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Introduction: Lincoln Cathedral and its Bishop

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Introduction

Lincoln Cathedral and its Bishop

The papers presented in this book originate from an international symposium, "Architecture as Cosmology: Lincoln Cathedral and Bishop Robert Grosseteste (1235–53)," hosted by Lincoln Cathedral on the 21st and 22nd January 2012, and funded by the Paul Mellon Education Programme and the Faculty of Art, Architecture and Design at the University of Lincoln. Supported by the Bishop and Chancellor of Lincoln Cathedral, the symposium (and subsequent published work) constitute the culmination of a more extended research project begun by Nicholas Temple in 2003 and published in his *Disclosing Horizons: Architecture, Perspective and Redemptive Space* (Routledge, 2007), and further developed by John Hendrix in his two books, *Robert Grosseteste: Philosophy of Intellect and Vision* (Academia Verlag, 2010) and *Architecture as Cosmology: Lincoln Cathedral and English Gothic Architecture* (Peter Lang Publishing, 2011).

These earlier investigations identified important connections between the symbolism and fabric of Lincoln Cathedral and the theological and scientific ideas of its thirteenth-century bishop, Robert Grosseteste (1235–53), in particular relating to Grosseteste's seminal writings on light and geometry. In Temple's initial study, these connections were examined through the lens of an early thirteenth-century description of the main cathedral crossing and its two rose windows, the Dean's Eye and Bishop's Eye. Forming part of a larger work, called "The Metrical Life of St Hugh" by the

thirteenth-century poet Henry of Avranches, this account brings to light remarkable parallels between Grosseteste's theories of optics and cosmology and the luminous spaces of the cathedral. Temple argues that underlying Grosseteste's salvific theories of light is the notion that the chromatic spectrum of the rainbow, that finds an analogous expression in the stained glass of the two rose windows, constitutes a "redemptive" passage to God; a perceptible "bridge" of imperfect light that is manifested in the fabric and spaces of Lincoln Cathedral. This theme is further developed in Temple's chapter in this book.

Temple's initial study served as the background to John Hendrix's more incisive and detailed scholarly research of Grosseteste's scientific writings (particularly on geometry), which was undertaken alongside a comprehensive survey of vaulting systems in English Gothic churches and cathedrals with specific focus on Lincoln Cathedral. From this study Hendrix identified more substantial, and wide-ranging, relationships between the design of Lincoln Cathedral and Grosseteste's original studies on geometry, extending to analogous relationships between the bishop's "mutational" concept of geometry (expressed in his little known treatise *De lineis, angulis et figuris*) and the so-called "crazy vaulting" in St Hugh's Choir. Through a chronological reconstruction of the various stages of building of the cathedral, before and during Grosseteste's episcopate, and the dating of the bishop's scientific and theological works, Hendrix makes a strong case for a cross-fertilization between built form and scientific/theological ideas, a connection which is further developed in his chapter in this volume.

The symposium at Lincoln Cathedral provided a platform for debating these relationships, and at the same time included other related fields of enquiry (political,

administrative, ceremonial and pastoral etc) in which Grosseteste's writings and the design and symbolism of the cathedral may have converged. Attended by leading architectural historians, medievalists, theologians and eminent scholars of Robert Grosseteste, the papers presented at this two day event stimulated a lively debate that both challenged, and provided new insight into, current scholarship on Grosseteste and Lincoln Cathedral.

The chapters in this volume constitute an edited selection of these presentations, offering a record of the key topics discussed and highlighting the main areas of contention. The overarching theme of the book concerns relationships between architecture, philosophy and theology, and other related cultural manifestations such as church ritual, procession, politics and the organization and authority of the church. The scope of the investigations gives valuable insight into the conception of Lincoln Cathedral as sacred space, and how the writings of Robert Grosseteste (and Scholasticism in general) can deepen our understanding of these meanings. At the same time, some of the chapters provide a broader historical and cultural overview, in which to situate the symbolism of Lincoln Cathedral and the ideas of Grosseteste.

