CHAPTER 1

INTELLECTUAL AND INSTITUTIONAL BACKGROUND TO THE STUDY OF GROSSETESTE'S ASTRONOMY AND COMPOTUS TEXTBOOKS

The twelfth century was a time of great change in Europe. Charles Homer Haskins went so far as to call it a 'renaissance,'[1] thereby placing it with the great movements of the Italian and Carolingian Renaissances. Among the achievements of the period he listed the rise of cities, the emergence of vernacular literatures, the revival of Latin literature, the origins of the universities, and the recovery of Greek science and philosophy, as well as the Arabic additions to those fields.[2] While the notion of renaissance may not be as popular in scholarly circles as it once was, it is hard to deny that the twelfth century saw significant changes in Western, Latin Europe.

In this chapter, I survey the intellectual and institutional developments of the twelfth and early thirteenth centuries, especially in England, that are significant to understanding the intellectual context in which Grosseteste composed his textbooks in astronomy and compotus. My survey will necessarily be selective, because certain developments of the twelfth and early thirteenth centuries are more clearly relevant to the topic. I begin with a general survey of the notion of an English renaissance during the twelfth century, noting its

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[1]Charles Homer Haskins, *The Renaissance of the Twelfth Century*, Cambridge, Mass.: Harvard University Press, 1927.

[2]Haskins, *Renaissance*, p. vi. See also the table of contents for a list of the topics his book covers.

peculiarities within the more general picture of a Latin or European renaissance. Following that, I discuss two areas that saw important developments during this period: the translation movement, especially the changes it produced in scientific fields of study, and the growth of the university. In both cases, the emphasis will be on the English experience of these trends. Finally, I devote a section to Oxford and the rise of its university. With this background material, the reader will be able better to understand the acheivement of Grosseteste in creating his texts.

1.1. England and the Twelfth-Century Renaissance

Haskins pictured the twelfth-century Renaissance as being fundamentally different from both the Carolingian and Italian Renaissances because it was not centered upon any one court or country.[3] Italy and France he credits with the most significant contributions to the changes that century saw, whereas Germany and England were largely the recipients and purveyors of advances begun elsewhere. Spain, as a frontier to the Islamic world, was a significant link in the process of translating the Greek and Arabic materials that Latin scholars sought.

Was England merely a passive recipient of the changes occurring in other parts of Europe? Haskins's treatment certainly supports that picture. For the most part, he presents English scholars who went to the continent for schooling, translators who travelled abroad, and the assimilation of new methods and ideas in courts and monasteries. R. W. Southern repeated this characterization when he described England as "a colony of the French intellectual empire, important in its way and quite productive, but still subordinate."[4]

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[3]Haskins, *Renaissance*, p. 11.

[4]R. W. Southern, "The Place of England in the Twelfth-Century Renaissance," in *Medieval Humanism and Other Studies*, 158–180, Oxford, Basil Blackwell, 1970; the quotation is on p. 158.

Southern himself, however, qualified this characterization by arguing that England did produce interesting and novel changes in four particular areas. Those areas included history, science, wonders, and government. In all cases, however, the key to English originality lay with the Conquest by the Normans in 1066. After this important event, certain aspects of English culture changed drastically. The new political leadership placed demands on English insitutions, especially the monasteries, that led to significant changes. The Norman rulers required an unprecedented level of proof of the monasteries' right to exist as corporate entities, leading the monks to increase their output of historical writing to defend their right to hold their property. Thus the monks, the main purveyors of history in twelfth-century England, developed their historical scholarship to meet the demands of a changing society. Similarly, Southern argued, the increasing concentration on wonders, marvels, and miracles was a product of the Norman pressure brought to bear on the monasteries to defend their past as the grounds by which they should continue to exist. Wonders demonstrated the validity of the monastic communities in which they had occurred.

The Conquest would change English life in the royal courts as well, especially in the field of intellectual treatments of government. Again, as in the monasteries, a practical advantage was to be found for those men who pursued these new studies; they found that such interests could lead to advancement within the governmental structure. But more than this, Southern argues, an innate interest among the English prompted them to produce literature of a type unprecedented elsewhere in Europe. "It was only in England that the complexities of secular government were a matter of anxious thought by men of high ability, and only England produced a literature of detailed elucidation…on government…."[5] So in addition to practical requirements, Southern also allowed that idiosyncratic intellectual trends could cause changes in scholarly output.

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[5]Southern, "The Place of England," p. 179.

Southern credited the development of science in England during the twelfth century to innate interest among the English coupled with innovations brought from the continent by the Normans. On the one hand, Southern wrote, the monasteries of England until the time of the Conquest had a near monopoly on education. Secular schools were almost non-existent until after the conquest, when a great number of secular schools were founded and staffed by masters educated in France.[6] This left England somewhat behind France regarding the establishment of scholastic education, though schools did multiply rapidly during the twelfth century. On the other hand, Southern also recognized a native interest among the English in scientific subjects, at least among the monastically educated. It was not a progressive interest, according to Southern, but it was valuable nonetheless. "There was no idea of new knowledge, but there was a foundation of technical accomplishment."[7]

Thus the English were in a good position to take up the scientific advances brought by the Normans. In the field of astronomy, especially, there was already an interest among the English both to increase and to improve the store of knowledge. Even before the twelfth century, Walcher of Malvern was interested in establishing greater precision of measurement regarding the moon's motion and position. And in the third and fourth decades of the twelfth century, the monks of Worcester were recording celestial phenomena and beginning to use the tables of al-Khwarizmi.[8] Thus, when the translation movement

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[6]Southern has elsewhere stressed that these schools offered only basic instruction in grammar, singing and chanting, and that Englishmen who wanted instruction in more complex subjects had little choice but to go to schools on the continent. See R. W. Southern, "From Schools to University," in *The History of the University of Oxford*, vol. 1, *The Early Oxford Schools* (hereafter *HUO1*), edited by J. I. Catto, 1–36, Oxford: Clarendon Press, 1984, especially pp. 2–3.

[7]Southern, "The Place of England," p. 166.

[8]Southern, "The Place of England," pp. 166–169. For more on Walcher, see Charles Homer Haskins, *Studies in the History of Mediaeval Science*, Cambridge, Mass.: Harvard University Press, 1927, pp. 113ff; and Charles Burnett, "Mathematics and Astronomy in Hereford and Its Region in the Twelfth

began in earnest, England was in a position to take advantage of it, and their nascent interest in the subject material provided fertile ground for the new science that blossomed in Latin Europe throughout the twelfth century. As it turns out, however, it was not in the monasteries that the new science would take hold. Many of the major impulses for accepting and utilizing the new science came from scholars in the southwest of England. We will return to this aspect of the story below.

In explicit response to Southern's treatment of England's place in the twelfth-century renaissance, Rodney Thomson suggested important modifications to Southern's theses.[9] First, Thomson argued that England should not be considered separately from northern France, stating, "A description of intellectual and cultural life in twelfth-century England and northern France must emphasize its shared character, its commonality."[10] Thomson pointed out that many of the leading proponents of scholasticism in the twelfth century came from England, but were educated in France. Rather than making this non-English, as Southern would do, Thomson emphasizes the shared culture of Anglo-Norman England and northern France. Thus the contributions to history and science made by English writers, Thomson argued, lay within the broader intellectual trends of continental Europe, and should not be seen as uniquely English. At the same time, however, Thomson did argue that the English in particular made important intellectual contributions in two fields neglected by Southern: the study of the literature of pagan Rome, and the production of books and libraries, especially among religious houses.

In the final analysis, though, Thomson did not equate Anglo-Norman English and

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Century," in *Medieval Art, Architecture and Archaeology at Hereford*, edited by David Whitehead, 50–59, Leeds: The British Archaeological Association, 1995.

[9]Rodney M. Thomson, "England and the Twelfth-Century Renaissance," *Past and Present* 101 (1983): 3–21.

[10]Thomson, "England and the Twelfth-Century Renaissance," p. 4.

northern French intellectual life in the twelfth century. Instead, he emphasized that, despite their commonalities, which must be recognized to gain an historically accurate picture of the era, they could be differentiated in important ways. England was both a frontier and had a smaller population than France. In addition, the centralized government and the vigor of the monasteries affected the character of English intellectual life. One significant effect of these differences was the delay in England of developing scholasticism: it happened earlier in France than in England.[11]

One final theme of the twelfth-century renaissance in England comes from Warren Hollister.[12] He agreed with, and indeed expanded upon, Southern's treatment of English innovation after the Conquest in the realms of historical writing and government. But in addition to the changes that the Normans brought to England, Hollister suggested that a new idea surfaced in the twelfth century that contributed to the changes of that era. He stated that the twelfth-century renaissance was the birthplace of a "new idea of a divinely ordered cosmos open to human reason."[13] In the field of historical writing, for example, a "new interest in naturalistic cause and effect may well have made the writing of history a far more intriguing enterprise than before."[14] He argued that systematic thinking of this kind also changed the way governments operated.

Hollister did not deal with the issue of science that Southern and Thomson had both

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[11]But Thomson also notes that Oxford by 1200 and Cambridge by 1220 accounted for two "of the five major *studia generalia* in Europe." Thomson, "England and the Twelfth-Century Renaissance," p. 20.

[12]Warren Hollister, "Anglo-Norman Political Culture and the Twelfth-Century Renaissance," in *Politics and Religion in Ancient and Medieval Europe and China*, edited by Frederick Hok-ming Cheung and Ming-chiu Lai, 127–146, Hong Kong: Chinese University Press, 1999.

[13]Hollister, "Anglo-Norman Political Culture," p. 135.

[14]Hollister, "Anglo-Norman Political Culture," p. 135.

broached, but his thesis does have application to this issue. The ability to consider new scientific ideas is fostered in an environment that sees the world as open to rational investigation, and indeed provides an impetus for such investigations to be carried out. Advanced studies in astronomy, received largely from the Arabic world, would demonstrate the power of human reason to unlock the mysteries of the created order. Haskins's examples of Walcher's attempt to provide "precise measurements … as a necessary basis for systematic calculations,"[15] as well as his use of an astrolabe in 1091, show a pre-existent desire for and expectation of order in nature that quantitative analysis can further illuminate. At the same time, with this expectation in place, the study of new ideas in science receives the boon of anticipated benefit. The translation of Arabic and Greek works into Latin was not just an expensive gamble, but was expected to provide a return. A study of the translation movement, then, is not simply a list of what was translated when and by whom, though it must necessarily include that information. It also becomes a story of why particular works were translated, why scholars travelled for hundreds of miles into foreign lands to seek them out, and what benefits they expected to achieve. In similar fashion, we will have cause to ask why Grosseteste chose to write his textbooks, and will be especially interested in the goals of the texts as evidenced through their contents.

1.2. The Translation Movement and the Growth of Science in England

For the purposes of this chapter, I shall not attempt to tell a complete story of the translation movement. The story has been told before, and in greater depth than I can devote to it here.[16] But I shall discuss some of the more important aspects of the translation

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[15]Southern, "The Place of England," p. 167.

[16]One of the most significant studies of the translation movement is still Haskins, *Studies*, though it must now be supplemented by Marie-Thérèse d'Alverny, "Translations and Translators," in *Renaissance and Renewal in the Twelfth Century*, edited by Robert L. Benson and Giles Constable with

movement as it applies to Grosseteste's textbooks, concentrating my efforts on examining the situation in England. Even Thomson, who pointed out the commonalities between Anglo-Norman English and northern French culture during this period, argued that there were differences between the two geographic areas. The historiography of the importation of science into England, discussed below, also maintains a uniqueness for England, due mostly to its geographic isolation at the edge of Europe.

