological features, clearly demonstrate that the majority of copyists were *not* technically informed, and were *not* writing for a professional audience, but rather for a ‘lay’ audience, some of whom had only a general encyclopaedic interest, but others were intending to be – and became – practicing amateur illuminators. Rare examples of such amateur illumination will be illustrated.

This art technological source research provides modern interdisciplinary technical art history with a practical encyclopaedia of medieval English craft techniques. There are correlations between recipes and materials analysis, but their use extends further. Recipes fill otherwise insoluble lacunae in analysis (notably identifying lost organic yellows and lost red glazes), and suggest directions for future investigations (recipes abound for a ‘ceruse’ made from tin in place of lead, not identified). They also supply the only practical evidence for the once-ubiquitous craft of ‘staining’ (figurative painting on cloth, for wall decorations, pageant scenery, and similar ephemera), of which no mediaeval English examples survive, as well as the earliest known recipes for block-printing on fabric.

In a wider European context, technical continuity is apparent from late eleventh-century ‘Channel School’ precursors (e.g. *De coloribus et mixtionibus*), through Anglo-Norman French recipes and the Anglo-Latin *Secretum philosophorum* (c.1300), to the Middle English recipes (c.1350-c.1500), with traces persisting into the sixteenth century.

SESSION 11

Nancy Turner, J. Paul Getty Museum

Reflecting a Heavenly Light: Gold and other Metals in Medieval and Renaissance Manuscript Illumination

The use of gold to decorate letterforms, backgrounds of images, elements within compositions, as well as border decorations has come to characterize the art of painting in codices through the entire history of western medieval and Renaissance European and Byzantine manuscripts. The term 'illuminations' derives from the Latin 'illuminare' and evokes the painted decorations in codices being 'lit up with gold' by the application of gold and other metals on the pages of books. For its spiritual connotations in addition to its value as a material, gold was used to embellish the word of God. The use of gold leaf and metallic inks on the page elevated religious and secular codices alike to a visually dazzling level that was appreciated not only by the reader close at hand, but by a wider audience of viewers when displayed below an altarpiece as part of the liturgical furnishings on an altar.

Featuring manuscripts from the J. Paul Getty Museum and other collections, this paper will consider the variety of uses of gold in illuminated manuscripts from the ninth to the sixteenth centuries. My aim is to show how the use of gold in book illumination was neither static nor constant over time. Chrysography – that is gold and golden inks for display letterforms and for the writing of whole texts – will begin the discussion, using Carolingian, Anglo-Saxon, and Byzantine examples from the ninth and tenth centuries. Various methods of application including water gilding, mordant gilding, and painted gold, and the range of coloured grounds for gold leaf will be discussed within the context of contemporary panel painting. The full range of golden effects on the page will be explored, including the use of alchemically-produced 'mosaic gold', a pigment traditionally associated with manuscript illumination. Technical analysis and close study under the microscope, made within the context provided by contemporary technical treatises and the historical circulation of gold and other metals (mainly through coinage) will be used to inform this study.

By approaching this beguiling material in a survey of its various uses and embellishment techniques within manuscripts chronologically, the paper aims not only to elaborate upon the range of visual effects achieved by book illuminators with elemental gold, metallic inks and other golden hues, but to highlight technological developments across the Mediterranean and Europe, new introductions to the palette, changing tastes, and economic considerations affecting manuscript illuminators over the centuries.

Cheryl Porter, Director of the Montefiascone Project and Consultant to the Conservation Department at the Library of Alexandria in Egypt
Metals in Cambridge Manuscripts

This paper will investigate the uses of metals – gold, silver and their substitutes – in Cambridge manuscripts.

The history of trade and the availability of gold and silver at various times throughout the fourth to the fifteenth centuries will be related to the artists' choice of the metals used as well as the method of their preparation for illuminating manuscripts.

Using images of various manuscripts, the paper will demonstrate the various ways that different metals could be prepared and applied, and how these methods could be modified and metals substituted according to taste, economics, technological advances, and the dictates of the substrates.

