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McCARTHY, Edward Randal, 1940-
MEDIEVAL LIGHT THEORY AND OPTICS AND DUNS
SCOTUS' TREATMENT OF LIGHT IN D. 13 OF BOOK
II OF HIS COMMENTARY ON THE SENTENCES.

City University of New York, Ph.D., 1976
History, medieval

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Medieval Light Theory and Optics And
Duns Scotus' Treatment of Light in D. 13
of Book II of his Commentary on the Sentences

by

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A dissertation submitted to the Graduate
Faculty in History in partial fulfillment of
the requirements for the degree of Doctor of
Philosophy, The City University of New York.

1976

This manuscript has been read and accepted for the Graduate Faculty in History in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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Acknowledgments

I wish to thank my adviser Professor Richard Lemay for his friendship, advice, criticism and unstinting support over the years. I also wish to thank Professors Howard Adelson and William Coleman for reading this study. Moreover I wish to acknowledge my debt to Professor Pearl Kibre, who first introduced me to Medieval Studies. A word of thanks should also go to Dean Hans Hillerbrand and Professor Gertrude Himmelfarb for their timely advice and support.

Of course I owe a debt of gratitude to the librarians at the Union Theological Seminary Library, the Duane Library at Fordham University, and the Butler Library at Columbia University. In addition a word of thanks is due to the Librarians at the Bibliothèque Nationale in Paris, the Vatican Library, the Nationalbibliothek in Vienna and the Biblioteca Comunale in Assisi. In addition a special word of appreciation is due to Father Luca Modric and Father Barnaba Hechich of the Scotist Commission.

To my Father I wish to say thanks for his support and understanding.

Medieval Light Theory and Optics And
Duns Scotus' Treatment of Light in D. 13
of His Commentary on the Sentences

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INTRODUCTION

Duns Scotus and Medieval Light

Theory and Optics

The problems encountered in the study of Medieval light theory and optics are due both to the nature of the tracts dealing with such subjects and the method of exposition. On the one hand, there are the theological treatises in which a discussion of light theory and some optics is integrated within the overriding theological perspective. The discussion of light here usually shows ontological and metaphysical preoccupations more than truly "scientific" ones. On the other hand there are the tracts written by natural philosophers in which theological considerations are minimal, and which represent a more scientific tradition. These tracts tend to be more optical than ontological and metaphysical. In addition the mode of exposition in the Latin west in the thirteenth and fourteenth centuries was that of Scholastic inquiry based on Aristotelian logic, following a basic format of question, disputation and conclusion. Although this mode of exposition persisted in the course of the later thirteenth and the fourteenth centuries, there can be noticed a departure from the earlier close adherence to Aristotle, who had been regarded by some as the ultimate authority and depository of truth to whom the answers to all questions had to conform. To others his philosophy had been considered a tool to be utilized and integrated with Christian doctrine and dialectic in the search for truth. By the fourteenth century however, a tendency emerged to replace this adherence to Aristotelian doctrine and method and to seek truth wherever it might be found without regard to the Aristotelian corpus or Christian doctrine. The fourteenth century scholars used an eclectic approach to their philosophic inquiry, borrowing from Neo-Platonic sources, Avicenna, and Averroes. The format of the inquiry also became less rigid. The names of Johannes Duns Scotus,

Siger de Brabant and William of Ockham are generally associated with this breakdown of the great thirteenth century synthesis of Aristotelian philosophy and Christian dialectic.

Johannes Duns Scotus (1265 - 1308) sits astride the two centuries, the thirteenth and the first decade of the fourteenth century. It is in the latter century that his works had their greatest influence. Unfortunately there is no official biography of Duns Scotus extant and hence there are many conflicting opinions about his birth, nationality and education. His scholarly accomplishments are for the most part contained in his Commentary on the Sentences of Peter Lombard, the theological text upon which all candidates for the degree in theology were required to comment. Duns Scotus himself, the Doctor Subtilis, is usually connected with profound philosophical and theological questions and is often synonymous with the subtle hair splitting dialectical exercises of the late Medieval Scholasticism. In general the topics usually discussed in literature connected with the career of Duns Scotus are theological and philosophical in nature. Some of the commonly discussed topics are his doctrines on original sin; the Immaculate Conception; predestination; the immortality of the soul; free will; the cognitive process; the formal distinction in re; freedom and existence; and his doctrine on contingency. This list is by no means exhaustive as indicated by the Index listing to the "Acts of the International Scotist Congress" held in Oxford and Edinburgh in 1966. Nowhere however do we find reference to a treatment of Duns Scotus in terms of questions based on natural science. However in Distinction 13 of Book II of his Sentence Commentary Duns Scotus did in fact discuss the nature of light, in this most natural place in the Sentence tradition, and thus his treatment falls

within that category of Medieval treatises on light and optics that are found incorporated into theologically oriented texts. The focus of attention here will therefore be on Distinction 13 and will be limited in scope to encompass the light theory found therein.

Although Duns Scotus' Commentary is in print, it presents a problem because the early printed editions were all based on faulty manuscript copies. Any serious study of Duns Scotus' thought therefore necessitates a return to the manuscript tradition. In addition there are in existence not one but four manuscript versions of his Commentary on the Sentences of Peter Lombard, because he lectured twice on the Sentences and each version has its own manuscript tradition.

The plan of procedure in the succeeding pages then is to provide, as accurately as possible, the important dates and events in the career of Johannes Duns Scotus; to establish the manuscript tradition for each of the four versions of his Commentary; to evaluate the position of each in the transmission of Duns Scotus' teaching over the centuries. Accordingly a reliable latin text for each version will be developed, together with an English translation of each version. The next step in the inquiry, will be an analysis of the discussion on the nature of light as found in Distinction 13. In addition, to determine how Duns Scotus' treatment of the subject fits into Medieval theories on light, a comparison will be made between his views and those of representative thirteenth century theologians and students of optics.

Chapter I

The Biography of Johannes Duns Scotus: the
History of the Text of his Commentary; and
the Plan of Study for Distinction 13 of Book II
of the Sentence Commentary

At various times in the past it had been popular to claim that Johannes Duns Scotus was Irish, English or Scottish¹ and that Duns was a family name and not the name of the town from which J. Duns Scotus originated.² It had been popular at one point to make Duns Scotus' educational background correspond to that of one of his contemporaries, William Peter di Godino O.P.³ These views can be traced through the works of such men as Luke Wadding,⁴ Ephrem Longpré,⁵ André Callebaut,⁶ Andrew George Little,⁷ and Carlos Balic.⁸ Today it is recognized that Johannes Duns Scotus was of Scottish origin;⁹ that he was born about 1265 in the town of Dunse in the County of Berwick in Scotland;¹⁰ and died in 1308 in Cologne.¹¹

There exists very little documentation in regard to his early life prior to his arrival at the University of Paris in 1302. Two known dates from the early period of his life are the date of entrance into the Franciscan Order in 1278 - 79 and the date of his ordination, March 17, 1291.¹²

In regard to Duns Scotus' education prior to his studies at Paris, it seems preferable for now to follow the reconstruction of events described by C. K. Brampton in his article, "Duns Scotus at Oxford, 1288 - 1301."¹³ According to Brampton, Duns Scotus studied at Cambridge for his Master's degree in the Arts program from 1284 to 1288.¹⁴ Brampton also concluded that Johannes Duns Scotus progressed normally through the Oxford program in theology between 1288 and 1301, lecturing on all four books of the Sentences of Peter Lombard between October of 1298 and October 1299.¹⁵ Duns Scotus then spent the remainder of 1299 and all of 1300 fulfilling the teaching tasks required of a graduate.¹⁶ Brampton suggested that he lectured for the year 1301 - 1302 and then went to Paris in 1302.¹⁷ It

is recognized that Duns Scotus gave an incomplete reading of the Sentence Commentary at Paris in 1302 - 03.¹⁸ Duns Scotus was forced to discontinue his studies at Paris in 1303 because he sided with Pope Boniface VIII in the latter's feud with King Philip IV of France. After a year's exile in England, Duns Scotus returned to Paris in 1304. In Brampton's opinion Duns Scotus then lectured on all four books of the Sentences between October 1304 and the end of April 1305.¹⁹ Andrew George Little suggested that the year 1305 - 06 was spent disputing questions with such contemporaries as Hervé de Nédelec and William Peter di Godino.²⁰ Duns Scotus spent the school year of 1306 - 07 as a Magister Regens at Paris.²¹ He was transferred to Cologne by the Franciscan Order in 1307 and died in Cologne on November 8, 1308.²²

The works of Duns Scotus appear in the Opera Omnia edited by Luke Wadding in 1639²³ and reprinted by the Vives Press in the late nineteenth century.²⁴ However Wadding presented these works uncritically and included many spurious works such as the Quattuor Libri Meteorologicorum.²⁵ Duns Scotus commented on the works of Aristotle and composed the Super Universalia Porphyrii Quaestiones.²⁶ He also produced a Quodlibet²⁷ and his famous opusculum De Primo Principio.²⁸ However by far the most prominent and mature of Duns Scotus' works is his Commentary on the Four Books of the Sentences of Peter Lombard. Both the Oxford and Paris versions of this Commentary are included in the Wadding - Vives Edition under their respective titles: Opus Oxoniense and Opus Parisiense. Both versions, like the other works found in this edition are presented uncritically. Modern efforts to restore the texts of Duns Scotus' Commentary will be treated in the coming pages.

Description of the Manuscript Tradition

The manuscript tradition for the Commentary of Johannes Duns Scotus

presents special difficulties for scholars because there are in existence four versions of Duns Scotus' Commentary on the Sentences of Peter Lombard. Of the four versions only one, the Ordinatio or, as it is frequently called, the Opus Oxoniense, is directly from the hand of Duns Scotus.²⁹ This version is the Oxford lecture read by Duns Scotus in 1298 - 99 and partially re-edited by him. Apparently he had planned to organize under the title Ordinatio a summary of his doctrine within the framework of the Commentary on the Sentences of Peter Lombard. To carry out his purpose Duns Scotus seems to have utilized the services of a secretary or socius to whom he dictated his responses to the various questions and objections covered within the framework of the Sentences. In so doing, Duns Scotus did not fully discuss each topic or argument, if he did not have the correct answer or formulation of the answer at the time of its initial treatment. Hence there are lacunae left in the Oxford lecture on the Sentences. In addition there are those responses to questions which were left incomplete originally but to which the author later added additional information. This additional information was apparently jotted down in the margin of the text by the secretary or the author himself under such sigla as "Scotus extra manu sua".³⁰ Unfortunately, Duns Scotus died in 1308 while many of the Distinctions of the Commentary on the Sentences were still only in a rough draft.³¹

Duns Scotus commented for a second time on the Sentences at Paris between 1300 - 1305. In this case we have only student notes of his lecture. These notes were usually taken down verbatim by the students and are referred to as a reportatio or reportation.³² Auguste Pelzer has given us the history of the transmission of the Paris Commentary for Book I in an article written in 1924.³³ Mgr. Pelzer points out the fact that all the early printed editions of the Paris Commentary are based on

faulty manuscript copies and thus should be considered as less than accurate.³⁴ In addition A. Pelzer indicated that the version of the Sentence Commentary known as the Additiones Magnae, which he called the Abridgment of William of Alnwick was not a true reportation but on the one hand an abbreviation of the Oxford Commentary and on the other an addition to it, since passages were added to it from the Paris Commentary.³⁵ The study which Carlos Balic did on Book II of Duns Scotus' Commentary on the Sentences³⁶ and the information contained in the still unfinished modern critical edition of the Opera Omnia of Johannes Duns Scotus³⁷ show that the pattern of transmission described by Pelzer for Book I also holds true for Book II of the Commentary.³⁸ In other words there exist three versions: the Oxford reading of the Commentary on the Sentences under the title Ordinatio; the Paris lecture entitled Reportatio; and the Additiones Magnae of William of Alnwick. But in addition, there exists a fourth version of the Sentence Commentary of Johannes Duns Scotus called the Lectura, which is actually a reportation of the reading of his Commentary on the Sentences at Oxford.³⁹

History of the Critical Edition

In the Middle Ages the Franciscan Order realized that Duns Scotus' works were distorted and that both his friends and detractors were quoting from these distorted texts. Hence the Order set up a commission to attempt to put forth the thought of the Master as close to the original "Liber Scoti" as possible. The Assisi, Biblioteca Comunale manuscript 137 is probably the result of this effort.⁴⁰ In modern times efforts to restore the original text of Duns Scotus began at the end of the nineteenth century with the application of the historical - critical method to Scholastic works. This is embodied in the works of Fidelis of Fanna, of Cardinal Ehrle, of Duhem and Grabman. They are followed in time by the studies of

Pelster, Pelzer and De Lorme.⁴¹ These authors questioned the reliability of the editions by pointing out inconsistencies between the editions and the manuscript traditions.

In 1924 Carlos Balic began a search throughout the libraries of Europe for manuscripts of the works of Johannes Duns Scotus. The results of his survey appeared in 1927 when he described 100 manuscripts and supplied a table of manuscripts and editions of the Commentary on the Four Books of the Sentences.⁴²

Another landmark event in the history of Scotist scholarship was the establishment in 1927 by the Franciscan editors at Quaracchi of a "Sectio Scotistica" under the direction of Fr. Ephrem Longpre.⁴³ The Quaracchi Scotist Section concentrated its efforts on discovering and photographing manuscripts. A restoration of the Metaphysica of Johannes Duns Scotus was also achieved.⁴⁴

Between 1931 and 1933 Carlos Balic added to his already impressive manuscript study some additional manuscript texts in relation to Duns Scotus' position on Mariology.⁴⁵

By far, the single most important event in the history of the Critical Edition occurred in 1938, when a General Chapter of the Franciscan Order decided to go ahead with a full restoration of the works of Johannes Duns Scotus similar to the project undertaken for Bonaventure. To this end a Scotist Commission was established in Rome at the Collegium San Antonio to supersede the work of the "Sectio Scotistica" of Quaracchi. Fr. C. Balic was appointed as the first President of the Commission.⁴⁶ Balic recruited from the Order twelve internal collaborators and many external collaborators. The internal collaborators identified within the text itself, Patristic, and other citations, and researched the "loci parralleli". In addition they began collecting a Scotist library.⁴⁷ Moreover they performed

the work necessary for the development and presentation of a critical edition.⁴⁸ The external collaborators took care of seeking out and photographing Scotist manuscripts throughout Europe. Notable among these was Fr. Ludwig Meier, who visited more than 300 libraries in Germany.⁴⁹ Fr. Uriel Smeets, along with others, presented their results in the form of a "Pro Manuscripto ad Usus Commissionis Scotisticae", in Lineamenta Bibliographiae Scotisticae (1942).⁵⁰

In the same year Carlos Balic circulated for review and criticism among a number of Medievalists his Normae in Editione Critica Operum Omnium J. Duns Scoti Servandae.⁵¹ The Scotus Commission brought out between 1950 and 1973 seven volumes of the critical edition of the Ordinatio, which included all of Book I and the first three Distinctions of Book II. In addition they produced a critical edition of Book I of the Lectura in volumes 16 and 17.

The Reception of the Critical Edition

In producing the critical text of the Sentence Commentary of Johannes Duns Scotus, the Scotist Commission relied very heavily on the Assisi, Biblioteca Comunale ms. 137, as the base text for the edition. Some criticism of this approach has been leveled at the Commission by François Masai and Fr. Ludwig Meier. While both men grant that the Assisi manuscript is of great value, they feel that either too much reliance was placed on it or that the ms. of Assisi was not examined as comprehensively as it might have been.⁵²

On this point Masai complained that the Commission neglected the services of a diplomatic and codicological study of the Assisi manuscript.⁵³ While a diplomatic study pays attention to the faithfulness of the reproduction of the manuscript text, codicology adds to this the details of the physical nature of the codex. The science of codicology gives the history

of the manuscript, thus enabling historians to glean information from the manuscript beyond the content of the written word. A codicological study of the Assisi manuscript would yield such information as the source of the text in the manuscript, the date of composition, the country, the town or university where it was done and perhaps the identity of the scribe. This would be done, said Masai, by studying the binding, the parchment, the handwriting, the notational style and the decoration of the manuscript.⁵⁴ Masai decries the fact that all this does not appear in the Critical Edition in the sixteen pages of the "Prologue" dedicated to describing the Assisi 137 manuscript.⁵⁵

The editors tell us that, the codex is beautifully decorated throughout with red and blue initial letters and a decoration in gold in the lower and left margins of the first page of each Book of the Sentence Commentary.⁵⁶

It would be as Masai notes of particular interest to Scotist scholars to know if the manuscript was written in Italy, France or England and from which exemplar it was copied.⁵⁷ Such information would be most helpful in tracing the history of the transmission of the works of J. Duns Scotus.

While Masai's chief criticism of the edition is the lack of a codicological examination, he also feels that it is a shortcoming not to tell us who examined which of the 300 manuscripts of the Ordinatio.⁵⁸ Moreover the question as to the creditability of Codex A is raised. Masai noted that this manuscript and others have many editorial notes such as "Non in libro Duns" in the margins and like Ludwig Meier, whom he cited, Masai points to the variance in the editorial notes between the Assisi manuscript and the other manuscripts of the Ordinatio.⁵⁹ Masai feels that, if the editors of the edition had to favor readings other than Codex A (the Assisi 137 ms.) at certain points, then this alone would indicate

the need for exercising more caution in throwing so much reliance on Codex A.⁶⁰ Moreover in regard to the editorial comments, Masai asks, how does one explain the presence of such comments in a Medieval text? Clearly, he said, the answer is that the manuscripts bearing such marks are all derived from the one principal manuscript of the Ordinatio.⁶¹ This is probably the result of the work of 1348 described earlier.

François Masai does however admire the genius in the approach which the Scotist Commission took in developing a system of sigla and an apparatus that gives the precise information of the diplomatic approach in regard to Codex A, while also giving critical notes on the variants of the other manuscripts in a way that does not overburden human endurance.⁶²

Ludwig Meier's criticism of the overreliance on the Assisi manuscript centers on the differences he sees between the other manuscripts of the Ordinatio, and the Assisi manuscript. In particular he draws attention to manuscript R (Vat. Latin ms. 882).⁶³ He admits that some of the variations are superficial as for example where R has "Vacat in Duns", a will have "Duns Vacat" but he identified sixteen places where ms. R notes "Extra" or "Extra non Duns hic" and ms. A does not have them.⁶⁴ Meier stated that if the editor of A really had the "Liber Duns" before him, why did he not put some editorial notes at these points of variance.⁶⁵

In response to Meier's criticisms, Carlos Balic explains away the objections based on these variants.⁶⁶ Balic pointed out that Codex R contains many interpolations that are not seen in Codex A and that it is evident that the editor of A was attempting to separate these interpolations out of the text giving only the true text.⁶⁷ Therefore, if it was the "Liber Duns" that he was working from, it did not have these interpolations. He thus was not seeking to introduce them into the text. Moreover the editor of A, while having the "Liber Duns" and the other

manuscripts before him, did not seek to gather all the variants into his edition.⁶⁸ Balic then proceeded to demonstrate that of the 16 variants found between Codices R and A none were universally attested to when comparing R to the other manuscripts.⁶⁹ Hence Balic dismissed the importance of these so-called errors of Meier, leaving one with the impression that ms. R itself is the less reliable text.

Father L. Meier also challenged the date ascribed to the Assisi manuscript. C. Balic and the Commission date the manuscript in the 1340's partially because of the marginal notes referring to Ockham's work containing questions from a "Liber Johannes".⁷⁰ Ockhamist influence was at its height in Paris in the 1340's and the reasoning is that this is why the notes appear in the manuscript.⁷¹ However Meier claimed that by 1340 the Ockhamist tide had turned and tried to claim somewhat arbitrarily the date 1325 for the composition of manuscript A.⁷² In his article mentioned aforehand, Balic cited additional evidence for choosing the 1340's. The Assisi ms. had been lent to Auguste Pelzer and Alfonso Gallo for a paleographic study. Their conclusions were that the manuscript was composed between the second and fourth decades of the 14th century, perhaps in Assisi itself, where at that time there was a Franciscan scriptorium.⁷³ Balic and the Commission feel that Codex A is a copy of a critical edition put out by the Franciscan Order.⁷⁴

The editors give folio measurements, the number of folios, the number of quires and their signatures, and the number of flyleaves. They describe the handwriting, binding and some particular features of the codex, such as the cutting out of the illuminated initial letters at the beginning of each book.

After the physical description, the editors report on the organizational and editorial procedures in the text. The codex contains the four

Books of the Ordinatio of which they give the incipit and explicit for each book. In regard to the various types of notes, mostly of a critical nature, with which the manuscript abounds, the modern editors present a list of them on pages 15* - 28*. There are also rubrical notes in the margins of the manuscript for the sake of clarifying what is being read and each additional note has a different type of marking and they are set off by a critical mark. All of these observations appear in the margins except where they precede a shortened column of text.⁷⁵

In the production of this critical text, the Scotist Commission editors did not reproduce any of the editorial signs or other materials appearing in the margins, if they were identical with those appearing in the text. They transcribed the content of the notes throughout, when these helped to determine the manner and method of procedure of the medieval editor of the manuscript, as well as those notes that show his weaknesses and strengths as an editor. Where they felt it was necessary, they produced together with the note of the editor the words of Duns Scotus that relate to that note. Moreover the name of each source not identified in the text itself was supplied by the researchers of the Scotist Commission. The editors generally omitted notes that touched on doctrine. Italics found in the critical edition were supplied by the editors and so this material does not stem from tradition.⁷⁶

Today the Assisi manuscript exists in a somewhat different state than that described by the editors in 1950. The manuscript was rebound about 1960. It was taken to the Pathological Institute for Books in Rome by Prof. Signoressa Sciascia, Superintendent of the Commission for the Preservation of Books. It should be noted that the mutilated folios 1. 97, 139, and 184 were at that time repaired so that a piece of white

parchment now covers the place where the illuminated letters were cut out of the upper left hand margins. This information was confirmed by Dr. Salvatore Pezzella of the Biblioteca Comunale in Assisi.⁷⁷

The cover of the manuscript is partially leather overboard and is part wood. This cover measures 25 cm. in width, with the wooden portion making up 17 cm. of that cover. The spine of the manuscript is totally leather. There are two clasps on the front cover and two leather thongs with metal hooks which extend from the back cover to the front; these hooks latch onto the two clasps on the front cover. There is one paper flyleaf in the front and one in the back. The folio pages as a result of the rebinding now measure 380 mm. by 250 mm. wide. The margins are as follows: 50 mm. on the right; 30 mm. on the top; 20 mm. for the left margin; and 77 mm. for the bottom margin.

The Procedure for Studying Distinction 13

In the present study the focus of our attention will be principally on Distinction 13 of Book II, which Distinction deals with the creation of light as explained in Genesis 1: 3 - 6. This section of the Sentences of Peter Lombard, as will be seen in a later chapter, is patterned after the old traditional hexaemeral literature. As an introduction to part of the study at hand we must investigate the manner in which Johannes Duns Scotus' treatment of Distinction 13 varies first of all from the hexaemeral treatment of the same subject and secondly, how the treatment of Duns Scotus varies from that of Peter Lombard in Distinction 13. Another aspect of the investigation will be to see what conclusions, if any, may be drawn concerning the thirteenth century Commentaries on the Sentences through the study of Duns Scotus' own treatment of Distinction 13. We will examine the works of Bonaventure, Aquinas and others to help us develop this picture. Moreover a comparison will be made between J. Duns Scotus and

the works of other thirteenth century scholars, who wrote on optics and light. These scholars will be Robert Grosseteste, John Pecham and Roger Bacon. We will also give special attention to any possible interdependence between them and Duns Scotus.

Earlier we described the evolution of the manuscript tradition for Books I and II of Johannes Duns Scotus' Commentary on the Sentences of Peter Lombard. In particular we found that there exists a medieval manuscript tradition for all four avenues of transmission for Book II. There are in existence for Book II 93 manuscript copies of the Ordinatio; 3 ms. copies of the Lectura; 7 ms. copies of the Reportatio; and 8 ms. copies of the Additiones Magnae.⁷⁸ It should be noted, that while we perhaps have in the Vienna, Nationalbibliothek ms. Latin 1453 a reportation for Book I, which might have been approved by Johannes Duns Scotus, there does not exist any such autograph for the Commentary of Book II.

In our study of Distinction 13 of Book II of the Sentences no attempt was made to establish a critical edition of that particular Distinction for either the Ordinatio or the other manuscript versions. This decision was made in view of the interdependence of D. 13 of Book II with the whole of Duns Scotus' Commentary on that Book and, since the Scotus Commission has already begun a critical edition of Book II,⁷⁹ a critical edition of this one distinction would not be a very significant contribution. Besides there is the practical consideration of the excessive number of manuscript copies of the Ordinatio for Book II alone, not to mention the other versions, which would require a great amount of time in order to evaluate all the variants. Moreover there did not appear to be an urgent need for such an edition to arrive at a reliable reading of Duns Scotus' text for this Distinc-

tion. Instead of a critical text, a working text has been prepared for all four versions of the *Distinction*. This procedure supplies a dependable presentation of what was said by Johannes Duns Scotus in the *Commentary* on D. 13 of Book II for our purpose.

In preparing the working text of D. 13 for the *Ordinatio* four manuscripts were examined. These four are: the Assisi, Biblioteca Communale ms. 137 (A),⁸⁰ ff. 130r - 130v; the second manuscript is the Paris, BN. Latin 3061, (C), ff. 224ra - 225ra; the third is the Paris BN. Latin 15360, (D), ff. 176ra - 176vb; and the fourth is the Vatican, Latin 876, (B), ff. 194ra - 195rb. The incipit for the *Distinction* as found in all four manuscripts is "Circa d. 13 quero simul de luce et de lumine et quero primo, utrum lux gignat lumen tamquam propriam speciem sensibilem sui."

The following manuscripts have been examined much more cursorily and appear to be in basic agreement with the versions of the *Ordinatio* mentioned above: the Cambridge, Gonville et Caius College 287, (J), ff. 48r - 49ra; Oxford, Merton College, 61, (E), ff. 89v - 91v; Paris, BN. Latin 15854, (K), ff. 131rb - 131vb; Paris, Bibl. Mazarine, 881, (L), ff. 130va - 131ra; Paris, BN. Latin 3114, (M).

In preparing our working text of the *Ordinatio* the procedure adopted by the Scotist Commission in developing the Critical Edition of Book I of the *Sentence Commentary* was followed. It consisted of using the Assisi manuscript, 137 as the base text in preparing the critical edition and likewise it served as the base manuscript copy for our working text. Despite the criticisms offered by François Masai and Ludwig Meier,⁸¹ ms. (A) still remains a valuable manuscript copy. In the apparatus, which was established from the four manuscript copies utilized, one can easily notice that the variant readings for the most part do not

entail a significant change of thought for this particular distinction. Most of the variants seem to be a question of a scribal error, the use of a synonym or an alteration in wording for the purpose of increasing the clarity of the passage. In some instances the variant readings represent the effort on the part of a scribe or editor to condense a particular passage. In addition certain glosses either appear or do not appear in any one of the four manuscripts due to the editorial decisions of the medieval copyist or editor. Hence we concur with F. Balic that the variants witnessed in ms. (A) do not detract from its reliability.

Fr. Balic long ago recognized that ms. (D.) was a very old and remarkably faithful copy of the Ordinatio for Books I and II.⁸² Manuscripts (C.) and (B.) in addition to containing a good text of the Ordinatio also contain the Additiones Magnae. Ms. (C) was studied by Fr. Balic in his discussion of the Additiones Magnae⁸³ and ms. (B.) was studied by Mgr. Pelzer for the same version of the Commentary.⁸⁴ Both of these manuscript texts were chosen for preparing the working text of the Ordinatio because the investigations of the two scholars have made them so well known and because both manuscripts were obviously put together with care and provide also a basic uniformity for the text of the Additiones Magnae.

Needless to say these same two manuscripts were used in preparing a dependable text for the Additiones Magnae. Distinction 13 of Book II of the Additiones appears on folios 247 - 248 in the Paris ms. and on folio 302ra - rb in the Vatican manuscript. Also utilized for this version was the Oxford, Balliol College ms. 208, (G) which was recommended by the editors of the Scotist Commission and which appears to be a carefully

prepared English manuscript. The incipit for d. 13 of the Additiones Magnae is "Circa dist. 13 quero utrum lumen sit propria species sensibilis ipsius lucis ...".

As for the Lectura, Distinction 13 has been examined in the following two manuscripts: the Vienna, Nationalbibliothek, Latin 1449, (H), ff. 105rb - 105va and the Rome, Convent of S. Francis ad Ripas, Q. II. 21, (I), ff. 82v - 87r. The incipits in the two manuscripts vary. In ms. (H) it reads (f. 105rb): "Circa distinctionem 13 queritur utrum lux corporalis gignat lumen tamquam propriam speciem eius." In ms. I (f. 82v), "Circa d. 13 queritur utrum lux corporalis gignat lumen in medio tamquam propriam speciem eius accidentalem." Both manuscripts were extensively examined by Fr. Balic.⁸⁵ He identified ms. (H) as the older of the two manuscripts.⁸⁶ However ms. (I) gives us a more reliable reading and so was used as the base text.

In establishing a working text for the Reportatio of Book II the Oxford, Balliol College ms. 205, (F), ff. 241v - 242r and the Merton College ms. 61 (E), ff. 171v - 173r were used.⁸⁷ Ms. (E) was used as the base text because of its better variant readings and the physical state of this manuscript indicates that it was carefully prepared. The incipit reads as follows: "Utrum lumen sit propria species sensibilis lucis corporalis."

In the foregoing pages our method for preparing the working texts for the four avenues of manuscript transmission of the Sentence Commentary has been explained. The resulting latin texts of D. 13 for the Ordinatio, Reportatio, Lectura, and Additiones Magnae are presented in the next chapter. The corresponding English translations of these texts are found in Appendixes A, B, C, and D.

Footnotes

1. For a full description of these claims see Appendix I, pp. 259 - 263
2. Ibid., 263 - 267
3. Ibid., 268 - 269
4. See Luke Wadding, Annales Minorum, VI, 2nd. ed. (Rome: 1733), 40 - 45.
5. Ephrem Longpré, "Nouveaux Documents Franciscains d'Ecosse" in Archivum Franciscanum Historicum, 22, (1929), 588 - 89. Hereafter referred to as A.F.H. See also "L'Ordination Sacerdotale du Bx. Jean Duns Scot", in A.F.H., 22, (1929), 54 - 62.
6. André Callebaut, "La Patrie du Bx. Jean Duns Scot" in A.F.H., 10, (1917), 3 - 16; "L'Ecosse Patrie du Bx. Jean Duns Scot" in A.F.H., 13, (1920), 78 - 88; "Le Bx. Jean Duns Scot à Cambridge vers 1297 - 1300" in A.F.H., 21, (1928), 608 - 611; "Le Bx. Jean Duns Scot, Bachelier des Sentences à en 1302 - 1303", in La France Franciscaine, (1926), 293 - 317.
7. Andrew George Little, "Chronological Notes on the Life of Duns Scotus", in The English Historical Review, 47, (1932), 568 - 582.
8. See Carlos Balic, "The Life and Works of John Duns Scotus", trans. Bernadine Bonansea, in Studies in Philosophy and the History of Philosophy, 3, (1965), 1 - 27.
9. See Appendix I, 263
10. Ibid., 267 - 68; 263 - 67.
11. Ibid., 281
12. Ibid., 268
13. C. K. Brampton, "Duns Scotus at Oxford, 1228 - 1301", in Franciscan Studies, 24, (1964), 5 - 20; see Appendix I, pp. 268 - 269 for André Callebaut's different reconstruction of Duns Scotus' educational background.
14. See Appendix I, 277
15. Ibid.
16. Ibid.
17. Ibid., 274
18. Ibid., 277 - 79; 270; 281 for a full discussion on the order and number of times the Commentary on the Sentences was read at Paris.
19. Ibid., 278 - 79.

20. Ibid., 273
21. Ibid.
22. Ibid.
23. Johannes Duns Scotus, Opera Omnia, 26 vols., ed. Luke Wadding, (Lyon: 1639).
24. Johannes Duns Scotus, Opera Omnia, ed. Luke Wadding, 26 vols. with commentary by Franciscus Lychetus Brixiensis and supplement by Johannes Poncius. Paris: Vives, 1881 - 89.
25. See Balic, "Life and works", 17; see pp. 16 - 18 for a full description of the works contained in the Vives edition.
26. Ibid., 16.
27. Ibid., 24.
28. Ibid., 23.
29. Carlos Balic, Les Commentaires de Jean Duns Scot sur les Quatre Livres des Sentences, Bibliothèque de la Revue d'Histoire Ecclésiastique, I, (Louvain: 1927), xi; see Appendix II, p. 293 for a discussion on the meaning of the word Ordinatio.
30. Joannis Duns Scoti, Opera Omnia, I., (Civitas Vaticana, Typis Polyglottis Vaticanis, 1950), 172*. Henceforth referred to as Critical Edition. François Masai, "Edition et Codicologie, L'Édition Vaticane des Oeuvres de Duns Scotus", in Scriptorium, VIII, (1954), 138; see Appendix II, 291.
31. See Appendix II, 291 - 92 for a discussion on the state of Duns Scotus' text.
32. See Appendix II, 292 - 94 for a description of the medieval usage of the words reportatio and reportare.
33. Auguste Pelzer, "Le Premier Livre des Reportata Parisiensia de Jean Duns Scot" reproduced in Études d'Histoire Littéraire sur la Scolastique Médiévale, ed. Ardien Pattin and Emile Van de Vyver, (Louvain: 1964), 422 - 467. See Appendix II, 296 - 304 for a full treatment of Pelzer's study of Book I.
34. For this conclusion see the discussion in Appendix I, 296 - 304.
35. Pelzer, "Le Premier", 446; See Appendix II, 344 - 346. For a discussion on the difference of opinion between Balic and Pelzer in regard to the nature of the Additiones Magnae, see Appendix II, 300; 305; 307 - 10; 315; 319 - 20.
36. Balic, Les Commentaires, 92 - 134.

37. Critical Edition, vols. I, VII, XVI, and XVII.
38. See Appendix II, 303; 312; 320.
39. See Appendix II, 310 - 311; 317 - 319.
40. Carlos Balic, "The Nature and Value of a Critical Edition of the Complete Works of John Duns Scotus", in Studies in Philosophy and the History of Philosophy, 3, (Washington: Catholic Univ. Press, 1965), 370. Henceforth referred to as "The Nature and Value"; see also Carlos Balic, "La Valeur Critique des Citations des Oeuvres de Jean Duns Scot", in Mélanges Auguste Pelzer, (Louvain:1947), 553.
41. Balic, "The Nature and Value", 369.
42. Balic, Les Commentaires de Jean Duns Scot sur Les Quatre Livres des Sentences, Bibliothèque de La Revue d'Histoire Ecclésiastique, I, (Louvain:1927).
43. Balic, "The Nature and Value", 369; Auguste Pelzer, "Chronique" in Revue d'Histoire Ecclésiastique, XXXIX, (Louvain:1943), 300. Henceforward referred to as "Chronique".
44. Balic, "The Nature and Value", 369.
45. Pelzer, "Chronique", 300. This appeared in the 21st Fascicule of the Bibliotheca Mariana Medii Aevi, (Sibenice, Yugoslavia).
46. Ibid.; Balic, "The Nature and Value", 369.
47. Pelzer, "Chronique", 301.
48. Balic, Die Kritische Textausgabe der Werke des Johannes Duns Scotus", in Archiv Für Geschichte der Philosophie, 43, (1961), 303 - 317; see Joannis Duns Scoti, Opera Omnia, I, (Civitas Vaticana, Typis Polyglottis Vaticanis, 1950), 12* - 18*; 259* - 270*.
49. Pelzer, "Chronique", 301; see Ludwig Meier, "Iter Germanicum Scotisticum" in Antonianum, XXIII, (1948), 500 - 520; also "The Manuscripts of Duns Scotus in German and Austrian Libraries" in Mediaeval and Renaissance Studies, (1954), 239 - 251.
50. Pelzer, "Chronique", 301: "... the alphabetical list omits the names De Wulf, Pelster and Pelzer."
51. Ibid.
52. Masai, "Edition et Codicologie", 136 - 142; Ludwig Meier, "De Skotusausgabe des Johannes Reinbold von Zierenberg", in Scriptorium VII, (1953) 89 - 114; the Assisi ms. is referred to by the editors of the Critical Edition as Codex A. See Critical Edition p. 11*.
53. Masai, 137 - 138.