I shall also maintain the separation of English and French culture because of the situation of Grosseteste. As will become evident in the next chapter, it is unclear that Grosseteste himself ever went to France until late in his life.[17] While his education in science may have been influenced by the works of French masters, merely because English education was heavily influenced by the French, I shall argue that the most important aspects of the translation movement in regards to Grosseteste's work in astronomy and compotus came from the native traditions of England. Thus while we will remain aware of the French connection among English intellectual circles, for the purposes of understanding Grosseteste's context, we must know the situation in England.[18]

Carol D. Lanham, 421–462, Toronto: University of Toronto Press, 1991, originally published by Harvard University Press, 1982. Another useful introduction to the topic is David C. Lindberg, "The Transmission of Greek and Arabic Learning to the West," in *Science in the Middle Ages*, edited by David C. Lindberg, 52–90, Chicago: University of Chicago Press, 1978.

[17]An older tradition of biography assumed Grosseteste went to Paris for portions of his education, but this is now under question. He did travel to the continent as a bishop, but this was too late in his life to have an impact on the astronomy and compotus textbooks.

[18]Footnotes in the following section will demonstrate my reliance on the work of other scholars in determining the contributions of particular contemporary authors. For a more general picture of the extent and impact in England of the twelfth-century translation movement, see Charles Burnett, *The Introduction of Arabic Learning into England*, London: The British Library, 1997, and "The Introduction of Arabic Learning into British Schools," in *The Introduction of Arabic Philosophy into Europe*, edited by Charles E. Butterworth and Blake Andrée Kessel, 40–57, Leiden: Brill, 1994; R. W. Hunt, "English Learning in the Late Twelfth Century," in *Essays in Medieval History*, edited by R. W. Southern, 106–128, New York: St. Martin's Press, 1968; and Josiah C. Russell, "Hereford and Arabic Science in England about 1175–1200," *Isis* 18 (1932): 14–25.

Even before the more concerted efforts of translation in the twelfth century, England had seen tantalizing glimpses of the advanced nature of Arabic science, especially in the region of Hereford.[19] Robert, Bishop of Hereford from 1079 to 1095, is known for a computistic work suggesting a revision of the Dionysian era (i.e., the numbering of the years), as well as for being an abacist and an astronomer. Walcher of Malvern, mentioned previously, is known for his astronomical work, including his treatise on the moon—which is also relevant to the calendar—and for his use of the astrolabe. He is known also for a work on eclipses, which may be a translation from Arabic performed with the help of Petrus Alphonsus, a converted Jew from Spain, living in England.[20] In addition to these texts, Burnett has shown that texts on the astrolabe, rhythmomancy (a genre used for teaching mathematics), and the abacus had come to the southwest of England, probably through Lorraine in France. Reinforcing Southern's notion of a nascent interest in science among the English, Burnett has shown that, before the twelfth century, English scholars had already begun to appreciate the benefits of Arabic science. Yet even more sophisticated works in mathematics and astronomy were to be had, and the later stages of the translation movement would introduce great changes to the study of these sciences in England.

The twelfth century saw two main trends in translation: those directly from Greek, and those from Arabic, the latter either originally Greek works translated into Arabic or

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[19]The following material is drawn from Burnett, "Mathematics and Astronomy in Hereford." Burnett also has a brief notice of this period as an early stage of the importation into England of Arabic science in his "Introduction of Arabic Learning."

[20]On Petrus, see Haskins, *Studies*, pp. 113ff. The information contained in this chapter of *Studies* was previously presented as "The Reception of Arabic Science in England," *English Historical Review* 30 (1915): 56–69. See also Burnett, *Introduction of Arabic Learning*, pp. 38ff.

original works written by Arabic authors.[21] This, however, is a categorization of modern scholars. There was no systematic organization among the translators of the twelfth century. Decisions on what would be translated appear to have been based on opportunity and the desires and whims of the translators.[22] Little is known of the translators themselves, or even of their mode of operation; we can only conjecture, for example, on how they earned their livelihood, or how they worked with assistants. To understand the situation in England, then, we must work our way backwards, from what was available in Grosseteste's day to the sources by which translations made their way into England.

Translation from the Greek took place largely in Italy, Sicily, and Spain. Patristic texts and Greek medical, philosophical and scientific works, including much of the Aristotelian corpus, were the most common items chosen for translation from the Greek. Translation from Arabic began in the eleventh century when Constantine the African, working in Italy, translated a number of medical texts. In the twelfth century, Toledo in Spain became a center for translations, attracting numerous scholars.[23] Some scholars have proposed that a school of translators worked there in an organized fashion under the patronage of archbishop Raymond, but this picture has been questioned.[24] It seems more likely that Toledo offered a congenial atmosphere for translation activity, and enjoyed a reputation as a place where Latin scholars could find both the works they wished to translate

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[21]There were also some translations made from Hebrew sources. These tended to be in the area of biblical scholarship.

[22]Lindberg makes similar points in the conclusions of his article "Transmission," pp. 75ff.

[23]For a list of translations made in Spain, both in Greek and Arabic, see George F. Hourani, "The Medieval Translations from Arabic to Latin Made in Spain," *The Muslim World* 62 (1972): 97–114; a table of translators and translations is on pp. 109–113.

[24]See, for example, d'Alverny, "Translations and Translators," pp. 444ff.

and linguistically adept assistants.[25] Astronomy and astrology, as well as various forms of magic, were popular topics for scholars working in Toledo. And as it turns out, Toledo was a very significant place for the translations that eventually reached England.

Those with a geographic understanding of medieval Europe will be aware that the places mentioned so far were on the borders of Latin Europe. Italy and Sicily, with their easy access to the Mediterranean, benefitted from contacts with the Islamic Empire through North Africa, and with the Byzantine Empire to the East. In Spain, large portions of territory had recently been taken by Latin forces from the Islamic rulers who had been in control since the eighth century; Toledo had been taken (relatively peacefully) in 1085. As the borders were pushed to the south, Arab and Latin speakers had more frequent contact, and the changing borders meant that interaction between the two cultures could persist. Because all these regions were outside England, scholars who brought translations to England necessarily had to travel.

One of the earliest of these travelling English scholars was Adelard of Bath,[26] who flourished in the first half of the twelfth century. As a young man, he travelled to France

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[25]For more on Toledo as a place of translation activity in the twelfth century, see Charles Burnett, "The Institutional Context of Arabic-Latin Translations of the Middle Ages: A Reassessment of the 'School of Toledo,'" in *Vocabulary of Teaching and Research Between the Middle Ages and Renaissance*, edited by Olga Weijers, 214–235, Turnhout: Brepols, 1995; and "The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth-Century," *Science in Context* 14 (2001): 249–288. Burnett offers evidence that the cathedral was an important center, at least for patronage or support of translators, and may have had a cathedral school, which employed the scholars who performed translations, but that there is no evidence of a school organized solely for the sake of translation.

[26]The bibliography on Adelard is fairly large. Haskins devoted chapter 2 of *Studies*, pp. 20–42, to Adelard. A more recent introduction and bibliography can be found in Louise Cochrane, *Adelard of Bath, The First English Scientist*, London: British Museum Press, 1994. More detailed studies can be found in *Adelard of Bath, An English Scientist and Arabist of the Early Twelfth Century*, edited by Charles Burnett, London: Warburg Institute, 1987. A brief introduction to Adelard's life and writings can be found in Marshall Clagett, *Dictionary of Scientific Biography*, vol. 1, pp. 61–64, edited by Charles Coulston Gillespie, New York: Charles Scribner's Sons, 1978.

where he studied and taught. He later continued his travels, going to Sicily, Italy, Greece, and the Near East before he returned to England in about 1116. In England, he probably received assistance in making his translations from Petrus Alphonsus, who had already made his own translations of Arabic scientific texts, and had taught astronomy to Walcher of Malvern,[27] as mentioned above. Adelard wrote two philosophical treatises, *De eodem et diverso* and *Quaestiones naturales*, a treatise on falconry, and the *Mappae clavicula*, a collection of chemical recipes. He is better known, however, for his mathematical and astronomical/astrological translations and writings. He wrote works on arithmetic: the *Regule abaci*, written before his travels to find Arabic science, and perhaps the longer *Liber ysagogarum Alchorismi in artem astronomicam a magistro A. compositus*, a work in five chapters, three on arithmetic, and the other two on geometry, music and astronomy.[28] In the field of mathematics, he is best known for his translation of Euclid's *Elements*, which was probably the first complete rendering of the *Elements* into Latin. In fact, Adelard's translation exists in three distinct versions, including in some of them additonal proofs and commentary.[29]

His contributions to astronomy and astrology were also significant. He wrote a work on the astrolabe, *De opere astrolapsus*, and translated the *Centiloquium*, a set of astrological aphorisms attributed to Ptolemy, and Abu Ma'shar's *Shorter Introduction to*

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[27]On Petrus's relationship with Adelard, see Charles Burnett, "Adelard of Bath and the Arabs," in *Recontres de culture dans la philosophie Médiévale; tradutions et traducteurs de l'Antiquité tardive au XIV^e siècle*, edited by Jacqueline Hamesse and Marta Fattori, 89–107, Louvain: Université Catholique de Louvain, 1990, especially pp. 105–106.

[28]Adelard's authorship is not clearly attested, but the dating and provenance of the work makes his authorship possible. See Haskins, *Studies*, p. 24.

[29]It is not clear that Adelard was directly responsible for each of the versions. See Hubert L. L. Busard and Menso Folkerts, *Robert of Chester's (?) Redaction of Euclid's* Elements*, the So-called Adelard II Version*, Basel: Birkhäuser, 1992.

Astronomy, which was known as *Ysagoga minor Iapharis matematici in astronomicam per Adhelardum bathoniensem ex arabico sumpta*. The latter would be supplanted when the *Greater Introduction* was translated, but may have served as an important first step towards the assimilation of Arabic astronomy. Adelard also translated the astronomical tables of al-Khwarizmi.[30]

A near contemporary to Adelard was Robert of Chester.[31] An Englishman by birth, he was in Spain in 1141 when he was commissioned with his associate Hermann of Carinthia to make a Latin translation of the Qu'ran. Robert, however, also had an interest in mathematics and astronomy. He translated the *Algebra* of al-Khwarizmi, wrote a treatise on the astrolabe, and converted the astronomical tables of al-Zarqali and al-Battani, as well as Adelard's translated tables of al-Khwarizmi, to the meridian of London.

Another important figure in making Arabic science available to the English was Daniel of Morley.[32] Though not a translator of works himself, he travelled to Toledo where he met Gerard of Cremona.[33] Gerard was a prolific translator during his years at Toledo, where he was perhaps a member of the clergy of the cathedral.[34] He was credited nearly

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[30]For a translation and commentary on the tables, see O. Neugebauer, *The Astronomical Tables of al-Khwarizmi*, *Historisk-filosofiske Askrifter udgivet af Det Kongelige Danske Videnskabernes Selskab*, Bind 4, nr. 2. The translation is from Adelard's Latin version of the tables.

[31]On Robert of Chester, also known as Robert of Ketene and Robert of Ketton, see Haskins, *Studies*, pp. 120ff.

[32]On Daniel of Morley, see Charles Singer, "Daniel of Morley, an English Philosopher of the XIIth Century," *Isis* 3 (1920–1921): 263–269; Lynn Thorndike, *A History of Magic and Experimental Science*, vol. 2, pp. 171–181, New York: Macmillan, 1923–58; and Theodore Silverstein, "Daniel of Morley, English Cosmogonist and Student of Arabic Science," *Mediaeval Studies* 10 (1948): 179–196.

[33]On Gerard, see Richard Lemay, "Gerard of Cremona," *Dictionary of Scientific Biography*, vol. 15, 173–192. This biographical article also includes a list of the translations and texts attributed to him.

