

The Dimensions of Colour

Robert Grosseteste's *De colore*

Robert Grosseteste's treatise *De colore* is presented here in an authoritative new critical edition, with translation, commentary on its context, and a functional analysis from the perspective of modern science. The volume emanates from a series of interdisciplinary meetings, involving medieval specialists (from history, literary studies, history of philosophy, and palaeography) and modern scientists (from psychology and physics). This unique combination of insights allows new and deeper appreciation of Grosseteste's treatise and the significance of his methods and observations. Grosseteste builds a coherent mathematical model in his exploration of what colour is and how it is to be described. What he articulates is a three-dimensional model for the operation of colour, depending on three factors, the amount of light, its quality, and the quality of the medium in which light is incorporated. The importance of the *De colore* within Grosseteste's scientific canon can be better established as a result of these investigations, as well as the enduring sense of the richness of the encounter between medieval and modern science.



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The Dimensions of Colour
Robert Grosseteste's *De colore*

Edition, Translation, and
Interdisciplinary Analysis

by

Greti Dinkova-Bruun, Giles E.M. Gasper,
Michael Huxtable, Tom C.B. McLeish,
Cecilia Panti, and Hannah Smithson



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Preface

The edition, translation, and commentary of the *De colore* (*On Colour*), a short treatise by Robert Grosseteste, is a product of a larger project to investigate the theme of the order of the universe within high medieval thought and experience. The period from the early twelfth century to the end of the thirteenth is remarkable in many respects. The intellectual instincts of its thinkers and the conceptual frameworks within which they operated, co-operatively and antagonistically, cast a long shadow forward. Within the history of science, this is the period where the origins of experimental science in the West traditionally have been sought. Within that search for origins the figure of Robert Grosseteste has loomed large. In part this is connected to historiographical legacies that have placed him as the first modern scientist, the founder and antecessor of the modern experimental method. Putting aside the more strident aspects of this claim and the obvious dangers of anachronistic investigation and presentist assumption, Grosseteste still lays claim to serious consideration for his interest in the created world, and the principles of order through which it came into being and by which it is sustained.

Grosseteste's universe is divinely created, but one whose description makes use of all authoritative sources at his disposal, as well, perhaps, as personal observation. He lived and worked, whatever the difficulties in establishing the chronology of his writings, in a period in Western intellectual history in which its scholars confronted significant quantities of new source material. Primarily these consisted of Aristotle's works on natural science, available for the first time in Latin, the product of a century-long movement of translation, notably in the Iberian peninsula. Not less significantly, the works of Aristotle introduced to the West carried with them translations of their Arabic commentators, whether identified as such or not. As a result of this acquisition of ancient and Islamic learning, Grosseteste's access to Aristotelian understanding of the natural world was greater than his predecessors, and the effect of that access is evident in Grosseteste's work. He did not, however, absorb this knowledge without careful criticism. As stated in his *Hexaemeron*:

... it is abundantly clear that very many philosophers claim, with Aristotle, that the world had no beginning in time. By throwing in one word, by saying “In the beginning,” Moses strikes them down and crushes them entirely.¹

There is no sense then, in which Grosseteste follows Aristotle beyond the authority of Scripture for his fundamental conceptions of the universe. Nevertheless, creation is studied long and hard by Grosseteste, especially the action and activity of light, both in contexts that are obviously theological and in those in which he engages with the knowledge of the natural world as a subject in its own right. Moreover, as the *De colore* itself illustrates, these contexts are not entirely mutually exclusive.

The *De colore* plays an important role within the canon of Grosseteste’s scientific works. Given the historiographical celebrity enjoyed by Grosseteste and the general significance of his thought on the natural world, his scientific works became a focal point for the Ordered Universe project. What makes the project unusual is the inter-disciplinary nature of its investigators. With representatives from medieval studies and modern science the project, and in particular the reading and presentation of Grosseteste, has been characterized consistently by the fruitful and positive interaction of multi-disciplinary subject specialists. It was the combination of disciplinary perspectives that led to the presentation of the current edition, translation, and commentary, forging a closely engaged multidisciplinary working method that countered the dangers mentioned above of bringing presentist assumptions to the text. The method that emerged directed the conceptual and analytical tools of contemporary science, itself a descendent of Grosseteste and his contemporaries, to bring his physical and mathematical reasoning into sharper relief. In some cases, as will be shown, this helped to resolve questions of interpretation that had previously escaped literary and historical analyses. In the course of a critical reading of the *De colore*, the limitations of the previous edition, the need to translate the text in order to understand it (and vice versa), and the range of responses that allowed Grosseteste’s achievement to be seen from so many angles, all demanded the production of this present volume.