54. Ibid., 137.
55. Ibid.
56. Ibid., see Critical edition, 14*.
57. Masai, 137 - 138.
58. Ibid., 138.
59. Ibid., 138 - 139.
60. Ibid., 139.
61. Ibid.
62. Ibid., 141.
63. In regard to Codex R see Critical Edition, I, xiii.
64. Ludwig Meier, "Die Skotusausgabe Des Johannes Reinbold von Zierenberg", 109.
65. Ibid.
66. C. Balic, "Zur Kritischen Edition Der Werke des Johannes Duns Skotus" in Scriptorium, VIII, (1954), 304 - 318; Henceforth referred to as "Zur Kritischen".
67. Ibid., 307 - 310.
68. Ibid., 307.
69. Ibid., 307 - 310.
70. Ibid., 310.
71. Ibid.
72. Meier, "Die Skotusausgabe des Johannes Reinbold von Zierenberg", 113; see Balic, "Zur Kritischen", 213.
73. Balic, "Zur Kritischen", 312 - 313.
74. Ibid., 317.
75. Ibid., Critical Edition, 13* - 15*.
76. Ibid., 15*.
77. The letter from Dr. Pezzella is dated 1/28/75. The pertinent passages read as follows:
 Circa la rilegatura del codice 137 Le comunico che esse
 è stata fatta una sola volta, probabilmente intorno al 1960,
 ma questo non si può stabilirlo con esattezza. Il codice

fu portato a Roma dalla Prof. ssa. Sciascia, Soprintendente ai Beni librari in Roma, presso l'Instituto patologico del libro della medesima Città.

Nel codice mancano le iniziali, miniature, dei fogli 97, 139, 184 e al loro posto non ci sono abrasioni o buchi, ma pergamena bianca che ricopre tutta la parte del lato superiore sinistro dei fogli, dove sono state asportate le miniature.

The work of the Scotist Commission is actually superior to some of the old catalogue descriptions of that ms. See: Critical Edition, 13*, ftn. 2: for Alessandri's description of 1906 and Mazzatinti's 1894 description.

78. Critical Edition, vol. I, "Prologue", 145* - 147*.

79. The first three Distinctions of Book II have already been published. See: Joannis Duns Scoti, "Liber Secundus", vol. VII of the Opera Omnia, (Civitas Vaticana: Typis Polyglottis Vaticanis, 1973).

80. See table of Sigla on page 22.

81. See chapter 1 pages 6 - 9.

82. Balic, Les Commentaires, p. 103.

83. Ibid., 93 et sq.

84. Pelzer, "Le Premier", 441 et sq.

85. Balic, Les Commentaires, 116 - 127.

86. Ibid., 126, ftn. 1.

87. The latter ms. was viewed by me in 1972 and a further study was done in Rome in the summer of 1974 from photo copies supplied by the Scotist Commission through the kindness of Frs. Luca Modric and Barnaba Hechich. The Balliol College ms. was studied in the same fashion.

CHAPTER II

The Texts of the Four Versions of Distinction 13

The purpose of this chapter is to provide the Latin texts of the four versions of Johannes Duns Scotus' commentary on Distinction 13 of Book II of the Sentences. These readings are based on the manuscripts described in the previous chapter. The English translations for each of the texts will appear in the Appendixes in the following order: the Ordinatio in Appendix A; the Reportatio in Appendix B; the Lectura in Appendix C; and the Additiones Magnae in Appendix D. These readings vary from one another in format and order of presentation. A comparison will be made between the texts of the Ordinatio and Reportatio developed from the manuscript traditions and that found in the Vives Edition.

The following table lists the sigla used to designate the various manuscripts used in this particular study of Duns Scotus' Sentence Commentary. The sigla to the left of the manuscript listing are our own designation. Those to the right are those that have been assigned to these manuscripts by the Scotist Commission.

- A. Assisi, Bibl. Communale 137 - A
- B. Civitas Vaticana, Vatican, Latin 876 - V
- C. Paris, BN., Latin 3061 - T^N
- D. Paris, BN., Latin 15360 - P
- E. Oxford, Merton College, 61
- F. Oxford, Balliol College, 205
- G. Oxford, Balliol College, 208 - B
- H. Vienna, Nationalbibliothek, Latin, 1449 - V
- I. Rome, Conv. S. Francisci Ad Ripas, Q.II.21
- J. Cambridge, Gonville et Caius College, 287
- K. Paris, BN. Latin 15854 - Σ⁹
- L. Paris, Bibl. Mazarine, 881
- M. Paris, BN. Latin, 3114¹ - Z

There seems to be some confusion on the part of the Scotist Commission in assigning the sigla to the various manuscripts. For instance, in Volume I of the Critical Edition of the Opera Omnia of Johannes Duns Scotus the letter B was used to indicate the manuscript Bononiae, bibl. univers. 2237 (Vol. I, p. xiii). In Volume VII (p. xii) the letter B was used to indicate the ms. Oxonii, bibl. Balliol, 208. The letter P was used in Vol. I (p. xiii) to indicate the ms. Parisiis, bibl. nat., lat. 15360, while in Vol. XVI (p. xii) the letter P was used to indicate

ms. Patavii, bibl. Anton. 178. Again, in Vol. I (p. xiii) the letter R was used for ms. Civitas Vaticana bibl. apost. Vat. lat. 882 and in Vol. XVI (p. xii) to indicate ms. Civitas Vaticana, bibl. apost., Palat. lat. 993. Lastly in Vol. I (p. xiii) the letter V was used to indicate the ms. Civitas Vaticana, bibl. Apost. Vat., 876. The letter V was also used in vol. XVI (p. xii) to indicate ms. Vindobonae (Wien), bibl. nat., lat. 1449.

Editorial symbols utilized in the Latin texts that follow:

[] is used to indicate an addition to the reading in the base text taken from the other mss. texts.

< > is used to indicate my emendations.

() is used to indicate redundancies in the base text or a gloss in the text.

ORDINATIO

BOOK II

DISTINCTION

13

Circa distinctionem 13 quero simul de luce et de¹ lumine. Et quero primo: Utrum lux gignat lumen tamquam propriam speciem sensibilem sui. Quod non:²

(1) Augustinus 7 Super Genesim ad Litteram³: "Anima ministrat corpora per lucem et aerem etc."

(2) Praeterea lumen gignit substantiam, ut patet de igne; ergo est substantia.

(3) Praeterea lumen frangitur et reflectitur. Ergo est corpus, quia istae sunt passionες corporis.

Praeterea, quod non sit species:

(1) Quia⁴ denominat medium; non sic⁵ species coloris.

(2) Excludit etiam oppositum, scilicet tenebram; non ita⁶ species, quia simul sunt species oppositorum, ut simul sunt⁷ species albi et negri in medio.

(3) ⁸Tertio, quia habet effectum realem in medio et organo, scilicet colore⁹ corrumpere visum; et gignere colorem¹⁰ effectum realem. Sed effectus realis¹¹ non convenit speciei. Ergo etc.

Contra:¹²

Lux est de sensibilibus: II De Anima. Ergo habet de se aliquam¹³ speciem sensibilem; non aliam a lumine. Ergo etc.

Hic sunt tria videnda. Primo: quid sit lux. Secundo: quid sit lumen. Tertio: qualiter lumen a¹⁴ luce gignatur.¹⁵

I. De primo, dico (1)[non potest poni substantia]¹⁶ quia lux est¹⁷ per se sensibilis. Non sic substantia, nisi per accidens.¹⁸ Ergo etc.

Patet¹⁹ in sacramento altaris post consecrationem, ubi non est substantia panis [sed transsubstantiatur in Corpus Christi,]²⁰ et tamen remanet ibi quidquid erat prius²¹ ab aliquo sensu apprehensibile. Ergo.

2.) Lux etiam in aliquo est accidens; ergo in nullo est substantia.

Quod enim vere est²² substantia nulli accidit,²³ ex Primo Phisicorum.

Antecedens patet: quia si in igne esset lux²⁴ forma substantialis, vel ergo²⁵ esset ultima differentia specifica, vel aliqua imperfectior quae esset in potentia ad formam specificam. Non primo modo: quia tunc quaecumque haberent lucem essent eiusdem speciei. Non secundo modo: quia tunc ista²⁶ forma esset imperfectior forma specifica ignis, et ita non esset forma substantialis alicuius corporis caelestis in quo nulla est forma substantialis imperfectior forma elementari.

3.) Tertium:²⁷ Probabile est formam substantialem corporis caelestis consequi aliquam²⁸ formam activam, sicut formas substantiales generabilium et corruptibilium consequuntur qualitates²⁹ activae. Non est autem alia³⁰ qualitas consequens formam substantialem corporis caelestis quam lux.

4.) Confirmatur per Damascenum c. 8. Quere ...

II. De Secundo dico (1) quod lumen non est substantia completa, hoc est per se subsistens; quia neque³¹ spiritualis, cum sit extensibilis;³² neque corporalis, quia tunc duo³³ corpora essent simul. Est enim lux cum toto aere, nec oportet aerem moveri localiter ipsa adveniente, nec³⁴ moveri ipsa³⁵ recedente vel non³⁶ adveniente lumine: quia tunc in medio illuminato non esset respiratio aeris si illud corpus³⁷ esset localiter admotum propter lumen.

(2) Nec etiam lumen est forma substantialis, quia illud cui advenit manet perfectum in specie, illo recedente; sicut apparet de aere quandoque illuminato et quandoque tenebroso. Nec³⁸ est materia: patet. Nec aliquid pertinens ad genus substantiae, nec est verisimile quod ad aliquod aliud genus pertineat praeterquam ad genus qualitatis.

Cum autem³⁹ genus qualitatis⁴⁰ quantum ad tertiam speciem distingua-
tur in qualitatem sensibilem,⁴¹ et in qualitatem⁴² quae est species
sive intentio qualitatis sensibilis, notandum est quod huius modi⁴³
nomen intentio est equivocum. Uno modo dicitur actus voluntatis intentio.
Alio modo: ratio formalis in re /f. 130rb/. Sed intentio rei a qua accipi-
tur genus differt ab intentione a qua accipitur differentia. Tertio modo,
dicitur communiter. Quarto modo, dicitur ratio tendendi in obiectum;
sicut similitudo dicitur ratio tendendi in illud cuius est.

⁴⁴Notandum est⁴⁵ quod intentio non dicitur hic 'quod intendit sensus';
quia hoc modo ipsum obiectum esset intentio. Sed intentio dicitur hic⁴⁶
'illud per quod tamquam per principium formale in obiectum tendit sensus'.
Et sicut⁴⁷ quidquid est signum, est res, secundum Augustinum De Trinitate⁴⁸
et De Doctrina Christiana, licet non econverso; et ideo in distinctione
rei et signi res⁴⁹ accipitur pro illa⁵⁰ re quae non est signum, licet illa
quae est signum sit etiam res, ita⁵¹ in distinctione rei et intentionis
licet intentio sit res et form^a⁵² sensibilis⁵³ in quam possit sensus
tendere, tamen illa dicitur intentio quae non est tantum res in quam sensus
tendit, sed est ratio tendendi in alterum cuius est propria similitudo.

Hoc modo dico quod lumen est proprie⁵⁴ intentio sive species propria
ipsius lucis sensibilis. Quod probatur. Tum⁵⁵ quia si non esset intentio,
tunc suprapositum sensui⁵⁶ prohiberet sensum. Quia quod est tantum sensi-
bile et non ratio sentiendi, si ponatur supra sensum, impedit sensationem.
Quia sensibile supra sensum positum non sentitur,⁵⁷ et ita⁵⁸ lumen supraposi-
tum oculo impediret⁵⁹ ipsum videre. Hoc autem⁶⁰ est falsum, et contra Com-
mentatorem super librum⁶¹ De Sensu et Sensato, ubi vult quod necessarium⁶²
est lumen positum⁶³ in oculo ad hoc ut recipiat species colorum et videat.
Modus autem⁶⁴ ponitur iste,⁶⁵ quia sicut lux⁶⁶ visibilis est prius natural-
iter colore, ita et species eius est species⁶⁷ naturaliter prior specie

coloris. Et hoc⁶⁸ tam in perficiendo medium, ita quod medium non illuminatum non sit capax ad recipiendum colores, quam in perficiendo visum ita quod organum non illuminatum non sit visivum proxime (vel proximum).⁶⁹

III. Et quantum ad tertium articulum⁷⁰ qui declarat istum secundum modum, notandum quod secundum triplicem radium: rectum,⁷¹ fractum et reflexum [multiplicatur lumen]⁷² secundum ipsum⁷³ Alacen in Perspectiva sua, gignitur lumen a luce.⁷⁴

Rectus radius est qui diffunditur a luminoso in medio eiusdem diafanitatis per rectum radium et continuatur corpori terminanti (vel terminato)⁷⁵ quantum durat virtus luminosi. Radius reflexus est qui, occurrente opaco antequam terminetur virtus activa luminosi, diffunditur in partem oppositam, non ex electione sed naturaliter.⁷⁶ Quia naturale agens cuius virtus activa non est totaliter exhausta⁷⁷ in directo, agit quantum potest;⁷⁸ et quando⁷⁹ non potest agere⁸⁰ in directum, agit in obliquum. Radius fractus est qui, occurrente medio alterius dyaphanitatis non tamen omnino opaco, multiplicatur in illo⁸¹ medio sed non secundum lineam rectam, sed incidit ibi angulus. Quando autem occurrit medium densius, frangitur radius⁸² ad perpendicularem; quia ex quo perpendicularis est fortissimus in agendo, unde cum⁸³ frangitur⁸⁴ in medium densius, requiritur situs propinquior perpendiculari radio. Talis autem⁸⁵ est situs radii fracti ad perpendicularem. Quando autem occurrit medium rarius, frangitur radius a perpendiculari propter oppositam causam.

Dico tunc quod lumen multiplicatum secundum istos tres radios immediate gignitur a luce ipsa, et etiam immediate est species sensibilis ipsius lucis.

De recto patet.

De reflexo probatur. Tum quia per illum radium⁸⁶ videtur res in se,⁸⁷ non autem in aliqua⁸⁸ specie impressa⁸⁹ speculo⁹⁰ reflectente. Tum⁹¹ quia querimus quatuor⁹² de hoc quod est.⁹³

Eodem modo⁹⁴ etiam⁹⁵ per radium fractum videtur ipsa res multiplicans se et non species aliqua⁹⁶ ipsius rei visae.⁹⁷ Et sicut ista luminaria primaria multiplicatione diffusa sunt immediate specie lucis gignentis,⁹⁸ ita immediate gignuntur ab ea, loquendo de immediatione ad causam, et non⁹⁹ excludendo ordinem effectuum ordinatorum respectu eiusdem causae.

Sed praeter ista est aliud¹⁰⁰ lumen secundarium quod dicitur lumen accidentale, quale est ubi est umbra. In hoc enim distinguitur umbra in actu a tenebra quia¹⁰¹ tenebra est privatio luminis tam primarii quam secundarii: umbra non est privatio luminis secundarii sed primarii.¹⁰² Istud autem secundarium lumen, licet quandoque diffundatur per reflexionem, non tamen a corpore polito; quia reflexio a tali corpore est gignitio radii primarii, et quia est immediate species ipsius lucis¹⁰³ gignentis. Non sic autem istud¹⁰⁴ lumen secundarium; immo gignitur ab ipso lumine primario ita quod si per impossibile reflexio remaneret in lumine radii imprimantis, gigneret sperice vel emisperice istud lumen secundarium,¹⁰⁵ sed non sic autem gigneretur lumen reflexum a radio primario, qualis reflexio est a corpore polito. Est ergo¹⁰⁶ omne¹⁰⁷ lumen species: sed lumen primum¹⁰⁸ est species lucis gignentis, lumen secundarium species lucis primarii.

Ex hoc apparet ad argumenta quae possent fieri contra istam partem: quia cum lumen videatur, non erit species visibilis. Respondeo: Species aliqua intensa, non obstante quod sit intentio¹⁰⁹ et species alterius visibilis, potest in se esse visibilis, sicut dicit Commentator super illud De Sensu et Sensato, cap. 1^o post principium,¹¹⁰ quod quando lumen reflectitur ad virides plantas, colorantur¹¹¹ parietes. Similiter¹¹² species non sunt visibiles nisi quando terminantur ad opaca, ita quod non contiguata opacis¹¹³ non possunt gignere species sui quibus¹¹⁴ videantur. Sicut species¹¹⁵ coloris dum est in medio non videtur; sed quando conti-

guatur opaco, tunc videri potest. Sicut patet de radio transeunte¹¹⁶ per vitrum coloratum: apparet color in pariete ubi terminatur radius ille et videtur coloratus similiter sicut vitrum, et tamen in medio non erat iste radius coloratus visibilis. Nec tamen negatur propter hoc ille rubor esse species qui¹¹⁷ apparet in pariete,¹¹⁸ quia oculus ibi existens, cui si supponeretur iste rubor,¹¹⁹ videret rubeum vitrum (vel ruborem vitri).¹²⁰ Unde haec est falsa: 'illud quod est intentio obiecti visibilis non est visibilis'; sed ista est vera: 'omnis intentio non tantum est visibilis, sed est ratio videndi'. Unde forma illuminans lunam lumen est, et non lux, quia non est corpus terminatum¹²¹ in luna; et tamen est sensibilis, et species lucis. Similiter per Aristotelem in primo¹²² De Sensu et Sensato: fulgor emissus ab oculo moto in tenebris visibilis est, et tamen est species lucis tantum.

Eodem modo lumen non terminatum ad opacum non videtur. Quod apparet, tum¹²³ quia radii solares de nocte¹²⁴ non apparent qui tamen intercipiuntur inter nos et caelum supra¹²⁵ conum pyramidis umbrosae terrae, tum qui existens¹²⁶ in carcere opaco et tenebroso, ubi per opposita foramina transiret radius solaris, non videret, ita quod nusquam reflectente se ad opacum non videret illum radium si corpuscula illa non frangantur. Similiter si medium illuminatum esset infinitum et non terminatum ad corpus opacum, sole existente super orizontem¹²⁷ nihil videretur,¹²⁸ quia non esset terminans. Eandem igitur¹²⁹ conditionem habet lumen quam habent aliae species et principales¹³⁰ colorum quantum ad videri et non videri et sicut principales species colorum, quae scilicet radiose multiplicantur,¹³¹ possunt gignere alias secundarias accidentales species¹³² non radiose multiplicatas et per illas videri.¹³³ Et tamen¹³⁴ non negatur illas primas esse intentiones, pro eo quod simpliciter sunt similitudines illorum primorum colorum gignentium. Ita in proposito.

AD ARGUMENTA:

- I. (1) Ad primam. Dico quod Augustinus accipit ibi lucem pro corpore subtili,¹³⁵ puta pro¹³⁶ igne qui¹³⁷ est corpus subtilius in mixto; vel pro aliquo corpore subtili multum conveniente cum igne in natura. Et sicut Scriptura dicit lucem factam fuisse prima die,¹³⁸ non quod tunc fieret accidens sine subiecto, sed tunc fiebat corpus luminosum cuius forma notior¹³⁹ erat lux. Et ideo describitur subiectum¹⁴⁰ ignotum per terminum notiozem.
- (2) Ad secundum. Dico quod alterans, in fine alterationis generat: non autem illa¹⁴¹ qualitas que alteravit sed alia.¹⁴²
- (3) Ad tertium. Dico quod ista¹⁴³ sunt metaphorice¹⁴⁴ dicta de lumine, sicut patet per Avicennam, 6 Naturalium, cap. 3°:¹⁴⁵ Non enim aliquid idem procedit recte quasi motu locali, et tamen quandoque¹⁴⁶ obliquatur frangendo vel refrangendo.¹⁴⁷ Sed quando virtus activa non est totaliter exhausta, id est,¹⁴⁸ non tantum causavit quantum potest causare, tunc ulterius si non potest secundum rectam¹⁴⁹ lineam agere, secundum quam natura maxime agit, quia illa¹⁵⁰ est brevissima¹⁵¹ et effectissima ad operandum, tunc agit secundum aliam lineam isti propinquiorem, et hanc¹⁵² fractam vel reflexam. Si nihil potest agere ulterius, reagendo in idem passum in quod prius egit, causando tamen¹⁵³ ibi cum illo prius causato aliquid simpliciter perfectius. Et si obicias quod cum perfectiori causato priori non potest esse causatum imperfectius posterius, et ita cum toto medio illuminato radio primario¹⁵⁴ non potest¹⁵⁵ esse lux, nec etiam cum medio illuminato radio recto potest esse radius reflexus: dico quod falsitas conclusionis apparet ad sensum. Patet enim: si radius solis incidat in aquam et reflectatur in aliquem¹⁵⁶ locum tenebrosam ubi non est aliquis radius rectus, sensus dicit reflexionem¹⁵⁷ fieri usque in locum illum tenebrosam. Non enim¹⁵⁸ illic fieret nisi prius esset radius

reflexus in medio illuminato radio recto. Eodem modo sensus dicit secundarium lumen, sive speciem luminis primarii, diffundi a lumine primario contiguo alicui corpori opaco usque ad oculum; alioquin non videretur¹⁵⁹ illud lumen primum. Et tamen per totum medium illud lumen primum est.

Tunc ergo¹⁶⁰ est ista¹⁶¹ propositio neganda: 'ubi est forma perfectior, ibi non potest multiplicari aliqua¹⁶² imperfectior, sive species quae sit¹⁶³ forma imperfectioris.'¹⁶⁴

II. Ad alia¹⁶⁵ quae sunt contra speciem, sive¹⁶⁶ contra intentionem.

(1) Dico ad primum: quod omne accidens forte posset denominare suum subiectum in quo est, si esset¹⁶⁷ denominans impositum quod significaret denominationem¹⁶⁸ convenientem tali formae¹⁶⁹ respectu talis subiecti.¹⁷⁰

Hoc modo non est denominatum impositum a speciebus colorum: quia denominativa imposita a coloribus denominant subiectum habens colores¹⁷¹ secundum esse reale (secundum se reales).¹⁷² Si autem esset¹⁷³ denominatum impositum quod denominaret subiectum habens formam secundum esse intentionale, non secundum esse reale, bene posset medium denominari a tali nomine.¹⁷⁴ Tale autem¹⁷⁵ est impositum¹⁷⁶ a lumine, et forte magis hic quam in coloribus, propter maiorem perfectionem et evidentiam huius intentionis quam aliarum intentionem visibilium.

(2) Quod additur secundo de opposito:¹⁷⁷ Dico quod lumen unum non excludit lumen aliud aliquod¹⁷⁸ alterius rationis; sicut lumen solis non excludit lumen lune in eadem parte medii, vel alterius stelle. Sicut nec species albi excludit speciem nigri vel econverso¹⁷⁹ in eadem parte medii. Sed sicut lumen quodcumque excludit a medio tenebram quae est eius privatio, non contrarium¹⁸⁰ vel disparatum, ita species cuiuslibet¹⁸¹ coloris¹⁸² excludit privationem illius¹⁸³ coloris in medio.

(3) Ad tertium. Concedo quod res est et effectum realem habere potest;

non tamen ita res quod non possit esse intentio. Quia cum ratione sua stat quod ipsa sit per se¹⁸⁴ ratio tendendi in obiectum. Et hoc sufficit ad rationem intentionis.

Quod autem totus radius gignatur immediate ab ipsa luce, et non pars radii a parte: probatur. Quia si ponatur quod lumen in aliqua¹⁸⁵ parte medii gignat lumen ex se, quilibet punctus lucis multiplicat se emispherice: Quia omne¹⁸⁶ naturale activum agit in medium circumstans sperice si sit ex omni parte aequè dispositum; et si habeat opacum obstans¹⁸⁷ ex una parte sui,¹⁸⁸ saltem multiplicat se emispherice. Ergo eodem modo si lumen esset gignens respectu alterius luminis, ex quo non habet opacum impediens ex aliqua parte sui, sperice se multiplicat. Et ita, sicut lumen principale gignit aliud lumen ulterius secundarium indirectem, ita gigneretur ex omni parte radii¹⁸⁹ distantis. Quod est contra sensum.

Praeterea aliquod luminare potest agere in distans localiter. Quia si non posset agere nisi ubi est localiter, tantum posset /f. 130vb/ illuminare aliquod indivisibile. Quod si praesens est in ratione agentis alicui distanti localiter, ergo et pari ratione¹⁹⁰ toti medio usque ab tantam distantiam ad quantam sufficit virtus eius. Et si praesens est illi toti et potest in¹⁹¹ toto causare lumen, ergo causat; quia ipsum lumen genitum ab ipso, dato quod possit¹⁹² causare aliud lumen, tamen luminare prius¹⁹³ est maioris virtutis quam lumen genitum, et ita prevenit ipsum lumen in agendo in partem remotam etc.

Ms. A. Assisi, 137, 130r -- 130v - Base Text
 Ms. B. Vat., Lat., 876, 194ra - 195rb
 Ms. C. Paris, BN., Lat. 3061, 224ra - 225ra
 Ms. D. Paris, BN. Lat. 15360, 176ra - 176vb

1. ABD. om. de
2. B. add. quero
3. B. / 7 vel 2; D. / Super Genesim
4. D. / quod
5. AD. / sit
6. A. / non sit
7. Ad. om. sunt
8. B. add. item
9. C. om. colore
10. A. om. colorem
11. B. colorem quia effectus reales sed effectus realis; A. om. sed effectus realis; D. / eius effectens realis; C. / sed effectus realis
12. BCD. / oppositum
13. B. / habet quam; C. / habet aliquam; D. / habet aliam
14. C. / de luce
15. D. / gignitur
16. A. om. non potest poni substantia
17. A. quod lux est; BCD / quia est
18. C. om. nisi per accidens; / ergo etc
19. C. om. patet in sacramento ...apprehensibile
20. BD. add. sed transubstantiatur in corpus Christi; B. / et tamen D. / ut tamen
21. A. om. prius; D. prius ab aliquo sensibile comprehensibile ergo etc. B. / erat prius ab aliquo sensibile apprehensibile etc.
22. B. om. est
23. D. / vere accidens nulli est substantia
24. BC. om. lux
25. B. / vel ultima; C. / vel esset; D. / ergo vel esset
26. D. / illa
27. C. / secundo
28. B. / quam
29. C. / quantitatis
30. D. / aliqua; B. om. autem
31. CD. / nec
32. A extrinsua; BDC / extensibilis
33. D. om. duo
34. C. / et non
35. BCD. om. ipsa
36. AD om. vel
37. ABD. / corpus (corpus) ms. proposes both corpus or corporis
38. C. add. etiam
39. B. add. quod
40. C. om. genus qualitatis
41. C. / qualitas sensibilis
42. C. om. et in qualitatem; D. om. in
43. CD. om. B. / hoc; A. huius
44. CD. om. notandum est quod ... to ... est quod intentio non dicitur

45. D. / etiam
46. D. / ibi illud; BC. / hic illud; A. om. hic
47. B. / sic
48. BCD. om. De Trinitate
49. D. om. res
50. D. / ipsam
51. CD. / ita; AB. illa
52. BCD. / forte; A. forme
53. BCD. add. res
54. BCD. add. proprie
55. D. / tamen
56. D. / sensum
57. D. add. sed impedit sensationem
58. B. / ideo
59. B. / impedum
60. BCD. om. autem
61. A. add. librum
62. B. / necesse
63. BCD. / proprium
64. B. add. autem
65. C. add. quid
66. D. add. ut
67. D. om. species
68. BC. / ita
69. BCD. om. vel proximum
70. BCD. om. articulum; CD. / secundum modum
71. BD. add. silicet secundum radium
72. C. add. multiplicatur lumen
73. C. om. illam B. / ipsam; AD. / illum
74. C. om. gignitur lumen a luce etc.; BD. om. etc
75. C. om. per rectum ... terminato
76. C. / sed naturale agens
77. D. / non est natura habet totaliter exhausta
78. C. om. et quando non potest agere indirectum agit in obliquum
79. B. / qui
80. B. om. agere
81. D. / ipso
82. D. / densius ad aliud per
83. C. / cum
84. ABD add. ad agendum
85. BD. add. autem
86. A. om. radium
87. AD. / videtur esse res in re
88. D. per aliquam
89. D. / speciem impressa
90. C. / speculo BAD. oculo
91. D. tamen
92. B. / quere quatuor
93. BCD. / quia quere conclusione de hoc quae est
94. C. / moto
95. A. et; BCD. / etiam
96. AD. om. aliqua
97. D. / in se
98. A. add. forte sic; C. om.; B. / forte super; D. / forte similiter
ista sicut; om. ita

99. BCD. / non excludendio; A. om. non
100. BC. / sed preter ista est ad; AD. / sed preter istud vel preter ista est aliud
101. AB. / quod
102. C. add. sed primarii ABD. om.
103. B. / illis lucis gignitus
104. BCD. / istud A. illud
105. BCD. om. sed; A. sed
106. D. / igitur
107. A. bene; BCD. omne
108. D. om. lumen; B. primarii
109. B. / intensio
110. A. c. post principium; B. / De Sensu c 1; C. om.; D. / cap. primo post principio
111. B. / colorantes
112. A. similes; CD. / similiter; B. sed ille
113. A. opacitatis; BCD. opacis
114. D. / vel speciem quibus
115. D. / proprias
116. B. / per radium transeuntem
117. B. / nec tamen propter hoc negatur ille rubor species que apparet
118. B. / in species
119. B. om. si; BCD. / si supponeretur ille; A. si supponetur iste
120. B. / videtur rubeum vitrum vel ruborem est vitri
121. B. / terminatur
122. A. in principe; BD. / in primo
123. D. / tamen
124. BCD. / de nocte; A. in nocte
125. D. / super
126. AB. add. in corpore
127. B. / orientem
128. B. / videtur
129. CD. / ergo; B. / etiam
130. B. add. sensibiles
131. B. / multiplicant
132. BCD. om. species
133. C. / videri; ABD. / videre
134. B. / tam
135. A. sensibili; BCD. / subtili
136. C. / per
137. D. / quod
138. D. / dice
139. A. / ad vel notior
140. B. / secundum
141. BCD. / illa A. ista
142. BC. om. sed alia
143. D. / illa
144. D. / methamatice B. / metaphorice decens
145. D. / 4 Naturalium partem 4c. 2; CB. / 6 Naturalium; A. / 6 Naturalium c. 3
146. CD. om. que
147. B. / reflectente
148. BCD. om. est

149. D. add. causare
150. A. ista; B. / ipsa; CB. / illa
151. A. verissima; BCD. / brevissima
152. CD. / hoc
153. D. add. est
154. A. recto non BCD. om. recto
155. BCD. add. esse lux, nec etiam cum medio illuminato radio recto;
A. om.
156. C. / alique
157. AD. add. illam
158. C. / eius
159. D. add. ad ubi videtur
160. BCD. / ergo A. igitur
161. BCD. / illa
162. BC. / aliqua; AD. alia
163. D. / sit; ABC sunt
164. BC. / imperfectio
165. D. / illa
166. D. add. speciem sive
167. B. add. nomen; D. add. natura
168. B. / denomine
169. C. / tamen forte
170. B. / subiectum
171. A. add. vel; BCD. om. vel
172. BCD. om. secundum se reales
173. B. / essent
174. A. add. aliquid albi
175. D. om. autem
176. C. / imposito
177. D. / opaco; BC. / oposito; A. objecto
178. BCD. om. aliquod
179. D. / econtrario
180. BCD. add. vel A. om.
181. B. / cuiuscumque
182. D. / caloris
183. A. istius; BCD. / illius
184. B. / possit esse
185. A. alia; BCD. / aliqua
186. A. omnem; BCD. omne
187. C. om. obstans; B. / post obstans
188. B. / sive; C. / sui circumstans
189. D. / medii
190. A. pari ratione; D. / ergo pari ratione; B. igitur et pari ratione;
C. / ergo et pari ratione
191. D. add. ille
192. D. / posset
193. BC. / praesens; AD. prius

REPORTATIO
BOOK II
DISTINCTION

13

Utrum lumen sit propria species sensibilis lucis corporalis.

Quod non:

Lumen est substantia; non ergo per se sensibile. Antecedens patet, quia lux fuit primo facta, et tunc fiebant accidentia sine subiectis; quia in primis operibus, non fiebant talia miracula.

Item Augustinus Super Genesim: "Anima que praedicta est etc." et postea: "omnia administrantur per lucem et corpora subtiliora." Ergo¹ lumen inter cetera corpora est sublimius. Ergo est corpus. Non ergo species sensibilis. Item, lux gignit corpora et substantias hic inferius. Non ergo est accidens, quia sic effectus excederet suam causam.

Item lux habet proprietatem corporis, quia potest moveri, frangi. Ergo etc. Item lumen habet esse reale² in medio. Non ergo est species sensibilis, cum illa habeat esse intentionale in medio. Antecedens probatur tripliciter. Primo sic: Lumen realiter denominat medium. Non autem species que habet esse intentionale; quia si sic, sicut dicitur quod aer est lucidus, sic diceretur quod aer est albus a specie albi, que habet esse intentionale in medio.

Secundo sic: Lumen excludit oppositum a medio, ut tenebram. Non sic species albi speciem nigri, sicut album realiter nigrum realiter.

Tertio sic: Lumen habet actionem realem in medio: quia ignis generatur in medio ex refractione radiorum a speculo terso et polito. Intentio non generat substantiam. Ergo etc....

Oppositum:

Avicenna, 6 Naturalium, parte 3a, capitulo primo: "Lux per se est sensibilis; sed nichil per se sensibile videtur nisi per speciem suam multiplicatam ad organum, 2^o De Anima. Ergo lumen est species lucis per quam videtur. AD QUESTIONUM, Dico quod lux est forma accidentalis, quia est per se sensibilis, ut sensu percipimus, et ut vult Avicenna. Ergo

non est substantia. Praeter hoc: In corpore elementari est lux accidens, quia nulla pars essentialis eius, ut materia vel forma. Nec prior forma substantiali ignis. Ergo in nullo est substantia, quia quod est uni substantia, nulli est accidens, primo Physicorum.

Item corpora caelestia habent qualitates activas nobiliores quam inferiora. Huius <modi> non videtur nisi lux, quia perspicuitas est qualitas passiva.

Dices: Quomodo est lux per se visibile cum coloratum sit primum obiectum visus; et lux non videtur per naturam coloris, Ergo visus non erit unus sensus. /f. 172r/

Dico quod utrumque est per se visibile, et tamen visus una potentia Quia quanto potentia est perfectior, tanto potest in plura quam imperfectior, si potentia imperfectior non omnia cognoscat que perfectior.

Secundo dico: Quia angelus inferior cognoscit omnes res quas angelus superior, et si non eque perfecte. Sed sensus visus plures differentias rerum nobis ostendit, primo Metaphysice; et cognita per se plus differunt quam contraria in genere physico, qualia solum cognoscuntur ab aliis potentiis sensitivis.

Ideo dico quod neutrorum istorum est primum obiectum adequatum. Sed est aliquod³ indifferens ad hoc et ad illud, et est innominatum. Sicut patet de tactu. Sentit enim duas contrarietates, quarum neutra ad aliam est reducibilis: et tamen non excedit genus tactus. Nec etiam est plures sensus formaliter. Similiter sensus communis est unius; et tamen sentit quodlibet per se sensibili, et suum obiectum adequatum erit unum commune abstractum ab omnibus sensibilibus particularibus; non tamen universale completum. Vel aliter potest dici: Quod quando sunt duo obiecta unius potentia in analogia quadam, tunc unum⁴ illorum erit primum obiectum, et virtute illius primi omnia alia cognosceretur. Non tamen oportet quod

sub eo contineantur. Sicut de tactu, esto quod non sentiret nisi calidum⁵ et frigidum: calidum esset primum obiectum, in virtute cuius omnia alia sentit. Et tunc potest dici quod lux habet primam rationem obiecti visibilis, non quia sit obiectum adequatum formaliter, sed quia virtute illius omnia quae non sunt talia formaliter videntur. Lux enim potest videri sine color~~e~~,⁶ color⁷ tamen non sine luce.

Secundo dico, supponendo quod lux dicitur ut est in fonte, lumen ut in medio: quod lumen non est substantia aliqua, quia non est corpus. Quod si non esset pervium, quodcumque corpus occultat que sunt post se, quantumcumque sit luminosum. Lumen autem non occultat, sed potest esse medium videndi sicut pervium.

Preter hoc, substantia corporea non est simul naturaliter cum alio corpore. Sed lumen est simul cum medio. Ergo non est substantia corporea. Probatio minoris: quia si aer cederet lumini, cum esset in medio, non posset homo respirare in medio illuminato, quia non respirat nec exspirat nisi aerem.

Nec etiam potest lumen esse forma substantialis, quia non manet aliquid in esse specifico recedente sua forma substantiali et accedente; sed lumine recedente et accidente,⁸ remanet idem aer specificus. Ergo etc..

Nec potest esse quantitas. Tum quia non posset esse simul cum aere. Tum quia non esset qualitas activa. Est ergo qualitas sensibilis quae est species lucis vel intentio.

Tamen hoc nomen intentio est equivocum. Uno modo dicitur actus voluntatis. Secundo, ratio formalis in re: sicut intentio rei a qua accipitur genus differt ab intentione a qua accipitur differentia. Tertio modo dicitur conceptus. Quarto, ratio tendendi in obiectum: sicut similitudo dicitur ratio tendendi in illud cuius est. Et isto modo dicitur lumen intentio, vel species lucis; quia sensibile positum supra sensum,

2^o De Anima. Sed lumen in oculo non impedit sensum; immo requiritur per Commentatorem De Sensu et Sensato ad hoc quod oculus videat. Igitur non tantum est lumen sensibile, sed intentio vel species quo obiectum potest videri. Est ergo lumen per se visibile, et tamen intentio visibilis.