In spite of Lincoln Cathedral being described by John Ruskin as the most important Gothic cathedral in Europe, the building has received surprisingly little scholarly attention in recent years. Grosseteste too, although studied by a relatively small number of dedicated scholars, lacks the international standing of some of his contemporaries within the broader themes of thirteenth-century scholasticism. This book brings together both the cathedral and its bishop, and highlights the importance of the physical setting of the cathedral as a visual and metaphorical reference in Grosseteste's cosmology. Furthermore by using this context to address a number of

contentious issues, such as the impact of Grosseteste's theories of optics and cosmology on his pastoral and administrative responsibilities, the studies suggest ways in which developments in Gothic architecture (and Lincoln Cathedral in particular) find remarkable—and indeed far-reaching—parallels in the intellectual ideas of Grosseteste.

The following key questions emerged from the symposium and will serve as the focus of this publication:

1) What do we know about the relationships between the clergy and bishop during the thirteenth century, and how might Grosseteste's turbulent and productive period as bishop of Lincoln have provided the momentum for intellectual and artistic exchanges that were perhaps different from other episcopates in medieval Europe at the time?
2) How might the design, symbolism and topography of Lincoln Cathedral, and its calendar of church rituals and ceremonies, have informed Grosseteste's commitment to Church reform and its relationship to ecclesiastical hierarchy?
3) To what extent could Grosseteste's cosmology of light and geometry be expressed architecturally, and inversely how might Grosseteste have viewed Lincoln Cathedral as an "analogical receptacle" of his cosmology?

Inevitably the broad subject matter covered in the various chapters does not lead to a clear conclusion about the possible modes of influence between Robert Grosseteste's cosmology and Lincoln Cathedral. Notwithstanding this, what emerges in these studies is a general recognition that Grosseteste's theories of optics and cosmology find their most fertile visual and spatial expression in Gothic architecture, and that Lincoln Cathedral would have provided an instructive spatial and metaphorical reference for supporting the bishop's pastoral/administrative duties and scholarly undertakings.

Summary of Grosseteste's Life and Works

Although Robert Grosseteste was one of the great philosophers and theologians of the Middle Ages, accounts of his life before he became bishop of Lincoln are few and relatively sketchy. He was probably born a peasant in the county of Suffolk, at Stradbroke or Stow Langtoft, near Bury St Edmunds, around 1170, or 1175. Even his name, Grosseteste—the French version of the Latin "Grossum Caput" or the English "Great Head"—is likely to relate to him directly rather than any family or feudal allegiance. First accounts of him suggest he studied at the Cathedral School of Lincoln, later serving Bishop Hugh of Lincoln (1186–1200) as clerk. Then, in the 1190s he became a clerk of William de Verre, the Bishop of Hereford (1186–98/1200). The Cathedral School of Hereford was a centre for Arabic learning in the late twelfth century and as such it is likely that it was there Grosseteste became familiar with the available works of Aristotle, some key Arabic scientific treatises, as well as the Neo-Platonism that filtered through works such as the *Theology of Aristotle*, *Fons Vitae* or *Liber de Causis*.[1]

His education appears to have begun in earnest at Oxford from 1199 to 1208 where he studied law, medicine, and theology, then becoming a teacher before his

[1] In later life he returned to Aristotle and went on to translate, and write some of the first commentaries in Latin on the *Posterior Analytics*, *Physics* and *Metaphysics*, and as a result his writings are filled with citations from treatises by Aristotle such as *De Caelo*, *Meteorologica*, *De Sensu*, *De Anima*, *De Generatione et Corruptione*, and *De Animalibus*, situating these philosophical ideas with respect to Christian revelation and redemption evident in works from Augustine and Gregory to Boethius—he owned copies of *De Civitate Dei*, *Moralia in Job*, and *De Consolatione Philosophiae*.