Comparisons between Islamic, Hebrew and Western Christian manuscripts will be made and reasons for preferences will be explained.

Prof. Dr Robert Fuchs, Cologne Institute of Conservation Sciences

Gold or Brass, Silver or Tin: Non-destructive Analysis of Metals in Precious Medieval Book Illumination

Gold, silver and other metals were widely used in medieval book illumination. The precious metals gold and silver were intended to increase the luxury appearance of splendid manuscripts. However, the analytical results do not always agree with the intended effect. Brass or bronze often replaced gold. Less often, tin replaced silver. When well preserved, the substitutes are not easy to distinguish from their more precious counterparts. This paper will present the metals employed in medieval book illumination, their production and application techniques, and will discuss some examples of the use of precious metals and substitutes. Sometimes sophisticated gilding techniques demonstrated the skills of master painters.

SESSION 12

Dr Cecilia Panti, University of Rome Tor Vergata and Dr Greti Dinkova-Bruun, Pontifical Institute of Mediaeval Studies, Toronto

Robert Grosseteste's Treatise De iride: Transmission, Reception, Meaning

It is generally accepted that Robert Grosseteste's treatise *De iride* is one of his last scientific works, written shortly after 1225 and before 1229, when he started teaching theology at the Franciscan Studium in Oxford. While both his earlier career as a Master of Arts and the didactic purpose of his writings on scientific topics, such as light, colour, the rainbow, sound, comets, optics and so on, are still a matter of debate, it is evident that several of these works enjoyed wide circulation. Among them it is worth mentioning *De iride* which was known to later medieval scholars, such as Roger Bacon and Theodoric of Freiberg, who both studied the phenomenon of the rainbow. Bacon, in particular, considers Grosseteste's text a valid methodological guide for the relevance attributed to perspective and the geometry of radial forces. Yet, he also criticizes Grosseteste's explanation based on a threefold sunlight refraction within a cloud, against which he proposes his own solution based on sunray reflection upon rain drops.

Our paper will discuss Grosseteste's treatise in the framework of its manuscript transmission, which includes later readers' responses to it, as can be seen in the following manuscripts: Florence, Biblioteca Marucelliana, C.163; Prague, National Library, XII.E.5; and Biblioteca Apostolica Vaticana, Barberini latini 165 (late thirteenth century). The last codex in particular, emerges as a remarkable witness, because here Grosseteste's text is followed by an *addendum* which develops further his theory and which insists on the role of the raindrops in the formation

of the rainbow in order to solve the apparently inexplicable consequences of Grosseteste's proposition, as Bacon had evinced.

This *addendum*, which we are studying and editing, and the context of its transmission are significant for several reasons: 1) they reinforce Bacon's claims concerning the teaching of *perspectiva* at Oxford; 2) they attest that the problem of the rainbow as well as other issues of natural philosophy were not only part of the curriculum in the Faculty of Arts at Oxford, but were also connected to Grosseteste and his circle of pupils and friends; 3) they provide help in establishing how Grosseteste's scientific *opuscula* are linked to each other, and specifically how the colour theory presented in *De iride* and its elaboration in the *addendum* are connected to the context of Grosseteste's colour theory in general.

Dr Donal Cooper, University of Cambridge

Vision and Colour in the Works of Giotto and His Contemporaries

The causal relationship between the study of optics that developed in the University schools during the thirteenth century and the emergence of the new realism in Italian art around 1300 is often asserted but has never been demonstrated. This paper reviews the evidence for the circulation of optical knowledge and colour theory in Italy in the closing decades of the thirteenth century and at the dawn of the Trecento, paying particular attention to the role of the mendicant orders in the dissemination of optical lore. Attempts to identify the means and moments of reception have met with limited success: perhaps only David Lindberg's account of the reception of Roger Bacon's work at the papal court in Viterbo in the 1260s and 70s has achieved widespread acceptance. This paper also considers the links – first outlined by Eva Frojmovič – between Giotto, the physician and natural philosopher Pietro de Abano, and the Tuscan poet and polymath Francesco da Barberino in Padua in the early years of the Trecento. The tendency to measure Giottesque art against Albertian perspective remains remarkably persistent amongst scholars. Releasing Italian art (including manuscript and monumental painting) of the later Middle Ages from this Renaissance teleology allows fresh insights into the shared concerns of optical science and artists.