[34]See Burnett, "The Coherence of the Arabic-Latin Translation Program," p. 252.

contemporaneously with translating over seventy works, and a dozen more are ascribed to him. He also composed a handful of original works. He translated numerous astrological and astronomical works, including Ptolemy's *Almagest* and works by al-Farghani, Masha-allah, and Thabit ibn Qurra. He was apparently assisted in his translation activity by a number of companions, and presented public lectures, perhaps as a means to provide an income in order to continue his work.

Daniel of Morley had left England for study in France, but found the method of the schools there to be vacuous.[35] In hopes of learning more, he travelled to Spain, where he heard the lectures of Gerard. After spending some time in Toledo, he returned to England, famously bringing with him a large number of books he had obtained in Toledo, almost certainly including some of Gerard's recent translations. In addition, Daniel wrote a work entitled *Liber de naturis inferiorum et superiorum*, which presented a great deal of Arabic science to a Latin audience, including high praise for the astrological benefits that Arabic astronomy confers on its practitioner.[36] Daniel relied heavily on Adelard's work, but also on translations from the Arabic of Abu Ma'shar's *Introduction to Astrology* and other

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[35]In an oft-quoted passage from the introduction to his *Liber de naturis inferiorum et superiorum*, Daniel refers to the masters of Paris as '*bestiales*,' marking up their books, but knowing nothing. A translation of the autobiographical portion of the text can be found in Burnett, *Introduction of Arabic Learning*, pp. 61–62.

[36]For a Latin edition of the *Liber de naturis*, also known as the *Philosophia*, see G. Maurach, "Daniel von Morley, *Philosophia*," *Mittelateinisches Jahrbuch* 14 (1979): 204–255. For an earlier edition, on which much scholarship has been based, see Karl Sudhoff, ed., "Philosophia magistri Danielis de Merlai ad Johannem Norwicensem episcopum," *Archiv für die Geschichte der Naturwissenschaften und der Technik*, Band 8 (1917–1918): 6–40, and a subsequent article by A. Birkenmajer, "Eine neue Handschrift des *Liber de Naturis inferiorum et superiorum* des Daniel von Merlai," *Archiv für die Geschichte der Naturwissenschaften und der Technik*, Band 9 (1920): 45–51. For analyses of the *Liber de naturis*, see Richard Lemay, *Abu Ma'shar and Latin Aristotelianism in the Twelfth Century: The Recovery of Aristotle's Natural Philosophy through Arabic Astrology*, Beirut: American University Beirut, 1962, especially chapter 4, pp. 313ff.; Silverstein, "Daniel of Morley…"; and Roger French, "Astrology in Medical Practice," in *Practical Medicine from Salerno to the Black Death,* edited by Luis García, et.al., 30–59, Cambridge: Cambridge University Press, 1994, especially pp. 37ff.

Arabic-Aristotelian works.[37]

By the end of the twelfth century, it should now be clear, a large portion of the mathematical and astronomical sciences of the Greeks and Arabs had been brought to England. The translations and original treatises of the earlier years would continue to bear fruit in the work of later scholars in England. One of the most important of these figures was Roger of Hereford.[38] It is not clear that he ever travelled outside of England, nor is it certain that he could translate directly from the Arabic, but he certainly made use of the Arabic science flowing into the borderland regions of southwest England. Most of Roger's writing took place in the 1170s. He wrote a *Compotus*, suggesting ways in which the calendar could be reformed and making use of the Arabic science that had recently been translated.[39] He also created a set of astronomical tables for the meridian of Hereford based upon Raymond of Marseilles's Latin version of the Toledan Tables[40] composed by ar-

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[37]See Burnett, *Introduction of Arabic Learning*, pp. 63ff, and Lemay, *Abu Ma'shar and Latin Aristotelianism*, pp. 319ff. Abu Ma'shar was known to Daniel through Hermann of Carinthia's translation. Burnett notes especially the Aristotelian works *De ortu scientiarum* and *Liber celi et mundi* as significant sources.

[38]Relatively little is known of Roger's life. For a summary of what we know, as well as the sources for this information, see Roger French, "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century," *Isis* 87 (1996): 453–480, especially pp. 459ff.

[39]On Roger's *Compotus*, see Jennifer Moreton, "Roger of Hereford and Calendar Reform in Eleventh- and Twelfth-Century England," *Isis* 86 (1995): 562–586. See also further discussion below in chapter 4 of this dissertation.

[40]For a modern commentary on the Toledan Tables, but not an edition or translation, see G. J. Toomer, "A Survey of the Toledan Tables," *Osiris* 15 (1962): 5–174.

Zarqala.[41] He also wrote a number of astrological tracts;[42] the works attributed to him include: *Theorica planetarum*, *De quator partibus astronomie*, *De ortu et occasu signorum*, *Liber de tribus generalibus*, and *De iudiciis astronomie*.

As we shall see in the next chapters, Grosseteste made use of many of the works that the translation movement of the twelfth century had brought to Europe. Astronomical texts and tables will play an obvious part in the creation of his textbooks. Arithmetic and geometry, important for his astronomical and computistical work, as well as his natural philosophy, were in large measure available to him because of the works of his predecessors. But to stop here would be to misunderstand the situation of the twelfth century. The circle of translators discussed above certainly did not produce their translations nor compose their original treatises simply so that future scholars could incorporate them into their textbooks. By examining their motivations, we will better understand the milieu of translators and scientific authors from which Grosseteste came.

Roger French has identified one of the most significant reasons that Latin scholars sought out the science of the Arabs: the ability to fortell the future through astrological means.[43] Thus the men who translated Arabic astrological works and wrote their own original treatises were the very same men who translated works of mathematics, explained the use of the astrolabe, and prepared astronomical tables for English meridians. All these latter accomplishments contributed to the preeminent goal of foretelling the future. Tables

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[41]The Arabic tables had been made in 1080, and Raymond's Latin version in 1141. Burnett, "Mathematics and Astronomy in Hereford," p. 55.

[42]The original extent of the treatise or treatises is unclear, because portions of texts appear under his name in a variety of manuscripts. See French, "Foretelling the Future," pp. 465–466.

[43]This is the main thesis of his "Foretelling the Future." He argues there that Roger of Hereford wrote his astrological treatises with the hopes of predicting the future, while William of England was one of the first to attempt to use this newfound ability on behalf of medicine.

provided vital data on planetary and other celestial motions, mathematics supplied a way to manipulate the data, and the astrolabe was a tool both to calculate with and to collect new data, while the astrological works of the Arabs offered the keys to understanding how the influences of the stars exerted themselves in the terrestrial region.

Recognizing this situation leads us to a better understanding of the work of the medieval translators, but we must be cautious not to make a significant mistake. Our modern distinction between astronomy and astrology was not recognized in the twelfth century; the two were inextricably intertwined. So to say that translators sought out astronomical material in order to improve their astrology would be a categorical mistake. In order to foretell the future, a variety of information was needed. The tables and instruments to collect data, mathematical tools to manipulate it, and the theoretical principles to engage in divination were all necessary components. Though astrology has been discredited in the modern scientific world-view, to the medieval scholar, it was still very much a viable prospect. Though religious objections had been raised in late antiquity by various patristic writers, most notably Augustine, the theological debates had not yet been resolved, and the practice of astrology would continue for centuries.

It is convenient that the theological issues surrounding astrology have arisen here, for it leads us to another significant point about the context of translators in England. Many of them were prominent ecclesiastics, often monks or bishops. On one level, this is not surprising, as literacy was not widespread, and Church officials accounted for a significant portion of the literate population; if *anyone* was going to translate from the Greek or Arabic, there was a good chance that they would be clerics. But beyond this basic relationship of literacy and religious office, we can detect from the examples above a more significant reason why ecclesiastically-minded individuals would seek out Arabic and Greek astronomical works: for the benefit of compotus. Late in the eleventh century, Robert, the bishop of Hereford, wrote on the subject, while Roger of Hereford, who may have entered a

monastery in his later years, did so again in the 1170s; we shall see in a later chapter that Grosseteste, too, was interested in Arabic and Greek astronomy because it could be used to correct the calendar. All of these writers had a concern not merely to explain the calendar, but to improve it, to reform it. In other words, the translated works of the Arabs and Greeks offered a solution to calendrical problems, and thus provided an additional impetus to the study of these works.

Is it reasonable, then, to say that many of the translators had a religious goal in mind when they translated the astronomical works of the Greeks and Arabs? Andrew Cunningham has argued that the categories of science and religion are inadequate to understanding the situation of the middle ages.[44] In many respects, his thesis is directed to what he perceives as modern misuses of medieval history,[45] but he has nonetheless presented a thesis that is significant to the way we ought to understand medieval science. Cunningham concentrates on the categories of nature and creature, and demonstrates that they were understood differently by educated medieval men, such as St. Francis of Assisi, than they are today. Ultimately, this means that there was no conception of 'science' in the middle ages akin to our own. And this leads us to yet another important characterization of the motivations of the translators of the twelfth century.

There was, of course, disciplinary differentiation in the middle ages. Astronomy had a certain relationship to other sciences, such as theology. But this is not the same distinction

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[44]See especially his two part article, "Science and Religion in the Thirteenth Century Revisited: The Making of St. Francis the Proto-Ecologist, Part 1: Creature Not Nature," *Studies in History and Philosophy of Science* 31 (2000): 613–643, and "Science and Religion in the Thirteenth Century Revisited: The Making of St. Francis the Proto-Ecologist Part 2: Nature Not Creature," *Studies in History and Philosophy of Science* 32 (2001): 69–98.

[45]The misuses are, respectively to the two parts of his article, the misappropriation of St. Francis of Assisi by modern ecological movements, and an anachronistic distinction between science and religion on behalf of the Catholic Church in the nineteenth and twentieth centuries.

moderns make between 'science' and 'religion.' The scholars we have been discussing would not have seen a dichotomy between their religious belief and their scientific work. In fact, if we take their religious beliefs seriously, as I am wont to do based on their commitment to church offices, then we can view them comparably to Cunningham's analysis of St. Francis. Their attempts to understand Arabic and Greek astronomy were attempts to understand the created world. The study of the disciplines we think of as scientific were in fact part of a theological need to understand the world. I am not aware of a translator of the twelfth century who made the link between religious calling and astrological study as explicitly or as polemically as did Roger Bacon in the latter half of the thirteenth century,[46] but certainly the perceived need to reform the *ecclesiastical* calendar offers evidence for their purposes in engaging in translation and composition of original treatises. To understand the natural—and created—world was of theological import, and the translation of scientific works recognized contemporaneously as superior to existing Latin traditions was motivated not by nascent 'scientific' views of the world, but by theological concerns.

I believe the same basic motivation was essential to the recovery of the corpus of Aristotelian natural philosophical works. This leads us to an additional portion of the narrative of the twelfth-century development of science in England, and one in which Grosseteste played a part. Though the present study focusses on Grosseteste's astronomical and computistical textbooks, Grosseteste was also a significant figure in the progress made in the thirteenth century of the appropriation of the Aristotelian corpus into the intellectual life of England and the university community in Oxford. Here, too, I believe, we can understand one aspect of the impetus for translation as arising from the religious

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[46]See especially his *Opus maius*, translated by Robert Belle Burke in *The Opus Majus of Roger Bacon*.

motivation to understand the created world. The Aristotelian corpus provided a unified and relatively complete natural philosophy, albeit needing a few modifications to fit into a Christian understanding of the world. The remainder of this section, then, will be devoted to a brief examination of the translation of Aristotle's works and the incorporation of Aristotelian thought in the English context.