appointment as first Master, or Chancellor, of the Oxford Schools sometime after 1208, when it became a university. As Master of Arts, Grosseteste studied and then taught the seven liberal arts, the trivium and the quadrivium, until about 1209. *De Artibus Liberalibus*, written before 1209, while Master of Arts at Oxford, is perhaps Grosseteste's first work, and shows the influence of Augustine and Boethius. It is an investigation of astronomy and astrology, and expounds the musical harmony of the universe. *De Generatione Sonorum* was probably written after *De Artibus*, and is a study of language and phonetics. *De Sphaera* is one of Grosseteste's earliest so called scientific treatises, written around 1215, where the motions of the heavens are attributed to an *anima mundi*, a world soul, on which Grosseteste would expand in later works.

Between 1215 and 1220 Grosseteste wrote a series of astronomical treatises, including *Computus I*, *Calendarium*, *Computus Correctorius*, and *Computus Minor*. In these, he places emphasis on the role of light from the sun in the movement and generation of sublunary phenomena (that is the four physical elements below the ninth celestial sphere), and solar light is given theological and symbolic significance, suggesting the treatment of light in the treatise *On Light*, or *De luce seu de inchoatione formarum*, written around 1225, as confirmed by Cecilia Panti. In *De Generatione Stellarum*, from around 1220, when Grosseteste was close to fifty years old, the heavenly bodies and the quintessence are given physical and spiritual substance beyond astronomy and astrology, showing the beginning of the influence of Aristotle, especially *De Caelo*. In *De Impressionibus Elementorum*, between 1220 and 1225, meteorological phenomena are explained in relation to the heat of the sun, in terms of

light as a generating factor, and geometrical optics, leading towards the metaphysical theory of light in *De Luce*.

As Jack Cunningham argues, Grosseteste was perhaps active in Paris towards the late 1220s, later returning to Oxford to lecture on theology. The treatise on light, *De Luce*, was followed by the *Commentary on the Posterior Analytics* (*Commentarius in Libros Analyticorum Posteriorum*) and the *De Lineis* (*Libellus Lincolniensis de Phisicis Lineis Angulis et Figuris*), completed before 1233, two years before he became bishop of Lincoln, and while he was lecturing to the Franciscans at Oxford. *De Luce* combines Greek, Arabic, and Christian theological sources in describing a metaphysics of light. In *De Luce*, Grosseteste explains that light is the first corporeal form, the origin of matter. A point of light auto-diffuses itself instantaneously into the form of a sphere of any size, the sphere being the geometrical form which encapsulates all structure of matter, from classical philosophy; light is the first corporeal entity because it is without dimension and is the closest humans can get to the forms that exist apart from matter. By multiplying itself and diffusing itself instantaneously in every direction, light introduces dimension into matter. And, in the same way that light is the first corporeal substance in the universe, it is also the first instrument of the soul, the *anima rationalis*.

In both *De Luce* and the *Commentary*, light is described as infinitely multiplied according to geometrical and mathematical principles. Discussions of these two treatises can be found in the essays by Noé Badillo and John Hendrix. Hendrix also discusses the *De Lineis*, and the possible parallels between these treatises and the architecture of the time.

For his *Commentary on the Posterior Analytics* Grosseteste used the Latin translation of Aristotle made by James of Venice and a paraphrase by Themistius

translated by Gerard of Cremona. According to Cecilia Panti, Grosseteste's *Commentary on the Physics* of Aristotle and his *De operationibus solis* were written in the 1220s. The treatises *De Motu Corporali* and *De Motu Supercaelestium* followed *De Luce* in around 1230. *De Iride*, *De Colore*, and *De Calore Solis*, from just after 1230, were Grosseteste's last treatises on natural philosophy.