Contra:

Si lumen est per se visibile, ergo non est ratio tendendi in obiectum visibile; quia tunc idem esset ratio tendendi in se. Quod autem lumen sit per se visibile patet, quia non videmus substantiam lune, sed tantum eius lumen quod nobis apparet in luna. Aliter enim corrumpetur substantia lune in $\langle \text{novilunio} \rangle$,⁹ quia nobis non plus apparet quod maneat nisi quod videmus. Item, quod lumen sit per se visibile patet per exemplum philosophi: si moveatur oculus clausus, apparet ibi lumen.

Dico quod aliqua est intentio visibilis, vel species, que est visibilis in se, et non solum ratio tendendi in obiectum propter eius maiorem virtutem: alia vero que tantum est ratio videndi, propter eius debilitatem: ut species albi vel nigri.

Exemplum primum de lumine: Unde si transeat radius per vitrum rubeum ad parietem, apparet paries rubeus; et tamen non coloratur paries ideo rubore. Quia si ibi esset oculus ubi est paries, videret vitrum rubeum, nec reciperet ibi colorem rubeum realiter. Ergo aliquando intentio visibilis potest videri propter eius perfectionem. Quia se ibi esset talis color realiter, oculus existens ibi positus non posset videre propter colorem positum supra sensum. Item Philosophus De Sensu et Sensato: quod quando transit nubes super aliquod viride, apparet ibi alius color quam prius; et tamen in se non est alius. Intentio ergo, quando est debilis, solum est ratio videndi; quando est fortis, potest esse quo et quod.

Nusquam tamen videntur iste species /f. 172v/ nisi contiguate corpori visibili, neque lumen videtur nisi coniunctum corpori. Quod patet dupliciter: Primo, quia de nocte non videtur radius <solis>,¹⁰ et tamen ultra illum conum umbre quem facit terra de nocte est radius. Quia tamen non coniungitur ibi immediate corpore terminanti¹¹ visum, non potest videri. Secundo sic: Esto¹² quod aliquis¹³ sit existens in puteo profundo, et in summitate vadat radius solaris per medium unius foraminis: nisi¹⁴ superius immediate ponatur aliquod corpus terminans visum, non videbitur ille radius. Ideo non videbitur antequam terminetur visio ad aliquod densum.

Tercio, dico: Quod lumen est duplex: vel radius luminosus, vel lumen accidentale. Lux enim causat triplicem radium: rectum, reflectum et fractum. Et quilibet istorum est immediate a luminari: immediatione autem¹⁵ causae, quia non est unus effectus causa alterius. Sed immediatione effectus, non est quilibet istorum immediate a luminari.¹⁶

Quod¹⁷ radius rectus sit immediate a luminari probo: Quia natura agit quantum potest sibi derelicta. Ergo si radius rectus esset hic in medio, et non a sole sed conservaretur a Deo, ageret sperice, causando lumen undequaque equaliter. Sed oppositum videmus ad sensum: quia agit per lineam rectam et non illuminat retro fenestram quantum facit directo aspectu. Et¹⁸ ex isto apparet quod agens potest agere immediatione causae in aliquod distans: quia necessario oportet dicere quod sol agit immediate in aliquam partem medii, ipsam illuminando immediatione causae. Quia si tantum ageret immediate in id quod illuminat ut sibi immediatum mathematice ergo¹⁹ solum illuminaret immediate superficiem, et ipsa illuminata aliam illuminaret immediate; et tunc²⁰ corpus illuminatum esset compositum ex superficiebus. Quia²¹ oportet quod agens agat in

distans quod non est sibi immediatum tantum mathematice, ergo maior virtus activa potest distantius agere. Ergo sol potest distantius agere quam radius, et non agit in hec inferiora mediante radio tamquam causa agente; radius tamen aliquam actionem haberet propriam, sed sol praevenit²² actionem radii et sic, agente debilior $\langle o \rangle$ ²³ presente, potest agens fortius praevenire actionem suam, prius inducendo illum effectum quem esset debilius agens natum inducere in maiori tempore.

Idem patet de radio reflexo, quod sit immediate a luminari, per experientias de speculo ardente: quia ignis non causatur ab illo, sed a sole. Similiter, species visibilis causata in oculo per quam videtur imago in speculo, non causatur ab imagine sed ab obiecto cuius est. Idem patet de radio fracto cum causatur combustio impleto urinali aqua ex opposita parte solis: nec generatur ignis ab aqua nec $\langle a \rangle$ ²⁴ vitro, sed a sole.

Praeter hec lumina, est aliud quod vocatur secundarium, ubi est umbra et non tenebra. Quia in tali lumine videmus nullo radio trium praesente. Et illud lumen non multiplicatur immediate a luminari, sed est per se species sensibilis luminis primarii.

Ad primum principale, dico quod illa lux fuit corpus luminosum denominatum a qualitate nobili in eo. Et forte fuit illud corpus quod nunc dicitur sol, et si non fuit tunc lucens tanta luce sicut nunc.

Ad aliud: quod Augustinus accipit lumen pro spiritu luminoso. Talem enim spiritum appellat Avicenna lumen vel lucem, 6 Naturalium, parte quarta.

Ad aliud: dico quod lux est principium alterandi et disponendi ad generationem substantiae. Et in termino, substantia producit substantiam, et non lux substantiam.

Ad aliud: respondet Avicenna 6 Naturalium, parte 3a, capitulo 2^o, quod

ibi sunt aliqua similia corpori cum dicitur radius frangi vel moveri etc...

Ad aliud: cum dicitur quod habet esse reale in medio, et non intentionale; dico quod habet utrumque esse in medio, quia et est res, et intentio in medio.

Ad primam probationem dico quod quelibet forma potest denominare subiectum in quo est. Et ideo, sicut dicimus aerem esse illuminatum, sic si esset nomen impositum quo species coloris denominaret medium intentionaliter, posset concedi illo modo aer albinus, vel aliquo alio nomine. Sed nunc²⁵ non habemus nomen impositum ad denominandum colorem nominare subiectum nisi secundum esse quod habet in subiecto ubi est formaliter. In proposito, habemus lucens et illuminatum.

Ad aliam probationem, cum dicitur lumen in medio excludit obiectum, dico quod verum est oppositum privative, sic quod non est ibi carentia luminis. Et sic species albi in medio excludit obiectum privative quod non est ibi carentia speciei. Sed non excludit speciem obiecti contrarii albi. Sic nec excludit unum lumen aliud lumen a medio, quia stelle et sol simul illuminant / f. 173r/ medium.

Ad tertiam probationem dico quod sicut habet actionem realem in medio, sic habet talem entitatem realem in medio que competit tali actioni; quia alterat et disponit ad inductionem substantie. Et in termino substantia producit substantiam.

Ms. E - Merton Coll., 61, ff. 171v - 173r - Base Text
 Ms. F - Balliol Coll., 205, ff. 241v - 242r

1. F. uses igitur frequently where E ses ergo
2. F. / realem
3. E. aliquid; F. / aliquod
4. F. / unus
5. F. / callidum
6. E. color; F. / colore
7. F. sine colore et coloratum
8. F. om. sed lumine recedente et accidente
9. emendation from novissimo found in both E and F
10. EF. om solis
11. F. / terminati
12. F. om. esto
13. F. / alias
14. F. / nec
15. F. om. causae; add. autem
16. E. add. probo quia agit
17. E. ex; F. / quod
18. F. om. et
19. F. / igitur
20. F. / etc.
21. E. / ergo
22. F. pervenit
23. EF. debiliori; f. / debliloi
24. EF. om. a
25. F. / nec

LECTURA
BOOK II
DISTINCTION

13

Circa distinctionem 13 queritur: Utrum lux corporalis gignat lumen¹ in medio tamquam propriam speciem eius.²

Quod non, videtur

(1) Unde³ secundo Super Genesim Augustinus: anima et quod⁴ corpora subtiliora administrant corpora subtiliora et⁵ grossiora, ut lucem et aerem. Hoc autem⁶ dicit Super Genesim, cap. 18⁷ de parvis. Igitur lux in medio sicut aer⁸ est corpus; non igitur est accidens.

(2) Praeterea hic arguitur de lumine: Lumen gignit substantiam, sicut patet quod ex concursu radiorum generatur ignis. Sed non substantia non potest generare substantiam. Igitur⁹ lumen est substantia et non accidens.

(3) Praeterea lumen habet proprietates corporis, quia frangitur et reflectitur. Igitur est corpus, et non accidens.¹⁰

(4) Praeterea arguitur quod lumen non sit qualitas intentionalis, quia realiter denominat medium. Species vero non.¹¹

(5) Item, excludit oppositum, ut tenebram.

(6) Item habet realem actionem in medium et in organo.

Contra: Lux est per se sensibilis. Igitur, per se speciem gignit; et non aliam nisi lumen.

Respondeo.

Et dico¹² primo quod lux¹³ non est forma substantialis, sed est qualitas sensibilis, ut per se manifestum est. Item: Lux in aliquo corpore est¹⁴ accidens; igitur in nullo est substantia, quia¹⁵ vere nulli accidit. Accidens ostenditur, quia:¹⁶ quod in corpore elementari est accidens, non $\langle \text{est} \rangle$ ¹⁷ forma substantialis eius specifica, ut in igne. Quia tunc differret specie a corpore celesti per lucem. Quod falsum est. Nec etiam est aliqua forma substantialis prior forma specifica in elemento;

quia tunc esset aliqua forma substantialis in celo que esset imperfectior quam forma substantialis elementi. Quod non est verum /f. 83r/
Item, corpora celestia sunt perfectiora quam corpora inferiora. Igitur formam substantialem corporis celestis consecuntur qualitates active, sicut et corpora inferiora. Sed non est alia qualitas que potest consequi ut activa corpora celestia nisi lux; nam perspicuitas non est qualitas activa, sed magis lucis¹⁸ receptiva.

Secundo, dico¹⁹ quod lumen non est substantia completa²⁰ et extensum dicitur,²¹ hoc est per se subsistens, non substantia incorporea spiritualis que extenditur ad extensionem medii. Nec²² etiam est substantia corporea, quia simul est cum alio corpore, ut cum aere; igitur non est substantia corporea²³ per se existens. Nec forma substantialis corporea: quia advenit²⁴ prius constituto in esse specifico, ut medio;²⁵ et etiam advenit lune quia²⁶ semper manet²⁷ eadem secundum speciem suam. Nec etiam est quantitas, quia tunc non haberet actionem, nec esset ratio²⁸ gignendi speciem sensibilem. Igitur et qualitas in tertia specie.²⁹

Sed cuiusmodi qualitas? Dico quod non tantum est qualitas sensibilis,³⁰ sed qualitas que dicitur³¹ esse intentio. Sed sciendum est³² quod diversimode accipitur intentio. Uno modo: quicquid³³ potest habere diversas rationes formales obiectivas in intentu³⁴ dicitur diversas habere intentiones, sicut alia est intentio veri,³⁵ alia est³⁶ entis etc. Et sic loquitur communiter Avicenna de intentione. Et secundum hoc potest bene intelligi³⁷ dictum doctoris illius quod est differentia secundum intentiones que non causant, nec requirunt compositionem realem termini et termini.³⁸ Alio modo³⁹ accipitur intentio et qualitas,⁴⁰ pro specie que est ratio representandi aliud,⁴¹ et non pro ipsa re in quam sensus tendit proprie intentus. Et sic dico quod lumen

est intentio et quidditas intentionalis, primo intentio.

Praeterea visibile⁴² quod non est intentio nec species sensibilis impedit sensationem si ponitur super⁴³ organum visus. Sed⁴⁴ lumen positum in organo visus non impedit visionem sed promovet,⁴⁵ sicut patet per Commentatorem in tractatu suo super librum⁴⁶ De Sensu et Sensato: quod lumen multiplicatur usque ad oculum et recipitur ibi in organo quod est dyaphanum. Et ideo, cum hoc quod lumen est sensibile, ipsum est species lucis.

Praeterea lumen non est sensibile⁴⁷ nisi reflectatur. Unde si medium non haberet aliquod corpus solidum, nusquam videretur lumen: si etiam essent duo foramina ex opposito in ostiis, et radius transiret et non frangeretur,⁴⁸ nihil igitur videretur.⁴⁹ Igitur, lumen non tantum est visibile, sed intentio et species ipsius lucis.⁵⁰

Et tum dico quod⁵¹ lux est primum visibile quia⁵² non dependet a colore⁵³ ad hoc quod videatur, sed econtra, color ad hoc quod videatur dependet a luce. Et sicut unum dependet ab alio et non econtra, ita⁵⁴ effectus unius dependet ab effectu alterius et non econtra. Unde species coloris⁵⁵ dependet a specie lucis que est lumen tam in perficiendo receptivum⁵⁶ quam etiam in operando: nam prius oportet medium illuminari quam speciem coloris⁵⁷ in eo⁵⁸ recipi. Similiter⁵⁹ ad hoc quod visus videat colorem per speciem eius requiritur ut⁶⁰ cum specie sit etiam lumen in oculo. Et igitur lumen est species⁶¹ sive intentio ipsius lucis.

Sed contra hoc arguitur: quod est $\langle$ intensum $\rangle$ tantum $\langle$ ut $\rangle$ species⁶² non videtur. Sed lumen videtur quando⁶³ est intense receptum, ut in luna. Igitur non /f. 83v/ tantum est species. Similiter quando lumen reflectitur ab aqua,⁶⁴ tunc lumen videtur. Item hoc patet in exemplo philosophi De Sensu et Sensato quod si admoveatur⁶⁵ oculus a suo loco

per motum, excutitur fulgor vel ignis quod est lumen.⁶⁶

Respondeo: quod est aliquid quod est tantum⁶⁷ visibile, sicut lumen quod intense recipitur, et est aliquid quod est tantum ratio videndi, ut lumen in oculo. Et similiter lumen quod multiplicatur secundum lineam rectam ad oculum $\langle$ perpendiculariter $\rangle$ ⁶⁸ et est lumen quod est ratio videndi, et est⁶⁹ visibile. Tunc dico quod lumen et est visibile,⁷⁰ et non tantum species. Unde non est contra rationem speciei quod videatur. Probatio:⁷¹ Radius transiens per vitrum rubeum ad parietem ibi frangitur et est rubeus⁷² et videtur, et etiam est species. Nam⁷³ si oculus ibi fuisset, esset ratio videndi vere ruborem in vitro. Hoc etiam patet in exemplo Commentatoris super librum De Sensu et Sensato quod lumen transiens per plantas virides causat viriditatem in medio, et si oculus posset sufficere, esset ibi ratio videndi si ibi esset. Unde sciendum est quod dicitur esse lumen primum sive essenziale, et lumen accidentale.⁷⁴ Lumen primum sive⁷⁵ essenziale dicitur esse lumen quod causatur et multiplicatur per lineam rectam,⁷⁶ aut fractam, aut reflexam. Sed lumen accidentale est⁷⁷ quod non causatur sic, sed fit⁷⁸ ex lumine praedicto multiplicato.⁷⁹ Lumen autem primum⁸⁰ gignitur secundum⁸¹ se totum immediate⁸² a luce. Hoc probatur primo sic⁸³ de radio recto:⁸⁴ Omnis punctus luminis in medio si gignat se, gignit lucem⁸⁵ sperice; quia omne agens naturale⁸⁶ in medium equaliter dispositum agit sperice, quia qua ratione agit⁸⁷ in unam partem, et in aliam. Igitur⁸⁸ si lumen quod gignitur in medio a luce gignatur non⁸⁹ secundum se totum a luce secundum lineam rectam,⁹⁰ igitur radius genitus in hac parte medii si gignat, gignet ubique sperice. Quod falsum est et⁹¹ contra sensum. Praeterea oportet quod lux⁹² gignat lumen in alia⁹³ parte medii immediate; in qua parte medii⁹⁴ est pars propinquior et remotior. Igitur gignit immediate lumen, verum⁹⁵ non⁹⁶ est secundum essentiam sed tantum secundum virtutem.⁹⁷

Et qua ratione ad aliquam⁹⁸ distantiam gignit lumen immediate in omni parte, eadem ratione secundum maiorem distantiam, si ponitur⁹⁹ corpus luminosum maioris virtutis. Et sic sol, cum sit corpus luminosum maioris¹⁰⁰ virtutis, potest immediate illuminare medium in quo recipitur lumen secundum lineam fractam etc. Et ideo dico quod lumen genitum in medio secundum lineam rectam,¹⁰¹ fractam vel reflexam immediate gignitur a luce, et licet¹⁰² sit ordo inter lumen genitum secundum lineam rectam et fractam, non tamen est ordo qui est causae ad effectum, sed est ordo effectuum, sicut prius natura¹⁰³ illuminatur prior pars medii quam posterior, licet totum immediate a sole; sicut est ordo inter intelligere et velle, non sicut causae ad effectum sed sicut unius effectus presuppositi respectu alterius.

Ad primam rationem quando arguitur secundum Augustinum quod lux est corpus nobilissimum, dico quod corpora non sunt nobis nota nisi per accidentia sua. Lux autem est qualitas nobilissima et prima, precedens alias quatuor qualitates primas, et non habet contrarium nisi privationem. Et ideo per lucem intenditur corpus primum luminosum, quod est corpus /f. 84r/ celeste, quod est corpus nobilissimum. Et sic etiam loquitur scriptura Genesis:¹⁰⁴ fiat lux.

Ad aliud, quando arguitur quod lumen gignit substantiam, dicendum quod licet accidentia sint alterantia substantiam subjecti¹⁰⁵ corrumpendi et dispon^{<ant>}¹⁰⁶ ad inductionem forme substantialis, non tamen inducunt¹⁰⁷ formam substantialem quia accidens non sequitur generans¹⁰⁸ sed substantia cuius est accidens sicut dictum est supra. Unde celum secundum suam substantiam generat formam substantialem, quia potest esse presens virtute¹⁰⁹ sua, licet non mathematice secundum tactum mechanice.¹¹⁰

Ad aliud, quod mechanice dicitur¹¹¹ radius frangi:¹¹² Quia cum¹¹³

hoc potest competere subiecto, ideo qualitati existenti¹¹⁴ in eo, unde dicitur frangi. Quia si esset corpus habens talem dispositionem qualem lux habet in subiecto secundum radios, tunc frangeretur. Unde non dicitur frangi quia movetur localiter, nec¹¹⁵ quia cedat, sed mechanice.¹¹⁶

Ad aliud, quando arguitur quod non sit species quia lumen realiter denominat medium, non autem species: dico quod species realiter¹¹⁷ denominat medium, sicut vult Commentator super librum¹¹⁸ De Sensu et Sensato quod lumen transiens¹¹⁹ per plantas virides causat species viriditatis in medio. Unde si esset nomen impositum¹²⁰ illi speciei tunc concretum¹²¹ posset denominare illud medium. Sicut medium quia¹²² lux est qualitas prima ideo¹²³ habet nomen impositum sue speciei, quod nomen non est concretum lucis.¹²⁴ Unde dicitur aer illuminatus non luminosus. Ita si esset nomen impositum speciei viriditatis causate in medio, denominaret¹²⁵ medium, nec hoc est contra rationem illius speciei.¹²⁶

Ad aliud, quando arguitur quod lumen non est species quia excludit suum oppositum: dico quod sicut¹²⁷ due species colorum¹²⁸ possunt esse simul in medio, licet colores quorum sunt sint impossibiles, similiter¹²⁹ species lucis solis et saturni, que sunt lumina, possunt simul esse, licet eorum luces sint impossibiles. Verumtamen quodlibet¹³⁰ lumen et quodlibet species excludit privationem sibi oppositam, ut tenebram.

Ad aliud, dicendum quod non repugnat speciei quod sit aliquid¹³¹ reale habens actionem realem. Et si lumen essentielle esset sine luce a qua gignitur, tunc posset gignere lumen accidentale.

Ms. I.- Rome, Conv. S. Francisci ad Ripas, Q. II. 21., ff. 82v - 87r -
Base Text

Ms. H.- Vienna, Nationalbibliothek, Lat., 1449, ff. 105rb - 105va

1. H. om. in medio
2. H. om. speciem; add. accidentalem
3. H. om. unde
4. H. om. anima et
5. I. om. subtiliora
6. I. / idem
7. H. / 7 super Genesim c. 30
8. H. om. lux ... aer
9. H. / ergo
10. H. om. Praeterea ... accidens
11. H. om. medium species vero non
12. I. Et dico primo; H. Et primo dico quod
13. H. / lumen
14. I. / Item hoc ostenditur quia lumen in corpore elementari est
15. I. add. est
16. I. / quod
17. HI. enim
18. H. om. magis
19. I. Item secundo; H. / Secundo dico
20. H. / incorporea
21. I. om. et extensum dicitur; H. om. hoc est ... extenditur
22. H. / non
23. H. om. quia simul ... corpore
24. H. / adducit
25. H. / meus
26. H. / que
27. H. manit or manet
28. H. / nec habet rationem
29. H. om. in tertia specie
30. H. / substantialis
31. H. dicitur esse (?)
32. I. om. est
33. H. / quidquid
34. H. / intentione
35. H. / vere
36. I. om. est
37. H. / intendi
38. H. om. termini et termini
39. H. om. alio modo
40. I. om. qualitas
41. H. / respiciendi; om. et non pro ... intentus
42. H. / primo intentio: Primo visibile
43. I. / sunt
44. H. / sic
45. H. / facit promotionem
46. I. / sunt libro
47. H. / visibile
48. H. / restringeretur
49. I. om. nihil igitur videretur
50. H. om. ipsius lucis

51. H. / dico tunc quod lux; I. Et tum dico quod lux
52. H. / quod
53. H. / calore
54. H. / similiter
55. H. / caloris
56. H. / receptum
57. H. / colorem
58. H. in eo (bis)
59. H. / sed
60. H. / quod
61. I. om. est; H. /sensibiles
62. I. quod tantum cum species non videtur; H. quod est intentus non videtur
63. H. / quod
64. H. / ab aliqua
65. H. / amovetur
66. H. om. quod est lumen
67. H. quod est tantum aliquid visibile
68. I. om. perpendiculariter; H. / perpendi declaratur
69. H. / etiam
70. H. om. tunc dico lumen videtur et est videtur
71. H. / primo
72. H. / rube~~us~~
73. I. om. nam
74. H. om. esse ... accidentale; / dicitur esse duplex lumen accidentale
75. I. om. sive
76. H. add. aut perfectam
77. I. om. est
78. I. sic sed ex; H. si sit
79. I. / non multiplicato
80. H. / primam
81. H. / sed
82. H. / mediate
83. H. / sicut
84. H. add. sic
85. H. / gignat vel non gignit lumen
86. H. / agit
87. I. aqua actione agit in unam
88. H. / ergo
89. H. / nam
90. H. om. rectam
91. H. om. et
92. I. / lumen
93. H. / aliqua H. om. lumen in
94. H. om. medii
95. H. / ubi
96. I. add. est
97. I. / veritatem
98. H. add. unam
99. I. positum
100. I. maxime
101. H. om. fractam
102. H. / vel

- 103. H. / non
- 104. H. / Grece
- 105. H. / quod quodlibet accidens sit alteratam; I. om. subjecti
- 106. H. disponatur; I. / disponunt
- 107. H. / inducit
- 108. H. add. quia accidens non sequitur generans
- 109. H. / secundum virtutem suam
- 110. I. om. mechanice
- 111. I. methamatice; H. add. quod
- 112. H. / frangatur
- 113. H. / enim
- 114. I. / ex consequenti
- 115. I. / autem
- 116. I. / methamatice
- 117. H. add. veraciter
- 118. I. / libro
- 119. I. / transcendens
- 120. H. / incompositum
- 121. H. / cognitum
- 122. H. medium quod; I. / modo quia
- 123. H. / Praeterea
- 124. H. / sue non est nomen concretum lucis
- 125. H. / denominare
- 126. I. / specie
- 127. H. / sint
- 128. I. / coloris
- 129. H. / sicut
- 130. H. / quod licet
- 131. H. / aliud.

ADDITIONES MAGNAE

BOOK II

DISTINCTION

13

Circa distinctionem 13 quero:¹ Utrum lumen sit propria species sensibilis² ipsius lucis.

Hic primo dicitur quod lux non³ est forma substantialis, quia per se sensibilis,⁴ per Avicennam 6 Naturalium, pars 4, cap. 3. - Sed est dubium quomodo potest esse per se sensibile, cum unius sensus sit unum per se et⁵ adequatum obiectum. Color autem est per se obiectum visus, qui non continetur sub luce, nec e converso. Ergo etc.

Respondeo quod utrumque potest esse per se sensibile, et tamen est⁶ sensus unus. Quia quanto sensus aliquis⁷ est perfectior, tanto potest in plura obiecta. Sed visus est sensus perfectissimus. Utrumque patet primo Metaphysice, eo quod plures nobis differentias rerum ostendit, non solum quia ostendit⁸ obiecta in pluribus ut⁹ in corporibus celestibus et inferioribus, sed quia plures differentias sensibilibus¹⁰ ostendit nobis, ut colorum et lucem. Non sic autem auditus et tactus: tactus¹¹ enim solum sentit¹² ea que sunt unius generis physici, sed visus sentit lucem et colorem que non sunt unius generis physici. Sicut omnes sapes medii cum extremis sunt unius generis physici.¹³

Tunc ad argumentum: Quod si queratur primum obiectum visus¹⁴ adequatum, dico quod oportet dare aliquod unum commune ad colorem et lucem. Hoc autem est innominatum sicut est de tactu qui secundum philosophum est duarum contrarietatem primo,¹⁵ que habent aliquod commune, innominatum tamen. Similiter de sensu communi qui apprehendit opposita¹⁶ sensuum particularium, qui¹⁷ non possunt habere aliquod unum, nisi aliquod commune abstractum. Aliter potest dici quod quando sunt aliqua plura obiecta alicuius potentie et in illis est ordo, ibi¹⁸ non oportet dare obiectum adequatum nisi primum, et aliud reducetur ad primum.

Et secundum hoc dico quod lux est primum obiectum et¹⁹ per se

visibile, et non dependet a colore, sed color in visibilitate dependet a luce, quia necesse est ad sentiendum colorem coagere lucem vel extrinsecam, vel intrinsecam (si cadat²⁰ in compositione coloris.)

Q. II.²¹ Utrum lumen sit propria species lucis?

Circa secundum²² articulum: quomodo lumen gignitur a luce, est sciendum quod duplex²³ est lumen: essenziale et accidentale. Essentiale dicitur illa species lucis²⁴ per quam visus potest devenire²⁵ in visionem corporis luminosi. Et illud est triplex, secundum triplicem radium: rectum, fractum et reflexum. Rectus est qui venit a luminoso ad terram per medium eiusdem dyaphanitatis sine aliquo angulo. Quia natura²⁶ agit quantum potest, et ideo breviori modo quo potest. Et quia linea recta est brevior acuta linea conterminali,²⁷ ideo radius solis semper tenet incesum rectum si potest. Sed dum occurrit medium alterius dyaphanitatis, ut cum radius transit²⁸ per aerem veniens ad aquam que non est corpus omnino densum, permittit²⁹ radium transire, sed non per incesum rectum, nisi veniat perpendiculariter.³⁰ Et ideo declinat radius ab incesu recto cum ingreditur superficiem aque que est medium alterius dyaphanitatis, ut patet in³¹ perspectivorum libris. Hec autem declinatio radii ab incesu recto vocatur fractio radii, et dicitur radius fractus. Reflexus est cum rectus radius inveniens obstaculum corporis sufficienter densi,³² non transit per medium. Sed quia natura corporis luminosi non potest multiplicare speciem lucis sue per medium illius corporis, facit quod potest multiplicando³³ eam in medio contiguendo eque³⁴ corpori obstanti. Et talis multiplicatio luminis³⁵ vocatur reflexio, que fit secundum equalitatem angulorum et³⁶ incidentie et reflexionum. De hoc Alacen, Euclides et alii. Lumen accidentale dicitur quod potest ducere in cognitionem luminaris, sicut lumen in angulo domus ubi³⁷ non accedit radius solis. Et illud lumen accidentale

venit a radio principali cadente per fenestram et hoc immediate.³⁸

(Sed lumen essentielle quod distinguitur per 3 radios causatur immediate) a corpore luminoso, non immediatione effectus /f. 14rb/ sed immediatione causae. Quod probatur.

Primo: de radio recto. Omne enim³⁹ agens naturale eque dispositum multiplicat se semper⁴⁰ eodem modo.⁴¹ Igitur,⁴² pars medii que est in fenestra eodem modo multiplicaret se in angulum⁴³ domus et in omnem partem, cum medium sit eque dispositum. Cuius oppositum⁴⁴ ad sensum apparet. Ergo sol immediate agit in aliquam⁴⁵ partem medii cui non est praesens mathematicae, sed solum⁴⁶ secundum praesentiam virtutis et non contactus corporalis, 6 Naturalium.⁴⁷

Item si lumen in aliqua parte medii gignat aliud,⁴⁸ hoc non est in puncto sed in aliqua parte divisibili. Ergo agit immediate in aliquod distans istius⁴⁹ partis, et per consequens agens maioris virtutis potest agere immediate in magis distans, et sic lux prima et⁵⁰ perfectissima in totam⁵¹ distantiam medii. Dico tamen quod si Deus conservaret radium terminatum ad fenestram in esse sine sole, aperta fenestra, iste radius multiplicaret se ad partem oppositam sicut nunc facit sol. Tamen nunc⁵² non fit ista. multiplicatio virtute radii, sed virtute solis immediate. Quia quando duo agentia sunt praesentia que nata sunt producere unum⁵³ et eundem effectum, agens fortius prevenit minus forte⁵⁴ agens ne ipsum agat illum⁵⁵ effectum.

De radio reflexo idem patet. Quia,⁵⁶ sicut in aliis, radius reflexus a speculo, immediate⁵⁷ quo res videtur, causatur⁵⁸ immediate a re cuius est illa species multiplicata ad speculum et reflexa ad oculum. Patet. Nam ad motum ipsius rei variatur⁵⁹ ille⁶⁰ radius. Nec potest fingi aliquid in speculo, ut ymago vel species, a qua causetur radius reflexus. Nam illud quod apparet in speculo non est aliud⁶¹ nisi ymago

vel⁶² species, quam res in se. Hec patet secundum perspectivos,⁶³
 precise secundum⁶⁴ Alacen, libro 7,⁶⁵ et Euclidem libro De Speculis.
 Nam probant isti quod in speculis planis, res apparet ultra speculum
 ad tantam distantiam ad quantam in rei virtute ipsa est citra. Sed
 constat quod species rei non transit per speculum densum⁶⁶ de calibe.
 Igitur,⁶⁷ nulla species est causativa huius radii visualis reflexi a
 speculo, sed solum habet ipsam rem pro causa efficiente. Eodem modo
 sol immediate causat radium reflexum sicut radium.⁶⁸

De radio fracto idem ostenditur. Nam baculus in aqua causat
 fractionem radiorum sue speciei cum ingrediuntur medium subtilioris⁶⁹
 dyafanitatis: quia declinant ab incessu recto modo quo dictum est, et
 non causatur ab aliqua specie, quia tunc⁷⁰ baculus non appareret
 fractus. Ideo⁷¹ in rei veritate nulla est species in loco ubi apparet
 fractio, ut sciunt perspectivi qui causam istius apparitionis⁷² assignant.
 Igitur,⁷³ illa⁷⁴ causatio fractionis non est ab aliquo agente nisi a re
 in se immediate.⁷⁵ Eodem modo de radio solis fracto in aqua vel alio
 medio.

Et isti tres radii dicuntur lumen essentielle, quia ducunt in cogni-
 tionem corporis luminosi. Quia in quocumque istorum radiorum oculus
 fuerit, potest videre solem: per radium rectum non est dubium; et per
 radium reflexum apparet in speculo; et etiam⁷⁶ per radium fractum patet
 per instrumenta.⁷⁷ (Quod non in corporibus aliquibus reflectantur sicut
 qualitates impressae subiectivae per hoc quod non videntur in superficie
 corporis polito sed apparent ultra illud corporis. Et patet in speculo
 in quo apparet species faciei ultra speculum: quod non contingeret si
 esset in ea ut quedam qualitas impressa superficiei.)⁷⁸

Ms. G. - Balliol College, 208, ff. 14r - 16v Base Text
 Ms. B. - Vat., Latin, 876, ff. 302ra - rb
 Ms. C. - Paris, Bn., Lat., 3061, ff. 247rb - 247vb

1. C. om. Circa d. 13 quero; / q. II
2. C. / substantialis
3. C. om. non
4. B. om. per se; C / substantialis
5. B. om. et
6. B. / tum; G. om.; C. / tamen; B. om. est
7. G. om. aliquis B. om. sensus
8. C. om. ostendit
9. B. / patet in; C. / quia in
10. B. / sensibiles
11. B. om. tactus
12. B. / sensus videtur
13. G. / physica; BC. phisici
14. B. add. sensus
15. B. / quia
16. B. / objecta
17. G. quia; BC. / qui
18. B. om. ibi
19. B. om. et
20. G. catat; BC. / cadat
21. C. / q. II
22. B. / secundum GC. istum
23. B. / ducere
24. B. om. lucis
25. C. om. de
26. B. add. sibi
27. B. / et linea recta est alia sibi conterminali brevior; G. illa recta;
C / alia linea sibi conterminali
28. B. / transeat
29. G. permittitur
30. G. perpendictus; BC. / perpendiculariter; B. om. et
31. C. / ex
32. B. / densum transit
33. G. multiplicato; BC. / multiplicando
34. BC. / contiguo C. om. eque
35. C. om. luminis
36. B. om. et
37. B. / ubi non; GC. om. non
38. G. om. hoc immediate ... immediate
39. B. om. enim
40. B. / sperice
41. B. om. eodem modo
42. BC. / ergo
43. B. / angulus
44. G. obiectum; BC. / oppositum
45. C. / aliquem
46. B. / solis; C. / solem
47. G. corporalis; BC. / corporalis 6 Naturalis
48. C. aliquod

49. C. / illis
50. B. om. et
51. B. / corpora
52. B. om. nunc
53. C. add. unum et; BG. om.
54. GB. om. agens; C. agens
55. B. / in ipsum
56. B. / quod
57. C. / mediate
58. BC. / causatur G. creatur
59. G. rariatur; BC. / variatur
60. C. / iste
61. B. om. aliud; C. add. aliquid; G. Aliud aliud
62. GC. nec; B. / vel
63. B. / habet patet per perspectives
64. B. / per
65. B. om. libro 7
66. C. / densium
67. BC. / ergo
68. C. / sicut radium; BG. sicut causam
69. B. cum distinguitur ergo substantias
70. G. om. tunc
71. C. / ideo
72. C. / quicumque qui istius apparitionis causam; B. / causam G. causat
73. BC. / ergo
74. C. / ista
75. B. / nisi a re immediate; C. / nisi silicet a re in se immediate
G./ubi ait in se mediate
76. C. om. etiam
77. C. / patet in manifeste per instrumenta
78. BC. om. quod ... superficiei (a gloss)

In the Vives Edition the Ordinatio for D. 13 appears in volume XII between pages 608 and 638. The text of Peter Lombard is presented first, followed by that of Johannes Duns Scotus' Quaestio Unica on page 611. The text of Duns Scotus is interrupted by interjections of a Commentary by P.R. Poncius, which is followed by a brief outline of the forthcoming exposition under the title "Scholium". There are four such interruptions of varying length on pages 612; 612 to 616; 617 to 623; 627 to 637. The text presented by the Vives Edition is basically complete for Distinction 13. There are some variations and these are mostly by way of omissions. For instance, an omission appears in the first proposition in the argumentation in opposition to lux being sensible. Here the text omits, "...nisi per accidens".¹ Another lengthy omission is the omission in the same argument of the example:

Patet in sacramento altaris post consecrationem, ubi non est substantia panis [sed transsubstantiatur in Corpus Christi] et tamen remanet ibi quidquid prius ab aliquo sensu apprehensibile. Ergo.²

One finds another such omission in Q. II, that lumen is not a complete substance. The omitted passage reads:

...notandum est quod huius <modi> nomen intentio est equivocum. Uno modo dicitur actus voluntatis intentio. Alio modo: ratio formalis in re. Sed intentio rei a qua accipitur genus differt ab intentione a qua accipitur differentia. Tertio modo, dicitur communiter. Quarto modo, dicitur ratio tendendi in obiectum; sicut similitudo dicitur ratio tendendi in illud cuius est.³

Again in section III of the manuscript reading presented earlier one finds the omission of: "... per rectum radium et continuatur corpori terminanti (vel terminato)."⁴ Once more an omission appears on the same page, namely, "... Querimus quatuor de hoc quod est."⁵

Other variations found in the text of the Vives Edition are in the word order; or the omission of a word here and there; or the rephrasing of a sentence. For instance, the ms. reading presented here on page 28

of Chapter 2 reads: "... umbra non est privatio luminis secundarii sed primarii."; while the Vives text reads: "...umbra est privatio luminis primarii."⁶ There is one instance where a change in wording is of significance and this is the second sentence of question II. The text presented in the Vives Edition reads: "Est enim lumen cum toto aere"⁷ However the text prepared from the manuscripts reads lux instead of lumen.⁸

The Reportatio for D. 13 appears in volume XXIII of the Vives Edition between pages 42 - 47. When compared to the manuscript tradition it is noticed that there are six major additions or interpolations to the text of the Reportatio. In five cases the interpolations can be identified as being borrowed from one of the other three readings of Duns Scotus' Commentary.