Very little of Aristotle's philosophy was known in Europe before the twelfth century. Latin translations of two logical texts, the *Categories* and *De interpretatione*, had been made by Boethius early in the sixth century A.D. Some principles of his natural philosophy were present in the encyclopedic authors of late antiquity, but the translation of Calcidius's commentary on the *Timaeus* provided Latin readers with a Platonic physics and cosmology.[47] Alexander Birkenmajer, in a famous paper in 1928,[48] argued that interest in Aristotle's natural philosophy in the Latin West was renewed among the doctors and naturalists of the twelfth century. Danielle Jacquart has verified Birkenmajer's suggestion that doctors in Salerno made use of Aristotle in their medical texts,[49] while Richard Lemay has shown that Aristotelian natural philosophy also made its presence felt in Western Latin Europe through the Latin translations of Abu Ma'shar's *Introduction to Astrology*.[50]

Lemay's thesis is especially significant for England, where, as we have seen, Arabic

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[47]Charles Burnett, "The Introduction of Aristotle's Natural Philosophy into Great Britain: A Preliminary Survey of the Manuscript Evidence," in *Aristotle in Britain in the Middle Ages*, edited by Jon Marendon, 21–50, Turnhout, Belgium: Brepols, 1996; see especially p. 22.

[48]Alexander Birkenmajer, "Le rôle joué par les médicins et les naturalistes dans la réception d'Aristote au XII^{e} et XIII^{e} siècles," in *La Pologne au VI^{e} congrès international des sciences historiques, Oslo, 1928* (1930): 1–15, reprinted in *Etudes d'histoire des sciences et de la philosophie du Moyen Age*, *Studia Copernicana* 1(1970): 73–87.

[49]Danielle Jacquart, "Aristotelian Thought in Salerno," in *A History of Twelfth-Century Western Philosophy*, edited by Peter Dronke, 407–428, Cambridge: Cambridge University Pres, 1998.

[50]Lemay, *Abu Ma'shar and Latin Aristotelianism.*

astronomical and astrological texts were prevalent.[51] It seems quite likely that the hints of Aristotelian natural philosophy that were a part of those works led contemporary scholars to seek out the philosophical works that would give them a more complete understanding of the natural philosophy that underlay, and therefore reinforced, astrological science. This thesis is supported even more by the fact that the earliest translators of Aristotle were part of a circle of scholars associated with Hereford, where astrology was a prominent goal of translation activity.

The general outlines of the importation of Aristotle into the West are well established.[52] Early in the twelfth century, more of Boethius's translations of Aristotle's logical works were recovered, namely, the *Prior Analytics*, *Topica*, and *Sophistici elenchi*. In the middle of the twelfth century, James of Venice translated a number of works: the *Posterior Analytics* (which completed the logical corpus), the *Physica*, *De anima*, *Metaphysica*, and some of the *Parva naturalia* treatises, as well as some commentaries. In addition to James, Henricus Aristippus, Gerard of Cremona, and other, anonymous scholars had translated large portions of the Aristotelian corpus, and added Pseudo-Aristotelian treatises as well. Outside of the logical texts, however, there is not a great deal of evidence that the Aristotelian works achieved widespread use until the thirteenth century.

Two English figures in particular stand out in their early use of Aristotle's

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[51]It may be that Adelard of Bath had some acquaintance with Aristotle's works during his travels, and especially through his contacts with Salerno. See Charles Burnett, "The Introduction of Aristotle's Natural Philosophy."

[52]See Bernard G. Dod, "Aristoteles Latinus," in *The Cambridge History of Later Medieval Philosophy*, edited by Norman Kretzman, Anthony Kenny, and Jan Pinborg, 45-79, Cambridge: University of Cambridge Press, 1982.

philosophy: Alfred of Shareshill (or Sareshel)[53] and Alexander Nequam (or Neckham).[54] Interestingly, both of these authors are tied into the circle of Hereford, though Alfred is known to have travelled to Spain. Alfred dedicated his translation of the Pseudo-Aristotelian *De plantis* to Roger of Hereford, and his original work *De motu cordis* to Alexander Nequam. So in addition to the interest in astrology and compotus evident with persons associated with Hereford, there was also an interest in the works of Aristotle.[55] The latter interest was, given Lemay's thesis, self-fulfilling; that is, because of an interest in astrology, the scholars naturally sought out Aristotelian texts in order to understand the basis of their astrological science.

Alfred is known both for translating and for writing commentaries on Aristotelian and Pseudo-Aristotelian works. In addition to translating the *De plantis* mentioned above, Alfred also translated the *De mineralibus*, which became attached to the fourth chapter of translations of Aristotle's *Meteora*. He may have translated other works from the *libri naturales* of Aristotle,[56] and he almost certainly wrote commentaries on them. Many of the

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[53]For Alfred, see James K. Otte, *Alfred of Sareshel's Commentary on the* Metheora *of Aristotle*, Leiden: E. J. Brill, 1988, pp. 3–15; the information is also present in Otte "The Life and Writings of Alfredus Anglicus," *Viator* 3 (1972): 275–291.

[54]For a more complete account of Alexander's life and works, see R. W. Hunt, *The Schools and the Cloister, The Life and Writings of Alexander Nequam (1157–1217)*, Oxford: Clarendon Press, 1984. This book was published posthumously, after being edited and revised by Margaret Gibson, from Hunt's doctoral thesis of 1936, a work that was frequently cited before the publication of the revised version.

[55]Roger French argued that Alfred, as well as Alexander, was part of an "English circle," which included Roger of Hereford, and perhaps Daniel of Morley and Robert Grosseteste, among others. See French, "The Use of Alfred of Shareshill's Commentary on the "De plantis" in University Teaching in the Thirteenth Century," *Viator* 28 (1997): 223–251, especially pp. 224–226

[56]Burnett, "The Introduction of Aristotle's Natural Philosophy," p. 31.

commentaries are no longer extant. He wrote a commentary on the *Meteora*,[57] and he refers to his own commentary on the *De generatione et corruptione*, though this has not yet been identified.[58] A 1664 catalog of Beauvais Cathedral also lists commentaries on *De caelo et mundo*, *De generatione et corruptione*, *De anima*, *De somno et vigilia*, *De morte et vita*, and *De colore celi*,[59] and in his extant works he cites the Aristotelian texts of most of these works, as well as the *Physica*, *Methaphysica*, *Ethica*, and a handful of others.[60]

Alexander, on the other hand, is part of this narrative not because he translated Aristotle's works, but because he was one of the earliest English writers to make use of the translations of Aristotle. He certainly gives high praise to Aristotle, writing that it is as superfluous to commend Aristotle's genius as it is to aid the sun with torches.[61] In fact, however, it is uncertain that Alexander had great familiarity with Aristotle's works outside of the logical works. It is also significant that Alexander was associated with the fledgling university of Oxford, and may have been one of the first to read Aristotle there. We shall return to Alexander, as well as other lecturers on Aristotle at Oxford, such as John Blund and Edmund of Abingdon, in a later section of this chapter.

During the thirteenth century, the natural philosophical works of Aristotle began to take on a standard form. By the middle of the thirteenth century, a body of texts, which

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[57]In a critical edition in Otte, *Alfred of Sareshel's Commentary*.

[58]Burnett, "The Introduction of Aristotle's Natural Philosophy," p. 32.

[59]Otte, *Alfred of Sareshel's Commentary*, p. 13, and Burnett, "The Introduction of Aristotle's Natural Philosophy," p. 32.

[60]Though Burnett is confident that he knew directly only the *Metaphysics*, *De caelo et mundo*, *Ethica vetus*, and *De causis*. See Burnett, "The Introduction of Aristotle's Natural Philosophy," p. 32–33.

[61]Paraphrased by Hunt, *The Schools and the Cloister*, pp. 67–68, from Alexander's *De naturis rerum*.

modern editors refer to as the *corpus vetustius*, had been established. This corpus included the major natural philosophical works, though they did not include the biological works.[62] Dod gives the following list of works, which includes some pseudo-Aristotelian texts, for the *corpus vetustius*: *Physica*, *De caelo* (also known as *De caelo et mundo*), *De generatione et corruptione*, *De anima*, *De memoria (et reminiscentia* is sometimes added to the title), *De sensu*, *De somno (et vigilia*), *De longitudine*, *De differentia spiritus et animae*, *De plantis*, *Meteorologica*, *Metaphysica*, and *De causis*.[63] By the late thirteenth century, after the translation activity of William of Moerbeke, the corpus was somewhat revised, and formed the *corpus recentius*.[64] But this takes us beyond the limits of what is necessary to our tale here.

In what way did the works of Aristotle become a part of the intellectual milieu of the thirteenth century? In large part, this was accomplished through the university, and the teaching of philosophy in the arts curriculum. At this point, however, it is best that we turn to the development of the institution of the university; we shall return later to the role that Aristotle's works played within the university curriculum, and especially at Oxford.

1.3. The Birth of Universities

As we saw in the previous section, a large number of scholars in England were interested in the benefits that Arabic and Greek science could lend to the study of astronomy and compotus. In that respect, Grosseteste might be seen as merely one more

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[62]Though there is evidence that Alfred of Shareshill knew of Aristotle's biological works. See Burnett, "The Introduction of Aristotle's Natural Philosophy," p. 33.

[63]Dod, "Aristoteles Latinus," p. 50. Dod also includes the translators of the texts that made up this corpus.

[64]Dod gives the contents of the *corpus recentius* on p. 51 of "Aristoteles Latinus."

interesting figure to add to the list of English scholars. I shall argue, however, that Grosseteste must be differentiated from those who came before him because of his role in introducing into English universities the first textbooks to make extensive use of the newly available Arabic and Greek astronomical material. It will be worthwhile, therefore, to devote some attention to the development of the university system at the end of the twelfth century.

The European university has been widely and deeply studied, and this brief introduction will by no means do justice to the volume of scholarly activity that precedes it.[65] My particular goal in is to introduce the reader to some of the basic characteristics of the medieval university so that the context for which Grosseteste produced his textbooks will be more clear. I will avoid many particular historiographic themes, such as arguments over primacy of founding, and will instead deal with broad characterizations of the university.[66] My account will neglect the great disparity in practices that can be found among the various instantiations of the general trends below; this is, unfortunately, an unavoidable result of the brevity of my sketch. I will not entirely forego the particulars of the development of universities, however. In the final section of this chapter, I shall discuss the development of the university at Oxford, clearly the institution that is most relevant to the story of Grosseteste.

One other warning is pertinent. The founding eras of the earliest universities date from the end of the twelfth century and the beginning of the thirteenth. Many of the developed features of university life that I shall discuss below can be clearly identified only

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[65]A study of the universities still begins with the magisterial work of Hastings Rashdall, *The Universities of Europe in the Middle Ages*, 3 vols., revised and edited by F. M. Powicke and A. B. Emden, Oxford: Oxford University Press, 1936. The best modern work to deal with the medieval university in general is H. De Ridder-Symoens, *A History of the University in Europe, Vol. 1, Universities in the Middle Ages*, Cambridge: Cambridge University Press, 1992, hereafter *HUE*.

[66]For a summary treatment of many of the historiographical themes of studies on the university, see Walter Rüegg, "Themes," in *HUE*, pp. 3–34.

at later dates. In Grosseteste's case, we are dealing with a university in its infancy, and indeed a period in which no university has reached the fully developed forms that will be in place by, say, the fourteenth century. Thus we will always have to be aware that, when we discuss the context of Grosseteste's textbooks, we must to some degree project backwards traditions and institutions that can confidently be placed only in later periods. For this reason, it is difficult to make strong arguments about such facets of Grosseteste's experience teaching at Oxford as how lectures were conducted, precisely how much of his texts would have been covered in lectures, and so forth. Nevertheless, even though arguments related to the university context must be made carefully, we can tentatively sketch a picture of the state of the university in the first quarter of the thirteenth century.