De Lineis was written in combination with *De Natura Locorum*, which applies the abstract geometries of *De Lineis* to natural phenomena, such as mountains, polar regions, the tropics, the equator, seasons, tides, vapors, night and day, planets and constellations. It shows the influence of Aristotle, and Avicenna and Averroes, among others, and is an attempt to explain the actions and formation of light and visible phenomena, in particular such actions as reflection, refraction, and rarefaction, through geometry, as they are perceived as an image or *species*, and are defined by the perception of them. The *virtus* of *lux*, or the power of celestial light, as it becomes rays of light in *lumen* or reflected light, is applied to earthly phenomena and translated into geometry, perspective, and optics, resulting in a new natural philosophy. An English translation of *De Lineis* can be found in a dissertation by Bruce Stansfield Eastwood, *The Geometrical Optics of Robert Grosseteste*, and the treatise can also be found in its original Latin in the British Library: *Libellus Linconiensis de Phisicis Lineis Angulis et Figuris per quas omnes Acciones Naturales Complentur*.

In *De Iride* (*On the Rainbow, or on the Rainbow and the Mirror*), geometry is used to explain colour and the range of colours. White corresponds to the densest light, for example, while black, at the other end of the spectrum, corresponds to the least dense composition of the lines of light. In *De Impressionibus Elementorum*, meteorological phenomena such as the warmth of air, the formation of clouds, and rain

are explained in relation to the heat of the sun, from the *virtus* of the lines forming light.

Grosseteste was finally ordained as a priest around 1225 at a time when his interests appear to be shifting from natural philosophy more towards theology and by 1229 he was appointed Archdeacon of Leicester (a post he retained until 1232 having earlier been an Archdeacon of Chester and Northampton), and by 1230 he was lecturing to the Franciscans outside the city walls at Oxford. Grosseteste was the first reader in theology to the Franciscans and, true to the ideals of the Franciscans, when appointed renounced most of his other sources of income. Jack Cunningham's and Cecilia Panti's contributions to this volume describe Grosseteste's increasing interest in theology at Oxford during this stage of his career between around 1230 and 1235 when, according to Panti, he wrote *De unica forma* and *De statu causarum*.

Grosseteste became bishop of Lincoln in 1235 and remained so until his death in 1253. According to Panti, his *Hexaëmeron*, a commentary on the early chapters of *Genesis*, was written in his first years as bishop, circa 1235–6, and within this piece he returns to the topic of light. His appointment as bishop did not end his association with Oxford and he continued relations with the University; the city was after all in the diocese of Lincoln and its schools were under his jurisdiction. As bishop, Grosseteste was able to make his own appointments and early on appointed John of Basingstoke as Archdeacon of Leicester. John, who had spent time in Athens and had brought back original Greek texts to England, is believed to have helped Grosseteste with translations from the Greek, which preoccupied him in his early years as bishop. Knowledge of Greek allowed Grosseteste to focus his attention on translations of the writings of Pseudo-Dionysus after 1235, perhaps between 1240 and 1243, which he must have

seen as a way that he could use his bishopric to benefit scholarship, by putting together teams of scholars and translators to produce scholarly works. During this period Grosseteste translated the *Celestial Hierarchy*, *Ecclesiastical Hierarchy*, *Divine Names*, and *Mystical Theology* of Pseudo-Dionysus and is thus seen as the first prominent figure to promote the learning of Greek in scholarship in England.

Grosseteste openly criticized the financial policies of Pope Innocent IV, and other abuses stemming from the papal wars, though he was a defender of papal authority and active inspector of clerical institutions. His visitations, moreover, at Lincoln caused friction with the cathedral clergy. These activities are explored by Nicholas Bennett, Nicholas Temple and Christian Frost in this volume.