Professor Simon Gilson, University of Warwick

Optics in Dante and in Italian vernacular culture, 1300-1600

This paper offers an overview of Dante's optical knowledge and especially his poetic treatment of related themes in his *Commedia*, as well as a short excursus on the ways that optics entered into vernacular discussions in Italy in such forms as preaching, other forms of poetry and prose, commentary and academic lectures in the period up to 1600. The main focus will, however, be to explore the ways in which Dante's own optics was updated, refined and expanded by later readers, especially in the sixteenth century, in the environment of the Florentine Academy. The paper will examine public readers such as Cosimo Bartoli, Benedetto Varchi, and Giovan Battista Gelli, with special attention to Bartoli's own lecture on the eye as part of his reading of 'Purgatorio' XXXI, 118-23.

SESSION 13

Dr Haida Liang and Dr Chi Shing Cheung, Nottingham Trent University, and Dr Paola Ricciardi, The Fitzwilliam Museum

A study of illuminated manuscripts using optical coherence tomography (OCT) and other complementary non-invasive techniques

Optical Coherence Tomography (OCT) is a non-contact and non-invasive 3D imaging technique for the examination of sub-surface microstructures of materials. In the last 10 years, OCT has been successfully applied to the study of easel paintings, revealing varnish and paint layer stratigraphy, ageing of the varnish, as well as giving the highest resolution and contrast images of underdrawings. In comparison, OCT has not been applied as extensively to illuminated manuscripts. Recently, we used our newly developed ultra-high resolution OCT (UHR OCT) to examine folios in a number of medieval manuscripts in the Fitzwilliam Museum's collection. The UHR OCT at a central operating wavelength of 810 nm has a resolution of ~1.2 microns in depth (for paint and parchment) allowing even the thinnest paint layers to be revealed.

This paper will illustrate how OCT can be used to examine illuminated manuscripts in order to deduce the thickness and structure of paint layers, examine the internal microstructure of the parchment and to assist the identification of pigments and binding media in combination with other complementary non-invasive techniques, such as visible and near infrared fibre optic reflectance spectroscopy (FORS) and X-ray fluorescence spectroscopy (XRF).

Dr Luca Nodari, CNR-IENI

FT-IR spectroscopy as a non-invasive tool to investigate pigments and binders in illuminated manuscripts

FT-IR spectroscopy is a well-established method for the investigation of the molecular composition of cultural heritage objects. Although the conventional technique, which operates in transmission mode on a powdered sample and is therefore considered 'destructive', is still used, nowadays more advanced tools are employed to investigate a wide range of cultural heritage materials. In the last few decades the use of micro-FTIR in attenuated total reflection (ATR) mode has allowed the study of paint cross-sections and other small samples, which retain their integrity after analysis but may show micro-indentations following contact with the analyzing probe. The latest generation of portable spectrometer, however, allows contactless investigation of both samples and whole object. These spectrometers operate in external reflection (ER) mode, and are now being used for the non-invasive study of pigments and paint binders on wall and easel paintings, illuminated manuscripts, as well as other types of artworks. The collaboration between the Fitzwilliam Museum and IENI-CNR in Padua allowed a thorough study of mock-up pigment-binder systems, painted on parchment, including a comparison of ER and ATR modes. Measurements were also performed on a selection of manuscript fragments and bound volumes from the Fitzwilliam Museum's collection.

The technique provided useful information about paint binders; it was generally possible to distinguish between binders with high lipidic, proteinaceous, and polysaccharide contents. The method's high sensitivity to carbonate-containing pigments makes it a valid tool for the identification of calcium carbonate, hard to recognise using other non-invasive methods such as XRF and UV-vis-NIR reflectance spectroscopy, and of lead white in low concentration. FT-IR is also the only non-invasive method which can distinguish between natural and synthetic

ultramarine. This paper will provide a brief introduction to FT-IR spectroscopy, as well as an illustration of significant case studies.