The first instance of this borrowing appears on page 43 column b of the Vives presentation, where we find at the end of the second paragraph on the subject of the primary object of sight the interpolation: "... quia ad sentiendum, vel ad videndum colorem necesse est coagere lucem, vel intrinsecam, vel extrinsecam, si cadat in compositione coloris." These extra lines are taken directly from the Additiones Magnae as seen on p.35 of Chapter 2.

The second interpolation appears on page 45 columns a - b of the Vives Edition, where the text speaks about two types of lumen. Again it is evident that the reading was taken from the Additiones Magnae. Thus we read:

Tertio dico, quod lumen est duplex, essenziale et accidentale, sive primum et secundarium. Essentielle et primum dicitur illa species, per quam visus potest devenire in visionem corporis luminosi, et illud est triplex secundum triplicem radium, rectum, fractum et reflexum. Rectus est, qui venit a luminoso ad terminum per medium ejusdem diaphaneitatis sine aliquo angulo,..., multiplicando eam in medio contiguo corpori obstanti.

Indeed this lengthy interpolation reads very close to the manuscript reading of the Additiones Magnae seen on page 35 of Chapter 2. This borrowing from the Additiones Magnae is interrupted at this point by the third interpolation taken from the Ordinatio as seen on page 27 of Chapter 2. The interpolation reads: "Naturale namque agens, cuius virtus activa non est totaliter exhausta, in directum agit, ... agit in obliquum:" The Vives reading then returns to that of the Additiones Magnae, "... et talis multiplicatio luminis vocatur reflexio, quae fit secundum aequalitatem angulorum incidentiae et reflexionum. De hoc Alacen, Euclides, et alii."⁹

The fourth interpolation is found almost immediately after the third one on page 45 column b.

Lumen autem essenziale, sive primarium, immediate causat supradictos tres radios immediatione causae, quia non est unus radius causa alterius, sed quilibet eorum est immediate ab ipso luminari.

In all likelihood this is a paraphrase of the reading found in the manuscript texts.¹⁰

The fifth and sixth interpolations found in the Vives text appear on page 46. The first reads:

Patet nam ad motum illius rei variatur ille radius, nec potest fingi aliquid in speculo, ut imago, vel speculo, a qua causatur radius reflexus, nam illud quod apparet in speculo, non est nisi imago vel species, quam res in se habet ...; ergo nulla species est causativa huius radii visualis reflexio a speculo, sed solum habet ipsam rem pro causa efficiente.

This interpolation is from the manuscript text of the Additiones Magnae as seen on page 56-7 of Chapter 2.

The sixth and last interpolation reads:

Praeterea, baculus in aqua apparet fractus, quia frangitur radius suae speciei, quia declinat ab incessu recto, ut dictum est, et non causatur ab alia specie, alias non apparet baculus fractus.

This interpolation agrees substantially with the reading in our manuscript text found on page 57 of Chapter 2.

The sixth interpolation which is not derived from the other versions is found on page 43a of the Vives Edition. It reads:

Si potentia imperfectior omnia cognoscat, perfectior perfectius cognoscet (quod dico, quia angelus inferior cognoscit omnes res, quas Angelus superior, etsi non aeque perfecte); sed sensus visus plures differentias rerum nobis ostendit, primo Metphys. cap. primo, ...

The reading from the manuscript tradition for this section reads as follows:

... si potentia imperfectior non omnia cognoscat que perfectior. Secundo dico: quia angelus inferior cognoscit omnes res quas angelus superior, et si non eque perfecte. Sed sensus visus plures differentias rerum nobis ostendit, primo Metaphysice: ¹¹

The other variations found between the manuscript reading and that of the Vives Edition are slight except for the use of "suppositis" in the Vives Edition instead of "subjecti", as found in the manuscript tradition on two occasions.¹²

Footnotes

1. Johannes Duns Scotus, Quaestiones in Secundum Librum Sententiarum in Opera Omnia, Nova Ed., t. 12 (Paris: Vives Press, 1893), 612a; Ordinatio, see above p. 24.
2. Vives Edition, t. 12, 612a; Ordinatio, see above p. 24.
3. Vives Edition, t. 12, 616a; Ordinatio, see p. 26. Obviously the scribe in copying from the ms. utilized originally by L. Wadding skipped from notandum to notandum.
4. Vives Edition, t. 12, 623b; Ordinatio, see p. 27. However this line is believed to be a gloss.
5. Vives Edition, t. 12, 623b; Ordinatio, see p. 27.
6. Vives Edition, t. 12, 624a.
7. Vives Edition, t. 12, 616a.
8. Ordinatio, see. p. 25.
9. Additiones Magnae, see p. 55.
10. Reportatio, see p. 41; see also Additiones Magnae, on p. 56.
11. Reportatio, see p. 38.
12. Johannes Duns Scotus, Reportata Parisiensia, in Opera Omnia Nova Ed., t. XXIII, (Paris: Vives Press, 1894), 42: "... et tunc non fiebant accidentia sine suppositis, ..."; and 47; "Ad primam probationem, dico quod quaelibet forma potest denominare suppositum, in quo est, ...".

CHAPTER III

An Analysis of Duns Scotus' Exposition on Light

Early Christian Thought on the
Nature of Light: From Light
Metaphysics to Optics

Duns Scotus began Distinction 13 of Book II of his Commentary on the Sentences by asking the question: "Whether or not lux can at the same time be lumen?" This question is a problem because in Medieval treatises on light the two words are not always used synonymously. If these terms are not synonymous, what is the distinction between light (lux) and light (lumen) in terms of the very existence and essence of the phenomenon. This distinction must be investigated and answered in terms of ontology, which is a branch of metaphysics that studies existence and being. Also involved in this question posed by Distinction 13 is the author's acceptance or rejection of the authority of Aristotle, who discussed the proper object of the sense of sight in Book II, chapter 7, of his De Anima, which is part of Aristotle's epistemological explanation of the acquisition of sensory knowledge. The De Anima of Aristotle is basic to the study of Medieval psychology. In conjunction with this epistemological explanation one would naturally expect the author to draw on all available materials from the science of optics to help answer the question.

From the theological point of view this question is also of significance. After all, it was on the very first day of creation that God said: "Let there be light" (Gn. 1:3).¹ Hence from the Genesis account it was known that light was the first thing made by God. Therefore, in any study of the universe and man's place in it, Christian scholars were thrown back to that first day and the creation of light as their starting point. The questions to be explored were: What is this light? Is it spiritual or material? If light existed on the first day why then

was it necessary to create the luminous bodies of the firmament on the fourth day? In ontological terms it could be asked if this light of the first day is to be called lux or lumen? A whole genre of Patristic and theological literature developed around the explanation of the creation story as found in the first chapter of Genesis, this of course is the literary genre known as the Hexaemeron. This is a step by step analysis of the objects of the natural world mentioned in the creation narrative. On another level Christian scholars were interested in light, its functioning, and nature, because of certain passages found in the Gospel of St. John: "There was a man, sent from God, whose name was John. He came for testimony, to bear witness to the light (de lumine), that all might believe through him. He was not the light (lux), but came to bear witness to the light (de lumine). The true light (lux) that enlightens every man was coming into the world." (Jn. 1:6 - 9) Scholars pondered over this light (lumen Christi) that Christ brings to this world as well as the process by which this light of Christ enlightens every man in the world. This naturally brings us to the Augustinian view of light as an intellectualizing agent in the process of cognition which is known to us today as the doctrine of Divine Illumination.

Within the whole spectrum of medieval treatises on light then one might expect the author to approach the subject from any one or all of the above mentioned points of view, that is optically, metaphysically (ontologically, epistemologically or psychologically) or theologically.

In their analysis of the natural phenomenon of light and the spiritual and psychological aspects of light, Christian scholars borrowed heavily from the philosophers of Pagan antiquity. In the first five centuries of the Christian era, they created a syncretism of the

intellectual heritage of the Greco-Roman world and the Revealed Truth of the Christian religion. Thus they forged an outlook on man and his universe that shaped the pattern of the intellectual activity in the Latin West. The activity was given a vital impetus and direction with the twelfth century reintroduction into the Latin West, through the intermediary role of Arabic scholarship, of a vast amount of Greek learning. The availability of the entire Aristotelian corpus sometime after 1150 A.D. was of special significance for the development of the Scholastic system of the thirteenth century. Admittedly the old Greek scholarship was modified somewhat and improved on by its Arabic Commentators. In some instances, as in the case of optics, the Arabic scholars broke away from the old Greek heritage and created a new body of knowledge based on their own discoveries. This is particularly true in the case of the Kitāb Al - Manāzīr (Perspectiva) of Abu ali Al - Hasan Ibn Al - Husain Ibn Al - Haitham (965 - c. 1039 A.D.); otherwise known to us in the West as Alhazen and in the East under his family surname, Ibn Al - Haitham.² The works of this man on perception and optics were to have profound influence on thirteenth century Latin scholars.³

The thirteenth century interest in the study of Optics (Perspective), as witnessed in the optical treatises of Bacon, Pecham and Witelo, was a direct result of the absorption in the West of Arabic achievements in the field of optics.⁴ It was the Arabic scholars who put together a believable and comprehensive theory of perception and optics. As David C. Lindberg has pointed out, they achieved this despite the great diversity in Greek thought on the subject.⁵ This Greek thought was always the starting point for scientific inquiry. Alhazen, the author of the Kitāb Al-Manāzīr is at the pinnacle of Islamic optical achievement.

Alhazen abandoned the "Emission Theory" of Euclid and Ptolemy, which propounded the notion that visual rays were emanated from the eye. Likewise he rejected the Epicurean "Intromission Theory", which had rays emanating from the object and made these rays corporeal; as well as the combined emission and intromission theories espoused by Plato and Galen. Moreover he abandoned statements made by that great Greek authority Aristotle to the effect that light was a qualitative change in the medium.⁶

Contrary to Euclid and Ptolemy, Alhazen postulated the idea that light does not emanate from the eye but enters it and that impressions made on the eye traveled along the optic nerve to be received by the brain thus forming visual images on the symmetric portions of both eyes.⁷ Also among his achievements was the explanation of binocular vision.⁸ He experimented with rectilinear propagation of light and discovered the laws of reflection and refraction of light and spherical and parabolic aberrations.⁹ Siddiqui also ascribed to Alhazen investigations in the following areas: the magnifying power of lenses; and the refraction of light in the earth's atmosphere. Moreover he tried to estimate the height of the homogeneous atmosphere.¹⁰ In his works Alhazen also made such observations as: the fact that light from self luminous bodies such as the stars and fires, is a form of heat energy; that in every body there resides a power to receive light; that a transparent body transmits light, while an opaque body does not; that light is transmitted in straight lines in constant transparencies; that light radiates from every point of a luminous body; and that the transmission of light in transparent bodies is the property of light and not of the transparency.¹¹ In addition, he classified transparencies as celestial and subcelestial

with the latter being divided into transparencies such as air, water, and fluid, and minerals, like glass and crystal.¹² Alhazen told us, that there is some opacity in all transparent subcelestial bodies, since from these there is a secondary light produced when the sun's rays strike them.¹³ He also said, that the radiation of secondary light from a transparency is in the opposite direction from the transmitted light.¹⁴ In addition, he observed that, "... although in principle transparency can be unlimited, in reality the transparency of space is the greatest."¹⁵ Thus we have a summation of the achievements of the greatest optical scholar of the Arabic world.

Returning for a moment, let us take a look at how light was treated in the hexaemeral format. The Hexaemeron opened with a consideration of the first words of Genesis: "In the beginning God created heaven and earth." (Gn. 1:1) There is usually a discussion on the manner in which God created, together with, especially in the earliest examples, a refutation of some of the Greek theories such as the pre-existence of matter, the eternity of the world, pantheism, and a condemnation of astrology. The hexaemeral literature usually discussed how God created not in time but ex nihilo by an act of his will. There is a consideration of the verses on the void and light. In regard to the first, "And the earth was void and empty, and the darkness was upon the face of the deep. And the spirit of God moved over the waters" (Gn. 1:2), there is some discussion of the nature of the void. In the case of the second, "And God said: Let there be light and light was made " (Gn. 1:3), the nature of God's command is a favorite topic for discussion on this verse. This is followed by the naming of the light day and darkness, night and the division of the day into 24 hours. Basil, Ambrose,

Augustine and Bede were the outstanding early commentators on the Hexaemeron. The most widely cited source of authority in the Christian West was St. Augustine. Besides being a Commentator on Genesis, he also is renowned for his theory of "divine illumination". This was Augustine's response to the question raised by the second part of the quotation from St. John: "What is the true light that enlightens every man that comes into the world?" According to David Knowles, Augustine's doctrine of "divine illumination" does not, "... imply the presence in the subject of either faith or sanctifying grace, nor does it imply in the mind of the recipient an experimental or existential recognition of its presence."¹⁶ Moreover Knowles tells us that St. Augustine did not subscribe to the Platonic doctrine of knowledge from memory known as Anamnesis nor the doctrine of Innate Ideas.¹⁷ Likewise Augustine did not adopt the opinion that ideas were seen in God by the human mind, which doctrine is referred to as "Ontologism".¹⁸ "Divine Illumination" moreover was not for him: "... a divine actuation within the process of cognition, an adaptation of the Aristotelian agent intellect as an essential component of the intellectual process. There would seem to be no trace in Augustine's writings of a division of the intellect along Aristotelian lines."¹⁹

On all levels of knowledge Augustine saw light as the formal and efficient cause of the cognitive process and that, "... therefore in all degrees and kinds of knowledge there is an activity analagous to that by which visual perception attains its object by physical light;".²⁰ For Augustine, fully rational truth is true knowledge and truth is immutable and eternal. The discovery of truth, right judgment, values and first principles was through contact with something immutable and

eternal. That something was God.²¹ These truths:

... are not innate in the soul, nor are they formed from sense-perceptions by the activity of any abstractive faculty. They are 'irradiated into' the soul, 'participated' by created beings, and 'illuminated' for the mind's perception by a divine light.²²

This light is neither metaphysical, supernatural, physical nor created light.²³ For Augustine, it was, "... in some sense 'truth' itself, the intelligible aspect of what we call reality, shining from eternal truth and illuminating in our minds the first principles of knowledge and the prime values of ethics and aesthetics."²⁴ Augustine used terms such as form, ideas, reasons, judgments of value to describe the objects that are 'participated' and 'illuminated'. All these are derived from the transcendent divine truth.²⁵

It would seem that Augustine borrowed heavily here from Plotinus.

We read in David Knowles that in Augustine:

The Plotinian Mind is replaced by the divine Word and the human soul is the recipient of its illumination; its light radiates into the soul the immaterial intelligible objects - forms, ideas, reasons, rules - and illuminates them for its perception. Such it would seem, is the origin and explanation of the divine illumination of the intellect"²⁶

In addition there is in Augustine's doctrine of divine illumination a foreshadowing of the light metaphysics of the Middle Ages. Augustine, using Plotinus and St. John as his inspiration, pictured light as:

... the one intellectualizing element in the whole of creation, reflecting the uncreated light of God. In man it is the illumination of the Word; in the sensible world (which Augustine would never call the material world) it is the created light of the sun, and in things inanimate it is the number which is, as it were a light immanent in the things.²⁷

Besides the earlier channels of Plotinus and Augustine, light metaphysics later reached Western Medieval authors through Alfarabi, Avicenna, and the pseudo-Aristotelian author of the Liber De Causis.²⁸

The Franciscan Order opted to make Augustine and his Neo-Platonism

the cornerstone of Franciscan philosophy and theology. Optical studies and aspects of light metaphysics became important elements in the works of such great Franciscans as Bonaventure, Roger Bacon, and John Pecham. All of whom we will treat in some detail later on.

Connected with the rise of Franciscan scholarship, especially at Oxford is the name of Robert Grosseteste, who while not a Franciscan heavily influenced the development of Franciscan philosophy and scientific thought at Oxford. Light metaphysics played an important role in the development of an attitude of study there which led to a more scientific analysis of the natural world. Behind this movement was the metaphysical conception of the universe and the application of light metaphysics to mathematics and the physical world espoused by Robert Grosseteste. This is especially clear in such tracts as the De Luce; De Colore; De Lineis, Angulis et Figuris; and De Iride of Bishop Grosseteste. He regarded light as the first metaphysical constituent of bodies and the generative power of all being. For him there was no separation between divine illumination or intellectual light or physical light. These were just different aspects of the same thing. There was no division for him between his metaphysics of light, his theology and mathematical studies.²⁹ A more precise treatment of Grosseteste on the subject of light as well as the above named Franciscans will be given later on.

So it is clear that Duns Scotus in asking, whether lux and lumen can be the same thing in Distinction 13, is well within a traditional topic of discussion in the Latin West. The question comes up in Book II of his Sentence Commentary, because as we will see Peter Lombard absorbed the hexaemeral topics into his treatment of creation in the

Second Book of the Sentences. Furthermore as a Franciscan, Duns Scotus was well acquainted with Augustinian Neo-Platonism, which was adopted by most Franciscan scholars. Moreover as an Oxford and Paris scholar, he had at his disposal not only all the traditional didactic literature and sources on the subject of light but also the light metaphysics of Bishop Grosseteste. More importantly the newer Arabic studies, which were available in the University communities of Western Europe, and which had already influenced certain members of the Franciscan Order in the direction of optics after 1260, were also at his disposal.

Duns Scotus' Theory of Light

The analysis of Duns Scotus' teaching in Distinction 13 will be presented in such a way, as to glean from the four versions of the Commentary on D. 13 a composite picture of the key points in the discussion. The thought, as found in the Ordinatio, Reportatio, and Lectura, will be presented first, because, while they do not exactly parallel each other topically in their order of presentation, they do follow a similar basic format and are more complete than the Additiones. The ideas, as found in the Additiones Magnae, which is a selective abbreviation of the presentation of the subject matter, in which Alnwick may have made his own orientation and preferences felt, will be presented after the complete picture drawn from the other three texts.

In his approach to the subject of the meaning of lux and lumen in D. 13, and in asking first of all, if lux could at the same time be lumen; and secondly, if lux begets lumen, as its own proper sensible species, Duns Scotus investigated these questions initially as a metaphysician and logician. He examined the two words lux and lumen in terms of substance, accident, species, quality, and intention, using the

methodology of Aristotle, in which all medieval schoolmen of his period were well trained.

The definition of the object under consideration is basic to Aristotle's approach to scientific inquiry. Aristotle's scientific method is based on an analysis of the possible ways in which a predicate may be related to the subject of a proposition.³⁰ In a syllogism, the value of each proposition depends on the relationship of the subject and predicate. Every predicate is either convertible (interchangeable) with its subject or it is not. If it is convertible, it either signifies the essence of the subject, thus being a definition of the thing, or it is a property.³¹ If it should develop that the predicate, "... is not convertible with the subject, either it is contained in the definition of the subject, in which case it is the genus or differentia, or it is not contained in the definition, and in which case it is an accident."³² A predicate then stands to the subject in one of five possible relations. That is to say that it is either a definition, a property, a genus, a differentia or an accident. In Aristotelian logic the subject term represents a form, type or universal, as opposed to something concrete and singular. The latter are not the subject matter of inquiry in Aristotelian science.³³

In all three readings of J. Duns Scotus' Distinction, the Ordinatio, the Reportatio, and the Lectura, the approach is to differentiate between lux and lumen and to determine, if lumen is the sensible species of lux. The three versions all contain the same basic propositions, although they are altered somewhat in their formulation in each version.

Principal Arguments

At the outset Duns Scotus sought to establish, if there is a difference between lux and lumen. He queried, is lux or lumen a substantial

body; and is lumen perhaps a species like color. He presented three propositions stating in them that lux and lumen are bodies and a second set of three propositions stating that lumen is not a species.³⁴ That lux and lumen are substances or bodies.

The first proposition of the first set, as read in the Ordinatio, is an argument based on authority. There Duns Scotus quoted from St. Augustine, Book 7 of Super Genesim ad Litteram, "The soul directs the body through light and air etc." and, that lumen being a highly subtle body can not be a species.³⁵ We find that in the Lectura Duns Scotus also quoted Augustine but this time from Super Genesim, chapter 18, saying that lux in the medium is like air, a body and not an accident.³⁶ Augustine ultimately seems to have regarded lux and lumen as spiritual substances with lux being from the luminous bodies of the firmament. Yet Augustine is quoted above as favoring a bodily nature for lux. The second proposition is that lumen begets a substance (namely more lumen) and therefore it is a substance. The third is that lumen is broken and reflected and therefore it is a body.³⁷

Before moving on to the next set of propositions concerning lumen, let us examine the propositions raised by Duns Scotus. The second proposition of the first series is that lumen begets a substance and therefore it is a substance. Substance in the Aristotelian use of the word means firstly, simple bodies like earth, fire, water and air, and things composed of these elemental bodies.³⁸ "All these are called substances because they are not predicated of a subject but everything else is predicated of them."³⁹ Aristotle further defined substance as:

(2) That which, being present in such things as are not predicated of a subject, is the cause of their being, as the soul is of the being of an animal - (3) The parts which are present in such things, limiting them and marking them as individuals,

and by whose destruction the whole is destroyed, ... (4) The essence, the formula of which is a definition, is also called the substance of each thing.⁴⁰

The term substance then has two senses in which it can be used, in one sense it is that which is not predicated of any other thing and this is the logical usage of the term. In another sense it is that which is separable and is the shape and form of each thing and in this case it is used in an ontological sense.⁴¹

The principle involved in Duns Scotus' proposition is that only substances can beget other substances. The argument comes from the De Generatione et Corruptione of Aristotle. We read there for instance, "... but everything always comes - to - be something and out of something - ...";⁴² and "For if a substantial thing comes - to - be, it is clear that there will 'be' (not actually, but potentially) a substance, out of which its coming - to - be will proceed and into which the thing that is passing - away will necessarily change."⁴³

The third proposition is aimed at making lumen a corporeal body. Since in definition (1) substance is said to be a body or composed of bodies, the fact that lumen can be bent and broken gives it the physical characteristics known to belong to corporeal bodies. If lux and lumen then are two substances, it follows that they can stand independent of each other; whereas, if lumen is only a species, then it belongs to a genus which is lux.

In the Aristotelian system a definition, "... is a phrase signifying a thing's essence."⁴⁴ The essence is a set of fundamental attributes, which are necessary so that a thing can be what it is. Genus, the first of the five possible relations in a definition, is that which is, "... predicated in the category of essence of a number of things

exhibiting differences in kind."⁴⁵ According to Aristotle the term genus could be used three ways:

"... (1) in reference to continuous generation of the same kind, (2) in reference to the first mover which is of the same kind as the thing it moves, (3) as matter; for that to which differentia or quality belongs is substratum, which we call matter."⁴⁶

The first way pertains to ontology, the second to dynamics, and the third to logic.

Species is actually a breakdown of genus. In the Categories Aristotle said that all attributes that belong to the species belong to the genus as well but that not all attributes that belong to the genus should necessarily belong to the species.⁴⁷ In the Metaphysica Aristotle said of species:

... but if we know each thing by its definition, and the genera are the principles or starting points of definitions, the genera must also be the principles of definable things. And if to get the knowledge of the species according to which things are named is to get knowledge of things, the genera are at least starting points of the species.⁴⁸

It is in this sense that genus and species are used. Thus to know lumen one must begin by knowing lux.

That lumen is not a species:

In the first proposition which states that lumen is not a species, Duns Scotus argues that it is true that it is not a species because it denotes the medium; and so it cannot be the species of color. The second proposition states that lumen excludes its opposite, namely darkness, and it cannot be a species, because at the same time that they are the species of opposites, the species of whiteness and darkness are in the medium. In the last proposition Duns Scotus said, that lumen had a real (physical) effect in the medium, so it would be seen as operating like a body and not a species.⁴⁹

Duns Scotus in the three propositions against lumen being a species gives three attributes of lumen which are real and identifiable as such, and not abstract principles or attributes, thus making lumen unsuitable as a species.

The first proposition offered by Duns Scotus against lumen being a species is based on the fact that species does not belong to the denotation or extension of the term but since lumen is denoting the medium then lumen cannot be a species but something real, a substance. Since species is not a denotation or extension of the term it would then be an intention or connotation of the term, a point Duns Scotus will argue later on in the distinction. The objection states, that since lumen denotes the medium, then lumen would be something real, a substance and so potentially independent of lux for its existence.

In presenting the case against lumen being a species the Reportatio has a format which is different from that found in the other two versions and is a clearer statement of the program of discussion than that found in the Ordinatio and Lectura. The subject is introduced in a statement that clearly indicates all of the elements of the proposition: (1) lumen has real existence; (2) species has an intentional existence. Ergo, lumen cannot be a species. Thus we read in the Reportatio: "Also lumen has a real existence in the medium, therefore it is not the sensible species, since the sensible species has an intentional existence in the medium."⁵⁰ The text of the Reportatio then proceeds to offer three propositions akin to those found in the Ordinatio and Lectura.
Meaning of Intention:

Since Duns Scotus argues in terms of the denotation and⁵¹ intention of terms, let us now see how these were used within the Aristotelian system. All propositions have a subject about which an assertion is

made; and a predicate, which either asserts or does not assert something of the subject.⁵² A term (subject and predicate) may be viewed in two ways, "... as a class of objects. ..., or set of attributes or characteristics which determine the objects".⁵³ That is as belonging to this or that class. In relation to the term species, the class of objects we are speaking of is the denotation or extension of the term. In relation to the set of attributes that determine the objects, we are then speaking of the intention (intension) or connotation of the term. So it is that:

Although the intension and extension of a term are distinct aspects, they are inseparable. All words or symbols except pure demonstrative ones ... signify some attributes in virtue of which they may be correctly applied to a delimited set of objects; and all general terms capable of being applied to some object, even though at any given time no object may in fact possess the attributes necessary to include it in the extension of the term. Why a term is applied to a set of objects is indicated by its intension; the set of objects to which it is applicable constitutes its extension.⁵⁴

Duns Scotus in Distinction 13 said that the meaning of the word was equivocal. In the text he said that in one sense it is said to be an act of the will but he did not develop this aspect of intention in his exposition.⁵⁵

The word intention can also be used to mean, (1) "... the sum total of the attributes which are present to the mind of any person employing the term."⁵⁶ Consequently the intention of a term is subjective, varying from person to person and having more of a psychological significance than a logical one.⁵⁷ This is so because the understanding of the sign which represents the reality of the thing of which the intention is the proper similitude can vary from person to person. (2) In another sense the intention of the term can also signify those attributes essential to regarding the object as an elemental part of the term. This is referred

to as the conventional intention of a term or its connotation which indeed really constitutes the definition of the term.⁵⁸ This way is referred to by Duns Scotus when he said, "In another way, it is the formal distinction in re".⁵⁹ The intention of the thing from which the genus is derived, however, differs from the intention, from which the difference is derived. (3) Likewise the intention of a term can stand for those attributes that the objects in the denotation of the term share in common. This is the objective intention or comprehension.⁶⁰ Duns Scotus in the Ordinatio made reference to this meaning saying: "the third way is said to be common";⁶¹ and in the Reportatio one reads, "In a third way it is said to be the concept".⁶² Duns Scotus listed a fourth way which, "... is said to be an inclination toward an object, as a likeness is called a relationship to that which it is alike".⁶³

The second in this series of propositions against lumen being a species, which states that light excludes darkness from the medium, is based on the notion of privation. In the Metaphysica Aristotle said that:

... a privative term may be used because the thing has little of the attribute (and this means having it in a sense imperfectly), ...; or because it has it not easily or not well (e.g. we call a thing uncuttable not only if it cannot be cut but also if it cannot be cut easily or well); or because it has not the attributes at all, ...⁶⁴

Here the proposition states, that the species of whiteness and darkness can co-exist in the medium but that lumen and darkness cannot. Hence lumen deprives darkness of its existence in the medium, but in order to do that lumen must be something real and not a species.⁶⁵

In the 3rd proposition Duns Scotus asked, if lumen has a real effect in the medium and the organ. Here again he is investigating the

physical nature of light. He said that lumen, "... is seen to be corrupted by color and gives rise to a real effect. But giving rise to a real effect is not suitable to a species;"⁶⁶ Thus lumen must be a substance. In Aristotle's works, the De Anima and the De Sensu et Sensatione, we find that the medium of light is regarded as a physical thing.

For Aristotle said in the II De Anima, ch. 7, that the transparency is:

... what is visible, and yet not visible in itself, but rather owing its visibility to the colour of something else; of this character are air, water, and many solid bodies. Neither air nor water is transparent because it is air or water; they are transparent because each of them has contained in it a certain substance which is the same in both and is also found in the eternal body which constitutes the uppermost shell of the physical Cosmos.⁶⁷

Also in regard to the organ, again the background for the argument is found in the De Anima:

Seeing is due to an affection or change of what has the perceptive faculty, and it cannot be affected by the seen colour itself; it remains that it must be affected by what comes between. Hence it is indispensable that there be something in between - if there were nothing, so far from seeing with greater distinctness, we should see nothing at all.⁶⁸

Once again Duns Scotus' point is to establish lumen as a real bodily substance and hence not the species of lux.

Arguments of the Sed Contra

In the positions offered in the Sed Contra Duns Scotus stated that neither lux nor lumen is a body, and that lumen is a species of a special sort. In his opposition to the initial six propositions Duns Scotus argued in the Ordinatio that lux is part of the sensible world. He cited the Second Book of the De Anima to the effect that lux has another sensible species from itself like lumen. However, here Duns Scotus said that three questions must be considered first: (1) what is lux? (2) What is lumen? (3) How is lumen produced by lux?⁶⁹ These three

questions do not appear in the other two versions of the text, yet the major content of the distinction now revolves around answering these three questions.

What is Lux?

In responding to the question, "What is lux?", Duns Scotus employed the philosophical approach, seeking to determine whether it was a substance or an accident. In the Ordinatio he stated that lux is through itself sensible; so it is not a substance, because a substance is sensed through its accidents.⁷⁰ Here he used the doctrine of transubstantiation in the Eucharist to illustrate his point about substance and accident. He pointed out that after the consecration one does not detect sensibly the presence of the body and blood of Christ, because miraculously, while the substance is no longer bread and wine, the accidents of bread and wine, which are sensible, remain and these are sensed.⁷¹ Taking up his argument again, he concludes that lux is an accident because it is attached to a luminous body; and a true substance is not attached to anything, for which he cited the First Book of Aristotle's Physics as his source.⁷² In the Metaphysica, Aristotle defined an accident as:

... that which attaches to something and can be truly asserted, but neither of necessity, nor usually ... Therefore since there are attributes and they attach to subjects, and some of them attach to these only in a particular place at a particular time, whatever attaches to a subject, but not because it was this subject, or the time this time, or place this place, will be an accident.⁷³

Aristotle implies two types of accidents. In an ontological sense he said that an accident has no definite cause and that, "The accident has happened or exists, - not in virtue of the subject's nature, however, but of something else;"⁷⁴ In a second sense, the logical sense, an

accident stands for, "... all that attaches to each thing in virtue of itself is not its essence, as having its angles equal to two right angles attaches to the triangle."⁷⁵

In the Reportatio, Duns Scotus modified his presentation of the Sed Contra. In that reading he cited Avicenna, 6 Naturalium, part 3 chapter I, that, "... lux per se is sensible, but all sensible things are seen through the multiplication of the species to the organ, according to the Second Book of the De Anima. Therefore lumen is the species by which lux is seen."⁷⁶ The discussion then continues along the lines of defining lux as either a substance or accident. The basic point again is to establish lux as an accident because then lux can be examined in terms of the following categories: genus, species, quality and differentia. Duns Scotus said, "... lux is an accidental form because it is through itself sensible so that we perceive it by the senses and, as Avicenna holds, not a substance."⁷⁷ In the Lectura at this point in the discussion we read:

First: that lux is not a substantial form but is a sensible quality, as is manifest in itself. Also lux in any body is an accident. Therefore it is not a substance, because a substance affects nothing. It is shown to be an accident because in an elementary body it is an accident. Also it is not a specific substantial form as in fire ⁷⁸

In the Ordinatio Duns Scotus continued the discussion saying:

The Antecedent is clear; because, if in fire lux is a substantial form either therefore it is the ultimate specific difference or one more imperfect, which was in potency to the specific form. It is not the first way, because then whatever has light, has the same species. It is not the second way, because then this form would be a more imperfect form than the specific form of fire and so it would not be a substantial form of any celestial body, in which there can be no substantial form less perfect than that of the elementary form of fire.⁷⁹

This lux is an accident because, if in fire, which is an elementary substance along with earth air and water, lux is a substantial form; then

it must delimit that substance, as the ultimate specific difference or it is a lesser form, which was in potency to the specific form of fire.⁸⁰ The differentia in Aristotelian terms, "... is that part of the essence, which distinguishes the species from the other species in the same genus."⁸¹ He claimed that lux is not the ultimate differentia because then everything that has light has the same species; nor could it be a form in potency to the elemental form because such an inferior form could not be the form of any celestial body, since all celestial bodies are of such a degree of perfection that they could not be less perfect than the elemental form of fire.⁸² Indeed then this leaves us with Duns Scotus' conclusion that lux is, "... the probable substantial form of a celestial body following from an active form, just as active qualities follow from the substantial forms of generated and corrupted bodies."⁸³

Another important philosophical term raised in Duns Scotus' exposition at this point is quality. Quality means the differentia of essence.⁸⁴ There is a second sense in which quality can be used according to Aristotle, "... in which it applies to the unmovable objects of mathematics, and the sense in which the numbers have a certain quality, ..."⁸⁵ Moreover in his definition he included, "All modifications of substances that move (e.g. heat and cold, whiteness and blackness, heaviness and lightness, and the others of the sort) in virtue of which, when they change, bodies are said to alter."⁸⁶ Quality also has a meaning in respect to virtue and vice; evil and good. Quality then according to Aristotle:

..., seems to have practically two meanings, and one of these is the more proper. The primary quality is the differentia of the essence, and of this the quality in numbers is a part; for it is a differentia of essence, but either not of things that move or not of them qua moving. Secondly, there are modifications of things that move, qua moving, and the differentiae of movements. Virtue and vice fall among these modifications;..."⁸⁷

According to Duns Scotus, "There is no other quality stemming from the substantial form of a celestial body other than lux."⁸⁸ To confirm this position Duns Scotus cited John Damascene from chapter 8 of Book I of the De Fide Orthodoxa as his authority. Thus for Scotus, lux is a quality. In the Lectura, J. Duns Scotus presented the same line of argumentation and conclusion. However there is no citation from J. Damascene found in the Lectura and there the following is added: "For a transparency is not an active quality but is more capable of receiving lux."⁸⁹

In the Reportatio the presentation of the argument is altered somewhat. In general it seems easier to follow. There Duns Scotus said that, "... lux is an accidental form because it is through itself sensible ...". He continued: "... in an elementary body lux is an accident, because it is not an essential part of it as matter or form, nor a form prior to the substantial form of fire."⁹⁰ Therefore in none of the elementary bodies is lux a substance because what is a substance cannot be an accident, according to the First Book of the Physics, which he cited.⁹¹ Likewise, he said, "... a celestial body has active qualities more noble than the lower bodies; of these only lux is seen to fit the description and not the transparency, because a transparency is a passive quality."⁹²

That Lux is per se Visible:

In the Reportatio Duns Scotus posited a question not treated at this point in the Lectura and Ordinatio: "... how is lux per se visible, since color is the primary object of sight and lux is not seen through the nature of color; if so, sight will not be one single sense."⁹³ Sight could have two primary objects, light and color. This is also tantamount

to making sight the product of stimulation of more than one faculty with different stimuli being identified in the perceived object by the Sensus Communis. Behind the whole question raised by Duns Scotus is Aristotle's treatment of the subject in II De Anima, chapter 7. Aristotle said that, "The object of sight is the visible and what is visible is colour ...".⁹⁴ He identified color then as the primary object of sight. In fact Aristotle believed that light is actually color. He said, "Light is as it were the proper color of what is transparent, and exists whenever the potentially transparent is excited to actuality by the influence of fire or something resembling 'the uppermost body'; ...".⁹⁵ Light for Aristotle is the activity of the transparent which makes color visible.⁹⁶ Hence color in order to be seen needs this light.

Duns Scotus in his response takes a position contrary to Aristotle and the consequences of his theory. Duns Scotus said that both lux and color are objects of sight and that sight is a single sense by reason of the more perfect and powerful nature of the faculty which permits it to perceive more than a single sensible object.⁹⁷ To amplify this latter statement, Duns Scotus used here as an analogy, the range of difference in intellection that exists between the lower and higher angels and applied the same principle in the case of sight. That is, that while sight is sentient like the other faculties, it has higher capabilities.⁹⁸ In the De Anima, Aristotle said that it is the sense of touch that is the most sophisticated faculty. Hence Duns Scotus is contradicting Aristotle.⁹⁹

Duns Scotus continued his response to the Aristotelian position concerning the primary object of vision by building on a statement from the First Book of the Metaphysics. There Aristotle said that sight shows

us many differences because things known by themselves have more distinguishable qualities from each other than contrary things in the physical order such as are known through the other senses.¹⁰⁰ Duns Scotus then argued that this is not the adequate primary object of sight but that sight is open to many stimuli, as is the sense of touch. The sense of sight does not, he said, rely on the Sensus Communis to distinguish the sensible object but the sense of sight perceives what is sensible by itself and obtains one common abstraction of the object out of all the sensible objects available to the faculty and which perception remains as individual and does not become part of a universal concept.¹⁰¹ Once again, Duns Scotus by denying that sight has a single primary object is contradicting Aristotle. Moreover Duns Scotus does not grant a special role to the Sensus Communis which would be necessary, if one were to follow the Aristotelian position.