Grosseteste's work is considered to have influenced successive generations of scholars at Oxford, and particularly the Franciscans (or Greyfriars), in its investigation of the natural world, use of empirical observation and mathematics and geometry, and the study of optics. Grosseteste left all of his manuscripts and notes to the Franciscan library at Oxford. There they were studied by Duns Scotus, who quoted from the *Commentary on the Posterior Analytics*, the *Hexaëmeron*, and the translations of Pseudo-Dionysus. Though Grosseteste cannot be seen as a source of Duns Scotus' thinking he did influence the thinking of John Wycliffe, who studied the works in the 1360s while he was lecturing on logic. Wycliffe incorporated Grosseteste's abstraction of particulars into universals and his use of geometry as distinct from physical matter in explaining natural phenomena. Wycliffe included Grosseteste in his list of great thinkers of the past, including Pythagoras, Democritus, Plato, and Epicurus. Grosseteste's influence can also be seen in Roger Bacon, John Peckham, Albertus Magnus, and Erasmus Witelo. A discussion of the influence of Grosseteste's *De Luce*

on Roger Bacon's *De Specierum Multiplicatione* can be found in the essay by Noé Badillo, whilst Dalibor Vesely examines Grosseteste's enduring legacy, even in the Renaissance through relationships between *perspectiva naturalis* and *perspectiva artificialis*.

Outline Chronology of Lincoln Cathedral

The dating of many aspects of Lincoln Cathedral has been the subject of on-going debate, due largley to the lack of clear documentary evidence. However the following outline provides a fairly reliable chronology of the various stages of Lincoln Cathedral's construction, with specific focus on the period immediately before and during the episcopate of Robert Grosseteste.

A Norman cathedral was built on the site by Bishop Remigius, a monk appointed by William the Conqueror, beginning in 1072. The cathedral was consecrated by its second bishop, Robert Bloet, in 1092. The roof was destroyed by fire in 1141, and most of the cathedral was destroyed by an earthquake on 15 April 1185. The only part of the Norman cathedral that survived is the central portion of the current west front. A triangular footprint of the Norman apse can be seen in the Angel Choir today. Traces of a hexagonal chapel for the relics of Bishop Remigius, and eastern transepts, also survive. The third bishop of Lincoln, Alexander, made repairs after the fire, and built the first masonry vaults to the cathedral.

Rebuilding after the earthquake was begun by St Hugh of Avalon, the seventh bishop. St Hugh was invited to England by Henry II, and is Lincoln's only bishop to be canonized. He was very involved in the building of the cathedral, having carried according to legend building stones on his own shoulders. Indeed, Hugh is thought to be the only person to be canonised and to supervise the building of a Gothic cathedral.

He also established the Guild of Saint Mary at Lincoln to finance the construction. Members of the fabric contributed one thousand marks a year, and furtherance of the guild by Hugh's successors was granted by the king.

St Hugh employed Geoffrey de Noyers, who had worked under William of Sens at Canterbury Cathedral, and possibly William the Englishman. Rebuilding under Hugh continued from 1192 to 1200. Geoffrey is referred to as *nobilis fabrice constructor*, a kind of keeper of the fabric, by Adam of Eynsham in the first biography of St Hugh, the *Magna Vita* of 1210. Instructions given to Geoffrey by St Hugh are described in the second biography of St Hugh, the *Metrical Life of Saint Hugh*, written by Henry of Avranches, a friend of Robert Grosseteste, between 1220 and 1235. Geoffrey is credited with the design of the original St Hugh's Choir and the eastern transepts.

Building continued under William de Blois (1203–6) and Hugh of Wells (1209–35). By the end of the bishopric of Hugh of Wells, it is probable that much of the eastern portion of the cathedral was complete, including St Hugh's Choir, the east and west transepts, and the walls of the nave and chapter house. The west transept includes the Dean's Eye to the north and the Bishop's Eye to the south, although the current tracery of the Bishop's Eye dates from 1320. Hugh of Wells bequeathed to the fabric in his will of 1233 a large amount of money and timber from his land. During the bishopric of Grosseteste (1235–53), it is probable that the nave and chapter house were vaulted (by Master Alexander), the Galilee Porch was completed, the west front was extended to 175 feet in width, and a new central tower was begun. Chapels were also built behind the new west front, the Morning Chapel on the north and the Consistory Chapel on the south. The new tower collapsed between 1237 and 1239 and was immediately rebuilt. A reticulated pattern or latticework ornament on the interior and

exterior walls of the new tower, as seen on the west front and side walls of the nave, are considered to be a trademark of Master Alexander. The vault of St Hugh's Choir may have been partially damaged by the collapse of the tower, and had to be rebuilt. It is not certain if it was rebuilt to Geoffrey's original design, or if it had to be altered.