Stijn Legrand, Frederik Vanmeert, Dr. Geert Van der Snickt and Prof. Dr Koen Janssens,
University of Antwerp

MA-XRF scanning of illuminated manuscript fragments

Since 2010, Macroscopic X-ray fluorescence scanning (MA-XRF) has established itself as an informative new imaging method for obtaining elemental distributions in paintings on panel and canvas, as it allows to obtain the distribution of pigments across the entire surface of the art work. Additionally, due to the penetrative nature of X-rays, sub-surface information can be gathered as well. Currently the application of MA-XRF is being expanded to other fields of cultural heritage where flat, two dimensional objects are under investigation. Within this framework, a selection of four Illuminated manuscript fragments from the Fitzwilliam Museum (Cambridge, UK) were analyzed by means of MA-XRF.

This talk will focus on two fragments excised from fifteenth century illuminated manuscripts: one of Italian origin, made in Bologna or Rome (Marlay cutting It 25) and a German illumination from the lower Rhine region (Marlay cutting G 4). Prior to MA-XRF scanning, both were subjected to infra-red imaging and other analytical (point) measurements. The results of point measurements, however informative, are sometimes difficult to generalise, and the extrapolation to other (non-analysed) areas can be incorrect. While some art historical or technical questions can often be answered by the information gathered by these means, new questions are also often raised, which MA-XRF can help answer.

Both fragments discussed here are examples of how MA-XRF can facilitate the interpretation of XRF spectral data; this is because the distribution of the elements is directly visualized and no longer needs to be indirectly inferred from a series of point measurements. This can help, for example, determine the origin of each chemical element in the cuttings' stratigraphy and also allows to separate contributions from the reverse side.

The possibilities of using macroscopic X-ray power diffraction (MA-XRPD) scanning, a method related to MA-XRF but of superior pigment identification capability, for the examination of illuminated manuscripts will also be briefly addressed.

Dr Carola-Bibiane Schönlieb, University of Cambridge

Mathematical Approaches for Virtual Art Restoration

Virtual image restoration, also called image inpainting, denotes the process whereby missing or occluded parts in images are filled in based on the information provided by the intact parts of the image. In this talk I will sketch and motivate different mathematical principles that can guide a digital restoration attempt. Digital photographs of art pieces are essentially mathematical objects, and this puts the vast toolbox of mathematics at the restorers' fingertips. We will encounter the role of differential equations and patch-based methods for virtually restoring structure, texture and colour in images. In particular, we will show examples from the restoration of the Neidhart frescoes (Tuchlauben, Vienna), the restoration of a painting by Sebastiano Del Piombo (the Hamilton Kerr Institute, The Fitzwilliam Museum), and the unearthing of hidden structures in illuminated manuscripts revealed by infrared imaging (the MINIARE project, the Fitzwilliam Museum).

After a critical discussion of restoration results I will conclude by pointing out the capabilities and limitations of digital restoration methods, and provide some hints towards applications of such mathematical approaches that go beyond the restoration of arts – such as medicine, forensics and geography.

SESSION 14

Dr Mike Huxtable, Durham University

[I]nitium habuit ab aliquo milite histrione vel gaudente...: Grosseteste's De colore and the Colouring of Chivalry in BL Add. MS. 28791

BL Add. MS.28791 contains a 'unique' version of a late fourteenth-century heraldic treatise, the *Tractatus de Armis* by one 'Johannis de Bado Aureo'. The composition of the text can be dated via internal evidence to soon after 1394, the year of Anne of Bohemia's death mentioned in the Prologue. This paper will examine the colour theory contained in the treatise: a treatment which in this manuscript alone (a point subject to ongoing research) refers to the early thirteenth-century theory of colour constructed by Robert Grosseteste, theologian, philosopher and eventually Bishop of Lincoln from 1235.

