

Team Pigment

Spectroscopic Analysis of Medieval Ink Pigments:

Look but don't touch!



Anyone looking at an illuminated medieval manuscript does so in awe of the skills and creativity of the scribes and illuminators. In the past, scholars made educated guesses as to the materials used in manuscripts, sometimes drawing spectacularly incorrect conclusions. The ability to use scientific methods and technology for the unambiguous identification of pigments and the investigation of medieval manuscripts by non-invasive, non-destructive means has the potential to revolutionise our understanding of the technology of early book production. Chemical analysis of pigments on the page can be achieved using Raman and reflectance spectroscopies and hyperspectral imaging – all techniques involve shining light on the page and looking at the reflected light. In conjunction with codicological and palaeographical information, this process can transform our understanding of their significance as indicators of cultural exchange and societal change.

These studies require a truly interdisciplinary cooperation and understanding, a detailed scientific expertise in the application of optical spectroscopy and an intimate understanding and knowledge of manuscripts and palaeography, and not least of the limitations posed by aspects of the work. For example, the logistical difficulties of moving priceless manuscripts to laboratories, or heavy and delicate spectrometers to libraries, and the lack of technical expertise within the community of humanities scholars and conservators has effectively prevented all but a few limited, localised studies of this type.

In 2013, a team of scientists and historians led by Professor Andrew Beeby (a chemist), Professor Richard Gameson (historian) and Dr Kate Nicholson (chemist), with the support of the Durham libraries, conducted a detailed, definitive scientific study of the pigments used in 7-8th Century Insular manuscripts.[1,2] Based upon this successful programme the team have gone on to a more ambitious analysis of strategic manuscripts that will provide a systematic study of pigment development by region and time.[3] For example, a study of some 15 manuscripts produced in Canterbury between 950 and 1150 have provided evidence for the staggered introduction of lapis lazuli and vermilion from the continent, as well as throwing up the first example of a British manuscript containing Egyptian Blue.[4]

Pivotal to this work was the demand for high performance, portable spectroscopic instrumentation tailored for the study of pigments in manuscripts and works of art.[5] Our innovative equipment has been designed to match the sensitivity of the best laboratory-based instrumentation, yet it can be transported in a small suitcase and assembled ready for use in less than an hour within the host library. Its revolutionary capability has been demonstrated numerous times over the past two years, with visits to more than 12 libraries across the UK, including the British Library and the Bodleian, and the analysis of more than 200 books and maps. The development of this innovative technology by Team-Pigment has therefore had a significant impact across the sector, enabling historians across the UK the opportunity to see manuscripts literally in a new light. New tools are being developed continually, such as a modified iPhone which can identify pigments on the page of a manuscript displayed in a glass case. Digital technologies have therefore contributed significantly to the understanding of early book production.

With the support of a major grant from the AHRC, and in collaboration with colleagues at Northumbria and Cambridge, the team is currently undertaking the first ever systematic scientific survey of British illuminators' pigments as a whole.

A study of a page from DUL Cosin V.ii.6, (Symeon) showing the presence of various pigments on the Close up of the Raman spectroscopy in action – the study of DUL Cosin V.ii.6, Symeon.



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Highlights of the Team's work include:

- The identification of the ink used to 'gloss' the Lindisfarne Gospels
- Studies of the paints used in Hereford Mappa Mundi
- A study of the pigments used in three 5/6th century Gospel books, some of the oldest books in the UK
- The discovery of four 11th century British books containing Egyptian blue, a pigment not made in Europe after the birth of Christ.
- A systematic study of over 20 books made in Canterbury from the 10 – 12th centuries, showing a change in the use of colour.

References

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Beeby (left) and Gameson(right) examine the St Augustine Gospels at Corpus Christi College, Cambridge.