Finally, the Angel Choir, or retrochoir, was begun in 1256, during the bishopric of Henry of Lexington (1254–8). It was begun after a license was obtained from Henry III to remove part of the eastern Roman wall of the city. Construction continued until the end of the bishopric of Richard of Gravesend (1258–79), under the supervision of master masons Simon Thirsk and Richard of Stowe. The Angel Choir contains the tomb of Remigius, first bishop of Lincoln, and a shrine for St Hugh. The spandrels of the triforium are filled with carvings of angels. This eastern extension of the cathedral completes the new Gothic structure, inaugurated by Bishop St Hugh in the late twelfth century, which remains largely intact today.

Arrangement of Chapters

The chapters in this volume have been divided into four sections, each addressing key themes that have cosmological bearings on the symbolism of Lincoln Cathedral and the intellectual ideas of its bishop, Robert Grosseteste. These are the following: 1. Ritual and Liturgy, 2. Philosophy of Grosseteste, 3. Architecture and Cosmology, and 4. Comparisons and Context. The first consists of contributions by Nicholas Bennett and Nicholas Temple; the second by Cecilia Panti and Jack Cunningham; the third by John Hendrix, Noé Badillo and Dalibor Vesely, and the final section with contributions by Christian Frost and Allan Doig.

In Nicholas Bennett's opening chapter, '''The Face of One Making for Jerusalem': the Chapter of Lincoln during the Episcopate of Robert Grosseteste," the

author examines the relationships between Robert Grosseteste and the chapter of Lincoln Cathedral, providing a picture of the community of the cathedral in the thirteenth century, which includes the design and building of the cathedral along with matters of governance, worship, education, and the policies of the bishop. Bennett's investigation provides an overview of the setting for the generation of the particular forms and spaces of the cathedral.

Nicholas Temple's chapter, "Light and Procession: Bishop Grosseteste and the Ceremony of the Visitation," examines the architecture of Lincoln Cathedral in the context of Grosseteste's understanding of the pastoral responsibilities of the bishop and his translation and commentary of the Dionysian Corpus. The chapter considers how these wide-ranging interests influenced Grosseteste's protracted dispute with the dean and chapter of the cathedral, in regard to the status of the canonical (episcopal) visitation. This dispute finds particular expression in the close correspondence between Grosseteste's views on church authority and the Dionysian concept of "hierarchy," as well as his Augustinian treatment of "Negative Theology" to reinforce Grosseteste's salvific model of impure chromatic light. Temple argues that the spatial and symbolic meanings of the Great Transept of Lincoln Cathedral, with its two rose windows (the Dean's Eye and the Bishop's Eye) and adjoining Galilee Porch, provided the bishop with a unified and coherent architectural metaphor in which to convey these analogies.