To clarify his position Duns Scotus provided a further argument based on the principle of analogy. Just as all things in the sense of touch are known in relation say to hot, that is to say by comparison, objects are warm, lukewarm, cool or cold. Hot can be the first object according to which all others are categorized and known. So by analogy lux is the first reason for the visible object not because it is the adequate object but because by virtue of it, as in the case of hot, the others are seen.¹⁰² Lux said Duns Scotus can be seen with color but color cannot be seen without lux.¹⁰³ He contradicts Aristotle in saying that lux has a visible existence apart from color.

Thus Duns Scotus by stating that:

- a) lux and color are per se visible
- b) that only one faculty is involved in vision

c) the powers of the faculty of vision are superior to the other faculties

d) there is no role for the Sensus Communis has contradicted the position of Aristotle in chapter 7 of Book II of the De Anima and the consequences of that position.

Therefore we find Duns Scotus in the Ordinatio, Lectura and Reportatio stating that lux is not a substance but an accident and more specifically that it is an accident following from a quality of a celestial body and that color and lux are two separate (but not independent) sensible objects of the sense of sight. Moreover that color is dependent on lux in order to be seen.

What is Lumen?

Lumen as an intention:

We have to return to the text of the Ordinatio at this point to find out how Duns Scotus proves lumen to be not a body or substance but an intention.¹⁰⁴ He quickly dismissed lumen as matter, (spiritual and material) and as a substantial form. He stated that lumen does not pertain to the genus of substance but that the only genus it could pertain to would be that of quality. He continued: "With respect to the genus of quality, the third type of species can be distinguished in a sensible quality and in a quality, in which there is the species or intention of the sensible quality."¹⁰⁵ Duns Scotus next demonstrated how the word intention was equivocal.¹⁰⁶ Intention as we saw earlier, is the connotation of a term used to delimit the meaning of the term. In one sense, Duns Scotus continues, intention is an act of the will. In another it is the "formal distinction in re".¹⁰⁷

The Formal Distinction:

This Scotist "formal distinction" needs some explanation. According to Allen B. Wolter medieval philosophers recognized 3 different distinctions: 1) the real distinction that exists between individuals in the extra mental world; 2) the purely mental distinction created by the mind; 3) an intermediate distinction which though defined with reference to a mind has some kind of basis in the thing.¹⁰⁸ The "formal distinction" was devised by Scotus to explain the third way, that is the intermediary between a mere distinction of reason and a real distinction in the thing (in re). The basis for the formal distinction is the existence in reality of formally distinct entities.¹⁰⁹ As Gilson pointed out, "Since Scotus does not accept the real composition of essence and existence, he can attribute several formal entities to any being without disrupting its actual unity."¹¹⁰ The formalities are part of the whole unity of the thing (re) in the real world but are also really distinct formal entities within the thing (re).¹¹¹ The Scotist understanding of concepts answers this distinction between forms in the unity of concrete subjects. There is a basic scholastic assumption that our concepts and reality are isomorphic, that is truly different and yet alike. To conceive of one of the correlatives without the other requires some actual non identity or distinction of properties, "a parte rei".¹¹² Such property differences are based on what the thing is or is not in reality. The property of the thing (re), that can be known without the other and apart from the thing (re), is formally distinct. This is so because Duns Scotus recognized more than one formal existent in the essence of a thing. These various formal distinctions in the essence of a thing (re) Duns Scotus labeled formalitas or realitas.¹¹³

Picking up the presentation again, Duns Scotus said that, "... the intention of thing, from which the genus is derived, differs from the intention, from which the difference is derived."¹¹⁴ If species is that which makes the various aspects of genus, the differentia is that which distinguishes one aspect from another in a genus. It is one aspect of the intention of the term to identify the differentia as it pertains to a species in a genus and another which applies to the sum of these species. The third meaning of intention according to Duns Scotus is said to be common, that is the attributes of the connotation of a term are shared by both the subject and the predicate. The fourth is said to be an inclination toward an object as a likeness is called a relationship to that which it is alike. Hence an intention is not said to be that which is grasped by the sense, because this way the object would be the same as the intention; but the intention is said to be that, through which as a formal principle, the intention is connected with the object. So that the sign and the thing are the same according to Augustine in the De Trinitate and De Doctrina Christiana but it is not convertible.¹¹⁵ Therefore the thing is as it is in reality which is not the same existence as the signification of the thing. Yet the signification is the thing. Analogously, it follows that an intention is the thing in reality and it is something sensible to which the sensory faculty tends but it also has an inclination or relationship to something else which is its proper similitude.

Applying this interpretation to lumen and lux, Duns Scotus said that lumen is the intention or proper species of sensible light itself.¹¹⁶ He proved this last by arguing the negative of his position. If lumen were not an intention it would be physical. Lumen, as a physical object,

if placed on the eye, would hinder sensation.¹¹⁷ On the contrary, vision to take place needs a medium between the visible object and the organ of sight. Duns Scotus referred his reader to the Commentator of the De Sensu et Sensato. Averroes said that it is necessary for lumen to be applied to the eye for the species of color to be seen. The medium needs to be illuminated by lumen in order for color to be seen. Hence according to Averroes lumen does not impede sensation, but is required for sight. Therefore, it cannot be a physical body.¹¹⁸

Examining the Lectura for this subject we notice that the definition of intention here reads differently than the one seen in the Reportatio and Ordinatio. Here the discussion is much less developed and the formal distinction is not mentioned at all. Intention is discussed in only two aspects.

One way: whatever is able to have a different objective formal distinction in the intention is said to have different intentions, as the intention of truth is different from the intention of essence. And so it is said, along with Avicenna concerning intention, and it is well possible that this doctor is understood to have said that it is different according to intention and is not causing nor requiring a real composition of a term for a term.

In another way lumen is taken as an intention and quality for a species and is the reason for representing any thing and not the thing itself in which the sense tends as a proper intention. And so I say, that lumen is an intention and the quiddity of an intention proper to intention.¹¹⁹

When speaking of lumen being applied to the eye hindering sensation he made a referral to Averroes, as in the Ordinatio and Reportatio, to point out that lumen is necessary for sight. But here in the Lectura the discussion changes. The doctrine is the same but the illustration supplied involves the proof of the rectilinear propagation of light rays. And so we read:

Besides lumen is not visible unless reflected. Whence, if the medium does not have a solid body anywhere, it is to be seen that lumen, if there were two openings opposite each other and

the ray would pass through and would not be broken, then nothing would be seen. Therefore, lumen is not so much the visible object but rather the intention and species.¹²⁰

At the beginning of the exposition on lumen in the Reportatio, Duns Scotus differentiated between the two words lumen and lux saying, "... supposing light be called lux in its source and lumen when it is in the medium."¹²¹ He then followed the same line of argumentation as in the Ordinatio to establish that lumen is not a substance, corporeal body, substantial form, quantity, or active quality. He finally concludes, as earlier, that lumen is "... therefore a sensible quality and is the species of lux or an intention."¹²² He discussed anew the various meanings of intention and ends this part of his exposition saying that lumen is per se visible and that it is an intention of the visible object.¹²³

Both in the Reportatio and Lectura¹²⁴ Duns Scotus spent time refuting the last mentioned thesis, a discussion which does not appear in the Ordinatio at this point. We will basically give the line of thought found in the Reportatio, with an occasional reference to the reading in the Lectura.

The discussion begins with a denial of his position: "If lumen is per se visible it therefore is not the inclination toward the visible object, because then the same object is an inclination to itself."¹²⁵ This approach questions the intentionality of lumen. To illustrate his point that lumen is per se visible J. Duns Scotus refers to the lumen of the moon in both readings as an example. The point being that in seeing the lunar lumen we do not see the lunar substance because if that were the case the size of the moon would gradually be reduced.¹²⁶ In the Reportatio and Lectura he used an example from the De Sensu et Sensato of Aristotle to show that lumen is visible per se. We read firstly in the Reportatio: "That lumen is visible through itself, is seen through

an example of Aristotle; if the closed eye is moved, lumen appears there."¹²⁷ The reading from the Lectura is more explicit,"... because if the eye were to be moved from its place through motion, a flash of light is produced which is lumen."¹²⁸ The passage upon which these two readings are based is from the Second chapter of the De Sensu et Sensato and reads as follows: "... when the eye is pressed or moved, fire appears to flash from it."¹²⁹

The author of the Reportatio maintains that there are two kinds of intention making for two types of species in the case of vision. The first type is the intention of the visible or species, which is visible in itself on account of its greater power and not just a tendency to an object. There is another kind which is also the basis of sight, but is ranked lower on account of its weakness, like the species of white and black. This latter type of species is just a tendency to an object which needs a supporting body in order to be seen.¹³⁰

In an example concerning lumen he exhibited an awareness of some basic optical information, a point we will return to later. At any rate the example in question is that of a ray passing through a red glass and turning a nearby wall red. The redness received on the wall is not the same as that in the glass and likewise, if it was the eye receiving the ray after passing through the glass it would see the red glass and not the redness.¹³¹ Therefore he concludes:

... sometimes a visible intention can be seen on account of its excellence, because, if the color would really be there and not merely as an intention, the eye placed there would be able to see, because of the color being placed on the sense of sight. As the Philosopher of the De Sensu et Sensato says, when a cloud passes over anything green, there appears there another color than the first, while in reality it is not different. An intention therefore, when it is weak, it is only the reason of sight; when it is strong, it is able to be the medium and the object.¹³²

The same examples appear in the Lectura.¹³³ In the Reportatio J. Duns Scotus stated emphatically that the weaker species (a mere tendency to the object) cannot be seen unless united to a body and that lumen likewise cannot be seen unless joined to a body.¹³⁴ Three demonstrations help to clarify this point. The first two are that unless the rays of the sun strike an opaque body they will remain unseen. These two demonstrations do not appear in the Lectura but with the third, the two versions begin to correspond again.¹³⁵ In the third demonstration Duns Scotus gets into the discussion of how two types lumen can be produced by the three types of light rays.

The Three Rays that Produce Lumen

For this central theme we must return to the Ordinatio. After reaching an answer to the question, "What is Lumen?", Duns Scotus next took up the problem of how lumen is produced according to the three types of rays. He then defined the three rays.¹³⁶ In the Lectura and Reportatio Duns Scotus did not give such definitions. It is significant that only the Ordinatio and Additiones Magnae (which is really a conflation of the Ordinatio and Reportatio) contain these definitions. The Lectura is regarded as a reportation of the Oxford lecture and the Ordinatio, a reworking of that original oral presentation. Hence it would seem that the definitions were added to the text of the Oxford lecture by Duns Scotus sometime later. Is it possible that at the time of the original reading J. Duns Scotus was not familiar with them? As to why the 3 definitions do not appear in the Paris reading, again we speculate that perhaps the audience at Oxford was more interested in things scientific than the audience at Paris, where theology dominated the scene. However we should note that, while he omitted the three definitions on the Reportatio, he retained the discussion on how the

three rays were produced by lux. Perhaps the case is just the reverse of our supposition, namely that every one at Paris was so familiar with the three definitions that he felt no need to include them.

Duns Scotus defined the three rays as follows:

The straight line ray he said is that, "... which is diffused from a luminary in a medium of the same transparency in a straight line and finally touches a limiting body or a terminating body, as long as the strength of the luminous body lasts."¹³⁷

A reflected ray he defined as that:

... which occurs when an opaque body intervenes before the active power of the light source reaches its end, and so this power is sent back in the opposite direction. Not however through choice is it sent back but naturally because of a natural agent whose power is not totally exhausted in one direction. The ray continues to act as it is able to and if it can not act in a straight line, then it acts in an oblique angle.¹³⁸

The refracted ray Duns Scotus said occurs when:

... there is a medium of a different transparency but not totally opaque. The ray multiplies itself in the medium but not along a straight line but it bends there at an angle. When however a denser medium occurs, the ray is bent in the direction of the perpendicular, because due to the fact that the perpendicular is the strongest in action. When it is bent in order to act in a denser medium, the ray seeks a place closer to the perpendicular ray. Such is the location of the broken ray in respect to the perpendicular. When a less dense medium is met the ray is bent away from the perpendicular for the opposite cause.¹³⁹

That Lumen is Produced by Lux

Johannes Duns Scotus in the Ordinatio, the Lectura, the Reportatio and Additiones Magnae stated that lumen, which is multiplied by the three rays is produced directly by lux and is also directly the sensible species of lux.¹⁴⁰ At this point, all the versions include a discussion on the production of lumen from lux through the three types of light rays. In the Reportatio he contrasted the luminous ray or essential

lumen produced by the 3 rays with accidental lumen. In the Lectura a distinction was made between lumen primarium or essential lumen and accidental lumen; whereas in the Ordinatio he spoke of two types of lumen, primary and secondary.¹⁴¹

a) Proof of the Production of Lumen by the Straight Line Ray:

In the Ordinatio Duns Scotus said that the multiplication of light along a straight line ray is evident and so he did not discuss it; but in the Reportatio and Lectura he demonstrated the point. In the Reportatio Duns Scotus argued that the straight line ray is caused directly by a luminary because nature acts as far as it is able when left to itself. What is needed is an agent or cause that can produce an effect or cause illumination over any distance. Duns Scotus says that the sun, a luminary, has the necessary qualifications to be an agent.¹⁴² It can act directly in all parts of the medium and is able to act on distant objects that are not mathematically (geometrically) contiguous with it. A ray can not fulfill the role of this agent because its power is not able to act over a great distance for a long period of time and because it can not act on celestial bodies and bodies of this world.¹⁴³ The implication is that there is a difference between a light source (lux) and a ray (lumen) which is not in the source.

b) Proof of the Production of Lumen by a Reflected Ray:

In regard to the reflected ray we read in the Ordinatio that "... through the ray the thing itself is seen in itself and not through the impressed species reflected in a mirror; (or because we look for four things about that which is)."¹⁴⁴ In the Reportatio our author said that a reflected ray is really directly from a luminary as is evidenced in the experience of the burning glass,¹⁴⁵ because fire is not

being caused by the glass but by the sun. Similarly he said, "... in regard to the visible species produced in the eye, by which an image is seen in a mirror, the species is not caused by the image but by its object."¹⁴⁶

c) Proof of the Production of Lumen by the Broken Ray.

Concerning the broken ray, Duns Scotus said in the Ordinatio that:

... the thing broken by the medium, the thing itself, is seen multiplying itself. However this is not seen through a species of the thing, just as in the case of the first luminaries, which were produced by multiplication by the immediate species of the engendering light, and hence immediately produced by it. Thus the rays are produced directly by it speaking of the immediacy in respect to cause and hence excluding the series of ordered effects in respect to this cause.¹⁴⁷

In all three cases Duns Scotus distinguished between the light of the rays (lumen) which exists in the medium and the light (lux) found in the light sources.

The Two Types of Lumen

The style of presentation in the Lectura is altered somewhat where the passage on the varieties of lumen precedes the discussion of the activity of the rays. Furthermore, in this version, only the straight line ray is treated at any length. Here we read that:

Primary lumen or essential is said to be lumen which is being caused and multiplied by the straight line ray, the refracted and reflected ray. But accidental lumen is that, which is not being caused, but is produced in the manner of multiplication from lumen. Primary lumen also is totally generated directly from lux.¹⁴⁸

Duns Scotus immediately turned to explaining the operation of the straight line ray. There are in his discussion some noteworthy ideas. As for instance the idea that there is an order of effects in illumination.

... if lumen which is generated by lux is being generated in the medium, not the entire line is generated by lux ... the generated ray is that part of the medium, if it should generate, will generate anywhere spherically, which is false and contrary to the senses. Besides it is necessary, should lux generate lumen directly in another part of the medium, it be generated in the

closest as well as the furthest parts of the medium. Therefore lumen is generated directly. Indeed it is not according to its essence but more according to power. By which reason it directly gives rise at one place and at another distant place to lumen directly in all parts of the medium by the same reason according to the greatness of the distance, if a luminous body of greater power is in position.¹⁴⁹

And again we read:

... there is an order in generated lumen, both in the straight line ray and the broken ray. It is not so much the order of cause to effect but the order between effects, as some parts of the medium are naturally illuminated prior to the other parts. So the whole is illuminated by the sun, just as there is an order between intellect and will, yet the order is not that of cause to effect, but like the order that is of the presupposed effect in respect to the other.¹⁵⁰

Here Duns Scotus said that there is an order of being in the medium. He is referring to an order of dignity, as between intellect and will, as to which is prior or first in the order of dignity or efficacy. The problem is basically an ontological one. He is saying that within the parts of the medium some are closer to the source in terms of the dignity of their existence. The text invites the supposition on the part of later scholars that light travels in time and this is more so because the medium is material whereas intellect and will are not. The notion of light being instantly present is rooted no doubt in the hexaemeral ideas concerning the creation of the first light which seems to have been mystically present even before the luminaries were created. The notion of light traveling across the medium in time is a modern notion. In speaking of an order between the effects of the rays, Duns Scotus specifies a priority other than time by making an analogy with the order between intellect and will. This latter was a controversial doctrine of Duns Scotus, who stressed the priority of the will in human choice, whereas Thomas Aquinas stressed the primacy of the intellect.

If we compare Duns Scotus' statements on secondary lumen in the Reportatio and the Ordinatio we find in the Paris reading of the Distinction that:

Besides these luminescences, there is another which is called secondary, where there is shadow but not darkness, because in such lumen we see none of the three rays present nor is this lumen multiplied directly from a luminary, but is per se the sensible species of primary lumen.¹⁵¹

Secondary or accidental lumen was also discussed in the Ordinatio but in greater detail. For instance, he expanded the discussion on what is shadow. He held that shadow was different from darkness because darkness is the privation of lumen both primary and secondary. "Shadow is not the privation of secondary lumen but only primary."¹⁵² Primary lumen is produced directly by rays from a producing lux, as reflected from a mirror or a polished surface.¹⁵³ Whereas secondary lumen is produced by primary lumen. Here is his conclusion to this discussion in the Ordinatio:

... secondary lumen produces a spherical or half spherical shape but it is not a reflected lumen produced by the primary ray, as a reflection from a polished body is. Whence all lumen is really a species but primary lumen is the species of a producing lux; and secondary lumen is the species of a primary lumen.¹⁵⁴

The other two versions end the topics of discussion for Distinction 13 at this point. There only follows in the Lectura and Reportatio, in true scholastic style, Johannes Duns Scotus' refutation of the initial arguments in successive order. However in the Ordinatio Duns Scotus now entered into the discussion of lumen as a visible species,¹⁵⁵ which had been discussed earlier in the other two versions after the section on "What is lumen?" Basically the same argument is offered in the Ordinatio as was given in the Reportatio to prove that lux and lumen are sensible per se. The example from Averroes Commentary on the De Sensu et Sensato

appears again. That is that light is being reflected from green plants and is coloring a wall; as well as the axiom that these species are not seen until they strike an opaque object. The same, Duns Scotus said, is true of the species of color; we find here the same example concerning the red glass as that reported earlier from the Reportatio. So for the species of color to be seen it must strike an opaque object because it is not visible in the transparent medium. Hence he concluded that an intention of a visible object is visible on striking an opaque object but also that it is the cause of sight. He elaborated in a manner very similar to the exposition in the other versions. The form that illuminates the moon is lumen and not lux because this lumen does not end on the lunar surface but radiates outward and yet this lunar lumen is a sensible species of lux.¹⁵⁶

Reference is again made to the emission theory of vision by once more citing from Aristotle in the De Sensu et Sensato where Aristotle spoke of a shaft of light sent out from the eyes moving in darkness being visible and that it is only the species of lux.¹⁵⁷

Duns Scotus reiterated that unless lumen strikes an opaque body it will not be seen as in the case of the rays of the sun which at night bypass the darkened side of the earth and so are not seen. Once more he described the rectilinear passage of a ray of light through a darkened box, which has a hole in either end.¹⁵⁸ This ray is not seen unless an opaque object should intervene between the two holes. "And so if it would never reflect itself against an opaque object the ray would never be seen, if that small body is not broken."¹⁵⁹ One is tempted to say that the small body here is an atom and that the idea stems from the Greek atomist Philosophers. However, this is not the case, since the Greek atomist did not see light as composed of corpuscular bodies, as

was shown by Rudolph E. Siegel in his article "Did the Greek Atomist Consider A Non-Corpuscular Visual Transmission?"¹⁶⁰ In all probability that small body is the species. This would appear to be in conflict with an earlier statement by Scotus that the species of lux and lumen were not substances. Thus it would seem that species for Scotus has a material as well as a formal existence. More precisely the species of lumen is a corporeal form without dimension per se. Corporality in this form is derived from prime matter which is imperceptible in itself. Hence the species of lumen lack material dimension in itself but in the transversal of the medium it activates the potentiality of the matter of the medium

Furthermore Duns Scotus said that the illuminated medium is infinite because when the sun is above the horizon part of its light misses the earth and so never strikes an opaque object. Thus the ray just continues indefinitely.

Finally J. Duns Scotus ended his discussion:

Therefore lumen has this same condition that all other principal species of color have, to be seen and not to be seen. Just as the principal species of color, multiplying themselves in the form of rays, are able to give rise to other secondary accidental species, which are not multiplied rays and are to be seen through these. However, it is not to be denied, that these first (the principal species of color) are intentions whereby they are likenesses of the prime colors that produced the rays.¹⁶¹

The Additiones Magnae

The Additiones Magnae as described in an earlier chapter, are a conflation of the Ordinatio and the Reportatio of Paris and moreover are in a certain respect an abbreviation of the Commentary of Johannes Duns Scotus. The Additiones Magnae were put together by William of Alnwick sometime after the death of Duns Scotus. Since the Additiones are based on the two readings of J. Duns Scotus, they can be said to represent the

thought of the great teacher. Yet on the other hand, since the selection of the passages to be included from the Oxford and Paris readings *was* done by someone else, the work in a sense represents the compiler's understanding of what was important in the Commentary. Thus the Additiones also can be said to represent the thought of William of Alnwick, the compiler, who was a student and follower of Duns Scotus and a "Scotist" of the first half of the fourteenth century.

For Distinction 13, which is included in the Additiones Magnae, we find that the presentation of the dual questions on lux and lumen as well as the initial arguments have been omitted. Rather Alnwick begins the discussion by asking the question, "Whether lumen is the proper sensible species of lux?"¹⁶² This question is important because, if lumen is defined as the species of lux through which it becomes visible, lux itself then is not sensible, since it requires a species through which it can be seen. Duns Scotus immediately takes up the discussion of lux being sensible per se. "... I say first, that lux is not a substantial form because it is per se sensible as Avicenna says in Liber 6 Naturalium part 4 chapter 3."¹⁶³ The topic is developed by stating that color depends on lux in order to be seen but lux and color are both sensible objects of sight because sight is a superior faculty capable of perceiving several objects.¹⁶⁴ The latter is demonstrated in the First Book of the Metaphysics.¹⁶⁵ Here the same line of presentation appears, although not verbatim, as in the Reportatio, taking up the comparison of sight with the sense of touch and explaining the role of the Sensus Communis in vision.¹⁶⁶ The discussion continues: "In another way, it is possible to say that, when there are plural objects of a given potency and among these there is an order, there can only be one adequate object to which the remainder are reduced."¹⁶⁷ The conclusion is drawn:

... I say, that lux is the first object and through itself visible and not derived from color but that color in visible-ness is derived from lux, because it is necessary for perceiving color to have lux cooperating either extrinsically or intrinsically, even in the hypothesis that it is part of the composition of color.¹⁶⁸

The Additiones makes a second enquiry as to whether lumen is the proper species of lux. How it is asked, is lumen given existence by lux?¹⁶⁹ In answer, it is stated that there are two kinds of lumen, essential and accidental, in the same terminology as found in the Reportatio and Lectura.¹⁷⁰ Essential lumen is defined as "... the species of lux through which the sense of vision is able to attain the vision of a luminous body."¹⁷¹ This is accomplished through 3 kinds of rays, the definitions of which appear at this juncture. The definitions are not at all identical with those found in the Ordinatio. In the Additiones we read: "The straight line ray is that which comes from a luminary to the earth through a transparent medium without any angle."¹⁷² This is so because, "... nature acts as much as it is able and the shortest way it can, and because a straight line is shorter than an angular line in the same points."¹⁷³ There seems to be an application of some geometrical terminology to this description of the straight line ray, that is not witnessed in the description contained in the Ordinatio. The latter reads as follows:

A straight line ray is that which is diffused from a luminary in a medium of the same transparency in a straight line and finally touches a limiting or terminating body, as long as the strength of the luminous body lasts.¹⁷⁴

The definition of both the reflected and refracted rays follows in the Additiones:

So a solar ray always progresses in a straight line, if it is able, but, if a medium of another transparency occurs, like when the ray passes through air and comes to water which is not an entirely dense body, the ray is permitted to cross but not in a straight line (unless it strikes at the perpendicular). There that same density bends the ray away from the straight line when the ray strikes the surface of the water, which is a medium of a different transparency"¹⁷⁵

The Additiones Magnae specify that the definition was taken from the Books of Perspective.¹⁷⁶ In the Ordinatio it was said that if the transparency is not totally opaque, "The ray multiplies itself in the medium but not along a straight line, but it bends there at an angle."¹⁷⁷ Likewise, a fuller description of the bending was given in the Ordinatio:

When however a denser medium occurs, the ray is bent in the direction of the perpendicular, because of the fact that the perpendicular is the strongest in action. When it is bent in order to act in a denser medium, the ray seeks a place closer to the perpendicular ray. Such is the location of the broken ray in respect to the perpendicular. When a less dense medium is met, the ray is bent away from the perpendicular for the opposite cause.¹⁷⁸

Lastly, there is the description of the reflected ray and once again the wording and tone of the two readings vary. Taking the Additiones first, we read:

A ray is reflected when the straight line ray comes to a bodily obstacle of sufficient density, so as not to permit the ray to pass through the medium, but because the nature of the bodily luminary is not capable of multiplying the species of lux through the medium of this body, it does what it is able by multiplying it in the equally contiguous medium to the obstructing body.¹⁷⁹

The reading continues:

And this type of multiplied lumen is called reflection. Reflection takes place according to the equality of the angles of incidence and reflection as seen in Alhazen Euclid and others.¹⁸⁰

The definition found in the Ordinatio reads as follows:

A reflected ray is that, which occurs when an opaque body intervenes before the active power of the light source reaches its end, and so this power is sent back in the opposite direction. Not however through choice is it sent back but naturally because of a natural agent whose power is not totally exhausted in one direction. The ray continues to act as it is able to and if it can not act in a straight line, then it acts in an oblique angle.¹⁸¹

It would seem that the definition in the Ordinatio was more metaphysical than mechanical as witnessed in phrases such as, "active power of the light source"; and "not however through choice is it sent back but naturally." Whereas in the Additiones we again see a mathematical

influence, as in the phrase, "in an equally contiguous medium". Perhaps there is evidence here of a greater familiarity with Alhazen on the part of Alnwick, for he presents a further detail not seen in the other versions. "Reflection takes place according to the equality of the angles of incidence and reflection, as seen in Alhazen, Euclid and others."¹⁸²

Alnwick then turned to presenting the material in Duns Scotus' Distinction on accidental lumen. His presentation is very direct but not unlike what we have seen in the other three versions of Scotus' Commentary.

Accidental lumen is said to be that which is able to lead to the knowledge of a luminary, as lumen in a room in a house where a solar ray reaches, and that accidental lumen comes from a principle ray falling through a window and this is caused directly [but essential lumen which is distinguished by the three rays is caused directly] by a bodily luminary and not by a directness of effect but by a directness of cause.¹⁸³

There follows as in the Reportatio, Ordinatio, and Lectura a demonstration of how accidental lumen is related to the three rays.

In the Additiones the treatment of the straight line ray, the reflected, and broken ray are based on the same principles and mode of presentation found in the Reportatio, Lectura, and Ordinatio, as described earlier in the chapter. However there are two passages that call for a closer look. The first is found in the section on the straight line ray. "Therefore the sun acts directly in some part of the medium to which it is not present mathematically but only virtually present and not by bodily contact."¹⁸⁴ The term mathematical also appears in the Reportatio but here in the Additiones it is contrasted with the notion of a virtual presence. This along with his previous reference to "the equally contiguous medium"¹⁸⁵ indicates a deeper mathematical interest on the part of Alnwick.

The second passage of interest is as follows:

For that which appears in the mirror is nothing except an image or species of the thing itself. This is seen clearly according to the authors of perspective, particularly Alhazen in Book 7 and Euclid in the Liber De Speculis.¹⁸⁶

This particular reference to Alhazen and Euclid appears only in the Additiones Magnae. The passage continues, "For they prove that in a plane mirror the thing appears beyond the mirror at a distance equal to that distance of the thing in reality from the mirror."¹⁸⁷ This bit of optical information does not appear in the three versions according to Duns Scotus and very likely was added by Alnwick and is a further indication of Alnwick's own familiarity with Alhazen.

The discussion draws to a conclusion in the Additiones in the following manner:

And these three rays are said to be essential lumen, because they lead to an understanding of a luminous body, and because the eye placed in any one of these rays can see the sun through the straight line ray.

It is not to be doubted that through the reflected ray, the sun would appear in the mirror and also with the broken ray it would be seen through instruments.¹⁸⁸

This implies a difference between essential (primary) lumen and secondary lumen.

There is no further discussion of secondary lumen nor a rebuttal to the initial six objections as seen at the end of the Distinction in the 3 versions by Johannes Duns Scotus, just as the objections were not presented at the beginning of the Additiones Magnae.

Drawing on the information garnered from all four versions of Distinction 13 we can then sum up the major points of Duns Scotus' light theory. Lux was described as an accident that was sensible per se. Duns Scotus defined lux as a sensible quality, as in a celestial body, stating that it probably followed from the activity of its substantial form, just as active qualities follow from the substantial form of generated

and corrupted bodies. The celestial body in question is the sun. Light in its source (the sun) is always referred to as lux. Light in the medium is called lumen.

Lumen is described as a quality but as such it is an intention and a sensible species of lux, which was itself defined as being sensible per se. The difference is between a sensible per se (lux) and a species of it (lumen). But species here takes on a modified meaning, no longer being merely a representation as in the metaphysical sense but a "continuation" of the same reality. Lumen said Scotus is found in the three types of light rays, the straight line ray, the reflected ray, and refracted ray, which are all equally produced by the sun. Duns Scotus identified two types of lumen; primary or essential lumen which is directly produced by the light (lux) of the sun or another luminous source; and secondary or accidental lumen which is produced by primary lumen. Primary lumen is called essential lumen because through this primary (essential) lumen, produced by the three rays, one could get to know the three rays and through them gain a knowledge of the producing luminary, the sun. The sun is thus seen because of the reflection of the lumen of these rays back to the opaque surface of the sun. It is this producing lux generated by the sun that gives rise then to primary lumen through the three rays. Primary lumen is also that lumen seen in refraction and reflection, especially reflection of solar rays from a mirror or polished body. Secondary lumen is that lumen produced by primary lumen which in turn was produced by the three rays. Secondary lumen is scattered or diffused light as in the case of a shadow.

Therefore to recapitulate lux can be defined as the light existing in the sun, the producing luminary. Primary lumen is said to be the

light traveling in the medium. It is also described as the light of the three rays. Secondary lumen is produced by primary lumen and is those forms of light that are scattered and diffused.

In addition in Duns Scotus' discussion there is an awareness that light travels in a straight line, as well as the general principles of reflection and refraction. He also was aware that the transparency (the medium) is a passive receptor of light.

In terms of vision he said that sight is a single faculty capable of receiving a wide variety of stimuli proper to it but diversified by their object, that is light and color. Light said Duns Scotus is the first visible object, and the adequate formal object of vision in virtue of which other things are to be seen. Color then in order to be seen is dependent on both lux and lumen. Moreover any light to be seen must strike an opaque object.

The Sources Cited by Duns Scotus

Thus indeed we have seen the four channels of transmission for Duns Scotus' thought on Distinction 13 of Book II of the Sentence Commentary, dealing with the nature of light, and dissected them for analysis. The Ordinatio is of course the main text since it is the closest to the original formulation of Duns Scotus. However, it is possible and probable that the Reportatio, Lectura and especially the Additiones Magnae represent what was going on in the actual classroom setting. By this we mean that they represent the various extra comments made by the teacher as well as the infiltration of additional readings into the reported texts that were being done by Scotus' students and followers. This would be particularly true in the case of the Additiones Magnae which were edited by William of Alnwick.

Turning our attention now to the source materials cited, let us see which ones were used in the various readings and what variations appear in the string of citations from the Church Fathers and the natural philosophers in the four versions.

In the first objection to the initial question at the outset of the *Distinction*, we notice that St. Augustine was cited by Duns Scotus from Book 7 of Super Genesim ad Litteram in the Ordinatio in reference to the soul directing the body. In the Reportatio Augustine was also cited in reference to light administering subtle bodies. Here the citation was simply Super Genesim.¹⁸⁹ In the Lectura a like reference was made to the Second Book of Super Genesim. Moreover there appeared there a reference from chapter 18 of the Super Genesim stating that lux in the medium is like air in a body.¹⁹⁰ Duns Scotus in speaking in the Ordinatio about intention being a relationship to that which it is alike turned to St. Augustine in the De Trinitate and the De Doctrina Christiana¹⁹¹ to say that whatever is the sign is the thing and that this relationship was not convertible.