What was the university? Though a seemingly straightforward question, there is no simple answer, for the very concept of the university was still being worked out in the thirteenth century. In one respect, however, the university was an institution distinct from the more general, smaller-scale 'school,' places where a master taught students. Of these there were many in the twelfth century. These could be schools for the young, teaching basic grammar, or more advanced schools, teaching, for example, theology. Schools could be either secular or religious, based within cities or within cathedrals or monasteries. Hereford in the second half of the twelfth century probably housed quite a large school, perhaps at the cathedral.[67] According to a poem by Simon du Fresne, the seven liberal arts, as well as *fisis* (probably best understood as natural philosophy), were taught at Hereford,[68] while Roger

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[67]See Russell, "Hereford and Arabic Science," p. 21; French, "Foretelling the Future," pp. 460–1; and Alan B. Cobban, *The Medieval English Universities: Oxford and Cambridge to c. 1500*, Berkeley: The University of California Press, 1988, pp. 27–28.

[68]For the poem, see Hunt, "English Learning," pp. 121–122.

of Hereford intimates that theology was taught there as well.[69]

The school of Hereford, as described by its contemporaries, presents a very similar picture of subjects available for study as will be the norm for universities, namely, the seven liberal arts, plus some level of philosophical instruction, and at least one of the higher faculties of theology, law, and medicine. Yet Hereford is never mentioned among the universities of the medieval period.[70] This is due in the main to a self-conscious contemporary identification of universities as something different from the schools that preceded them. In my opinion, this is best understood by considering the 'corporate identity' of universities that developed throughout the thirteenth century.

In the schools of the twelfth century, the master perpetuated his own position by successful teaching. The secular master collected fees from the students and was, in some respects, reliant on the goodwill of the city in which he conducted his business. The religious master, teaching for example in a cathedral, was not an independent master in the sense that the later university masters would be; he was an employee or member of the particular cathedral at which he worked. At larger schools, the presence of numerous masters helped to solidify the reputation of the school, and also gave the school greater economic viability within the community. The school of Hereford was probably of this type. Yet even these kinds of schools had not yet developed a sense of being something different from what had come before.

One significant factor in the development of the university as an institution was in response to the social pressures that teachers and students felt. A corporate identity was

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[69]Russell, "Hereford and Arabic Science," pp. 20–21, quotes from the preface of Roger of Hereford's compotus.

[70]Similar comparisons could be made to the school at Chartres. The phenomenon of an advanced school that never developed into a university is not limited to England.

formed as the masters, sometimes with the students, sometimes not, presented themselves as a group that deserved the protection of the crown or the church. By gaining the protection of a king or the pope, for example, and by securing privileges from the governing body of a city, the members of the university set themselves apart as a group. In tandem with the self-identification of the university's faculty and student-body as a corporate entity, the physical trappings of a corporation also developed. Rules and regulations for student conduct, statutes listing required curriculum, means of evaluating students, and the certification of teaching rights are among the details that were worked out as the corporate identity developed and sharpened its focus.

The practical benefits of corporate identity, however, do not tell the whole story of the university. The protection of Church and crown would not have been granted *to* the university were there not benefits to be had *from* the university. On one level, there was the purely practical result that numerous individuals were educated in matters that ecclesiastical and governmental bodies found useful, thus continuing a trend that had begun with the twelfth-century renaissance. But the universities were never merely trade schools.[71] In addition to the usefulness of the education, there was a spirit of learning within the early universities. As Stephen Ferruolo puts it, "[f]rom its very beginning, the university was established more as the embodiment of an educational ideal than a workable means to organize learning and teaching."[72] He acknowledges that other factors contributed to the rise of the university, such as the relationships that were established with governmental and

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[71]Alan B. Cobban stresses the practical side of university training as a key component of its survival as an enduring institutional form. See his "Reflections on the Role of Medieval Universities in Contemporary Society," in *Intellectual Life in the Middle Ages, Essays Presented to Margaret Gibson*, edited by Lesley Smith and Benedicta Ward, 227–241, London: Hambeldon Press, 1992.

[72]Stephen Ferruolo, *The Origins of the University, The Schools of Paris and Their Critics, 1100–1215*, Stanford: Stanford University Press, 1985, p. 3.

ecclesiastical authorities, but he agrees that the key to the establishment of the university was the establishment of a corporate identity. He cites other views that have been advanced to explain this identity: a shared notion of *amor scientiae*, a love of knowledge; a concept of the unity of knowledge derived from the recently translated Aristotelian works; or the desire for fame and money, or more simply for employability. But he concludes that it was primarily for the goal of teaching that the masters bonded together into a corporate entity. He bases his conclusion upon the fact that the earliest statutes of Paris deal with matters of teaching: what will be taught, in what manner, and by whom.

> Does this not suggest that the professional identity that the masters shared and that motivated them to form the university was based above all on their consciousness of their duties and responsibilities as teachers?[73]

As we shall see in the next chapter on Grosseteste's life, as well as in the chapters that analyze his textbooks, the motivation to teach was indeed a strong one for Grosseteste. It is no surprise that he found a home within the university system.

What would masters and students experience during their time within the university system? A contemporary term used for the universities was *studium*, and this best describes the general sense of what the universities were seen as: schools with organized faculties.[74] The faculties included teachers of the arts, who were frequently themselves studying towards a degree in a higher faculty, and typically at least one of the higher faculties of theology, law and medicine.

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[73]Ferruolo, *The Origins of the University*, p. 311

[74]The term *studium* was used throughout the thirteenth century. In the second half of the century, the phrase *studium generale* became common, *generale* indicating that students were drawn from places outside of the local environment. Eventually the phrase *studium generale* would achieve legal status, denoting imperial or papal patronage and conferring certain rights to the institution and its members. See A. B. Cobban, *The Medieval Universities: Their Development and Organization*, London: Methuen & Co. Ltd., 1975, pp. 23ff. Also note that the term *universitas* was not used until the late fourteenth century; thus the institutions of the early thirteenth century that I call 'universities' would have been referred to by contemporaries as *studia*.

Students usually entered university at about the age of fourteen or fifteen, though they could be older, and were expected to know how to read and write Latin, have a basic understanding of Latin grammar, and probably the ability to deal with elementary arithmetic.[75] No formal requirements of age, social status or preliminary education were in place in the early university, though generally the student needed to commit himself to the guidance of a particular master, who could choose whether or not to accept a student.[76] At this early stage of their career, students were known as undergraduates, and could typically be from any social or economic class. Students at this level might have a variety of goals: to study with a master in preparation for higher education, for example, or to gain schooling for whatever personal motivation the student had. During this time, the student heard lectures in the arts curriculum: the trivium of grammar, logic, and rhetoric; the quadrivium of arithmetic, geometry, music, and astronomy; and the three philosophies: natural, moral and metaphysical. The lectures that a student heard would depend on his own interests, what was available to him, and eventually on the statutory prescriptions of the university. Many a student at this stage would be a *scholaris simplex*, a student who is not taking examinations and will not progress to a degree.

A student wishing to progress further, or to take a degree, would spend about two to two-and-a-half years in study and examination. A student who did so could achieve a bachelor's degree in the arts. Many students would leave the university at this time, if they had made it this far, and use the degree for personal advancement, perhaps in courtly or

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[75]A general picture of student progression in the university can be found in Rainer Christoph Schwinges, "Student Education, Student Life," in *HUE*, pp. 195–243.

[76]For more information on the standards for enrollment at a university, see Rainer Christoph Schwinges, "Admission," in *HUE*, pp. 171–194.

ecclesiastical office.[77] Those who wished to study further, either at the same university or at another, spent an additional two to three years hearing more lectures in the arts, participating in disputations, and delivering their own lectures to undergraduates. Eventually, a student could achieve a master's degree, which often carried with it the obligation to teach in the arts faculty for a further two years. At this stage, he might progress to a study in a higher faculty, often teaching while doing so, and perhaps holding administrative positions within the university. In fact, however, some masters remained in the arts faculty to teach, without the intention of achieving a higher degree. Those who did study further might go on to achieve a licentiate in a higher faculty, and thereby the right to teach in that faculty.[78]

All the various steps in the progression of students cost a good deal of money, in payments to both masters and the university, as well as for the cost of living in a university town.[79] To achieve the higher degrees required substantial economic support from somewhere. Those from the upper-class might have been able to get by on their own wealth, while relatively poor students would probably have to rely upon patronage to be able to study for a long enough period of time to achieve degrees. In some places, the privileges

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[77]For more on what a university degree could do for a student, see Peter Moraw, "Careers of Graduates," in *HUE*, pp. 244–279. Careful studies of the graduates of Oxford have been made; see, for example, Jean Dunbabin, "Careers and Vocations," in *HUO1*, 565–605, Oxford: Clarendon Press, 1984; and Guy Fitch Lytle, "The Careers of Oxford Students in the Later Middle Ages," in *Rebirth, Reform, and Resilience*, edited by James L. Kittelson and Pamela J. Transue, 213–253, Columbus: Ohio State University Press, 1984.

[78]Schwinges, "Student Education, Student Life," notes an atypical progression for a limited class of aristocratic students. They are especially associated with law faculties and, because of their high social rank, rarely taught in the arts.

[79]On the costs of university education, see Schwinges, "Student Education, Student Life," pp. 235–241. Southern summarizes some of the privileges granted to scholars at Oxford by a legatine award of 1214 in "From Schools to University," p. 30, which include controlled rates on rents and food; the legatine award is also discussed in Graham Pollard, "The Legatine Award to Oxford in 1214 and Robert Grosseteste," *Oxoniensia* 39 (1974): 62–71. Nonetheless, life at university would still cost a substantial amount of money.

granted by a city to its university included financial support for poor students through, for example, scholarships or occasional feasts.

Students did not always comport themselves with the highest degree of scholarly restraint. Schwinges describes the opinion held by many townspeople of university students:

> Students are bawling and brawling, carousing and whoring, singing and dancing, playing cards and chess, are addicted to dice and other games of chance, are up and about town day and night, are swanking around in inappropriate, fashionable clothing, are behaving provocatively to burghers, guild members, and town law-and-order forces, are carrying arms, and are even making use of them. It is not the university and knowledge which attract them but the diversions and seductions of town life.[80]

University life, then, was not simply attending lectures and taking examinations, but was also a time in which students enjoyed themselves, sometimes perhaps more than was good for them.[81]

Nonetheless, learning was accomplished at the universities. The majority of students and masters were involved with the arts program, at least in the universities of northern Europe, such as Oxford and Paris.[82] In some places, the arts program was seen as preparatory to higher education, whereas in other locations the arts were deemed less important; similarly, different portions of the liberal arts received greater or lesser emphasis

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[80]Schwinges, "Student Education, Student Life," p. 223.

[81]Schwinges, "Student Education, Student Life," describes other aspects of student life, such as the development of colleges, student lodging, social life, holidays, regulations to restrict behavior, and the ordinary problems of life, such as food and clothing. See especially pp. 211–231.

[82]See Gordon Leff, "The *Trivium* and the Three Philosophies," in *HUE*, pp. 307–336, especially pp. 308–310. He argues that the emphasis on the arts in northern Europe was two-fold: the requirement for entering a theology faculty of either having passed through the arts faculty or being in a mendicant order, and the tradition from monastic and cathedral education to subordinate the arts to theology.

in different universities.[83] In a general sense, however, the arts were seen as the basic, introductory components of a university education. The seven liberal arts were in large part a descendant of the Greco-Roman educational system, and had persisted in the schools that existed prior to the universities. The translation movement, however, presented new opportunities and challenges to the university. Of the works translated from Greek and Arabic, Gordon Leff writes that,

> This new body of knowledge had a transforming effect upon the existing state of knowledge, of which the emergent universities were the direct recipients. It not only radically changed the content and enlarged the structure of the liberal arts,…it also challenged many Christian conceptions about the nature of the world and of man, and accordingly involved a redefinition of Christian belief in relation to philosophy, particularly the three philosophies, which were principally those of Aristotle, accompanied and mediated by Arabic interpretations.[84]

The thirteenth century, then, saw the appropriation of a great deal of previously unknown works into the framework of a traditional educational system.