The paper will address how colour theory is applied to heraldry and the ideology of chivalry within this text and its sources (alongside more orthodox staples on colour such as Aristotle's description of a colour scale in his *De sensu et sensato*) and consider how it captures a significant moment for our understanding of late medieval visual culture and symbolism; and further, helps equip our exposition of other genres of late fourteenth-century writing such as contemporary alliterative poetry treating Arthurian themes and material. The argument of the paper holds that the hierarchy of colours within chivalry debated by heraldic writers such as Johannis de Bado, Franciscus de Foveis, Bartholus de Saxoferrato and others is both conceptually intriguing and creatively inspiring for the period – but is a discourse which only seems to have cultural significance for two or three generations of writers. By the early fifteenth century, heraldic texts such as the *De studio militari* by Nicholas Upton specifically reject the approach taken by an earlier generation of writers. Why was this, and what might it tell us about changes in the perception and cultural conceptualization of colour from the late medieval to Early Modern periods?

Prof. Lucy Freeman Sandler, New York University

Seeing Red: The Use of 'Gules' in the Pictorial Imagery of Fourteenth-Century English Manuscripts

In general, and in non-technical terminology, from the beginning to the middle of the fourteenth century, the chief colours used in English manuscript imagery and decoration are blue, rose, orange and metallic gold. Occasionally this palette is offset by a bright red – the heraldic gules – technically either a more saturated version of rose or orange, or an entirely different pigment. The aim of this paper is to catalogue some examples of the use of gules in figural imagery of the period, to understand the colour choice made by illuminators, and to interpret its meaning to viewers and owners of manuscripts.

Dr Holly James-Maddocks, University of Birmingham
*John Bray, Limner-Binder, and Three Sequences of Manuscripts Illuminated in Oxford
(1450-1484)*

This paper identifies the hand of one Oxford-based illuminator, John Bray (d.1493), in three sequences of manuscripts made for three different patrons, and today housed in Balliol, Merton and Exeter Colleges. I will present the stylistic evidence for attributing eighteen manuscripts to Bray's hand (within the sequences and beyond them), and discuss the archival records that give us this limner's name and tell us something about his life on Catte Street, Oxford from at least 1450 until 1493. The most striking aspect of Bray's work in producing these three sequences was his collaboration with four London illuminators, two from the St Paul's area and two from Westminster. This prompts a reassessment of the currently scant evidence for peripatetic book artisans in England in this period, as well as for the reasons why the Oxford trade might have been reliant on the supply of London labour. One of the London illuminators involved is newly identified as Thomas Tresswell, a border artist normally working in the immediate vicinity of London Stationer William Abell. Tresswell appears in four manuscripts written by Oxford scribes for prominent Oxford patrons – each one of them dated – and to the exact years that a 'Thomas Tresswell, limner' rents a shop on Catte Street. This paper demonstrates, for the first time, the itinerant activity of members of the London guild of Stationers, and posits that the number of book artisans involved in these networks is much smaller than previous estimates have assumed.

SESSION 15

Dr Lucia Burgio, Victoria and Albert Museum
Manuscripts at the V&A

This paper will give an account of several technical studies of Western medieval manuscripts from the V&A collections, explain the motivation and goal of the analyses and give an overview of some of the results.

Manuscripts from museums and other heritage institutions are rarely allowed to travel, therefore they can only be examined and analysed using whatever analytical techniques are available on site. This means that often only partial results can be obtained, but if well contextualised they can still be interesting and relevant to both curators and conservators.

More often than not, manuscripts are analysed at the V&A in order to inform object labels and catalogues, and to collect information to keep in the object's file for future reference. However, these seemingly routine analyses can yield unexpected and interesting results which can have an impact on the wider heritage community.

This is the case of the Nativity by Jean Bourdichon, where a bismuth-containing material was found to have been used as a grey pigment and as a pencil, therefore showing that bismuth ore or its derivatives were being traded from Germany to France as early as the end of the fifteenth century.