Modern scientific interest, matched with the interests of intellectual history and philosophy and the necessary linguistic and palaeographical skills have

1 Robert Grosseteste, *Hexaemeron* 1.8.4, ed. Richard C. Dales and Servus Gieben (Oxford, 1982); translated by C.F.J. Martin as *On the Six Days of Creation* (Oxford, 1996), 58–59. Unless otherwise noted, all translations are the work of the authors.

combined in what follows; perspectives from each discipline spurring on, questioning, and inspiring the others. Grosseteste himself appreciated the importance of sound critical editions not merely as the basis for reflection, but as an active component within the process of intellectual engagement. This is nowhere better illustrated than in the continuation of the passage from his *Hexaemeron* quoted above:

We have cited all these texts against certain modern writers who, in the teeth of Aristotle himself, and his commentators, and the sacred commentators too, strive to make Aristotle's view [that the world had no beginning in time], which was heretical, a Catholic one. With amazing blindness and presumption they think that they can understand Aristotle more clearly, and interpret him more accurately, as they work from a corrupt Latin text, than could the philosophers, Catholics and heathens, who had perfect knowledge of the original, uncorrupted Greek text. They should not deceive themselves and toil away at making Aristotle into a Catholic, or they will fruitlessly use up their time and strength of mind, and while they make a Catholic of Aristotle, will make heretics of themselves.²

While the consequences of working with a defective edition of the *De colore* might not have quite the eternal consequences with which Grosseteste is concerned, the importance of the accuracy of the text remains a serious concern. What is presented here is, it is believed, a more considered and probing treatment of this treatise than previously available.

The preliminary and discursive work vital for the collaborative methodology developed in this volume was carried out in five international workshops held at Durham University, under the aegis, and with the financial support, of the Institute of Medieval and Renaissance Studies, between 2010 and 2012. The authors would like to thank the external participants, including Faith Wallis (McGill University), Joseph Goering (University of Toronto), Mary Carruthers (New York University and All Souls College, University of Oxford), Jay Diehl (Long Island University), Neil Lewis (Georgetown University), as well as the Durham participants, including Neil Cartlidge (English Studies) and David Baker (English Studies and Radley College), Brian Tanner (Physics), Vanessa Kind and Per Kind (Education), and all of the PhD and MA students who attended.

2 Grosseteste, *Hexaemeron* 1.8.4 (ed. Dales and Gieben); trans. Martin, *On the Six Days of Creation*, 59.

In what follows, the historical and contextual sections have been principally compiled by Giles Gasper (Durham University, History) and Cecilia Panti (University of Rome – Tor Vergata). Greti Dinkova-Bruun (Pontifical Institute of Mediaeval Studies, Toronto) edited the text and led on the translation and Michael Huxtable (Durham University, English Studies) took responsibility for the material relating to John Trevisa. The functional analysis was the primary responsibility of Tom McLeish (Durham University, Physics) and Hannah Smithson (formerly of Durham University, Psychology, now Experimental Psychology and Pembroke College, University of Oxford). The working method was presented at the North East Vision Conference, St Mary’s College, Durham University, 21–22 May 2011 and an early statement of results at the 21st Symposium of the International Colour Vision Society (ICVS), Buskerud University College, Kongsberg, Norway, 1–5 July 2011. The discussion generated by ICVS was helpful and wide-ranging. A paper deriving from the Symposium was published as: “A three-dimensional colour space from the 13th century,” *Journal of the Optical Society of America A* 29 (2012).³ The authors are grateful to John Mollon (University of Cambridge) for his detailed comments on the paper, and his encouragement for the project, and to the editors of the *Journal* for permission to reprint modified versions of some of the figures and other material. All of the authors would like to thank the editorial team at the Pontifical Institute of Mediaeval Studies, Toronto, especially the wise guidance of Fred Unwalla and the indefatigable efforts of Stephen Shapiro.

Although, as indicated above, individual sections in what follows have drawn on particular specialist expertise, all of the authors wish, again, to stress how fundamentally collaborative has been the presentation of this text and its commentaries. The *De colore* represents the first of an intended series of similar editions, translations, and commentaries of the scientific works of Robert Grosseteste, which will be produced by the IMRS Durham Grosseteste Project. The next volumes projected will deal with the treatise on light itself, the *De luce*, to be followed by that on the rainbow, the *De iride*.

3 Hannah E. Smithson, Greti Dinkova-Bruun, Giles E.M. Gasper, Mike Huxtable, Tom C.B. McLeish, and Cecilia Panti, “A Three-dimensional Color Space from the 13th Century,” *Journal of the Optical Society of America A* 29.2 (February 2012), A346–352.