There is not room here to discuss the various fields of the liberal arts and the philosophies, nor to disentangle the variations that certainly were present in the way these fields were taught at different times and places.[85] An additional complication is that, even if we can establish a curriculum (either as practiced or a contemporary idealization) for the completion of a degree, we do not know whether all students attended university for the full length of time required to receive a degree, and thus we cannot know what each individual student might have learned. For determining what was taught, however, three sources of information are most valuable. First, attestations of what particular individuals were teaching can establish to a minimal degree what was available to a university student. The relevance

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[83]See Leff, "The *Trivium* and the Three Philosophies," pp. 308ff.

[84]Leff, "The *Trivium* and the Three Philosophies," p. 311.

[85]For basic introductions to each field of the liberal arts, see David L.Wagner, ed., *The Seven Liberal Arts in the Middle Ages*, Bloomington: Indiana University Press, 1983.

of this type of evidence, however, is restricted to a limited time and place, and is not of itself sufficient to establish generalizations. We will make use of this kind of evidence in the final section of this chapter, which deals with the particular situation at Oxford. The second type of evidence is the textual evidence that has passed down to us in the form of contemporary works: treatises, textbooks, quaestiones, and so forth. Because this kind of evidence for the earliest decades of the thirteenth century is spotty, no general synthesis has yet emerged; that is, few manuscripts that are dateable to this era and that were clearly used in the university are available. Yet texts that were written in this period, even if available for the most part only in later editions, are of obvious worth, for they reveal the interests of scholars within the university context. In fact, the basis for the present research project is the examination of two of these works. The value of this approach, it is hoped, will be demonstrated in the relevant chapters of this dissertation.

The third source of information on the curriculum of the early university is the statutes of the period. These texts represent documents created by members of the university, and are thus of obvious value. Even these texts, however, must be approached with caution. In the first place, there are few that date from before the middle of the thirteenth century. We shall see that distinct changes occur by the end of the century, and so we can make only reasonable guesses about the situation prior to this period. We will also see that, in the case of Oxford in particular, curricular statutes are found only for a relatively late period. This raises the additional question: how far back can we draw inferences from statutes? That is, can a statute from 1268 or 1340 tell us anything about the curriculum at the beginning of the thirteenth century? And does the fact that something is not mentioned, such as the study of the quadrivium, necessarily imply that that particular subject was not studied at all?

An additional complication is that statutes are not straightforward witnesses for the practice of the period. They require interpretation. For example, we must ask whether they

establish already standard practice as normative, and thus accurately reflect what was being taught, or whether they are attempts to regulate practice, implying that a variety of practices were in fact in existence? In addition, the texts that were written during this period often attest to emphases different from what the statutes would suggest. The implications of this fact will resurface in the analysis of Grosseteste's textbooks in subsequent chapters. Nevertheless, we shall attempt to draw a few conclusions about the university arts curriculum from the sources available to us.

The earliest set of university statutes detailing the requirements for a master's degree in the arts comes from Paris, and dates from 1215.[86] In this case, it is quite clear that the statutes were promulgated in order to prescribe proper activities in the university. They were officially granted by the papal legate, Robert de Courçon, and probably embody the principles agreed upon at a prior meeting of university and papal representatives.[87] In addition to various other topics, the statutes of 1215 prescribe for a course of study in the arts: the *Organon* of Aristotle and the *Isagoge* of Porphyry in logic, the two books of Priscian (*Priscianus maior* and *Priscianus minor*) in grammar, the *Barbarismus* of Donatus and the *Topica* of Aristotle in rhetoric, and Aristotle's *Ethica vetus* and *Ethica nova* (portions of the *Nichomachean Ethics*). No books are prescribed for the study of the quadrivium, and Aristotle's *Metaphysica* and books on natural philosophy are expressly forbidden. Pearl Kibre points out that the only mention of the quadrivium in the 1215 statutes is that "no books other than those of the philosophers, rhetoricians, and

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[86]See Hastings Rashdall, *The Universities of Europe in the Middle Ages*, vol. 1, 2nd edition edited by F. M. Powicke and A. B. Emden, Oxford: Clarendon Press, 1936, pp. 439ff.

[87]Gordon Leff, *Paris and Oxford Universities in the Thirteenth and Fourteenth Centuries*, New York: John Wiley & Sons, Inc., 1968, p. 25.

quadriviales, might be lectured on in feast days."[88] This seems to imply that quadrivial subjects were indeed taught, but the statute provides no details of topics or texts. Clearly the emphasis was on the trivium and moral philosophy. This is due in part to a strong reaction against the newly translated natural philosophical works of Aristotle (even though, as seen from the list above, the logical and ethical texts were utilized). But the proscription against Aristotle was not enacted at Oxford, for example, and so we can see that statutes can mislead us if we generalize uncritically from them.

Statutes from a few decades later show that major changes occurred at Paris, either in practice or at least in what was considered proper for inclusion in the curriculum. Statutes of 1252 from the English nation[89] for attaining the bachelor's degree require the same books as the 1215 statutes, but also include Aristotle's *De anima* (formerly prohibited), Boethius's *Divisiones* and *Topica*, and Gilbert de la Porrée's *Sex principia*. But these statutes were only for the bachelor's degree; in 1255, a statute regarding the books on which a master was to lecture include not only the previous works, but also nearly the entire Aristotelian *corpus vestutius* plus the *De animalibus*. At some point in the intervening four decades, then, Aristotle's works had again achieved favor and were recognized as being part of the proper curriculum of the university. The arts of the trivium, clearly, were valued throughout the period. What of the quadrivium? The statutes for Paris from the thirteenth century essentially neglect this portion of the arts, but it is clear from other sources of evidence that the quadrivium was not being neglected by all members of the university. In

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[88]Pearl Kibre, "The *Quadrivium* in the Thirteenth Century Universities (with Special Reference to Paris)," *Actes du quatrième congrès international de philosophie médiévale*, published as *Arts libéraux et philosophie au moyen âge*, 175–191, Montreal: Institut d'études médiévales, 1969. The quotation, from p. 175, is her translation of the Parisian statute.

[89]The 'nations' were student organizations within the university; see Pearl Kibre, *The Nations in the Medieval University*, Cambridge, MA: Mediaeval Academy of America, 1948. For the statutes of 1252, see Rashdall, *The Universities of Europe,* vol. 1, pp. 441–442.

addition, as we shall see below, it certainly was not being neglected at Oxford.

One source of evidence that the quadrivial arts were actively pursued is that scholars associated with the University of Paris were producing books on the quadrivial subjects during the first half of the thirteenth century. In addition to these original treatises, two other sources are particularly relevant: guides or manuals produced for the benefit of students, and *quodlibeta* and *questiones disputatae* on quadrivial topics.[90] An anonymous guide written by a Parisian master for students in the arts lists works for each of the quadrivial arts: Boethius's paraphrase of Nichomachus of Gerasia's work for arithmetic; Euclid's *Elements* as the text for geometry; Boethius's *De musica* for music; and Ptolemy, at least the *Almagest*, for astronomy.[91] In addition, quodlibetal questions exist for some of the quadrivial arts, though these tend to date from later in the century.[92] Kibre also emphasized that Roger Bacon, writing during the third quarter of the century, insisted that mathematical sciences are an essential part of a proper university curriculum;[93] this vociferous master, at least, promoted the quadrivial arts, as well as other mathematical science.

Original works in the areas of the quadrivial arts and mathematical sciences were being produced in large numbers, and masters did not rely upon only the translated works mentioned in the anonymous guide. Alexander of Villedieu's *Carmen de algorismo* and John of Sacrobosco's *Algorismus* both date from the first half of the thirteenth century, and both deal with the use of Arabic numerals in an elementary fashion suitable for university

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[90]Kibre, "*Quadrivium*," p. 176ff.

[91]Kibre, "*Quadrivium*," pp. 181, 183, 186, and 187.

[92]For example, see Kibre "*Quadrivium*," p. 187.

[93]Kibre, "*Quadrivium*," pp. 177ff.

instruction.[94] Sacrobosco also composed an astronomical textbook, *De spera*, with which we shall deal at greater length in a later chapter, and a compotus, as well as tracts on the astrolabe and quadrant. Later in the thirteenth century, masters such as Albertus Magnus, Thomas Aquinas, and Roger Bacon would stress the need for instruction in the quadrivial arts, as well as the proper relationship between the different sciences. It would be difficult to construct a reasonable scenario in which the degree of interest among contemporary masters, demonstrated by their creative work, did not impact the teaching at the university, even if those interests are not reflected in the statutes.

The late thirteenth and fourteenth centuries saw even further increase in the attention paid to the quadrivial arts. As the number of works by university masters on these subject areas grew, the statutes began to list texts that were required. At Oxford, for example, in 1350, statutes list Euclid for geometry, Boethius for arithmetic, and require that works be read in compotus, algorismus and astronomy.[95] The judgement of modern scholars, however, is that Oxford had a stronger tradition during the thirteenth century for teaching the physical sciences, and so the general relevance of this statute is not clear.[96] We shall return to Oxford in the final section of this chapter.

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[94]See Guy Beaujouan, "Él'nséignement de l'arithmétique élémentaire à l'université de Paris aux XIII^{e} et XIV^{e} siècles," in *Homenaje a Millás-Vallicrosa* 1, 92–124, Barcelona: Consejo superior de investigaciones cientificas, 1954, especially pp. 106ff.

[95]The statutes list Euclid's and Boethius's names explicitly, but for the other quadrivial arts list only the names of texts, "*Compotum* cum *Algorismo*, tractatum *De spera*," in *Statuta Antiqua Universitatis Oxoniensis*, edited by Strickland Gibson, Oxford: Clarendon Press, 1931, p. 33. It is assumed by virtually all modern scholars that the *De spera* referred to is Sacrobosco's, but no convincing argument has been presented to explain why the statute must refer to Sacrobosco's work, and so the assumption is unwarranted.

[96]For example, see Edward Grant, "Science and the Medieval University," in *Rebirth, Reform, and Resilience*, edited by James L. Kittelson and Pamela J. Transue, 68–102, Columbus: Ohio State University Press, 1984, especially p. 71, where he cites the work of James Weisheipl, which I shall cover in greater detail below.

In the area of astronomy in particular, the thirteenth century saw the production and incorporation of a great deal of new material into the university context. Olaf Pedersen, in a survey of manuscripts, has shown that a *corpus astronomicum* developed during the latter half of the thirteenth century.[97] He examined in particular manuscripts that he argued could "be taken as representative of the scientific interests of successive generations of teachers."[98] While this does not imply that all of these texts were actively taught in the university, it would require a torturous explanation to account for the prevalence of these texts if interest in astronomy were not strong in the universities. The corpus, as Pedersen saw it, began in its earliest stages with the inclusion, in the same manuscript, of works on algorismus, compotus, and a basic work on astronomy, usually Sacrobosco's *De spera*; frequently, a calendar, treatises on astronomical instruments, and some astronomical tables were also included. By the fourteenth century, the corpus had expanded to include *theorica planetarum* (works on the planetary motions), a greater number and variation of astronomical tables, more texts on instruments, and translated texts by Arabic authors (which had before been present only implicitly in the introductory works that made use of them). It is not clear that these manuscripts represent *curricular* changes in the university, but certainly they are suggestive that astronomy was an important science within university circles, just as it had been among the English translators of the twelfth century.