John Damascene is referred to in support of Duns Scotus' contention that lux is a quality. The citation is from the De Fide Orthodoxa, Book I, chapter 8.¹⁹²

When Duns Scotus got around to stating that lux was part of the sensible and that lux and lumen were sensible per se, we encountered Aristotelian doctrines and those of some of his Arabian Commentators. Duns Scotus cited from the Second Book of the De Anima, chapter 7,¹⁹³ to set up his refutation of the Aristotelian position that color was the primary object of sight. In his refutation of the Aristotelian position we find that J. Duns Scotus utilized other works of Aristotle to develop

his argument. Thus in effect using Aristotle to refute Aristotle. Further, in stating that a true substance is not attached to anything Duns Scotus in the Ordinatio and Reportatio turned to the First Book of the Physics to support his statement.¹⁹⁴ By way of confirmation of his position that the sense of sight perceives many different objects, Duns Scotus both in the Additiones Magnae and in the Reportatio cited the First Book of the Metaphysics.¹⁹⁵ Moreover in the Additiones Magnae Duns Scotus spoke of the object of sensation in the sense of touch as being of two contraries. Here he cited Aristotle as his authority from II De Anima chapter 2.¹⁹⁶

In arguing that lux is per se sensible Duns Scotus turned to Avicenna in Liber 6 Naturalium, which is really Avicenna's De Anima, as his authority. Avicenna of course is in agreement with the Scotist position that lux and lumen are sensible. In the Reportatio we find him citing the Liber 6 Naturalium Part 3 chapter 1,¹⁹⁷ saying that lux is per se sensible and all sensible things are known through the multiplication of the species to the organ. Duns Scotus also cross-referenced Aristotle here citing II De Anima chapter 7¹⁹⁸ in regard to the need for some intermediary between the visible object and the sense organ. This intermediary for Duns Scotus is the species acting in the transparency. Likewise in the Additiones Magnae reference is made to the fact that lux is not a substantial form because it is per se sensible by citing Avicenna. This time the citation is from Part 4 of the Liber 6 Naturalium chapter 3.¹⁹⁹ Moreover there is the citation from Averroes' Commentary on the De Sensu et Sensato²⁰⁰ stating that it is necessary for lumen to be placed on the eye in order that sight may take place. This contradicts Aristotle's statement in II De Anima chapter 7,²⁰¹ that the object of

sensation if placed in contact with the eye would impede sensation. Averroes is resorted to again in the Ordinatio as part of the discussion on lumen being visible per se. The reference is to green plants reflecting colored light to a wall.²⁰² There is a second recourse to Averroes in reference to a cloud passing over green plants changing the intensity of the color. The example was used as an illustration of the meaning of intention in the discussion of the two types of lumen in the Reportatio.²⁰³ There are two references to Aristotle himself in the Ordinatio and Reportatio²⁰⁴ in the discussion of intention and both refer to light flashing out from the eye. This can be read in chapter 2 of the De Sensu et Sensato.²⁰⁵

At the end of the Distinction stands the rebuttal to the propositions raised at the start of the topic. Here in response to the first proposition concerning the quotes from St. Augustine, we find in the Reportatio a citation from Avicenna, Liber 6 Naturalium, Part 4,²⁰⁶ purporting to show that Augustine's spiritual luminary is the same as what is called lux and lumen by Avicenna.²⁰⁷ Avicenna's use of lux, lumen, splendor, and fulgor in Part 3 of the Liber De Anima places him in association with the hexaemeral tradition and the theologians of the 13th century, who will be treated in the next chapter. Moreover in regard to rays having the corporeal properties of being broken or moved, we find a reference from Avicenna to the effect that being broken is really a metaphor. In the Reportatio the citation is listed as Liber 6 Naturalium Part 3 chapter 2 and in the Ordinatio simply as Liber 6 Naturalium Part 3.²⁰⁸

In defining the three types of rays in the Ordinatio Duns Scotus seemingly cited Alhazen's Perspectiva as his source. However it is more probable that the reference is to a statement by Alhazen that vision

takes place through three types of rays²⁰⁹ in support of Duns Scotus' statement just prior to the definition of the straight line rays: "... it must be noted that lumen is engendered by lux according to three types of rays: the straight line ray, the broken and the reflected ray, according to Alhazen in his Perspectiva".²¹⁰ Since the three definitions as formulated by Scotus could not be located in the De Aspectibus of Alhazen, it is probable that he took them from a thirteenth century author (or authors) of perspective who relied on Alhazen. In Alhazen the reference is not to rays but to vision. Since Alhazen adhered to an intromission theory of sight, he made no difference between the external world and the eye. Both the medium and the eye are passive receptors of light. However the extromissionists place the burden of sight on the eye. Duns Scotus and Western authors of perspective in borrowing from Alhazen shift from vision (*Visio*) as seen in Alhazen's text to the ray to describe the phenomenon because they are trying to salvage part of Aristotle's extromission theory. The fact that in the Additiones Magnae the source for the description of the refracted ray is cited as the "Books of Perspective" helps to bear this out.²¹¹ Moreover in the old Vives Edition of the Ordinatio, there is an editor's note in the margin that refers the reader to the text of John Pecham for a definition of a ray.²¹² However in comparing the definitions of Scotus with those of John Pecham one fails to note a word for word correspondence but only a likeness of thought. Thus it is likely that the definitions of Duns Scotus reflect some well digested information gathered from sources available in the thirteenth century on the subject and thus the appellation "Books of Perspective" found in the Additiones Magnae is more accurate. A like reference to the authors of perspective is made in the description of the breaking of a ray, while treating accidental lumen in the Additiones Magnae.²¹³ In

addition a reference is also made in the Additiones to "those authors of perspective" but especially Alhazen in Book 7 and Euclid in the Liber de Speculis, while treating of the reflected ray. Here it is said that what is seen in the mirror is only an image of the real object; and secondly that the thing seen in a plane mirror appears beyond the mirror at a distance equal to that of the real object from the mirror.²¹⁴ Alhazen, Euclid and others are referred to again in support of the statement that reflection takes place according to equality of the angles of incidence and reflection.²¹⁵

Thus indeed we have seen that Duns Scotus' discussion on the nature of light in Distinction 13 of Book II of his Sentence Commentary fits within a long established tradition of Christian inquiry in the Latin West. Hence the reason for the appearance of compatible materials cited from Augustine and John Damascene. Moreover, his discussion of lux and lumen in terms of Aristotelian categories and his utilization of the syllogistic format placed him within the scholastic system of inquiry. In his discussion of lux and lumen being per se sensible and of lumen as a species we saw that Duns Scotus refuted Aristotle's description of the objects of vision in Liber II De Anima, chapter 7. In this part of the discussion citations from the works of Aristotle abound. In some instances the references from Aristotle were used to refute Aristotle. However when the Discussion gets around to the truly optical parts we notice a shift in source citations from Aristotle and the theologians to a reliance on Alhazen, Euclid and those unnamed authors of Perspective. This of course is especially true of the Additiones Magnae. It was noticed that this version of Duns Scotus Commentary seems to address itself more to the scientific than the logical, and ontological aspects of the

distinction and that most of the citations from Alhazen and authors of perspective are found here. There are four such references to be exact.

The older theologically orientated source citations appear more in the Ordinatio with references from St. Augustine in the Super Genesim, De Doctrina Christiana, and De Trinitate. In addition there is a reference from John Damascene's De Fide Orthodoxa. It is interesting that in the rebuttal at the end of the distinction the two references to Avicenna are used to try to remove some of the mysticism from Augustine's concept of light and identify it more with the lux and lumen of Duns Scotus and the thirteenth century theologians. Moreover Avicenna was resorted to in the refutation of Aristotle in Book II, chapter 7 of the De Anima.

Earlier we listed the contributions of Alhazen to the understanding of light as found in Raziuddin Siddiqui's article, "The Scientific Achievements of Ibn Al - Haitham". The question is raised as to just how many references to these contributions can be found in this Distinction by Duns Scotus. A list of these contributions which are found in the discussion of Distinction 13 either explicitly or implicitly will be given here as well as a list of page references where they can be found in the four versions of Distinction 13, as seen in Chapter II.

First there is the definitions of the three rays which come from Alhazen through intermediary scholars. (Ordinatio, on p. 27; Additiones, on p. 55). Secondly, we have seen that either Scotus or Alnwick mentioned in regard to reflection the angles of incidence and reflection (Additiones, on p. 55). Thirdly, there is a reference to the demonstration for the rectilinear propagation of light (Ordinatio, on p. 29; Lectura on p. 47). Fourthly, the radiation of secondary light is not in the direction of the radiation of transmitted light (Ordinatio, on p. 28). Fifth,

we find the notion that light must strike an opaque object to be seen (Ordinatio, on p. 28; Lectura, on p. 47; Reportatio, on p. 41). The sixth contribution found mentioned in the four versions of Distinction 13 is that light travels in a straight line in a transparency (Additiones, on p. 55; Lectura, on p. 48 - 49; Reportatio, on p. 41). The seventh notion is that in all transparent sub-celestial bodies there is some opacity and from each of these there proceeds secondary light when the sun's rays fall on them (Ordinatio, on p. 28; Lectura, on p. 48 - 49; Reportatio, on p. 42). Lastly that the transmission of light is the property of light and not of the medium (Lectura, on p. 46; Reportatio, on p. 38).

Over and above these seven there are some other optical principles found in the Distinction which were known to students of optics in the thirteenth and fourteenth centuries. For instance there is the description of the angle of declination in refraction in terms of its relation to its proximity to the perpendicular, which was described in the Ordinatio and Additiones Magnae. Also there is the example of the ray passing through red glass found in all four versions. In the Additiones Magnae we find that in a plane mirror the image of the object appears beyond the mirror at a distance equal to the distance of the real object from the mirror. Here either Duns Scotus or his abbreviator, William of Alnwick cited Alhazen from Book 5 of the De Aspectibus and Euclid from the Liber De Speculis.

Obviously Duns Scotus and Alnwick were well aware of the best optical information of their day and were not hesitant in going to Alhazen, Euclid and the authors of perspective and incorporating reliable scientific information into the discussion of a Distinction within a theological work such as the Sentence Commentary.

1. Citations from the Bible (Old and New Testaments) are taken from the Revised Standard Edition.
2. Hamud Askari "Ibn Al-Haitham: The Greatest Muslim Physicist", in Hamdard, Apr. - June, (1970), 73; see also Raziuddin Siddiqui, "The Scientific Achievements of Ibn Al-Haitham", in Hamdard, Apr. - June, (1970), 65.
3. David C. Lindberg, "Alhazen's Theory of Vision and Its Reception on the West", in Isis, (1967) 321 - 349; see also Lindberg "Lines of Influence in Thirteenth-Century Optics: Bacon, Witelo, and Pecham". in Speculum, XLVI, (1971), 66 - 83.
4. See above note 3.
5. Euclid, Catoptrica, in Opera Omnia, vol. 7, ed. J. L. Heiberg and H. Menge, (Leipzig: 1895), 286 - 343; "The Optics of Euclid" trans. H.E. Burton, in Journal of the Optical Society of America, vol. 35 (1945), 357 - 72; Albert Lejeune, Euclide et Ptolémée, (Louvain; Bibliothèque de l'Université, 1948); On Ptolemy see L'Optique de Claude Ptolémée dans La Version Latine d'après l'Arabe de l'Emir Eugène de Sicile ed. Albert Lejeune (Louvain: 1956). On Tideus see, Alkindi, Tideus, and Pseudo-Euklid; Drei Optische Werke. A.A. Bjornbo and S. Vogel (Leipzig: B.G. Teubner, 1912); see Lindberg, "Alhazen's Theory", 321
6. Lindberg, "Alhazen's Theory", 321
7. Siddiqui, "The Scientific Achievements of Ibn Al - Haitham", 66.
8. Ibid.
9. Ibid., 67
10. Ibid.; Some corrections to this account are required after reading: A.I. Sabra, "The Authorship of the Liber de Crepusculis, an Eleventh - Century Work on Atmospheric Refraction" in Isis, 58, Part I, (1967), 77 - 85. Siddiqui attributed to Alhazen the discovery of the refraction of light in the earth's atmosphere and that predawn light is an indirect light resulting from the scattering of light rays due to the atmosphere in which these are found. Sabra in his article demonstrated that the Liber De Crepusculis was actually written by Abu Abd Allah Muhammad Ibn Mu' Adh, an Andalusian mathematician of the eleventh century. Since these phenomena were discussed in the Liber de Crepusculis they then originated with Abu Abd Allah Muhammad Ibn Mu' Adh and not Alhazen to whom this book was falsely attributed. See Fuat Sezgin, Geschichte des Arabischen Schrifttums V, Mathematik, (Leiden, 1974), pp. 358 - 374 for a more detailed bibliography on Ibn Al - Haitham's achievements.
11. Siddiqui, "The Scientific Achievements of Ibn Al - Haitham", 67
12. Ibid.
13. Ibid.

14. Ibid.
15. Ibid.
16. David Knowles, The Evolution of Medieval Thought, (New York: Vintage Books, 1962), 41.
17. Ibid.
18. Ibid.
19. Ibid.
20. Ibid., 42
21. Etienne Gilson, History of Christian Philosophy in the Middle Ages, (New York: Random House, 1955), 76; Knowles, 43
22. Knowles, 42
23. Ibid.
24. Ibid., 43
25. Ibid.
26. Ibid., 44
27. Ibid., 49
28. Ibid., 240
29. Ibid., 282; Gilson, 261 - 264; see Alexander Birkenmajer, "Robert Grosseteste and Richard of Fournival", in Medievalia et Humanistica, V., (1948), 36 - 41. Richard of Fournival like Grosseteste sees lux as the agent that extends the matter of the universe. Light is an active power while matter is a passive recipient of its action. Fournival described in the Poem De Vetula which he fathered on Ovid a type of hierarchy in the universe based on participation in light. However unlike Grosseteste and Bacon, we do not find in the De Vetula the notion that light itself expands due to its own self multiplication. A somewhat similar philosophy of light exists in Islam. This theory is known as Ishraq. It became widespread in the 12th and 13th centuries A.D. and was derived from Persian sources. It was developed and propagated by Shihaboddin Yahya Sohrawardi. Ishraq was a philosophy of the universe designed to mystically transcend the world of the senses to the world of pure intelligence and thus a union with God. Light was the agent by which one transcended the world of matter and sense to God. The first light emanated from the intelligences and multiplied itself through the universe. The whole of the cosmic order exists and manifests itself through its connection with light which is a divine principle. Some Ishraqi authors have seen a foreshadowing of this philosophy in the works of Ibn Sina (Avicenna). On the Ishraqi Philosophy see: Henri Corbin, Histoire de la Philosophie Islamique, (Gallimard, 1964)

pp. 284 - 304; Also see, Sayyed Hussen Nasr, An Introduction to Islamic Cosmological Doctrines, (Cambridge: Belknap Press, 1964) pp. 19, 185, 190 - 191; on Ibn Sina, see pp. 243, 263, 276 - 77.

30. Morris Cohen and Ernest Nagel, An Introduction to Logic and Scientific Method, (New York: Harcourt Brace and Co., 1934), 234.

31. Ibid.; see also p. 236: One of the possible relations within a definition is property. The property of a thing, "...is a predicate which does not indicate the essence of a thing but yet belongs to that thing and is predicated convertibly with it."

32. Cohen and Nagel, 234.

33. Ibid.

34. Ordinatio, see above in Chapter II, p. 24.

35. Ibid.; see also the Reportatio, p. 37; see the Lectura on p. 45. For a fuller treatment on the sources cited in the exposition see pages 108 - 113 where all the citations found in the exposition are discussed.

36. Lectura; see above in Chapter II, p. 45.

37. See the Ordinatio above on p. 24.

38. Aristotle, Metaphysica, trans. and ed. W. D. Ross, in The Works of Aristotle Translated into English, VIII, (Oxford: Clarendon Press, 1972) 1017^b, line 10.

39. Ibid.

40. Ibid., lines 15 - 20.

41. Ibid., lines 22 - 26.

42. Aristotle, De Generatione et Corruptione, trans H. H. Joachim, in The Works of Aristotle Translated into English, II, ed. W. D. Ross, (Oxford: Clarendon Press, 1970), 317^a.

43. Ibid., 317^b.

44. Cohen and Nagel, An Introduction to Logic, 235.

45. Ibid.

46. Aristotle, Metaphysica, in The Works of Aristotle, VIII, 1024^b.

47. Aristotle, Categoriae and De Interpretatione, trans. E. M. Edghill, in The Works of Aristotle Translated into English, I, ed. W. D. Ross, (Oxford: Clarendon Press, 1968), 111^a.

48. Aristotle, Metaphysics, in The Works of Aristotle, III, 998^b.

49. See Ordinatio on p. 24
50. See Reportatio on p. 37
51. Ibid.
52. Cohen and Nagel, An Introduction to Logic, 30
53. Ibid., 31
54. Ibid.
55. See Ordinatio on p. 26
56. Cohen and Nagel, An Introduction to Logic, 31
57. Ibid.
58. Ibid.
59. See Ordinatio on p. 26
60. Cohen and Nagel, An Introduction to Logic, 31 - 32
61. See Ordinatio on p. 26
62. See Reportatio on p. 39
63. See Ordinatio on p. 26
64. Aristotle, Metaphysica, in The Works of Aristotle, VIII, 1023^b
65. See Ordinatio on p. 24
66. Ibid.
67. Aristotle, Liber II De Anima, chapter 7, trans. J. A. Smith, The Works of Aristotle Translated into English, III, ed. W. D. Ross, (Oxford: Clarendon Press, 1968), 418^a
68. Ibid., 419^a
69. See Ordinatio on p. 24
70. See Ordinatio on p. 24
71. Ibid.
72. Ibid., 25
73. Aristotle, Metaphysica, in The Works of Aristotle, VIII, 1025^a
74. Ibid.
75. Ibid.

76. See Reportatio on p. 37
77. See Reportatio on pp. 37 - 38
78. See Lectura, on p. 25: "Et dico primo quod lux non est forma substantialis, sed est qualitas sensibilis, ut per se manifestum est. Item: Lux in aliquo corpore est accidens; igitur in nullo est substantia, quia vere nulli accidit. Accidens ostenditur, quia: quod in corpore elementari est accidens, non est forma substantialis eius specifica, ut in igne."
79. See Ordinatio on p. 25: "Antecedens patet: quia si in igne esset lux forma substantialis, vel ergo esset ultima differentia specifica, vel aliqua imperfectior quae esset in potentia ad formam specificam. Non primo modo: quia tunc quaecumque haberent lucem essent eiusdem speciei. Non secundo modo: quia tunc ista forma esset imperfectior forma specifica ignis, et ita non esset forma substantialis alicuius corporis caelestis in quo nulla est forma substantialis imperfectior forma elementari."
80. See David Knowles, The Evolution of Medieval Thought, 12 - 13. Knowles described the Aristotelian form as: "All being, then, that can be perceived by the senses and adequately known by the mind can be analyzed into matter and form. Matter is the unknowable substratum carrying the qualities of a substance, and surviving all, even substantial change; in all 'material' or composite things it is the constitutive element of individuality. Form or essence, is the universal, cognoscible element which signifies the individual and can be abstracted by the mind. If things are regarded not as being but as becoming or changing, then matter is the potential element, susceptible or a multiplicity of forms in succession,..."
81. Cohen and Nagel, An Introduction of Logic, 235
82. See Ordinatio on p. 25
83. Ibid.
84. Aristotle, Metaphysica, in The Works of Aristotle, VIII, 1020^a
85. Ibid.
86. Ibid., This is sometimes referred to as the 3rd species of quality.
87. Ibid.
88. See Ordinatio on p. 25
89. See Lectura on p. 46
90. See Reportatio on p. 38
91. Ibid.

92. Ibid.: "Item corpora caelestia habent qualitates activas nobiliores quam inferiora. Huius <modi> non videtur nisi lux, quia perspicuitas est qualitas passiva".
93. See Reportatio on p. 38
94. Aristotle, Liber II De Anima chapter 7, in The Works of Aristotle, III, 418^a
95. Ibid., 418^b
96. Ibid., 418^b
97. See Reportatio on p. 38
98. See Ibid.
99. Aristotle, Liber II De Anima, chapter 2, in The Works of Aristotle, III, 413^a
100. See Reportatio, p. 38, lines 15-18
101. See Reportatio on pp. 38 - 39
102. See Reportatio on p. 38, lines 1-5
103. See Reportatio p. 38, lines 5-6
104. See Ordinatio on p. 25
105. Ibid., 26
106. Ibid.
107. Ibid., lines 4-5
108. Allan B. Wolter "The Formal Distinction" in Studies in Philosophy and the History of Philosophy vol. 3 - 4, ed. John K. Ryan and Bernardine M. Bonansea, (1960), 45
109. Gilson, History of Christian Philosophy in the Middle Ages, 462
110. Ibid.
111. Ibid.
112. Wolter, "The Formal Distinction", 50
113. Ibid.
114. See Ordinatio on p. 26
115. See Ordinatio on p. 26

116. Ibid., lines 19-20

117. Ibid.

118. Ibid., see lines 24-27; see Aristotle, Liber II De Anima. Chapter 11 in The Works of Aristotle, III, 423^b, lines 13-25:

"But there remains this difference between what can be touched and what can be seen or can sound; in the latter two cases we perceive because the medium produces a certain effect upon us, whereas in the perception of objects of touch we are affected not by but along with the medium; ...hence in neither the one case nor the other can there be any perception of an object if it is placed immediately upon the organ, e.g. if a white object is placed on the surface of the eye. This again shows that what has the power of perceiving the tangible is seated inside. Only so would there be a complete analogy with all the other senses. In their case if you place the object on the organ it is not perceived; ...". See also Liber II De Anima, chapter 7, 419^a lines 6-21: "Seeing is due to an affection or change of what has the perceptive faculty, and it cannot be affected by the seen colour itself; it remains that it must be affected by what comes between. Hence it is indispensable that there be something in between - if there were nothing, so far from seeing with greater distinctness, we should see nothing at all."

119. See Lectura on pp. 46 - 47

120. See Lectura on p. 47

121. See Reportatio on p. 39

122. Ibid.

123. Ibid., 39 - 40

124. Ibid.; Lectura p. 47; Ordinatio on p. 28; Reportatio on p. 40

125. See Reportatio on p. 40, lines 7-8

126. See Reportatio on p. 40

127. Ibid.

128. See Lectura on pp. 47 - 48

129. Aristotle, De Sensu et Sensato, chapter 2, in The Works of Aristotle, III, 437^a

130. See Reportatio on p. 40

131. Ibid.

132. Ibid.

133. See Lectura on p. 48
134. See Reportatio on p. 41
135. See Lectura on p. 48; Reportatio on p. 41
136. See Ordinatio on p. 27; lines 4-7
137. Ibid., lines 8-10
138. Ibid., lines 10-14
139. Ibid., lines 14-21
140. See Ordinatio on p. 27; Reportatio on p. 41; Lectura on p. 48
In the Lectura the statement follows the discussion on the three rays
and the types of lumen.
141. See Ordinatio on p. 28; Reportatio on pp. 41 - 42; Lectura on p. 48
142. See Reportatio on p. 41; see also Lectura on pp. 48 - 49
143. See Reportatio pp. 41 - 42
144. See Ordinatio on p. 27
145. See Reportatio on p. 42, the reference is to Archimedes using
mirrors to set enemy ships afire during an attack on Syracuse
(214 - 212 B.C.). See W. E. Knowles Middleton, "Archimedes, Kircher,
Buffon and the Burning Mirrors" in Isis, 52, (1961), 533 - 541; see
also Thorndike, II, 442, 455, 651, 789.
146. See Reportatio on p. 42
147. See Ordinatio on p. 28, "Eodem modo etiam per radium fractum
videtur ipsa res multiplicans se et non species aliqua ipsius rei
visae. Et sicut ista luminaria primaria multiplicatione diffusa
sunt immediate specie lucis gignentis, ita immediate gignuntur
ab ea, loquendo de immediatione ad causam, et non excludendo
ordinem effectuum ordinatorum respectu eiusdem causae."
148. See Lectura on p. 48; "Lumen primum sive essenziale dicitur
esse lumen quod causatur et multiplicatur per lineam rectam, aut fractam,
aut reflexam. Sed lumen accidentale est quod non causatur sic, sed
fit ex lumine praedicto multiplicato. Lumen autem primum gignitur
secundum se totum immediate a luce."
149. See Lectura on pp. 48 - 49; "...si lumen quod gignitur in medio a
luce gignatur non secundum se totum a luce secundum lineam rectam,
igitur radius genitus in hac parte medii si gignat, gignet ubique
sperice. Quod falsum est et contra sensum. Praeterea oportet quod
lux gignat lumen in alia parte medii immediate; in qua parte medii
est pars propinquior et remotior. Igitur gignit immediate lumen,
verum non est secundum essentiam sed tantum secundum virtutem.

Et qua ratione ad aliquam distantiam gignit lumen immediate in omni parte, eadem ratione secundum maiorem distantiam, si ponitur corpus luminosum maioris virtutis."

150. See Lectura on p. 49; "...et licet sit ordo inter lumen genitum secundum lineam rectam et fractam, non tamen est ordo qui est causae ad effectum, sed est ordo, sicut prius natura illuminatur prior pars medii quam posterior, licet totum immediate a sole; sicut est ordo inter intelligere et velle, non sicut causae ad effectum sed sicut unius effectus presuppositi respectu alterius."

151. See Reportatio on p. 42; "Preter hec lumina, est aliud quod vocatur secundarium, ubi est umbra et non tenebra. Quia in tali lumine videmus nullo radio trum praesente. Et illud lumen non multiplicatur immediate a luminari, sed est per se species sensibilis luminis primarii."

152. See Ordinatio on p. 28, lines 7-9.

153. Ordinatio on p. 28.

154. Ibid.

155. Ibid.

156. Ibid., p. 29,

157. Ibid.

158. Ibid.

159. See Ordinatio on p. 29; "...ubi per opposita foramina transiret radius solaris non videret et quod nusquam reflectente se ad opacum non videret illum radium si corpuscula illa non frangantur."

160. Rudolph E. Siegel, "Did the Greek Atomists Consider a Non-Corpuscular Visual Transmission?", in Archives Internationales d'Histoire Des Sciences, Jan. - June (1969), 3 - 16.

161. See Ordinatio on p. 29.

162. See Additiones Magnae on p. 54.

163. Ibid.

164. Ibid.

165. Aristotle, Metaphysica, in The Works of Aristotle, VIII, 980^a.

166. See Additiones on p. 54.

167. Ibid.

168. See Additiones on pp. 54 - 55.

169. See Additiones on p. 55
170. See above page
171. See Additiones on p. 55
172. Ibid.
173. Ibid.
174. See Ordinatio on p. 27
175. See Additiones on p. 55
176. Ibid.
177. See Ordinatio on p. 27
178. Ibid.
179. See Additiones on p. 55
180. Ibid.
181. See Ordinatio on p. 27
182. See Additiones on p. 55
183. Ibid., pp. 55 - 56
184. Ibid., 56
185. See above page 104
186. See Additiones on pp. 56 - 57
187. See Additiones on p. 57
188. Ibid.
189. See Ordinatio, on p. 24; Reportatio on p. 37. All the citations from Augustine are taken from Book VII of the Super Genesim ad Litteram, chapter 15; see P. L., 34, 3, Part 1, p. 363.
190. See Lectura on p. 45.
191. See Ordinatio on p. 26; this citation was not able to be located.
192. See Ordinatio on p. 25; see John Damascene, De Fide Orthodoxa, Book I, chapter 8 in A Select Library of the Nicene and Post Nicene Fathers. Second Series, vol. 9, p. 8.
193. See Ordinatio, on p. 24; Reportatio on p. 37; see Aristotle, Liber II De Anima, Chapter 7, in The Works of Aristotle, III, 419^a.

194. See above p.82 ; see Ordinatio on p. 25; Reportatio on p. 38; see Aristotle, Physica, in The Works of Aristotle, II, 185^a.
195. See Additiones on p. 54; also the Reportatio on p.38; Aristotle, Metaphysica, in The Works of Aristotle, VIII, 980^a.
196. See Additiones on p. 54, line 20; see Aristotle, Liber II De Anima, chapter 2, in The Works of Aristotle, III, 423^b - 424^a.
197. See Reportatio on p. 37; see Avicenna, Liber De Anima seu Sextus De Naturalibus, Pars Tertia, in Avicenna Latinus, ed. Van Riet, (Louvain: E. Peters Pub., 1972), 171.
198. Aristotle, Liber II De Anima, chapter 7, in The Works of Aristotle, III, 419^a.
199. This citation is probably a scribal error. Part 4 deals with the passions of the soul. It is part 3 that discusses light as being sensible. See above note 197. This citation perhaps should read Part 3 chapter 4.
200. See Ordinatio on p. 26.
201. Aristotle, Liber II De Anima, in The Works of Aristotle, III, 419^a.
202. See Ordinatio on p. 28
203. See Reportatio on p. 40
204. See Ordinatio on p. 29; Reportatio on p. 40
205. Aristotle, De Sensu et Sensato, chapter 2, trans. J. I. Beare, in The Works of Aristotle Translated into English, III, ed. W. D. Ross, (Oxford: Clarendon Press, 1968), 437^a.
206. See Reportatio on p. 42. This citation should probably read Liber 6 Naturalium, Part 3, chapter 1. See Avicenna, Liber de Anima, Part 3, chapter 1, in Avicenna Latinus, 169 - 177.
207. Perhaps this illustrates Gilson's point that Avicenna and Augustine were used with somewhat equal weight by the schoolmen. See Kenelm Foster, "Avicenna and Western Thought in the 13th Century", in Avicenna: Scientist and Philosopher: a Millenary Symposium, ed. G. M. Wickens, (London: Luzac and Co. Ltd., 1952), p. 109; see also Etienne Gilson, "Avicenne et le Point de Départ de Duns Scot", in Archives d'Histoire Doctrinale et Littéraire du Moyen Age. II, (1927), pp. 89 - 149.
208. See Reportatio on p. 42; Ordinatio on p. 30; see Avicenna, Liber De Anima, Part 3, chapter 2 in Avicenna Latinus, 180.
209. Alhazen, De Aspectibus, Book 4, chapter 1, in Opticae Thesaurus, ed. Frederic Risner, (Basel: 1572), 102: "Iam explanavimus in libris tribus modum comprehensionis formarum in visu, cum fuerit directus: et enumeravimus singula, quae in rebus visis comprehendit visus. Sed

diversificatur acquisitio visus tripliciter: aut enim directe, sicut diximus: aut per reflexionem in politis corporibus: aut per penetrationem, ut in raris, quorum non est raritas, sicut raritas aeris. Et non potest diversificari visus, nisi in his modis tribus."

210. See Ordinatio on p. 27

211. See Additiones on p. 55; see also p. 104.

212. See Duns Scotus, Liber II Sententiarum, D. 13, in Vives Edition, XII, 623. The reference is to a question to disputed by Jacobus Alkindi and to John Pecham, Part I of the Perspectiva, conclusion 14; see David C. Lindberg, John Pecham and the Science of Optics, (Madison: Univ. of Wisconsin Press, 1970), p. 89.

213. See Additiones on p. 57

214. See Additiones on p. 57. The 7 is probably a scribal error, since Book 7 of the De Aspectibus deals with refraction and Book 5 with reflection. See Alhazen, De Aspectibus, Book 5, chapters 11 - 12, in Opticae Thesaurus, 132.

215. See Additiones on p. 55; see Alhazen, De Aspectibus, Book 5, chapter 9, in Opticae Thesaurus, 130.

CHAPTER IV

Light Theory in the Sentence Commentaries
of Three Representative Theologians:
Thomas, Albertus, and Bonaventure

Theologians have traditionally sought to explain man's environment and his place in the universe. Consequently we find from early Christian times a theological literary form on the story of creation known as the Hexaemeron. Until the acceptance in the thirteenth century of the Sentences of Peter Lombard, as the official text book for theology programs and the official guide on positive theology, the treatment of man and his relationship to the universe was best found in the hexaemeral literature.¹

An Hexaemeron is structured around the events outlined in the days of creation, as found in the first chapter of Genesis. An Hexaemeron begins with a consideration of the first words of Genesis: "In the beginning God created the heavens and the earth." (Gn. 1:1). There is usually a discussion on the manner in which God created, together with, especially in the earliest examples, a refutation of some Greek theories on creation and condemnation of astrology. The hexaemeral literature usually contains a consideration of the meaning of the verses on the void and the creation of light on the first day of creation, as found in the Genesis account. In the first case (Gn. 1:2): "The earth was without form and void, and darkness was upon the face of the deep, and the Spirit of God was moving over the face of the waters." In the second case (Gn. 1:3): "And God said, 'Let there be light'; and there was light." The nature of God's command is a favorite topic for discussion on this verse. This is followed by the naming of the light day, and darkness, night.²

The second day of creation is taken up with the creation of the firmament: "And God said: 'Let there be a firmament in the midst of the waters,...' (Gn. 1:6). Here there is a discussion on the nature

and purpose of the firmament and the popular themes of the number of the heavens and the nature of the waters above the heavens.

On the third day God said: "'Let the waters under the heavens be gathered together into one place, and let the dry land appear'." (Gn. 1:9). A discussion on the problem of how all the waters could be gathered into one place is presented here. This discussion is followed by some comments on the dry land and the formation of the various types of vegetation.

The fourth day's discussion is taken up with the lights of the firmament, as described in Gn. 1:14: "And God said, 'Let there be lights in the firmament of the heavens to separate the day from the night; and let them be for signs and for seasons and for days and years, ...". Here the discussion centers on the problem of dividing the day into hours and a refutation of astrology.

The fifth day of creation is described in Gn. 1:20 "And God said, 'Let the waters bring forth swarms of living creatures, and let birds fly above the earth across the firmament of the heavens." The discussion deals with a survey of the various species of birds and fish that inhabit the earth.

The work of the sixth day is described in Gn. 1:20: "And God said, 'Let the earth bring forth living creatures according to their kinds: cattle and creeping things and beasts of the earth according to their kinds.'"; and in Gn. 1:26 "And God said: 'Let us make man in our image, after our likeness; ..." An enumeration of the animals inhabiting the earth is presented in the discussion as well as a description of man's place in the order of creation.

Since the Hexaemeron is a didactic form of literature intended to

further Christian doctrine, especially in regard to moral and eternal matters, every opportunity was used in the early examples of this literary form to make some comparison between the natural world and that of man in reference to morals and eternal salvation.

In style the Hexaemeron abounded with supportative statements from authorities such as the Old Testament, the ancient Greek and Roman authors on natural science, and the Patristic writings. Among the reasons for writing an Hexaemeron Lynn Thorndyke noted were the edification of the Church, the satisfaction of the scientific curiosity of the audience and the need to dispel any conflict between Greek science and the Bible, especially in regard to the teaching of the eternity of the world and the use of astrology.³

Examples of this type of literature go back to the early centuries of the Christian era. Among the early Greek writers there were two approaches to the study of Genesis, the allegorical school of thought and those following a literal interpretation of the biblical account. The allegorical or Alexandrian School was comprised of the following authors: Clement of Alexandria (+c. 200 A.D.); Origen (+c. 253 A.D.); St. Athanasius (+ 373 A.D.); and St. Cyril (+ 444 A.D.). This school was noted for its belief in a simultaneous creation rather than creation over a period of six days. Those that adhered to a literal account or a successive creation over the 6 day period were St. Ephrem (+ 373 A.D.); John Chrysostom (+ 407 A.D.); Gregory of Nazianzen (+ c. 390 A.D.), St. Basil (+ 379 A.D.) and Gregory of Nyssa (+ c. 395 A.D.).⁴

St. Basil is considered the best example of hexaemeral writing. His Hexaemeron was very highly praised by his contemporaries.⁵ St. Basil's work on the Hexaemeron is composed of nine homilies. In the beginning

of the first homily, he made reference to a section to be done on man, but he died before he accomplished this. Two homilies were, however, added to his nine homilies by his brother, Gregory of Nyssa, on the creation of man.⁶ Professor Thorndyke asserted, that St. Basil's work seemed to have supplanted all previous Greek works in this field of Christian writing and that it had a profound influence on Western authors.⁷ He cited for example Saint Ambrose's imitation of St. Basil on the Hexaemeron.⁸ Further evidence of the influence of this work is provided by the widespread use of translations from Greek into Latin of St. Basil's Hexaemeron. For instance there is the translation of St. Basil's Hexaemeron by Eustathius about 440 A.D.⁹ Also there is Rufinus' translation of Basil's homilies¹⁰ and that of Dionysius Exiguus in the sixth century.¹¹ Lynn Thorndyke mentions also the fact, that in Bede's estimation of chief authorities on Genesis were St. Basil, St. Ambrose and St. Augustine.¹²

Two other writers whose works had a wide influence were John Philoponus, who wrote the De Opificio Mundi between 546 - 549 A.D. In this work he tried to show, that there need not be contradiction between science and Christian faith.¹³ The other is John Damascene (+ c. 747 A.D.), the author of the De Fide Orthodoxa. John's work later provided a structural plan for the organization of Peter Lombard's Sentences.¹⁴

Of these early writers on the subject, the two most influential in the West were Ambrose and Augustine. St. Ambrose (c. 340 - 397 A.D.) wrote an Hexaemeron in which he closely imitated the work of St. Basil, even to the point of duplicating an error.¹⁵ He did not introduce anything, which could be considered a new area of study for hexaemeral

writing.

St. Augustine (354 - 430 A.D.) on the other hand wrote three treatises on Genesis: De Genesi: Contra Manichaeos; De Genesi: Ad Litteram Imperfectus; and De Genesi: Ad Litteram.¹⁶ In addition, he also took up the discussion of the biblical account of creation in his Confessions.¹⁷ Furthermore some other examples of hexaemeral writing are found in the West. Theophilus (385 - c. 428 A.D.) wrote a work on the subject entitled To Autolytus.¹⁸ Bede, the English monk, who lived between 672 and 735 A.D., also has a work on the six days of creation. The continued tradition of hexaemeral writing down to the day of Duns Scotus is demonstrated by the Hexaemerons written by such notables, as Peter Abelard (1079 - 1142);¹⁹ Robert Grosseteste (1175 - 1253); and Bonaventure (1221 - 1274). This subject was also treated in other works on natural questions as witnessed in the De Divisionis Naturae of John Scot Erigena and the De Universo of Rabanus Maurus.

The most famous Christian commentators prior to 1100 were Basil, Ambrose, Augustine, and Bede. Basil and Ambrose were the classic models of hexaemeral writing, which set forth the format for the literary genre. In the Latin West Ambrose and Augustine occupied the more important place. In regard to natural questions one finds in Ambrose's Hexaameron the following authoritative sources cited: Pliny's Historia Naturalis; Horacés Epodes and Odes and Cicero's De Natura Deorum, De Senectute, Tusculan Disputations, and Somnium Scipionis; Ovid from the Metamorphosis; Vergil from the Georgics, the Eclogae, and Aeneid; and finally Sallust's Jugurthine War.

While Augustine did not write an Hexaameron per se, his De Genesis ad Litteram was regarded as a prime authoritative source on the subject.

Augustine and Bede are the two sources most heavily relied on by Medieval scholars (except for John Scot Erigena) in writing on the days of creation. Augustine had touched in his writings on every aspect of Christian doctrine and Bede, as Beryl Smalley has pointed out, made Augustine and the other Fathers available to Medieval men through his sensible compilation of the key points in the Patristic writings.²⁰

In the twelfth century a new didactic form of literature came into existence, which would become an important integral part of the entire scholastic structure and which would eventually provide an opportunity for the thirteenth and fourteenth century schoolmen to express their ideas about God, man, the universe and eternal salvation. This new literary form was the Sentences of Peter Lombard. Peter Lombard borrowed the hexaemeral themes and incorporated them into the Second Book of his Sentences.