In Cecilia Panti's chapter, "Robert Grosseteste's cosmology of light: A symbolic model for a sacred space?," the author examines Grosseteste's light cosmology in *De Luce* (c. 1225), *De colore* (c. 1230) and the *Hexaëmeron* (1235). She illustrates the importance of Grosseteste as a forerunner of the modern concept of experimental science, and demonstrates that Grosseteste's writings constitute a wide-ranging and

original epistemology; a broad natural philosophy which establishes an important basis for modern conceptions of philosophical enquiry. These demonstrations, with the light cosmology at their core, also provide a broader background to the nature of thirteenth-century England in which the building of the cathedral is situated. Panti describes the translation of light into geometry in Grosseteste's treatises, as it may be applied to an architectural conception, and in its use of architectural metaphors. Panti also discusses an Anglo-Norman poem written by Grosseteste, the "Chateau d'amour" (Castle of Love), which is filled with architectural metaphors and which is dated (according to Panti) to between 1230 and 1235, the period during which Grosseteste was lecturing to the Franciscans at Oxford. She asserts that the theological writings after 1230 should be seen as a renunciation of the earlier cosmologies, because spiritual light can no longer be seen to be represented in the physical world. From this she comes to the conclusion that bishop Grosseteste would not have been able to see the architecture of the cathedral as representing a cosmology, although there is no clear textual evidence to confirm this.

Jack Cunningham's chapter, "*Lumen de lumine*: Light, God and Creation in the thought of Robert Grosseteste," argues that one cannot properly understand Grosseteste's theories of light without also understanding their historical contexts; indeed that Grosseteste's intellectual development was significantly shaped by the tempestuous events that took place in thirteenth-century Europe. These include the increasingly rigid stance of the Papacy on matters pertaining to church authority, the impact of the Forth Lateran Council on church reform and the momentous developments in academic and ecclesiastical learning. Cunningham also makes a case that Grosseteste's intellectual development was not just influenced by his time at

Oxford, as teacher of the Franciscans, but also, more contentiously, during a period in Paris in the 1220s. This intellectual development was to play a significant role in influencing Grosseteste's activities as bishop of Lincoln. These insights into Grosseteste's ideas are applied to the architecture, light and space of Lincoln Cathedral, to paint a picture of Gothic architecture as an exemplum of light as the first corporeal form.

John Hendrix's chapter, "The Architecture of Lincoln Cathedral and the Cosmologies of Bishop Grosseteste," focuses on the vaulting elements of the cathedral, such as the ridge pole, tierceron or non-structural rib in the vaulting, lierne or segmented ridge rib, flying rib, conoid springer vault or cone of ribs rising from the springer pole in the elevation, tri-radial vaulting or three ribs meeting at the ridge pole, double syncopated or overlapping arcading, and bundled and ribbed umbrella column. Hendrix points to the similarities of the geometrical elements in the architecture to the geometries described by Grosseteste in his cosmologies of light and geometry to suggest that the architecture can be read as a catechism, or model, of Grosseteste's original cosmologies. Hendrix argues that the geometries that are implicit in the architecture of Lincoln Cathedral can be understood in direct relationship to the geometries that form the basis of the cosmologies of Robert Grosseteste, in particular *De Luce* (*On Light*, c. 1225), and *De lineis, angulis et figuris* (*On lines, angles and figures*, c. 1230). The vocabulary elements such as the ridge pole, tierceron, lierne, flying rib, conoid springer vault, triradial vaulting, double syncopated arcading, and the bundled and ribbed umbrella column, all originate in some form or are developed for the first time in Lincoln. All of the geometries which appear for the first time in the architecture appear in the cosmologies of Grosseteste, for the purpose of explaining the

generation, emanation, reflection, refraction, and rarefaction of light as it forms the material world in geometrical configurations. The cathedral would thus be a catechism of the geometrical substructure of the physical world, in the tradition of the *Timaeus* of Plato. There is no evidence that the concepts were dictated by Grosseteste directly to masons, but it is well known that such concepts permeated medieval architecture and city planning, and that they were filtered down through all trades involved in construction of the city and the cathedral.