Before we move on to discuss the situation at Oxford, it will be worthwhile to spend a little time describing the methods of instruction in the university. We do not have a clear glimpse into the experience of students in the classroom, but we can make a few reasonable

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[97]Olaf Pedersen, "The *Corpus astronomicum* and the Traditions of Medieval Latin Astronomy" in *Astronomy of Copernicus and Its Background*, edited by Owen Gingerich and Jerzy Dobrzycki, *Studia Copernicana* 13 (1975): 57–96.

[98]Pedersen, "*Corpus astronomicum*," p. 74.

generalizations.[99] The two main kinds of classroom activity were lectures and disputations. Undergraduate students would attend numerous ordinary lectures, given by masters, often in the morning, in which the standard texts were read and then commented upon. Cursory lectures were given by bachelors as part of their training, and generally supplemented the ordinary lectures. Masters might also offer extraordinary lectures, which were frequently on texts not demanded by the curriculum but for which there was interest among the students. More advanced students would also attend and participate in disputations,

> in which set questions were debated, and objections and replies presented by successive opponents and respondents, ending with a final resolution or determination, which always seems to have been the prerogative of masters, except during the bachelors' period of determining or disputing during Lent.[100]

Participation in disputations came at a later stage in a student's education, and thus might never have been experienced by those students who left university early or who did not seek a degree. When a student had heard the required lectures and participated as required in disputations, a course of study that normally took about four years, he could choose to determine, in other words become a bachelor and enter the course of study towards the master's degree. He had to swear he had attended the prescribed lectures and disputations, and to bring forth witnesses to testify that he had done so. After this process, the student would attend and participate in further disputations, as well as present cursory lectures. After another three or four years, the student could be presented by his master for inception. This began another process of testifying that he had fulfilled the requirements, and testing by other masters to ensure that his education had been sufficient. After completing certain ritual requirements, such as presenting an inaugural lecture and presiding at a disputation, the student finally became a master.

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[99]See Leff, "The *Trivium* and the Three Philosophies," pp. 326ff.

[100]Leff, "The *Trivium* and the Three Philosophies," p. 326.

We now have a general picture of the early years of the medieval university. The generalizations of the previous section have been intended to give the reader a sense of the context in which Grosseteste operated. Each university, however, was unique, and the experience of one would have been different from the experience of another. We shall thus end this chapter with a brief history of the early decades of the University of Oxford so that we can better place Grosseteste in his proper environment.

1.4. The Growth of the University of Oxford, with an Emphasis on the Teaching of Quadrivial Subjects and Natural Philosophy

The city of Oxford in the twelfth century probably seemed an unlikely place for one of the preeminent—not to mention earliest—universities of the middle ages to arise. It had no cathedral, was merely an archdeaconry, and lacked any great tradition of monastic education. It had some strategic significance, but was not particularly important to the crown. It was merely one of many English towns that hosted masters and schools during the twelfth century, a modest town within the large diocese of Lincoln.[101] And according to Daniel of Morley, around 1180, it was Northampton, not Oxford, that had a reputation in England for the teaching of the arts.[102]

We do not know a great deal about the schools at Oxford during the twelfth century. According to Southern, we have evidence for two masters who taught in the first half of the

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[101]Southern says that it was "one of three or four medium-sized towns in the diocese of Lincoln," and that it had fallen from its place as the sixth or seventh largest English town after depopulation following the Norman Conquest, "From Schools to University," p. 4.

[102]Southern, "From Schools to University," p. 11. For more on Northampton, see H. G. Richardson, "The Schools of Northampton in the Twelfth Century," *English Historical Review* 56 (1941): 595–695. See also Cobban, *The Medieval English Universities*, pp. 29ff.

century.[103] Theobald of Etampes taught in Oxford from shortly before 1100 until the 1120s. His extant correspondence suggests he was interested in theological matters, but it is not clear that he taught anything more than elementary subjects. Robert Pullen taught in Oxford for about five years, lecturing on the scriptures, before he departed for Paris. In the same period, that is, around 1135, a few other prominent scholars were in Oxford, though it is not clear whether they were teaching.[104]

After 1135, however, Oxford "sinks from sight as a scholastic centre,"[105] and remained so for about fifty years. In other respects, however, Oxford was growing, becoming more prominent as an English town. When England experienced civil wars during this period, military leaders realized that Oxford was strategically important during such times of crisis.[106] It was centrally located in the kingdom: it was at the crossroads of a number of important routes, connecting London, Southampton, Northampton, Cambridge, Bristol, Winchester, Bedford, Buckingham, Worcester, and Warwick, and offered access to the southern coast, Ireland, and the continent.[107] There was a castle in Oxford, as well as a royal mint, and a royal palace had been built at nearby Woodstock in 1100. In addition, two

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[103]Southern, "From Schools to University," pp. 5ff, and Cobban, *Medieval English Universities*, pp. 37–38.

[104]Examples of scholars active at Oxford at this early date include the historian Geoffrey of Monmouth; Walter of Coutances, the archdeacon of Oxford; and Robert de Chesney, later bishop of Lincoln. See Southern, "From Schools to University," p. 8.

[105]Southern, "From Schools to University," p. 8. Southern admits that positive evidence is lacking, but that a few clues suggest that Oxford was not a significant place for schools during this period.

[106]See Southern, "From Schools to University," p. 12; Cobban, *Medieval English Universities*, pp. 34–35; and Leff, *Paris and Oxford Universities*, pp. 76–77.

[107]Its location on the river Thames has also been suggested as an important part of its strategic importance, but Cobban points that the Thames is not easily navigable at Oxford, and it was not an important region for river traffic. See *Medieval English Universities*, p. 35.

guilds, those of the weavers and leatherworkers, were present in the city, suggesting a favorable economic climate.

Ecclesiastically, too, Oxford's importance grew. The Augustinians were there in force, in the college of secular canons at St. George-in-the-Castle, founded 1074; the Priory of St. Frideswide, begun in 1121; and Osney Abbey, made a priory in 1129, and an abbey in 1154. In addition, a Benedictine nunnery was in nearby Godstow from 1132.[108] Ecclesiastical courts also became very prominent in Oxford in the last decades of the twelfth century. Not only were its central location and easy land access significant to its becoming a convenient place for courts to meet, but the litigation between the Augustinian houses at St. Frideswide and Osney was abundant. As a central location for the courts, it brought dignitaries and their retinues to Oxford, benefitting the community financially and intellectually. Combined with increasing royal attention, Oxford was on its way to prominence.

There was no reason, however, that a university need have developed in Oxford simply because the location was convenient. London, for example, was a prominent city, significantly larger than Oxford, yet a medieval university did not develop there. The key to the development of a university in Oxford, according to Southern, was the presence of the courts.[109] The active courts at Oxford drew lawyers to the city. To supplement their income, they probably turned to teaching. Law, as a profession and as a subject for teaching, required both classroom instruction in theoretical principles and observation of courts in session. Oxford was in a position to offer both. In 1190, Emo of Friesland came to Oxford

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[108]Cobban, *Medieval English Universities*, p. 35.

[109]Southern, "From Schools to University," pp. 17ff. Rashdall, in *Universities of Europe*, vol. 3, pp. 12ff, argues that Oxford was the site to which a number of English masters migrated from Paris when Henry II recalled English scholars from France in 1167. The case for this supposed migration is slim; see H. E. Salter, "The Medieval University of Oxford," *History* 14 (1929–1930): 57–61.

to study law. Emo was not a particularly significant individual in his own day, but he was the first foreign student that we know by name who came to Oxford to study law. Oxford had finally achieved an international reputation for teaching.

It was not with the teaching of law, however, that Oxford's reputation would become entrenched during the thirteenth century. It was instead in the areas of the arts and theology that Oxford would achieve prominence. This is surprising given Paris's preeminence in those two areas. Southern suggests that war between France and England, especially from 1193 to 1204, made it very difficult for English students to travel to France for an education.[110] In the same period, present in Oxford were certain prominent lecturers in theology and the arts whose reputations undoubtedly brought students to Oxford. It is not clear, unfortunately, why these masters were in Oxford. For now, we are limited to assuming that the vicissitudes of circumstance played a large part in their residence, leaving us with the situation that Oxford's rise as a *studium* was due in no small measure to chance.

The reputation of the Oxford *studium* at this early stage in its development was simply not sufficient to attract masters and students. Instead, it was the reputation of individual masters who brought students to Oxford. One of the most important of these early masters was Alexander Nequam, whom we met above as one of the earliest teachers to use the newly translated Aristotelian works. Alexander lectured in theology and preached frequently in Oxford, beginning in about 1190, before he entered the monastic life sometime around 1200.[111] It is difficult to know precisely on what he lectured and which among his works were written later, though Southern suggests that even later works reflect the topics

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[110]Southern, "From Schools to University," p. 21.

[111]See Hunt, *The Schools and the Cloister*, pp. 9ff.

with which he was concerned while teaching.[112] He commented widely on the scriptures; some of these commentaries include examples of disputations, which likely were drawn from his teaching experiences.[113] He wrote a theological work, the *Speculum speculationum*, as well as scientific treatises, the most famous of which are *De naturis rerum* and *Laus divinae sapientiae*. It is especially in these latter works that his use of Aristotle and other translated scientific works becomes clear.[114]

Two other prominent masters lectured on Aristotle while teaching in the arts during the earliest years of Oxford. Edmund of Abingdon lectured on the *Sophistici elenchi*, and his biographer insisted that he had a deep attraction to the quadrivial arts.[115] John Blund lectured on the *libri naturales* of Aristotle while in the faculty of Arts.[116] We unfortunately know very little of the content of Blund's lectures beyond the fact that Aristotle was of central importance. In both cases, they probably received their own education at Paris before coming to Oxford to teach, and both studied theology while there. But their use of Aristotle while teaching at Oxford clearly indicates a growing body of students at the levels of undergraduate and bachelor with an interest in philosophy and, correspondingly, the arts.

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[112]Southern, "From Schools to University," p. 23.

[113]See Hunt, *The Schools and the Cloister*, pp. 102–103.

[114]The extent of his knowledge of Aristotelian and pseudo-Aristotelian works is in question. D. A. Callus confidently asserts that Alexander knew *De caelo et mundo*, *Metaphysica*, *De generatione et corruptione*, *De anima*, the *Ethica vetus*, and the *Liber de causis*; see his "Introduction of Aristotelian Learning to Oxford," *Proceedings of the British Academy* 29 (1943): 229–281, p. 236. Hunt, on the other hand, in *The Schools and the Cloister*, questions Alexander's knowledge of the Aristotelian corpus except the logical works; see especially pp. 68ff.

[115]As stated by Callus, "Introduction of Aristotelian Learning to Oxford," p. 244.

[116]Regarding Blund, I have relied heavily on Callus, "Introduction of Aristotelian Learning to Oxford," pp. 241–252.

The pattern represented by these two masters is indicative of the general picture of university learning by Englishmen at the beginning of the thirteenth century. They received their elementary education in England, but then went to Paris for advanced training in the arts. They returned to England, for reasons not entirely clear to us, and taught in the arts while studying for a theological degree. A similar path has also been suggested for another prominent master of Oxford, Robert Grosseteste. But as we shall see in the next chapter, he may have taken an alternative route to teaching at Oxford, a route that is relevant to his early interests in astronomy and compotus.