With the arrival of the Sentences of Peter Lombard on the University scene, a change took place in terms of the source cited and the questions explored. The Sentences were an ordered compilation of positive theology,²¹ that is settled doctrinal questions whose answers had long since been agreed on by the magisterium of the Church. The Sentences also consisted of a compilation of texts borrowed from the Fathers of the Church, especially Augustine, which were traditionally applied in answering certain theological questions. However these texts quoted from Augustine retained little of his philosophical and theological speculations, which can be found most notably in his De Doctrina Christiana.²²

The Four Books of the Sentences grew out of Peter Lombard's glosses on the psalms.²³ He relied heavily on the Fathers of the Church, the Councils and scripture to marshal authoritative sources for the proposed

doctrinal thesis or question bringing forth authorities for and against the thesis.²⁴ After having presented both sides of the issue, he then gave his own opinion on the subject. In presenting his material, the Lombard borrowed the style of the Sic et Non method from Peter Abelard, and also the rules by which one can reconcile differences between authorities.²⁵

An examination of his sources show that Augustine is the most frequently cited source, in fact there are one thousand citations from Augustine. This figure represents 9/10 of all the direct citations found in the Four Books of the Sentences by Peter Lombard. Ambrose and Hilary rank second with some 30 to 40 citations apiece.²⁶ Naturally his citations lean more heavily toward the Latin than the Greek Fathers. Chrysostom is the most frequently quoted of the Greek Fathers with some 20 citations.²⁷ Peter Lombard's Patristic quotations do not stem from a personal search through the Fathers but rather from compilations and anthologies that were available through the efforts of men like Florus Lugdunensis.²⁸ Those works of Augustine that were used by the Lombard include: the Enchiridion; the Retractationes; the Liber 83 Quaestionum De Trinitate; De Genesi Ad Litteram; and a pseudo Augustinian work entitled De Fide Ad Petrum.²⁹ In addition to the Patristic sources Peter Lombard used the Glossa Ordinaria, after the tradition of Anselm of Laon.³⁰ He also relied heavily on his teachers, Hugh of St. Victor and Peter Abelard. Peter Lombard used Hugh's Summa Sententiarum and De Sacramentis Christianae Fidei.³¹ He imitates Hugh in his reverence for tradition and authoritative sources. Unlike Abelard, Peter Lombard set forth the teachings of the Church simply and clearly. He rarely used dialectic to weave great speculative webs around a point of Christian Doctrine.³² Besides the Sic et Non, the Lombard also made use of the

following works of Abelard; the Theologia Scholarium; the Theologia Christiana; and Abelard's Commentaries on the Epistle to the Romans.³³

Moreover Peter Lombard also borrowed from Ivo of Chartres and from Peter's counterpart in canon law, Gratian. He also made use of the newly translated work of John Damascene.³⁴

The great achievements of the early scholars of the ninth through the twelfth centuries were the production of textbooks and secondly independent exegesis on scripture. Laon and Paris were the two schools that excelled in this category. The need for standardized texts was vital because teaching in the Middle Ages was dependent on texts handed down from earlier periods. The standard scriptural text and exposition on it was the Glossa Ordinaria.³⁵ The Lombard's Sentences represent a new breakthrough in textbook development because it eliminated the slavish adherence to a line by line exegesis of the biblical text. The Sentences utilized the "quaestio" system, which had been developed at Laon. This system raised key points of doctrine in a logical order without presenting an entire chapter of scripture with its commentary, and explained the question by selecting only those precise verses that applied to the question under discussion. Peter Lombard had studied at Laon and hence we see why the format of the Sentences followed the "quaestio" system and why the Sentences were so heavily influenced by his own Magna Glossatura, which he wrote at Laon.³⁶ As Beryl Smalley wrote in describing the transition from the Glossatura to the Sentences:

When the Lombard compiled his Sentences he transferred to them a number of questions from his Magna Glossatura; he was able to remove these questions from their context and to arrange them in the systematic doctrinal schema of the Sentences without making any important verbal alterations. ³⁷

We know that by the end of the twelfth century, when some systematic doctrine was given apart from the sacred text itself, it took the form of the lectures on the Sentences of Peter Lombard.³⁸ The Books of the Sentences break down topically as follows: Book I deals with the nature of God; Book II discusses the creation story and salvation history up to the coming of Christ; Book III is concerned with the topics of Incarnation and Redemption; and the fourth Book touches of the Sacraments, death, judgment, heaven and hell. Each book is subdivided into Distinctions, that is a major topic with a number of quaestiones within each Distinction.

Until 1953 the usual dates ascribed to the composition of the Sentences was 1150 - 1152. Moreover, as a result of the work on the critical edition of the Sentences published in 1970, it is now recognized that the Sentences were composed, read, and re-edited between 1155 - 1158.³⁹ The Books of the Sentences were first used as a text at Paris between 1223 and 1227, when Alexander of Hales, then a Magister Regens, used the Sentences for his lecture.⁴⁰ Between 1240 and 1245 the Sentences came to be accepted by the faculty of Theology as the ordinary textbook on scripture and every candidate had to write and read a commentary on the Sentences as a requirement for the degree in Theology.⁴¹

In the present chapter the direction of the inquiry will be to assess the relationship of the doctrines contained in Duns Scotus' exposition on D. 13 of Book II of his Sentence Commentary with what was said on the same subject matter by some of the famous Scholastic doctors. Among the theologians of the thirteenth century none hold a more prominent spot in the history of medieval theological and philosophical thought than Thomas

Aquinas, Albertus Magnus, and Bonaventure. All three of these men commented on The Sentences of Peter Lombard in the course of obtaining their theology degrees. It is only natural therefore to compare their comments on D. 13 with those of Johannes Duns Scotus. Since Thomas Aquinas has attained the premier position in the history of thirteenth century philosophy and theology, we will treat his opinions first followed by those of his teacher Albertus Magnus. The opinions of Bonaventure, who represents a different philosophical tradition, will be treated next in regard to the same questions. Some notice will also be given as to how the format and emphasis of the Commentary on D. 13 of the Sentences evolved from the original format and focus as presented by Peter Lombard.

In the format developed by Peter Lombard, D. 13, which is a discussion of the creation of light, is broken down into seven chapters and covers the points closely related to the discussion found in the old hexaemeral story on the creation of light on the first day. In Chapter I of D. 13 the Lombard indicated that the object of study was to be how light was suddenly formed out of the chaos and began to adorn the world. ⁴²

Chapter II of this distinction is composed of three articles. The first raised the question as to whether lux is corporeal or spiritual. Peter Lombard cited Augustine from the De Genesis ad Litteram to the effect that lux is both corporeal and spiritual. The second article discussed light as being spiritual and the third treated light as a bodily nature. ⁴³

Chapter III had two articles. In the first, light is discussed as being prior to the luminaries and filling the space between the waters. The creation of the first day and night is the subject of the second article. ⁴⁴

Chapter IV likewise had two articles and in the first the Lombard spoke of the light that illumined the air for the first three days and the division of the day into 24 hours. Article two faced the problem of when to begin computing the 24 hours of the day, since there was only evening on the first day. ⁴⁵

Chapter V contains four articles, the first is concerned with the natural order of reckoning a day; evening to evening, or morning to morning. The Lombard in the second article discussed how one should reckon the beginning of the day not from the aurora but from the full light of day. He went on to discuss Bede's solution of reckoning the hours of the day from morning to morning. In the third article Peter Lombard asked, if the first light was sufficient, then why was there need to create the luminaries of the heavens on the fourth day. The answer supplied was that the sun and stars were needed to amplify the first light and to help fill the depressions in the earth with light. The last article explained that all light is gathered in that part of the heavens where the sun is located. ⁴⁶

In Chapter VI the manner in which the voice of God was heard above the waters is analyzed. The answer given is from St. Augustine in Super Genesim, namely that the voice of God was not heard in time because then it would be mutable and God is immutable. It was also described as the voice of the Word of God. ⁴⁷

Chapter VII therefore dealt with the role of the Trinity in the work of creation. Two of the five articles in this chapter are aimed at dispelling heretical notions in regard to the Trinity. ⁴⁸

In comparison with Johannes Duns Scotus' presentation, as seen in chapter four, it is noticed that Scotus reduced the discussion to two questions centering on the nature of light. It is also evident in reading

the seven chapters of P. Lombard, that he adhered very closely to the old hexaemeral format, as outlined by Basil in his Hexaemeron. Moreover his sources for this distinction are all from the old tradition with four references to Augustine's De Genesis: a reference to his De Trinitate; and one to Augustine's treatment of Psalm 32. One observes also in this chapter the use of Bede's Super Genesim as well as the Hexaemerons of Ambrose and Basil. John Chrysostom is cited from the Expositione Epistolae Ad Hebraeos. Also in evidence is a reliance on the Glossa Ordinaria and Hugh of St. Victor's De Sacramentis.⁴⁹ Hence we see by comparison that except for reference to Augustine, who as we mentioned earlier wrote so widely in regard to doctrine and Christian philosophy, all of the sources quoted by Duns Scotus come from the so called new learning of the twelfth century. These sources are either from the natural works of Aristotle, condemned in 1215, and 1277 or those of a commentator on Aristotle such as Averroes. Yet we find these very sources some 25 - 30 years later incorporated into a commentary on the text of Peter Lombard's Sentences, which was regarded as the textbook on Positive Theology.

Returning now to the Commentaries of the three great Doctors, Thomas, Albert, and Bonaventure on D. 13 we will see that they reflect the organizational framework of Peter Lombard much more closely than the Commentary of J. Duns Scotus did. Also in their Commentaries one sees the manner in which the scholastic doctors expanded the issue from the days of the Lombard. Therefore before examining each of the Doctors individually on this Distinction, it would be of value to present an overview of the method utilized by these men in commenting on the Sentences.

The aforementioned Doctors presented the text of Peter Lombard in some fashion in their Commentaries. Thomas gave the full text of the Lombard for the Distinction followed by a "Divisio Textus", which is an outline of the points of the Lombard he wished to utilize in his discussion. His own discussion immediately followed the "Divisio Textus" and the Distinction ended with an "Expositio Textus", where he clarified the points in the text of Peter Lombard with which he had some conflicting views.⁵⁰ Bonaventure also presented the text of the Lombard first, followed by a "Divisio Textus" and then his own exposition. Bonaventure like Aquinas also had a section entitled "Dubium Circa Litteram Magistri", where he emphasized his differences with Peter Lombard.⁵¹ Albertus Magnus broke up the presentation of the Lombard's text. In his organization of the Distinction Albert first presented a "Divisio Textus".⁵² He then introduced, prior to each of the topics he wished to discuss, the corresponding chapters from Peter Lombard's format. Sometimes 2 and 3 chapters of the Lombard were treated together by Albert and others were divided up into smaller parts. These chapters from the text of the Lombard were alphabetically labeled and became the basis of the division of his text into four major sections labeled according to the Lombard's themes A; B, C; D, E, F; G, H, I, K. Corresponding to each of these divisions and following immediately after each was his Commentary for each division labeled Articles I; II; III; IV.⁵³

The First Article investigated the work of distinguishing in the first three days of creation.⁵⁴ The Second examined the lux of the first three days: whether that light was a luminous cloud; a body; or a form of a body.⁵⁵ The Third Article examined the different ways of reckoning the division of time by the measure of a day.⁵⁶ The Fourth discussed whether God the Son and Holy Spirit shared a role in creation

with God the Father. ⁵⁷

Aquinas following the Quaestio system, divided his Distinctions into Questions. Distinction 13 had only one Question, which was subdivided into five Articles. Article I examined whether or not further distinction was needed in the things of creation after they were created. ⁵⁸ Article II asked whether lux is properly to be found in the category of spirituality. ⁵⁹ Article III discussed whether or not lux is an accident. ⁶⁰ Article IV examined whether lux is adequately described in the creation narrative. ⁶¹ Article V asked whether God the Father made all things through the Son. ⁶²

Bonaventure's Distinction is composed of three Articles and each is subdivided into two questions. Article I is concerned with the production of light. Question one asked, whether the lux of the first day was made corporeal or spiritual. ⁶³ Question two is, how lux made day and night. ⁶⁴ Article II dealt with the essence and nature of lux. Question one is whether lux is a body ⁶⁵ or form of a body and Question two asked whether lux is a substantial or accidental form. ⁶⁶ Article III is about the effect and irradiation of lux. The first Question determined whether lumen, which comes from a luminous body, is a body. ⁶⁷ The second is whether lumen is a substantial or accidental form. ⁶⁸

From the foregoing paragraphs, it is seen that the format for commenting on the Sentences of Peter Lombard was not all that rigid and in fact varied somewhat with all three men with Albert being the one adhering the most closely to the Lombard's outline. In every case however, there is a basic similarity due to the utilization of the "Quaestio System" by all three men and the use in whole or in part of the topics from P. Lombard's Sentences. Thus we see that there was no universal slavishness in following the Lombard verbatim. By comparison

with the format of the three Doctors just discussed, the Commentary of Duns Scotus is the farthest removed from the Lombard. His Distinction has only two questions: (1) whether lux can at the same time be lumen; (2) whether lumen is the proper sensible species of lux.⁶⁹ The Question headings do not resemble those seen in the Lombard. Of the three Doctors examined Bonaventure is the closest to Duns Scotus in terms of curtailing the focus of the original Distinction. Also in labeling the questions Duns Scotus is very close to Bonaventure except for Bonaventure's exhaustive dealing with all of the Lombard's topics.

The method of demonstration and argumentation in the various articles and questions of Duns Scotus and the three thirteenth century Doctors for this Distinction is the same. Each Article or Question opened with a series of propositions in support of the stated issue under investigation and a series against the issue. After this there appeared a "Solutio" in which the author gave his opinion and then finally a rebuttal of the objections initially raised against the stated issue. This format is characteristic of Scholastic disputations of the thirteenth and fourteenth centuries.

There are within these pro and con arguments two approaches in argumentation. One is philosophical, approaching issues in terms of form, substance, accidents, qualities, genere, and species. This approach utilized both the Aristotelian and Platonic philosophical systems. The other approach is authoritative and exegetical, namely citing lines of scripture commentary and invoking the learned authorities such as Aristotle, Augustine, Dionysius, John Damascene, Averroes, Avicenna, etc. Sometimes this approach turns out to be nothing more than semantical exercises with the lines of scripture.

In the various arguments pro and con one notices in the Commentaries

of the three Doctors a recurrence of sources, quotations, and philosophical and physical principles. These no doubt represent common stock arguments, sayings and quotations, many of which were also used by Duns Scotus. These all appear in the discussion of lux and lumen as substances, forms, qualities, and accidents. For instance, there are three statements from Augustine which recur variously in all four Commentaries. The first is from Liber III of the De Libro Arbitrio cap. V, that lux in a body holds first place; the second from Liber 7 Super Genesim states, that the soul cannot generate anything because lumen is the highest generation; and the third also from Super Genesim. Liber 7, that the soul administers bodies through lux and air. There is also a citation from the Third Epistle of Augustine to Volusianus and a quote from J. Damascene, that lux is a quality of air. Also Dionysius is frequently cited from the Liber De Divinis Nominibus. Needless to say there are frequent references to the works of Aristotle and the Commentators on Aristotle, notably Averroes.

Some of the common stock physical arguments employed are: Two bodies cannot occupy the same place at the same time; nothing is moved unless it is a body; and nothing bounces off a body except another body.

In the philosophical aspects of the arguments pro and con the approach utilized by Commentators is to establish the argument for or against lux and lumen being a form, body, substance, or accident by either denying or attributing to lux and lumen the attributes of a form, body, substance, quality or accident. So we find the points being made such as, two accidents of the same distinction of a species cannot exist in the same subject at the same time; or that nothing can act beyond its species because an effect cannot exceed its agent. There are also arguments concerning lux and lumen in the medium based on the notions of privation and habitus.

At this point it would be well to return to each of our three Doctors in turn and biographically place each within the context of the 13th century. Moreover it is now necessary to examine the content of each Commentary on D. 13 in greater depth especially in regard to that part which corresponds to what was discussed by Duns Scotus in his Commentary, so as to eventually provide material for comparison.

Thomas Aquinas

Thomas Aquinas was born in Roccaseca, Italy near the famous Benedictine monastery of Monte Casino about 1224 - 25⁷⁰ and died on March 7, 1274 at Fossanova near Maenza, Italy.⁷¹ The Aquino family was of the lower nobility and actively involved with the Imperial politics of the time. His family alternately served Emperor Frederick II and the Papacy depending on which way the political currents were running.⁷²

In 1231 he was placed in the Abbey of Monte Casino according to his family's plans. There he received his elementary education.⁷³ When the abbey was occupied by the troops of Frederick II in 1239, Thomas was sent to the University of Naples to complete his studies. There he was trained in grammar and logic by Master Martin and in natural science by Peter of Hibernia.⁷⁴ It was here too that he received an early introduction to Aristotle.⁷⁵ While at Naples Thomas entered the Dominican Order about 1244, much against his family's wishes.⁷⁶ Thomas was apparently abducted by his brothers in an effort to dissuade him from his decision.⁷⁷

After this episode Thomas went first to Paris about 1245 and then to Cologne in 1248 to further his studies.⁷⁸ Aquinas studied under Albertus Magnus possibly at Paris but certainly at Cologne from 1248 - 1252.⁷⁹ He was ordained in Cologne in 1250 or 1252.⁸⁰

In 1252 Thomas was sent to the Dominican priory of St. Jacques to read his Commentary on the Sentences of Peter Lombard.⁸¹ During the 1250's the dispute between the Mendicant and Secular Masters was in full swing and Pope Alexander IV intervened so that both Saints Bonaventure and Thomas were accepted as Masters at Paris.⁸² Thomas Aquinas' first Paris professorship extended from 1256 to 1259.⁸³ It was during this time that he began one of his important works, the Summa Contra Gentiles.⁸⁴

From 1259 to 1265 Thomas was in Italy at Anagni and Orvieto in association with the Papal Courts of Popes Alexander IV and Urban IV.⁸⁵ The years 1265 - 67 were spent in the Dominican Priory of Santa Sabina in Rome where he began his most famous work, The Summa Theologiae. At this time he was under the patronage of Pope Clement IV.⁸⁶

In 1269 Thomas returned to Paris for a somewhat unprecedented second term as professor and this tenure lasted until 1272. Fr. Wallace suggests that his second professorship was in connection with the disputes over Aristotelianism then raging at Paris.⁸⁷ Here Thomas combatted both the traditional Augustinian orthodoxy championed by many Franciscan scholars, notably Bonaventure, John Pecham, and the heterodox Aristotelianism of Siger of Brabant and the so called Latin Averroists.⁸⁸ One of the key issues debated was that the creation of the world in time was not demonstrable by reason and that an eternal universe was not a concept repugnant to philosophy.⁸⁹ When Etienne Tempier, Bishop of Paris, in 1270 condemned certain Averroist teachings it would appear that Thomas was also under attack. The condemnations of 1277 clearly included this proposition of Thomas and another on the unity of the substantial form in man. It was at this time that Albert returned to Paris to speak in defense of Thomas, who had died in 1274.⁹⁰

When Aquinas' second professorship ended in 1272, he returned to

Naples to erect a Dominican Studium. There Thomas became ill late in 1273 and died the following year enroute to the Second Council of Lyons.⁹¹

Like Albert, his teacher, Thomas wrote two expositions based on the Hexaemeron that touch in part on the nature of light. The first is Distinctions 12 - 15 of his Commentary on the Sentences of Peter Lombard and the second is Questions 66 to 74 of the Prima Pars of his Summa Theologiae. The section on creation found in the Summa represents a "... complete reworking of the materials he had presented earlier, but without any marked change in doctrines."⁹² Thomas' attitude toward interpreting scripture and scriptural commentaries on creation is found in Distinction 12 Q. 1 of the Second Book of his Commentary on the Sentences. He stated that on some things in scripture, such as the doctrine on the Trinity, one can not have diverse opinions because they are essential to faith but there are others, which are only incidentally essential to faith and in respect to these Christian authors had different opinions. In regard to the origin of the world, what is essential is that it began with a creation by God. On the other matters as the succession, and order in creation there can be different opinions. Thomas gave two of these but indicated his leanings toward the opinion of Augustine.⁹³ In the discussion on the creation of light, we will notice that Aquinas completely rejected the key notions of the exponents of light metaphysics. This light metaphysics based on Neo-Platonic doctrines culled from Augustine, Plotinus, Proclus, Ps. Denis, Basil, Avicenna and William of Auvergne was particularly espoused by Robert Grosseteste, who influenced several of his followers. The chief tenets of this theory are that light was the first corporeal form and exercised a role of efficient causality in the creation of the world. This light then was said to be a first form created in primary matter and thus a substantial

form.⁹⁴ This notion was rejected by Aquinas, who held that light was a quality of the substantial form of the sun or another illuminating body. Fr. Wallace suggested that it was perhaps in reaction to Grosseteste and other Oxfordians such as Bacon and Pecham that both Thomas and Albert held to a more orthodox Aristotelian approach to the subject.⁹⁵ However in having said this, Father Wallace did not deny that Thomas was familiar with the main Neo-Platonic sources of his day and indeed gave recognition to that fact.⁹⁶ Some of these sources will be witnessed in Thomas' treatment of D. 13.

Articles II and III of Aquinas' Distinction 13 correspond most to the subject matter discussed by Duns Scotus in his Commentary. Article II asked whether lux is properly to be found in the category of spirituality. Aquinas here presented 5 propositions in favor of lux being a spiritual substance and two in opposition to it. We will reproduce the substance of four of these arguments, two pro and two con, because they illustrate the exegetical approach to argumentation mentioned earlier. For example, in the first argument in favor of lux being spiritual Thomas made reference to St. John's Gospel 1:9 and wrote that the true light which enlightens the world is God, the highest spirituality, and so lux must be a spiritual substance. Again in the second argument for the proposition he cited Augustine IV Super Genesim cap. 28 to the effect that, when scripture says that Christ is the light of the world, this is not said figuratively, as in the case when scripture says that Christ is a millstone. So for Christ to be called lux, lux must be spiritual. In the first of the two arguments against the proposition Thomas recalled that Ambrose used a physical term metaphorically when speaking of God. Thus splendor, which is really the multiplication of lumen, is used metaphorically when applied to God. So it is seen that lux in spirituality

is used metaphorically. The second argument made a reference to IV De Divinis Nominibus, where it is claimed, that God is said to be lumen when his action is likened to that of the solar rays. However Thomas pointed out that all names applied to God are similitudes and so lux is here used metaphorically. ⁹⁷

In the "Solutio" Thomas Aquinas wrote, that lux is a sensible quality per se, and that it is a species which is determine in sensibility and which is not able to be called spiritual unless equivocally and metaphorically. Aquinas said that something corporeal can be transferred into spirituality by similitude, which is a similitude of proportionality. This similitude of necessity is reducible to a kind of univocation such as analogy. So in the proposition, what is called lux among spiritual beings is that, which produces manifestation to the intellect, just as corporeal and sensible light produces illumination among sensibles. So, when John and Augustine speak of lux being spiritual, it is not by the proper *raison d'être* of lux but according to the *raison d'être* of manifestation. ⁹⁸

Turning now to the Third Article we find the subject under consideration is whether or not lux is an accident. Aquinas offered ten objections to lux being an accident and two in favor of the proposition. Here he argued the issue according to the philosophical and physical principles described earlier. ⁹⁹

In the "Solutio" to the issue Thomas stated clearly that in regard to light we are really dealing with four different things: lux; lumen; radius; and splendor. He then defined each: (1) Lux, he said, is that, which is in any luminous body in act by which another is being illuminated, as in the case of the sun. (2) Lumen is that, which is received in the illuminated transparent body. (3) Radius is said to be the illumination according to a direct line to a luminous body and wherever the ray is, there also is lumen but that it is not vice versa.

He then gave the example of lumen existing in a house through the reflection of a solar ray. (4) Splendor is the reflection of a ray by any clean and polished body like water or silver and also from the projection of a ray by reflection. ¹⁰⁰

Thomas reported that concerning lux and lumen there was a mixture of opinions. 1.) Some he said say, that lux is a body, that it is the substance of the sun from which flows a certain body which is called lumen or radius. This position Thomas said is not possible and offered three demonstrations against it.

(a) Supposing this position were true, then it followed that illumination was the local motion of a body flowing from the sun but local motion can not be sudden. Hence it follows that illumination must be successive in time, therefore it should be sensible. But this particular succession is not able to be sensed even over the vastness of the distance from the sun to us nor between East and West. Hence illumination does not occur in time.

(b) Moreover two bodies can not exist in the same place at the same time, namely air and lumen. Thomas stated, that others claimed, that lumen was received in the pores of the air, which claim he labeled ridiculous.

(c) Bodily emanation from the sun would diminish the size of the sun and this cannot be. Thomas called attempts to offset this argument by the idea of a continuous creation as pure fable. He cited Avicenna Part III c. 2 from the De Anima or VI De Naturale in support of his conclusion. ¹⁰¹

(2) Others said, according to Thomas, that lumen, which is received in a transparent body, is an accident because after it has completed arriving and leaving the thing remains the same. But in a lucid body lux

is a substance either of the light filled body itself, according to some or according to others, the very substantial form of such a body. ¹⁰²

Aquinas stated, that this is not able to be supported. So he wrote that illumination is an univocal act because a luminary illuminates. If lumen is an accident in air, it is also one in its source. He said that the Commentator (Averroes) has shown us that heat is not the substantial form of fire, because in bodies to be heated is an accident. Thomas said that no substance is per se sensible because essence (quod quid) is the true object of the powers of the intellect (not the concrete thing itself). Hence it is necessary that lux, which is seen per se, not be a substantial form. In order to escape this conclusion some attempt, he said, to give lux a different connotation and so call it fulgor. But this will no more do unless it be with equivocation. Here to support this argument he cited Aristotle from the Fourth Book of the Metaphysics. ¹⁰³

(3) Another position held by some is that lux is no more than color, but the visibility of color itself is called lux or lumen. This position said Aquinas was disproved many times by Avicenna, as in the De Anima Part III, c. I and III. ¹⁰⁴

Other Philosophers asserted that lux does not have to be a firm recognizable being in nature but it is merely an intention. They said, according to Thomas, that:

...just as the species of color, carried through the air to the pupil, does not have to be natural in air but spiritual, (whence in the same part of the air is carried both the species of whiteness and blackness), so also the intention of the luminous body left in the air is lumen... ¹⁰⁵

Thomas said, that this opinion was very probable, although he did not completely agree with all aspects of it. He gave two points in support of this last position and one in qualification of it. In support he said:

a) if lumen is said to give spirituality to color, a fortiori it is

itself spiritual; b) because no natural quality superimposed over the organ of sight can be perceived but as soon as lumen touches the pupil of the eye, it is seen, it therefore must have a spiritual existence. ¹⁰⁶

In qualifying the statement he said, that is not always true that lumen is only an intention, because what is an intention does not cause transmutation except in the operation of the soul. In illumination we see that there is also occurring sensible natural mutations, as heat from solar rays. Hence lux does not have totally an intentional existence. ¹⁰⁷

Thomas then gave a last opinion with which he was inclined to agree: "...lux is an accidental form having a real existence in nature, and just as heat is an active quality of fire, so lux is an active quality of the sun. In other things, light exists according to their degree of communication with the sun, which is the source of all lumen." ¹⁰⁸ He elaborated on this offering four points:

(1) Relying on what Avicenna said in the Liber De Caelo et Mundo c. XIV, he stated, that there can be no action by the celestial bodies on those of this world except through lux in the very same way that fire acts through heat. So lux and lumen have the same relationship as fire and heat.

(2) Since the heavens are the primary cause of change, it follows that all changes (alterations) in this lower world, whether in natural beings or in perception occur by the action of lumen; and thus lux gives their origin to all bodies as Dionysius says.

(3) Also lux thus gives to colors a spiritual existence as far as they subsist in a medium and in the perceiving organ; hence lumen itself has a spiritual existence.

(4) Hence lumen becomes a medium for all the senses as St. Augustine wrote in Liber 7 Super Genesim Ad Litteram, although with primacy and

immediacy in regard to the sense of sight. For visible qualities are prior to all others, because they are present in bodies of the lower world with a formal existence that links them directly to the heavenly bodies, as seen in II De Anima and II De Generatione, whereas in the other senses lumen is present only through other qualities (non visible ones). ¹⁰⁹

In the Summa Theologiae Aquinas again dealt with the subject of light. This is found in Pars Prima Q. 67 of the Summa. ¹¹⁰ The Question as a whole examined the work of differentiation in creation, which was the special subject of Article I of his treatment of D. 13 in the Sentence Commentary. Question 67 of the Summa is subdivided into 4 Articles. Article I, which asks if light may properly exist in spiritual beings, corresponds to Article II of D. 13. ¹¹¹ Article II from the Summa Question asks if light is a body, which is the same in reverse, as asking if it is an accident, as Thomas did in Article III of D. 13 and indeed some of the same arguments are presented. ¹¹² Article III of Q. 67 of the Summa asks if light is a quality, which proposition was also dealt with in Article III of D. 13. ¹¹³ Thomas here repeated himself writing that:

... light is an active quality deriving from the substantial form of the sun, or any body that is self illuminating. An indication that some may exist is that rays from different stars produce different effects in bodies of various types. ¹¹⁴

Here again he argued against light having only an intentional existence in air. ¹¹⁵ Article IV of Q. 67 is the same as Article IV in D. 13 namely, is the production of light properly recorded in the Genesis narrative of the first day. ¹¹⁶ The discussion here is totally within the hexaemeral format. Aquinas gave a summary of opinions ranging through Augustine, Chrysostom, Basil, and Dionysius.

Thomas' approach to the study of light is totally on an ontological

basis, as was that presented at the beginning of J. Duns Scotus' presentation. Aquinas pursued a line of investigation to determine first if lux is spiritual or bodily and secondly whether a substance or an accident. Thomas stated, that, when lux is spoken of as a spiritual substance, it is spoken of metaphorically. This same point was made in Duns Scotus' text, when he cited Avicenna to that effect.¹¹⁷ Like Duns Scotus, Thomas agreed that lux is a sensible quality and that lux and lumen are sensible per se. Moreover, he agreed that lux was not an accident or substance but rather a quality of the substantial form of the sun, a celestial body, and that it belonged to the third species of quality.¹¹⁸ Going further, Thomas like Duns Scotus found lumen to have an intentional existence at least at times.

Aquinas' whole query into the phenomenon of light is circumscribed within the hexaemeral framework and so he is primarily interested in distinguishing the nature of the light of the first three days from the solar light created on the fourth day. In his discussion Thomas distinguished between the four terms, lux, lumen, fulgor, and splendor. Aquinas also stated that light, lux or lumen, is necessary for vision and that color is only seen through lumen. The medium he stated must be transparent and when lumen is present it is totally illuminated.

In Thomas' expositions on light there is no description of what is lux and lumen in terms of the three types of rays, which was seen in Duns Scotus. In fact there is no optical material in relation to the laws of reflection and refraction and only passing reference is made to the activity of species. This same reference also presupposed an adherence to an intromission theory but there is no elaboration on either of these points. Throughout the discussion Thomas is basically a theologian following the traditional text of the Sentences.

Albertus Magnus

One cannot discuss Thomas Aquinas without turning to examine the works of his teacher, Albertus Magnus. Albert was born in Lauingen, Bavaria about 1200 and died in Cologne, Prussia on Nov. 15, 1280.¹¹⁹ Albert was born in one of his family's castles on a manor in Bollstadt, which was close to Lauingen. Hence the occasional appellation, Albert of Bollstadt. Albert's family was wealthy and of the nobility.¹²⁰

Albert received his Liberal Arts education at Padua. It was at Padua, under the influence of Jordan of Saxony, that Albert entered the Dominican Order despite family opposition.¹²¹ Albert probably studied his theology in Germany and was also ordained there and until about 1241 he taught in the various priories of Germany before going to Paris. In 1245 he also attended the Council of Lyons. In the summer of 1248 Albert went to Cologne to establish a Studium Generale. It is here that he taught Aquinas.¹²²

From 1252 - 1256 Albert was Provincial of the German Provinces and Bishop of Regensburg from 1260 to 1262.¹²³ The later years of his life were spent in the area around Cologne teaching and preaching. Albert made two notable trips outside of Germany during this time. In 1274 he attended the Second Council of Lyons. Albert also went to Paris in 1277 in an attempt to block the Condemnations of 1277, some of which applied to the teaching of Aquinas.¹²⁴

Albertus Magnus is famous for his integration of Aristotle into theological and philosophical discussions. Moreover he had a wide range of familiarity with Greek and Arabic science and philosophy, which he did not hesitate to use in discussing theologically oriented questions.¹²⁵ Albert's attitude toward faith and science was clearly set forth in Distinction 13 of Book II of his Sentence Commentary. In the rebuttal to the objections found in Article II of that Distinction we read:

Whence it must be known that in those things, which belong to faith and morals, one must prefer Augustine to the Philosophers when they disagree. But in speaking of medicine, I would more readily believe Galen or Hippocrates. If it is things of nature we speak of, then, I defer to Aristotle more than to anyone, even to one, who is an expert in natural science. 126

He followed this approach in his Sentence Commentary, Summa Theologiae and his Commentaries on the works of Aristotle. 127

Albert's study on the phenomenon of light can be located in three places: Distinction 13 of Book II of the Sentence Commentary: the Commentary on the De Anima; and Tract IV of Book II of the De Meteoris.¹²⁸ His commentary on Distinction 13 of the Second Book of the Sentences, as seen previously, follows the outline developed by Peter Lombard. It is in the second article that Albert discussed the nature of light. At the outset he picked a statement from Aristotle's Meteorologica on the theory of clouds to reject Peter Lombard's hexaemeral view that the light of the first three days was that of a luminous cloud.¹²⁹ Here we see the application of the dictum that Aristotle ought to be preferred in natural questions. Albert then proceeded to question further whether lux was a body or a form of a body. In this Article Albert presented 8 arguments that light (lux and lumen) is not a body but rather the form of a body.¹³⁰ Four of these arguments are from Aristotle, three from Avicenna and one from Averroes. Albert also presented nine objections arguing that light is a body.¹³¹ Five of these objections are from Augustine, four from philosophy and experience.

Throughout the objections it is a question of examining lux and lumen in terms of form, substance, accident and quality. Here we find the philosophical and physical principles, described previously, utilized by Albert. Also appearing here are the three citations from Augustine.¹³² Aristotle is also cited from the De Anima and De Visu et Natura Oculi.¹³³

In the "Solutio" Albert said that some of these issues appear fool-proof to their holders but he recalls that he had disputed all the opinions

in his tract on the De Anima and also whether vision takes place by emission outward from the eye or by an inward reception.¹³⁴ This is undoubtedly a reference to a discussion on Alhazen's intromission theory, to which Albert was clearly opposed. Albert said that in the De Anima he had reviewed the opinions of Aristotle, Avicenna, Alkindi, the writers of perspective, and Gregory of Nyssa and so would not belabor their opinions again. Albert here asserts that in his earlier work, the De Anima, he had posited the principles by which Avicenna's and Aristotle's positions can be defended and had shown that the authors of perspective hold some erroneous suppositions, which if these authors were willing to change and adopt other principles, all their books on perspective would be accurate without having to contradict Aristotle, who says lux is an accidental form.¹³⁵

In response to objections 1 - 5, which are all based on citations from Augustine explaining that, Augustine called wetness a body, but in fact it is not a body but only a quality of a body (water) and thus it is seen that the statement from Augustine does not support the argument. Lux is a form located in a body, just as carnal beings want to imagine something noble and the best thing they can think of is a luminous body. Therefore, when it comes to matters of faith and morals, one ought to follow Augustine and not the authors of natural science, if they disagree. But in matters of medicine it would be better to follow Galen and Hippocrates. But, if it is a matter of nature, then one ought to defer to Aristotle more than to anyone else, even more than the experts of natural science.¹³⁶

In response to objection 6, as to whether lumen is in air per se or per accidens Albert said that so much of the argument is a sophism. He continued saying that an accident exists in 2 ways: (1) as an accident in an individual existing by contingency (chance) and nothing about it is demonstratable, as the Posterior Analytics says, and it can't be used

to prove anything else and such is the case of lux in air. (2) as an accident of a species, and this exists by necessity and nothing can be demonstrated about it and this kind of species can adhere to something per se or through another and, if it is the latter case, then it can still be reduced to an existence by necessity. ¹³⁷

In his response to the seventh objection, which said that lux was a body, Albert wrote that lux is a form of air, which is always produced when the illuminating source is present, it multiplies itself in the medium, modifying it as long as there is no direct opposition to the luminous source. This can be seen in a ray passing through a window. For from the base of the wall inside of the house it is not possible to trace a straight line back to the sun. And yet, the air is illuminated by the ray entering through the window. This is on account of the nearby air being changed. It would appear that Albert believed the cause of refraction was due to a difference between the air outside the window and that in the room, instead of the passage from one medium (air) to another (glass). Hence Albert's understanding of refraction is less precise than it should be. Albert continued his discussion by speaking now of reflection. He said that the light from the ray is multiplied through reflection on a polished and plane surface. But then it generates itself in the opposite direction from the source of illumination. Whence it can be at one and the same time generated in the East and West and in all parts of the transparency and from a straight line it may be traced back to the sun, that is, to the luminary which is its direct source. That is why the Commentator in the Fourth Book of the Physics says, that illumination is the end of local motion just as generation is the end of alteration and either one is induced instantaneously because the end of motion is indivisible. The motion involved here is that of the sun

crossing the horizon. For variation in altitude (latitude) implies variation in the times of ascension from the horizon and yet this form (light in air) at each moment finds the transparent medium always in its ultimate state of readiness to receive light requiring only for its generation the presence of the luminary. Hence each generation of light is an instantaneous individual act. All these principles said Albert have been proved elsewhere and all Arabic philosophy is based on them. ¹³⁸

In regard to the eighth objection which stated that nothing reflects light unless it is opaque and spoke about lux crossing a vacuum, Albert upheld Aristotle's belief that light will not diffuse itself in a vacuum. He likewise asserted, that nothing can be seen in a vacuum; and that those who hold otherwise were proceeding from a false supposition. ¹³⁹

In response to the last objection, which stated that two accidents of the same species can not be in the same subject, but, since two lights of the same species are in the air at the same time without being confused, lux could be an accident. Albert said that this was not a sound objection. He explained this saying that any cause in generating any quality, when it is being multiplied, increases its intensity and, when it is being diminished, it lessens it. Hence when one lumen is in air from two candles, lumen is more intense, than, if there were only one candle. ¹⁴⁰

In continuing his exposition on this Distinction Albert gave two further opinions. He objected to an "Author of Perspective," whom he said, "has a small reputation among us". Albert asserted that whatever there is in that author's work concerning nature cannot be accepted, when in contradiction with authors of natural philosophy. The question of whether lux is a body or not is not within the competence of the

author of perspective as Anaritius (Al - Nairizi) said in his Commentary of Euclid's Geometry. Hence the 'Author of Perspective' acted unwisely in interposing this discussion. Moreover, said Albert, we do not lack books on perspective by other philosophers, such as Aristotle and others, who posit totally different principles of natural science than the "Author of Perspective".¹⁴¹

Albert also claimed that some authors object that, if the rays were to be mixed, all that would be seen would be confused, and the rays would indeed be confused, if lux were a quality; hence all ought to be seen intermingled. However none of this stands, said Albert, because even granting that we see by intromission this is not to concede that colors are intermingled according as they are in air, because those beings whose status consists of perpetual becoming are not affected by the motion of the subject, but rather react in straight opposition. This is principally what occurs with lux and colors as the Commentator of the De Anima said: because this presence in the medium is of a more spiritual essence than are other sensibles; and this is not the same because the colors actually exist from the production of lux, which by nature precedes hot or cold; moist or dry in the transparency. For it is present there according to its suitability with the perpetually superior body. Other sensibles do not have this same source.¹⁴²

Finally, the shining cloud spoken of at the beginning of the Distinction is a similitude. This is so, because a thin cloud, when raised on high, receives luster from contact with the light of the sun; likewise, the first created lux did not have such full brightness as the sun, as said in Littera, therefore it was likened to a bright cloud and for this resemblance it was called nubecula (little cloud). That is why it is later stated that the sun was made "of it" or "after it".¹⁴³

In his discussion of Distinction 13, we find that Albert's central interest is in the ontological aspects of light; is it spiritual or corporeal; a substance; an accident; or a quality. He concluded that lux was an accidental form and lumen a quality of an accidental form. His method of presentation is that of the logician. Albert refers to a wide range of authors indicating his awareness of the sources available on the subject. In so doing he becomes an apologist for Aristotelian philosophy, defending Aristotle's principles against the attacks of the Naturalists. Albert rejected the authors of Perspectives, particularly Alhazen and the intromission theory of sight, because the principles used were contradictory to those of Aristotle.