Noé Badillo's chapter, "Robert Grosseteste and the Phenomenological Nature of Geometry and Light," expands the analysis of Grosseteste's light cosmology by situating it in the broader context of the history of philosophy, in particular in relation to twentieth-century phenomenology, and the writings of Edmund Husserl. Just as phenomenology has played such an important role in the understanding of architecture in the modern world, in its incorporation of philosophies of light, geometry, optics and vision, so Grosseteste's ideas underlie many modern philosophical concepts as Badillo demonstrates. This extends to understanding the architecture of Lincoln Cathedral as a physical embodiment of Grosseteste's cosmology. A particular focus of Badillo's essay is an examination of the influence of Grosseteste's *De Luce* on Roger Bacon's *De Specierum Multiplicatione*.

In his chapter, "Robert Grosseteste and the Foundations of a new Cosmology," Dalibor Vesely examines Grosseteste's light cosmology within the broader context of medieval and Renaissance cosmology, optics, perspective and theories of vision. Vesely illustrates the important role that Grosseteste played in these developments, and at the same time argues that Gothic architecture (and Lincoln Cathedral in particular) provides the clearest expression of his cosmology. Grosseteste's theories of optics

contributed to developments in astronomy, geometry, natural philosophy, modern cosmology and ultimately physics. Vesely traces the developments in these fields in relation to questions of architectural meaning, thereby emphasising the importance of the writings of Robert Grosseteste in understanding sacred space in the Middle Ages.

Christian Frost's chapter, "Architecture, Liturgy and Processions: Bishop Grosseteste's Lincoln and Bishop Poore's Salisbury," paints a picture of England at the time of Grosseteste and the building of Lincoln Cathedral. At the same time, the chapter gives a broader picture of medieval architecture in England in terms of spatial relationships and patterns of use, especially those of sacred space and liturgy. Frost draws parallels between Robert Grosseteste and Richard Poore, Bishop of Salisbury (1194 to 1217), and provides a comparative analysis of the building of Lincoln Cathedral and the building of Salisbury Cathedral, in relation to the politics of the bishops and ritual, liturgical, and festive processions. Frost focuses on the relation between sacred space and feast, celebration, and the church hierarchy and calendar, to develop an understanding of architecture based on cultural activity.

Allan Doig's chapter, "Charlemagne's Palace Chapel at Aachen: Apocalyptic and Apotheosis," examines the Church of the Holy Mother of God, located beside Charlemagne's Palace at Aachen, as a symbol of the Holy Roman Empire and of both earthly and heavenly kingdoms. The author makes the case that the Carolingian chapel, and its later medieval additions, provides a revealing precedent for interpreting the developments of the Gothic cathedral, of which Lincoln Cathedral is paradigmatic. The iconography of the Carolingian chapel is described in its theological, eschatological, and apocalyptic dimensions, for the purpose of explaining the architecture in relation to the religious, social and political dimensions of Charlemagne's empire. At the same

time, Doig's chapter broadens the framework for understanding Lincoln Cathedral, during the episcopate of Robert Grosseteste, through an examination of philosophical, theological and cosmological ideas, in particular how the sacred rituals and hierarchies are embodied in the sacred space of the Aachen Chapel. The notion of ecclesiastical architecture as an image of heavenly Jerusalem (from Revelations, Chapters 4 and 21), finds expression in the chromatic and material juxtaposition of gold, precious stones and light. Doig argues that the articulation of polished marbles, Imperial porphyry, and the installation of classical columns brought from Ravenna, was in many respects an anticipation of what was later to come in the Gothic Choir at Aachen. At the same time, this material and chromatic juxtaposition also extends to the reception of Dionysius the Pseudo Areopagite in the Carolingian period, which in many respects provides an important precedent to Grosseteste's interpretation of the Dionysian Corpus and its relationship to the luminary symbolism of Lincoln Cathedral as argued in Nicholas Temple's chapter.

Taken together the chapters presented in this volume provide an in-depth analysis of the philosophy and scientific thinking of Robert Grosseteste, and of the architecture of Lincoln Cathedral at the time of Grosseteste's episcopate and their precedents, revealing new connections between medieval concepts of order (as they relate to theology, cosmology, ecclesiastical hierarchy and religious procession) and sacred space.