Other studies just extended our knowledge of the range of materials used in different regions at different times. For example, the systematic pigment analysis of hundreds of manuscript cuttings gave us a panoramic view of what was used where in medieval Italy and with which

frequency. This was only possible because the V&A has a vast collection of manuscript cuttings collected by Victorian enthusiasts (or vandals?).

In other cases the scientific examination of manuscripts can be used to support a curator in his or her hypothesis by providing unequivocal evidence on the identity of the materials used in the illumination. This was the case when the Science Section was asked to analyse five miniatures to support the suggestion that they were by the so-called Spanish Forger – and indeed nineteenth century pigments were found to have been used extensively on these objects.

Dr Christina Currie, Dr Steven Saverwyns and Dr Dominique Vanwijnsberghe, Royal Institute for Cultural Heritage (IRPA-KIK), Brussels

The Spanish Forger Exposed: an Interdisciplinary Study of Two Paintings

Recently two privately owned paintings in the style of the so-called Spanish Forger were brought to the Royal Institute for Cultural Heritage in Brussels for examination. They presented a unique opportunity to investigate the techniques and materials of this celebrated forger using state-of-the-art scientific imagery and analytical techniques.

The first painting is a triptych depicting the *Coronation of a French King*, clearly inspired by two panels now in the Musée de Cluny in Paris. The second panel represents a *Knighting Ceremony*. An illustration in Paul Lacroix's *La vie quotidienne au Moyen Âge* may be the source of the composition.

Both paintings were intended to give the impression that they are fifteenth-century oak panel supports with integral frames. The Forger's painting technique includes idiosyncratic brushwork that bears no similarity to fifteenth-century painting and in places appears more related to manuscript illumination; his stylised 'system' of linear highlights, shadows and dots, with tempera-like modelling in the flesh tones, is instantly recognisable. He went to great lengths to reproduce the effect of an aged paint layer, damaging, filling and retouching the surface in order to suggest later restoration. He also deliberately added layers of 'patina'.

The scientific analysis of the layer structure and pigments produced some quite extraordinary results. The artist's palette was determined by means of two non-invasive analytical techniques: X-ray fluorescence (XRF) and/or micro-Raman spectroscopy (MRS). Several pigments not available before the nineteenth century were identified in both works. Moreover, in the triptych depicting the *Coronation of a French King* one of the earliest synthetic organic pigments, *Pigment Red 83* (PR83), was found. As this pigment was commercially not available before 1869, this date also marks the earliest possible creation date of the painting. Cross-sections from both works reveal grounds atypical of the fifteenth century, confirming the much later origin of the paintings.

All pigments found in the *Knighting Ceremony* were also confirmed in the palette of the *Coronation of a French King*, which was studied more extensively. The palette identified compares well with earlier studies on other paintings and miniatures made by the Spanish Forger.

Dr Stella Panayotova, The Fitzwilliam Museum

Was the Psalter-Hours of Isabelle of France Restored in the Nineteenth Century?

Fitzwilliam Museum MS 300, a Psalter-Hours made for a French royal woman, is – together with its sister book, the Psalter of St Louis (Paris, BnF, MS lat. 10525) – among the finest manuscripts illuminated in Paris in the third quarter of the thirteenth century. The identity of its owner remains elusive, although St Louis' sister Isabelle (1225-1270) remains a strong contender. By the mid-nineteenth century the volume belonged to the London dealer John Boykett Jarman. His manuscripts were flooded in 1846 and restored by Caleb Wing, a virtuoso engraver and illuminator. When John Ruskin purchased the manuscript from Jarman on 24 February 1854, he recorded in his diary that he had just acquired 'the greatest treasure in his life'. Did Ruskin appreciate Wing's restoration? Do we appreciate it today? Can we detect it? While some of the images show extensive water damage, others seem in surprisingly good condition despite their immediate proximity to areas of smudged script. Nevertheless, technical analyses has not yet revealed the presence of modern pigments in what we may suspect as restored images. This paper will present the visual and technical evidence, and invite the audience to comment on both.