When did Oxford truly become a university, as opposed to a mere gathering of masters? Its origins lie in the last decades of the twelfth century, but a significant symbolic date is 1214. Rashdall and Southern both present evidence for the presence of a number of teaching masters in the late twelfth century, and lectures on Aristotle were there in the first decade of the thirteenth century. Further evidence of an active school comes from 1209.[117] A woman was killed by a scholar in Oxford; in response, some townsfolk raided the hostel in which the scholar had been living, and two or three scholars were seized and executed. A *suspendium clericorum*, a cessation of teaching, was declared, and scholars dispersed from Oxford.[118]

It was not until 1214 that the matter was settled. A papal legate reached an agreement with the king and the city of Oxford to bring back the masters and students. Among other privileges, the award controlled rents and food prices for scholars, stated that arrested

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[117]Rashdall, *Universities of Europe*, vol. 3, pp. 33–34; Leff, *Paris and Oxford Universities*, p. 78; Cobban, *Medieval English Universities*, pp. 44–45.

[118]Rashdall claimed that many of the scholars migrated to Cambridge, and began the university there; Rashdall, *Universities of Europe*, vol. 3, p. 334; see also Cobban, *Medieval English Universities*, pp. 50ff. Rashdall also notes Matthew Paris's claim that 300 scholars left Oxford at this time; even if the number is exaggerated, which is not certain, his claim implies a very large body of students and masters were in residence in Oxford in 1209.

scholars would be handed over to the bishop of Lincoln, required the city to adopt a charter enforcing the articles of the award, and spelled out a penance to be performed by those responsible for executing the scholars five years previously.[119] With this legatine award, the University of Oxford had sealed in writing its corporate identity. Many of the features of a *studium* reach back into the twelfth century, but with the document of 1214, it is incontrovertible that a university was present in Oxford.

A significant feature of the University of Oxford is that it enjoyed a reputation for greater attention to the mathematical and quadrivial arts than any other thirteenth-century university, Paris included. We have already seen that Aristotle's works were present at an early stage of the university's development. In addition, tantalizing hints of connections between one of the earliest Oxford masters to know Aristotle, Alexander Nequam, and the circle of scholars at Hereford, with their interests in Arabic and Greek science, suggest possible routes by which new scientific texts and ideas made their way into the Oxford community.

Even though we can only conjecture about the sciences in the earliest years of the university, we can stand on firmer ground regarding the rest of the thirteenth century. J. A. Weisheipl has gathered much of the evidence for the teaching of scientific subjects at Oxford.[120] As he points out, texts were available from the translation movement of the previous century. Mathematics and astronomy had been of keen interest to the translators, and texts in these subject areas could fit neatly into the quadrivial arts. The *libri naturales* of Aristotle were available in the early decades of the thirteenth century, and the commentaries of Averroes were probably available after 1230. These texts did not fit into the traditional

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[119]Pollard, "The Legatine Award," summarizes the award with a list of eleven injunctions on p. 64.

[120]See J. A. Weisheipl, "Science in the Thirteenth Century," in *HUO1*, 435–469.

arts of the quadrivium or trivium, and so led to the incorporation of natural philosophy into the arts curriculum. These texts certainly represent what was available, but not necessarily what was taught; if nothing else, there was not sufficient time for the typical student to study all these texts.[121]

Nonetheless, we do know that a number of masters at Oxford were interested in the quadrivial arts and natural philosophy. Weisheipl states clearly where this interest began:

> Without doubt the most important figure in Oxford science in the early thirteenth century was Robert Grosseteste, whose long life…dominated the Oxford scene even into the fifteenth century. And Oxford science throughout the thirteenth century can be understood and appreciated only in the light of Grosseteste's ideals, inspiration and influence.[122]

We shall discuss Grosseteste's intellectual development in more detail in the next chapter, but it is worth noting here that Weisheipl mentions three areas in which Grosseteste's influence was most heavily felt. First, he made use of the new Aristotelian works now available in the university setting. Second, he developed his philosophical and theological doctrines about light. And, third, he emphasized the need for mathematical training, especially geometry, to understand the behavior of light.[123] James McEvoy, in agreement with Weisheipl's high opinion of Grosseteste's influence at Oxford, writes of Grosseteste that

> his writings and his fame helped to establish at Oxford an interest in scientific and mathematical learning that flourished in the fourteenth century, and which might well not have got off the ground without his inspiration.[124]

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[121]Weisheipl, "Science in the Thirteenth Century," pp. 439–440.

[122]Weisheipl, "Science in the Thirteenth Century," p. 440.

[123]Weisheipl also notes that Grosseteste began to study Greek late in life, but the relevance of this portion of his life to developments at Oxford is not clear.

[124]James McEvoy, *The Philosophy of Robert Grosseteste*, Oxford: Clarendon Press, 1982, pp. 18–19. For more on Grosseteste's lasting influence at Oxford, see A. C. Crombie, *Robert Grosseteste*

Grosseteste's importance is thus clear.

Grosseteste was especially influential among the Franciscans at Oxford.[125] His influence can be seen among such notables as Adam Marsh and Bartholomeus Anglicus, and into the next generation with Roger Bacon and John Pecham. Roger Bacon, in fact, insisted that it was only in English schools that mathematics was truly appreciated, in the eminent persons of Grosseteste and Marsh, who were "perfect in divine and human wisdom."[126] Bacon also claimed that Grosseteste, Marsh and unnamed others—in the words of a modern author—"revived the tradition of applying mathematical explanations in diverse fields to discover causes."[127] Of Grosseteste, Bacon wrote that he "was the only one above all men to know the sciences."[128] And a large treatise entitled *Summa philosophiae* was written around 1265–1270 and was faithful to Grosseteste's legacy, suggesting that his influence was still a major factor three decades after he had departed the university community.[129]

Weisheipl does not, however, credit Grosseteste as the key figure in the

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and the Origins of Experimental Science, 1100–1700, Oxford: Clarendon Press, 1953, pp. 135–188.

[125]See, for example, McEvoy, *Robert Grosseteste*, Oxford: Oxford University Press, 2000, pp. 154–159.

[126]Quoted in McEvoy, *The Philosophy of Robert Grosseteste*, p. 14.

[127]McEvoy, *The Philosophy of Robert Grosseteste*, p. 14.

[128]Solus dominus Robertus…prae aliis hominibus scivit scientias. Quoted and translated by Weisheipl, "Science in the Thirteenth Century," p. 443.

[129]The work was often attributed to Grosseteste. The author is still unidentified, and is usually referred to as pseudo-Grosseteste. The work is contained in *Die philosophischen Werke des Robert Grossteste, Bischofs von Lincoln*, edited by Ludwig Baur, 275–643, *Beiträge zur Geschichte der Philosophie des Mittelalters*, Band 9, Münster: Aschendorffsche Verlagsbuchhandlung, 1912. See also, C. K. McKeon, *A Study of the* Summa philosophiae *of the Pseudo-Grosseteste*, New York: Columbia University Press, 1948.

incorporation of Aristotle into the curriculum.[130] As we have seen above, Oxford masters were lecturing on Aristotle in its early years. Statutes from 1268 required a determining bachelor to have heard lectures on the *Physica*, *De anima*, and *De generatione et corruptione*, and, in certain circumstances, the *Meteorologica*.[131] In addition, a number of masters are known to have lectured on the *libri naturales* throughout the thirteenth century. Weisheipl devotes a great deal of attention to both Adam of Buckfield and Geoffrey of Aspall, demonstrating a strong tradition of lecturing in natural philosophy in the faculty of arts.[132] This interest in natural philosophy at Oxford continued well into the fourteenth century.[133]

The quadrivial arts, too, were important. Later chapters of this dissertation discuss the presence of Grosseteste's astronomical and computistical works at the university, but we have already seen from Weisheipl that geometry and optics were important for those who were influenced by Grosseteste. We also possess a great deal of evidence that the quadrivial arts were important in the early part of the fourteenth century. Among the earliest statutes of the university is the requirement that the following books on the quadrivial arts be heard for determination: "six books of Euclid, the *Arithmetica* of Boethius, a *Compotus* with

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[130]McEvoy credits Grosseteste with a greater role in the establishment of Aristotle at Oxford. He writes, "without the stimulus of his [Grosseteste's] commentaries and translations the Aristotelean [*sic*] movement at Oxford would not have become what it did, or at least not so quickly." McEvoy, *The Philosophy of Robert Grosseteste*, p. 19.

[131]Weisheipl, "Science in the Thirteenth Century," p. 461.

[132]Weisheipl, "Science in the Thirteenth Century," pp. 462ff. For more on Aspall, see Enya Macrae, "Geoffrey of Aspall's Commentaries on Aristotle," *Mediaeval and Renaissance Studies* 6 (1968): 94–134.

[133]See John North, "Natural Philosophy in Late Medieval Oxford," in *The History of the University of Oxford*, vol. 2, *Late Medieval Oxford* (hereafter *HUO2*), edited by J. I. Catto and Ralph Evans, 65–102, Oxford: Clarendon Press, 1992.

Algorismus, [and] the treatise *De spera*."[134] These statutes dates from before 1350, but cannot be dated more precisely. Those statutes also list the amount of time that should be allotted to each topic: five weeks for Euclid, three weeks for the *Arithmetica*, and eight days for the *Compotus*.[135] Statutes that may date from later in the century also require eight days for the *Algorismus* and *De spera*.[136]

Weisheipl has noted a number of other works that were used in the Oxford community, though he cannot be sure which, if any of them, were used in teaching.[137] In arithmetic, he notes in addition to Boethius's *Arithmetica* and the *Algorismus* of the statutes, that books seven through ten of Euclid, devoted to the properties of numbers, might have been used, as well as a summary of Boethius by Thomas Bradwardine. Geometry may have been supplemented by a number of different treatises, and that texts in *perspectiva* (a science closely related to optics) probably would have been treated as geometrical. Astronomy, in addition to the *De spera*, might have included both the *Almagest* and *Tetrabiblos* of Ptolemy, works in the tradition of *Theorica planetarum* (at least by the fourteenth century), astronomical tables, a treatise on the quadrant, and works of Bradwardine. He also believes that Grosseteste's *Compotus* was used throughout the thirteenth century, but was supplanted by Sacrobosco's *De anni ratione* in the fourteenth. So while Weisheipl is unable to establish definitively that any of these texts were used in

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[134]…sex libros Euclidis, *Arsmetricam* Boycii, *Compotum* cum *Algorismo*, tractatum *De spera*…audierunt competenter. Strickland, *Statuta Antiqua*, p. 33, ll. 17–20.

[135]Strickland, *Statuta Antiqua*, p. 33, ll. 31–32 and 37–38; and p. 34, ll. 1–2..

[136]Strickland, *Statuta Antiqua*, p. 33, ll. 33–36. Strickland gives a date of before 1407.

[137]See James A. Weisheipl, "Curriculum of the Faculty of Arts at Oxford in the Early Fourteenth Century," *Mediaeval Studies* 26 (1964): 143–185.

teaching, their survival suggests that there was a great deal of interest in the quadrivial arts at Oxford during the thirteenth century. Certainly in the fourteenth century, mathematics and astronomy were flourishing at the University of Oxford.[138]

The reader now has a basic introduction to the first century of the university at Oxford. The attention given to the quadrivial arts and natural philosophy has not presented a full picture of the university, but such is not necessary. Our interest here has been to understand the environment in which Grosseteste worked, as well as the environment he helped to create through his work. The foci of the present study are his astronomical and computistical textbooks, and so we have sacrificed attention to certain aspects of the medieval university that were contemporaneously important, but which are not relevant to the questions that will arise in the following chapters. Before we move on to his textbooks, however, let us examine his life, so that we may more fully understand the milieu from which he came, for his life was by no means restricted to the university of Oxford.

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[138]See John North, "Astronomy and Mathematics," *HUO2*, 103–174.