Albert's object in the discussion was to distinguish between the light of the first three days and that of the sun. His interest is primarily that of the theologian and the scripture commentator. His treatment of perspective is really a digression. Albert's description of refraction is weak and perhaps erroneous and his definition of reflection remains general. Moreover, since he rejected the works of Alhazen, we do not find here a description of the three types of light rays, nor a reference to the equality of the angles of incidence and reflection. Neither is there mention of the fact that the distance of the reflected image in a mirror is equal to the distance of the object from the mirror. Albert did speak however of the need for a transparent medium and attested to the fact that without lux and lumen color would not be seen.

However there were other occasions where Albert discussed light and color more as a scientist as seen in a tract called De Coronis et Iride quae Apparent in Nubibus found in Part IV of Book III of the De Meteoris.

It is here that Albert gave his famous theory on the rainbow.

A.C. Crombie and Carl Boyer have studied Albert's work on the rainbow and agree that he was heavily influenced by Robert Grosseteste's De Iride.¹⁴⁴ In his discussion of the topic Albert was very encyclopedic giving views from antiquity to his own day. Boyer asserted that Albert's approach to scientific problems was less mathematical than Grosseteste's. Albert was more metaphorical and made many literary allusions.¹⁴⁵

Albert identified two interpretations of the rainbow described in antiquity. The first is that of Seneca who said that, "...the rainbow was a compound image of the sun formed from a multitude of reflections from individual raindrops; ..." ¹⁴⁶ The other is that of Poseidonius who said that the reflection was produced by the whole cloud acting as a single concave mirror. ¹⁴⁷ Albert believed that the solution was with Seneca's position on the individual raindrops. According to Albert:

The efficient cause of the rainbow, ..., was the returning rays of the sun repercussed and reflected in many refractions by raindrops (the material cause) falling from a cloud, so that the rays formed an image and vapour standing opposite the cloud; and this reflection of rays is in part similar to the reflection of rays coming through a window into a vessel of water and refracted to the opposite wall. ¹⁴⁸

An even better result could be obtained, he said, by sprinkling droplets into rays of light coming through a window in which case each droplet reflected rays to the others and then to the opposite wall on which an image with the colors of the rainbow would be formed. Albert also asserted that these are real colors and not imaged productions. ¹⁴⁹

To explain the shape of the arc Albert borrowed Grosseteste's theory that the sun's rays passed through a series of layers. ¹⁵⁰ Albert said that there was a moist vapor or rain in the shape of a pyramid with its base on the earth and its vertex in the cloud and that the luminous

parts of the vapor were near the base. However before the drops of rain are formed there is beneath the concave cloud a subtle distillate in the upper part of the cone beneath the cloud. Thus there are four transparent media altogether: (1) that in the cloud (2) the subtle distillate (3) the more coagulated moisture in the pyramid (4) the air mixed in it all. This air is thick with coldness and also damp from the moisture descending from above. ¹⁵¹

The bow is produced according to Albert by the sun shining on the lower part of the cloud and the rays are reflected by the four media which send them. The rays are refracted at the extremities of the watery pyramid, as if a globe were cut in half. The rays are multiplied at this extremity and generate the bow. The semicircular shape of the bow is a result of the fact that a cone of the sun's rays strikes the round pyramidal vapor and only half a circle is produced because the other rays are extinguished by the heavy material in the lower part of the pyramid. ¹⁵² As Carl Boyer stated, Albert was specific about the refraction in the different raindrops of the cone. The dense ones near the base produce the green of the rainbow; those at the top the red; and yellow is produced in the middle. ¹⁵³ To demonstrate these ideas on the bow Albert experimented with a flask filled with black ink or oil. ¹⁵⁴

There is however some ambiguity in Albert's presentation stemming from his use of the words reflexio and refractio. In some instances they appear to be synonymous with reflection at a surface and at other times with the refraction of rays in the medium. Boyer stated that:

...the confusion leaves doubt in the mind of the reader that he fully appreciated the significance of the step which Grosseteste had taken from the reflection theories to one hinging on refraction. Had Albert adequately

understood the problem, it is unlikely that he would have insisted upon the agreement of his views with those of Aristotle. 155

In chapter 8 tract III of his Commentary on II De Anima Albert discussed the diaphanum. He said that the proper place for lumen to manifest itself is a transparency or as it is called in Greek, the diaphanum. 156 The transparency he said is visible only when it is in the act of being filled with light. Lumen is not seen through itself but through the transparent subject which is not visible and is colorless prior to the arrival of lumen. The transparency receives lumen and color from without. Color, Albert said, was the diffusion of lumen or a terminating body. 157 Lumen is the act of light passing from the light source, when it is the act of being luminous, as color is the act of being colored. 158 Fire or a celestial body perfect the diaphanum in the act of shining. Lumen is an act and it perfects the diaphanum, which is a subject with the potential for light and darkness. 159

Toward the end of the chapter Albert stated that luminare, lux, lumen and splendor are all different. He supplied definitions of the first three. A luminary is a body, he said, whose form has lux, as in the case of the sun, moon, and stars. Lux is said to be the form of lumen in a luminary or in that which is the first source of lumen or just as in that which is the form of a first lumen. Lumen is also that which is received in another illuminated body. 160

So it is seen from the treatise on the rainbow that Albert was aware of Grossetest's De Iride. Moreover Albert knew how light rays behaved in refraction and reflection but that because of some uncertainty in his terminology, there remains some doubt as to his full understanding of the refraction of light rays. From his Commentary on the De Anima

it is also seen that he was aware of the transparent nature of the medium, as well as the difference between the use of the terms lux and lumen. That difference being that lux is light in its source and lumen is light in the medium.

Bonaventure

Bonaventure was born in 1221 at the episcopal city of Bagnorea, in the district of Viterbo. He was the son of Giovanni di Fidanza and Maria Retelli.¹⁶¹ Although baptized John, he became known as Bona Fortuna or Bona Ventura because of his remarkable recovery from a critical illness in infancy after his parents prayed to St. Francis of Assisi for a cure.¹⁶² Some historians believe Bonaventure took the Franciscan habit in 1243 or 1244. Others say he made his novitiate in 1238.¹⁶³

It is known that he studied at Paris under Alexander of Hales.¹⁶⁴ According to Salimbene's Chronicle, Bonaventure became a bachelor in 1248.¹⁶⁵ He read the Sentences and explicated the texts of Sacred Scripture at Paris. Besides these academic exercises he also had an active apostolic ministry, preaching frequently before the people, University Doctors, and dignitaries of both the French realm and the Church.¹⁶⁶

Bonaventure like Aquinas was called upon to defend his Order against the attacks of the Secular Masters, who were opposed to the Mendicants receiving the theology chairs at the University of Paris. In 1252, as a result of the publication of the Joachimite tract, the Evangelium Aeternum, William de St. Amour, a Secular Master, directly attacked the Mendicants and their concept of poverty in a pamphlet entitled, De Periculis Novissimorum Temporum. Bonaventure responded

to this attack in a tract called De Paupertate Christi, which is preserved among Bonaventure's Quaestiones Disputatae. The Mendicants won the battle, when Pope Alexander IV condemned the tract of St. Amour in a Bull dated Oct. 5, 1256. However this condemnation did not stem the tide of criticism and attack, and Bonaventure wrote the Apologia Pauperum in defense of the Order. The battle was joined again, when Bonaventure and Thomas sought the theology chairs at Paris. Only by Papal intervention in 1257 were both men permitted to assume their teaching positions. ¹⁶⁷

On February 2, 1257 John of Parma resigned as Minister General of the Franciscan Order and Bonaventure, although only 36 years old, was elected to succeed him. ¹⁶⁸ Bonaventure, as Minister General, was extremely active. He had to deal with the Joachimite Controversy, which was damaging the reputation of the Franciscans and causing dissensions within the Order. ¹⁶⁹ Bonaventure conducted six General Chapters in which he revised the constitutions of the Order; fought against abuses of the rule; brought about reforms in the liturgy and the observance of poverty; and reorganized the governance of the Order. ¹⁷⁰ He conducted frequent visitations of the convents in Italy, France and Germany. Bonaventure is often regarded as the second founder of the Franciscans. ¹⁷¹

During this time Bonaventure also continued to study and write. He received the title of Doctor of Theology at Paris on October 23, 1257. ¹⁷² In 1259 he wrote one of his more famous tracts, the Itinerarium Mentis in Deum. ¹⁷³ Bonaventure was also commissioned in 1260 by the General Chapter of Narbonne to write the Life of St. Francis. ¹⁷⁴ During the Easter season of 1273 Bonaventure preached his Collationes De Hexaemeron

before the Doctors of the University of Paris. ¹⁷⁵

Bonaventure came to be one of the leading figures of his day due to his personal life, preaching, and administration of the Order. In 1265 Pope Clement IV offered him the Archbishopric of York. However, Bonaventure declined the honor out of humility. ¹⁷⁶ He was also instrumental in the election of Pope Gregory X and Bonaventure and the Order assisted the Pope in negotiations with the Greek Church for reunion with the Church of Rome. Pope Gregory X made Bonaventure a Cardinal and Bishop of Albano on June 3, 1273, so as to be able to utilize his talents in organizing and conducting the Council of Lyons. ¹⁷⁷ Bonaventure resigned the Generalship on May 2, 1274 at Lyons during a Chapter of the Order, so that he might be able to devote his attention to the work of the Council. Jerome d'Ascoli succeeded him. Bonaventure became sick during the course of the General Council of Lyons and died there on July 15, 1274. ¹⁷⁸

A full collection of the works of Bonaventure can be found in the edition of his Opera Omnia done by Quaracchi editors. ¹⁷⁹ Bonaventure was a prolific author. Suffice it to mention here some of his more famous works such as his: Commentarii in Quatuor Libros Sententiarum Petri Lombardi; his Quaestiones Disputatae; Breviloquium; Itinerarium Mentis in Deum; Collationes in Hexaemeron; De Reductione Artium ad Theologiam; and the Commentarius in Evangelium S. Lucae. ¹⁸⁰

The influence of Alexander of Hales on the thought of Bonaventure has already been mentioned. David Knowles told of another influence when he wrote:

While all the Paris masters had regarded Augustine as the supreme master in theology and while all had adopted parts of the Aristotelian and Arabic philosophers as the need arose, Bonaventure is the first to declare that he is professedly following Augustine's thought as well as theology. ¹⁸¹

Bonaventure borrowed three aspects of Augustinian and Neo-Augustinian epistemology: (1) the metaphysic of light (2) the doctrine of divine illumination (3) the doctrine of seminal tendencies in matter. ¹⁸²

Other sources found in the works of Bonaventure would of course include Aristotle, as well as: Dionysius, Ambrose, John Chrysostom, Jerome, Gregory, Bede, Hugh of St. Victor, and Bernard. ¹⁸³ Many of these sources appear in D. 13 of Book II of his Sentence Commentary, which is to be examined here for his thought on the subject of light.

As mentioned earlier Bonaventure's Distinction 13 is divided into three Articles each composed of two questions. In Article I, the first question seeks to determine whether the lux of the first day was corporeal or spiritual. Six arguments are presented saying, that lux was not of a bodily nature and four to the contrary, namely that it is a body. ¹⁸⁴ Bonaventure's approach in all these propositions is to create arguments for the position pro and con, by going to the text of scripture and to scripture commentaries and to logically create arguments for his purpose.

In his "Conclusio" he stated that it is more probable that the light created on the first day was corporeal. Bonaventure acknowledge that this position was in contradiction to Augustine and other scripture scholars, who view this light as being spiritual. These latter scholars held that the reckoning of a day as a measure of time in the Genesis account was by a spiritual light and not a material light. In this approach the work of distinction in the first three days is sensible and material and the work of these days was to create sensible light. The creation of the sun on the fourth day then was to give a greater perfection and clarity to light. ¹⁸⁵

Bonaventure gave at end of the "Conclusio" a refutation of the

six objections raised against light being corporeal.¹⁸⁶ There is little here beyond a playing with the words of the Genesis story, typical of the hexaemeral style, and the use of Scholastic logical argumentation to prove a position. In his presentation Bonaventure cited Bede, Augustine, and Dionysius by name.

Question II of Article I asked, how did lux make day and night. At the beginning of the Question Bonaventure points to a difference of opinion between the Greek and Latin Commentators on Genesis. Bonaventure cited John Damascene, Gregory, and Basil, representing the Greek tradition, that the light of the first three days was lux and that day and night were formed by an emission and contraction of rays of lux. However the emission and contraction were not caused by the motion of the sun. He then gave the position of the Latin Commentators on Genesis citing Bede for his purpose to the¹⁸⁷ effect that the motion of the sun was the cause of day and night.

The remainder of the question is the explanation of the creation of day and night according to the Greek and Latin interpretations. Bonaventure presented four propositions against the position of the Greek Fathers and four against the position of the Latins. The entire line of inquiry for Question II is very hexaemeral, explaining the biblical readings, which state that God divided light from darkness and created evening and morning of the first day. Bonaventure concluded that, if one followed the Greek approach, we would be speaking of a formal distinction in the sense of the presence of form or its absence. Hence the having of light and the absence of light occurred on the first day by divine will, as was the case of the darkness at the time of the Lord's passion and the darkness that covered the land of Egypt. The

progression of light and regression of light in morning and evening then is explained in terms of the possession and privation of light. ¹⁸⁸

The solution to the approach of the Latins, which Bonaventure considers more reasonable, because it was more suitable to the law of nature, is that night and day were formed by the motion of lux and that the sun was later formed from lux. God, according to Bede, illumined the world by a succession in time and through motion. Both time and light they claimed were created at the same time. The distribution of day and night between the two hemispheres is explained by the irregular density of the air, which in the first days was not fully formed. ¹⁸⁹

In the solution to the fourth proposition offered against the position of the Latins, Bonaventure stated that lux made things visible by the multiplication of rays in transparent matter. He asserted that lux illumined instantly; that succession in time resulted from the mutability of matter and that in nature it was the luminous clouds that moved and not lux; that primal matter was transparent; and that rays of light do multiply themselves in extension. ¹⁹⁰

Article II is concerned with the essence of lux and its nature. In this article there are two questions asked: (1) Whether lux is a body or form of a body? (2) Whether it is a substantial form or an accidental form? ¹⁹¹

Question I begins by arguing that lux is a body. In support of this Bonaventure offers six reasons. The first three are familiar statements from Augustine, seen variously in the other Commentaries that lux is a body. The remaining three are based on rational and physical principles. All these arguments are familiar and were among

the common stock arguments also witnessed in the Commentaries of Albert and Thomas. There are four fundamental reasons raised in opposition to the proposition. Again the sources cited are familiar ones: John Damascene, that lux is a quality; Aristotle, that form is the source of activity, and that, since lux has the highest activity, it must be a form; Augustine, from 12 Super Genesim Ad Litteram, that lux is most subtle in a body and has the greatest participation in form and so lux is pure form. The fourth argument is that nothing opposite can be found in a body by way of privation; but in the case of lux qua lux darkness belongs to it as its privation, so therefore lux cannot be a body. 192

Bonaventure concluded, that lux properly and in the abstract is not a body, but is the form of a shining body. He argued that, since only God is a pure form, and that all extension is rooted in corporeal matter, lux can not be pure form. On the other hand lux designates a form but cannot be a body itself. For if it were a body, since it is self multiplying, there would thus be a body that can multiply itself of itself without the intervention of matter from somewhere else. This however is impossible for any creature, since matter cannot arise except by creation. Therefore lux must be explained in other ways. There are, he said, two ways of speaking of it: a) in one case we speak of lux in the abstract as of wetness and heat and so we speak of a property or quality of a bodily substance. By abstraction then, lux is a form of a luminous body by which that body can light and act. Thus spoke Damascene, when he said that lux is a quality of fire; b) in the other case we speak of a luminary as a body that shines and it is in that context that there are said to be three species of fire, the burning ember, the flame and lux (Aristotle, Topica V, c. 3). It is in this

way that Augustine was speaking. 193

Bonaventure's position then is that lux is not a body but a quality that is sensed from a luminous body.

The Second Question is whether lux is a substantial or accidental form. There are six basic positions presented by Bonaventure that lux is a substantial form. All are argued from the nobler attributes of lux marking it as being superior to an accident; or by the priority of the generation of lux, since substance is prior to accident (otherwise creation would have been disorderly); or because the degree of activity in lux places it above an accidental form. Opposed to these are six objections that lux is an accident. This is done by finding the qualities of accidents in the behavior of lux or by identifying such by analogies with fire and color. 194

In the "Conclusio" Bonaventure offered the two contrary opinions of the philosophers, that lux is in one respect a substantial form and in another an accidental form. In regard to the first opinion Bonaventure stated, that some say, that lux is an accident of a luminous body, as wisdom, knowledge, and spiritual lights are accidents of ones mind; or as color is an accident of a terminating body; or as heat is an accident of a warm body. All of these bodies just mentioned operate or are sensed by the operation of heat, color, and wisdom, which are all said to be accidents. Against this view, Bonaventure said, that scripture enumerates lux among other pure corporeal forms. Moreover, catholic authorities such as Dionysius in the De Divinis Nominibus and Augustine and even the philosophers attribute to lux the main cause of activity in bodies. So lux is seen to be more substantial than accidental. 195

According to the second opinion lux is the substantial form of all bodies and by their greater or lesser participation in lux they obtain a truer or more noble rank among beings. Bonaventure found it difficult to decide between the two opinions, each of which is shared by great minds, and none of which can easily be refuted. In his own judgment, Bonaventure attempted to reconcile the two opinions. Lux, he said, may be understood in two ways; (1) as the very form, which gives existence to a light source by which the light source is principally active; (2) in the other way lux is said to be the fulgor, which surrounds a luminous body, following from the existence of lux in that body. Also it is the object of sense and the instrument of operation. Therefore lux is an accidental complement in that body just as color is an accident and passive quality of lux and perceived by sense. 196

Bonaventure, after the "Conclusio" responded to the six objections. From these responses a few additional notions concerning his views on light can be detected. In response to the first objection which said, that lux is part of the composition of color, he retorted that lux is not part of color as an intrinsic principle but as an effective principle, since accidents are simple. In fact, a substantial form is well able to be the effective principle of an accident. In the second response Bonaventure said that lux is sensed not by its essence but by fulgor and color and inseparable from these, especially when lux is strong. In regard to lux increasing and decreasing, it is fulgor, which is increased and decreased and not lux itself as a substantial form. When we speak of intensification and remission in forms, we mean general forms to which terms of commonality of analogy apply rather than univocal terms. 197

Here in these rebuttals one notices the use of the word fulgor where

one might expect to see the word lumen. The editors of Bonaventure's Opera Omnia specify that Bonaventure uses fulgor as the effect of light not in the medium, but in the luminous body itself, by which its light is perceptible, as against lux, which is its essence and not perceptible by the senses. The editors add that such opinions of Bonaventure's were not shared by other schoolmen. ¹⁹⁸

Article III of D. 13 is concerned with the effect of lux and irradiation. Here Bonaventure posed two questions: (1) whether lumen, which is emitted from a luminous body is a body or a quality of a body?; (2) given that it is a quality, it is asked whether it is of a substance or an accident?

Looking at the first question, it is seen that Bonaventure proposed six arguments in favor of lumen being a body. ¹⁹⁹ These arguments are based on such physical axioms as: a) only a body moves, and rays from the sun do move; b) the only thing that can bounce off a body, as lumen does on opaque obstacles, is another body: c) only bodies can be broken and intersected as lumen and rays are in mirrors; d) what has three dimensions, such as lumen, must be a body; e) there is no matter in a vacuum and assuming that there is a vacuum between the sun and us light would still pass, then it would be without supporting matter, hence it must have matter itself; f) and only a body generates a body and lumen when concentrated can generate a body, namely fire. Bonaventure offered eight arguments against lumen being a body. Once again all the arguments are from authority, physical principles and logical inconsistencies. ²⁰⁰

In the "Conclusio" Bonaventure maintained that lumen and radius properly understood are not bodies. He noted that there were 4 opinions on the nature of lumen and radius. The first opinion claimed that lumen is a body. Lumen and radius are compared to a rivulet flowing from a

spring. Just as a spring is not consumed but continues to flow and is renourished by the rivulet, so also in the case of lumen flowing from the sun; the action of the rays draws vapors back to the sun and replenishes it. This opinion is that of Seneca. However he pointed out that this is in opposition to philosophy which holds that celestial bodies are incorrupt. 201

The second opinion compared lumen and the sun to a branch of a root and the tree which is produced. The root is not diminished by this production and this production is still part of the original root. Lumen and the sun though were made at the same time by God, and the sun is not diminished by the emission of rays and the two are always together, the rays moving when the sun moves. In opposition to this opinion Bonaventure offered the case of the darkness that occurred in the Lord's Passion, when the rays ceased and then returned. If these rays were a body then this would be a new creation. 202

The third opinion is that lumen in the medium is a body. However its production with respect to form is from the sun, and with respect to its matter from God. Thus this makes for the perfection of the universe, which contains beings which are directly from God in matter and form, such as angels; others are directly from God with respect to their form, and from nature with respect to their matter, like man. Hence a third group is in order. It is from creature with respect to its form but from God with respect to its matter. However this position is false, because God did not make matter independently from form.

Each of the three foregoing opinions have some weak points concerning the production of lumen from lumen, and Bonaventure said that they were to be rejected for their holding that lumen is a body. 203 Consequently he presented a fourth opinion, which is more akin to reason and philosophy,

that neither lumen or radius, if properly named as having their origin from lux, is a body or an outflowing from a body. Thus, if one should say that radius is air illuminated through a shaft and lumen is air illumined in depth, then one may speak of radius and lumen as bodies. But properly taken, lumen and radius in a medium are not bodies. ²⁰⁴

Bonaventure then disproved the six propositions in favor of lumen being a body. The first rebuttal states that two motions can be ascribed to a ray: motion from a source and motion, when a reflecting object moves. The first motion is generation, the second is accidental and not productive of light emission. From rebuttals 2, 3, 5 and 6 some additional notions on the subject of lumen can be gathered. For instance in rebuttal two we read that a luminous body, as long as its power lasts, sends out lumen. In addition Bonaventure noted that:

...when prior to the termination of that power it meets another body, which is not suitable for its reception, because lumen is not able to multiply itself forward, it multiplies itself in reverse; not however from the power of the resisting body but from the power of the first mover. Hence when rays are rebounded in water, if the water moves, the ray is moved not because water is the principle of motion but the first power producing the ray, which on the occasion offered by water, is able to reflect the ray, on another offered by the same water, it is able to alter the reflection and so to move the ray. ²⁰⁵

Further on in the rebuttal Bonaventure stated that lumen through a non-body can be repelled by a body as is manifest in the image reflected in a mirror. The reason for this is the lead backing on the mirror, which is an opaque body. ²⁰⁶ For glass alone, a transparent body, would let the species through and not return it to the eye.

In the third rebuttal, concerning the intersection and breaking of rays, Bonaventure explained these phenomena in epistemological terms. Here the operation is due to the subtlety of the air with which lumen has contact in the vicinity of the reflecting object. The air in this

place becomes more subtle and is moved. Furthermore rays are broken when produced from opposite directions (i.e. the source and the mirror). This augments both lumen and the subtleness of the air around the polished body, hence heat in a ray becomes more intense and fire is generated. 207

Also in the fifth rebuttal he indicated that the medium must be material, hence light would not illumine a vacuum. 208

Lastly we read in the sixth rebuttal that:

...lumen does not act by its proper power, but by the power of the bodily luminary. A bodily luminary does not emit a body materially but rather formally and, since lumen is that through which it acts, then it is not necessary that lumen be a body but it suffices that lumen is the form of a body. 209

Question II of Article III seeks to resolve the issue of whether lumen is a substantial or accidental form. These are four fundamental points posited in favor of lumen being an accidental form and four in opposition of this. The method of argumentation is to test the nature of lumen by attributing to it qualities and attributes of an accidental form; and in the four presentations to the contrary to deny these to lumen or to attribute to lumen attributions that would make it a substantial form. 210

In his "Conclusio" Bonaventure formulated his opinion as follows:

"Lumen in the medium so far as it denotes an active force denotes a substance but is present as an accident; as far as it denotes a sensible quality, it denotes an accident which does not have the full strength of a natural accident but only of a similitude or intention." 211

In explaining his position he stated that there were three opinions on this question, each of which implies that, lumen in the medium is a form or a certain quality.

The first opinion was that lumen on the medium is a substance but it exists in the medium in the manner of an accident because it is not of the very substance of air. This they hold because the generation of

lumen from lux is according to a univocal fashion. Since lux is a substantial form in its source, so also lumen in the medium is a substance with an accidental existence. Lux and lumen are not different in essence, but only in their mode of being. ²¹²

However, since lumen is what is directly perceived in the medium (a substance cannot be perceived directly) there follows a second opinion that lumen in the medium is an accident. First, since it is caused by a bodily luminary only because that luminary has fulgor, it is an accident when compared to its source. They add that it is an accident by comparison with the subject in which it is because it comes to a subject already complete and is able to be present or absent without the corruption of the subject. Thus lumen in the medium has the full status of an accident but not with respect to the same factor. For an accident ought to be compared to its substance both as to its subject and to its cause. Lumen can be compared in these two ways, but not to the same substance. In one way it is compared to air as its subject and in the other to the luminary as its cause. ²¹³

A third opinion then is that lumen as it exists in the medium has to be known per se in such a way that touching the sense it produces sensation. It must also be able to be multiplied in the same part of the medium without confusion. Consequently the third opinion stated that lumen in the medium is neither a substance nor properly an accident because it does not possess here an essence which is natural and embodied in matter but only a spiritual and abstract reality. Thus as the species of color in the medium is related to the color existing in the bodily object so lumen in the medium is related to lux in the luminous body. ²¹⁴

Each of these opinions leads from one to the other. Bonaventure

however was not satisfied with them and indeed registered his reservations on the third opinion. He said he was doubtful because the operation of lumen in the medium cannot be said to be merely spiritual nor is it seen in air in only a spiritual fashion but that it must have there some natural (physical) ground for operating. 215

Bonaventure found elements of truth in all three opinions and from them he proposed to elicit one single view which he claimed would contain the whole truth. This review is as follows:

(1): Lumen in the medium connotes an active power going out from a luminous body, by which the luminous body acts upon things of this world and this is the power of a substance. On this subject Damascene said, that lumen, which is from fire is not any instrument of fire itself, or accidental, but power connatural to it and consubstantial,..., and this power is not sense perceptible nor only operative in the sense of vision but also it makes for the production of all sensibles in act. 216

But then, Bonaventure adds:

So also say the philosophers, that the heavenly body (the sun) through its lumen penetrates to the entrails of the earth where it gives rise to mineral bodies. In this sense, they speak correctly who say that lumen connotes a substance in an accidental way, when related to air, just as the power of an agent is connoted only accidentally, when related to the carrier. 217

(2) Lumen in the medium involves a sensible quality:

Not only does lumen connote this active force of the luminary, which is not perceived by the senses, but also a certain sensible quality, by which the sense of sight is made to be sentient in act. This is an accidental quality in the third species of quality. On this Avicenna said in the Liber De Sufficiencia Naturali (De Anima), that lumen is the affect of a body having lux when it will be placed against it, namely the transparency. So what was said in the second opinion is true, that lumen is an accident not only by comparison to air in which it is received, but also in comparison to the body by which it is caused, because it arises from the luminary in as much as the latter has fulgor and has to be the object of sense. 218

Bonaventure then concluded that lumen stands in respect to air along these

two characteristics just described: (a) connoting an active power; (b) connoting a sensible quality not as its primary subject, but as to its carrier and its medium (i.e. air is the carrier and the medium in order for lumen to have all its properties). This mode of existence is not like one of nature, but one of habitus (the 7th category of Aristotle); it is not a natural form either, but rather a similitude of it; just as the species in a medium is not properly color, but like color or a similitude of it. But lumen has an extremely close relationship and resemblance to air and so leans on it for its existence so that it does not need any other principle from which to be produced. Hence, lumen does not have its material principle in the medium from which it is produced, but has only an original source principle (existing in the luminous source) from which it flows and to which it returns, when ceasing to exist in the medium; just as a similitude does. This is the meaning of what the Commentator said in II De Anima, namely that lux is the habitus of the transparency and it does not exist in this transparency by way of an intention or species or a similitude. ²¹⁹

Bonaventure ended the question with a rebuttal to the four objections raised against lumen being an accident. He also added a postscript enlarging on principles discussed in the objections. ²²⁰ The Distinction closed with the section entitled "Doubts on the Text of the Master". ²²¹

In his Collationes in Hexaemeron Bonaventure also covered the creation of light. Here the treatment is in the exegetical style of the hexaemeral literature and extremely literary and allegorical. For instance in Sermon IV ²²² Bonaventure spoke of the light that God created on the first day as elucidating the mind of man; as guiding philosophers and bringing truth to the mind. Hence we detect the Augustinian

doctrine of "Divine Illumination".²²³ Bonaventure went on to enumerate the ten sciences known to men (he included contemplation as the tenth science). All of these sciences he said lead to the knowledge of God. Bonaventure here speaks of the three rays, but as a similitude, likening them to the three branches of philosophy.²²⁴

He also mentions the science of perspective.²²⁵ Bonaventure said that just as the triangle can lead to the knowledge of the Trinity so also the three rays. He presents very brief and inadequate descriptions of the three rays. The straight line ray is described as the strongest of the rays. He likened the superior power of the straight line ray over the other two rays to an example from sound, when he said that if you throw a stone down in front of you there will be a loud noise; but if you throw it down at an angle the sound will be less. A reflected ray is the result of a cleaned and polished body receiving the species. The refracted ray he said is one that goes into another transparency.²²⁶ In Sermon VII he again speaks of lux but only to compare it to the four causes of Aristotle.²²⁷

Bonaventure's treatment of light in his Sentence Commentary is much like that of Albert and Thomas, that is to say ontological. The line of investigation and the method are also the same. Bonaventure seeks to determine whether lux and lumen are corporeal or non-corporeal; whether substance, accident, or quality. He described lux as being non-corporeal; as the form of a shining body; and as a quality sensed from a luminous source. Moreover he said, that lux was more of an accidental form than a substantial one. Lumen which exists in the medium he described as being non-corporeal and as the form of a certain quality. Bonaventure believed that lumen was the sensible quality of

an active power present in the light source. Hence lumen is the affect of a body having lux. However, Bonaventure introduced a new notion in his discussion, that of fulgor, which also causes a refinement in the meaning of lux. Fulgor is the shining effect of lux in the light source. Thus lux then is the essence of light in the source. In the medium this shining effect is lumen.

Some other ideas on light found in Bonaventure's discussion are that time and lux were created at the same time; that lux illuminated instantly; that succession in time resulted from the mutability of matter; and that in reality it was the luminous clouds that moved and not lux.

The discussion of the creation of light found in his Hexaameron was seen to be very literary and allegorical. Here his descriptions of the three types of light rays proved to be extremely sketchy and inadequate.

The foregoing review of opinions from the works of Thomas, Albert and Bonaventure shows that they also distinguished between the application of the terms lux and lumen in reference to light in the same manner as Duns Scotus. Indeed, Thomas by his definition of splendor and radius; and Bonaventure by his use of fulgor, developed the ontological differentiation between the various aspects of light beyond that witnessed in Duns Scotus' Distinction 13. The three thirteenth century theologians also described lux as an accidental form and lumen as a sensible quality of that form. Part of Duns Scotus' exposition dealt with the laws of refraction and reflection and some basic notions pertaining to the science of optics. Aquinas did not discuss the laws of reflection and refraction and the discussion of these principles found in Bonaventure's Hexaameron proved to be very inadequate. It is in the works of Albertus Magnus, who wrote prior to the other two thirteenth

century theologians, that we find material more akin to the optical considerations noticed in Duns Scotus' Distinction. Albert's defense of Aristotle's extromission theory and Aristotle's position that light could not cross a vacuum are most interesting. This along with Albert's uncertainty in regard to the law of refraction seen in his discussion on the rainbow indicates that the optical information derived from Alhazen was not fully understood or accepted in the West at that time.

Footnotes

1. For an extensive discussion of the hexaemeral tradition see; Frank E. Robbins, The Hexaemeral Literature: a Study of the Greek and Latin Commentaries on Genesis, (Chicago: Univ. of Chicago Press, 1912). Robbins expanded the meaning of hexaemeral literature to all works that discuss aspects of the creation story while in this study we will limit ourselves to only those works that adhere to the format of St. Basil. For further additional information on this subject see; Thomas Aquinas, "Cosmogony", vol. 10, Summa Theologiae trans. William A. Wallace, (N. York: McGraw-Hill Book Co., 1970), see Appendices 7 and 8.
2. The events of the first day are treated on pages 69 - 70
3. Lynn Thorndike, A History of Magic and Experimental Science, I, (N. York: The Macmillan Co., 1923), 485-486.
4. Wallace, in Aquinas, "Cosmogony", Appendix 7, 204
5. Thorndike, I, 482; For Basil's Hexaemeron see; Patrologia Graeca, XXIX, (Paris, 1857) 204 - 08; "St. Basil, Letters and Selected Works", vol. 8, 2nd Series, A Select Library of Nicene and Post Nicene Fathers of the Christian Church, trans. Rev. Bloomfield Jackson, 51 - 109.
6. Joseph T. Muckle, "Robert Grossetest's Use of Greek Sources in His Hexaemeron" in Medievalia et Humanistica, Fasc. 3, (1945), 39
7. Thorndike, I, 484
8. Ibid.
9. Joseph T. Muckle, "Greek Works Translated Directly into Latin Before 1350: Part I, Before 1,000", in Medieval Studies IV, (1942), 35; Eustathius' transl. of Basil's Hexaemeron is available in the Patrologia Graeca, XXX, (Paris: 1888), 869 - 968.
10. Muckle, "Greek Works Translated Directly into Latin Before 1350: Part II", in Medieval Studies V, (1942), 102: Rufinus transl. is available in the Patrologia Graeca, XXXI, (Paris: 1885), 1723 - 1794.
11. Thorndike, I, 484; Dionysius' transl. is found in the Patrologia Latina, LXVII, (Paris: 1848), 347 - 407
12. Thorndike, I, 485
13. On Philoponus see; Wallace, Aquinas, "Cosmogony" Appendix 7, p. 207, note 34
14. Wallace, Aquinas, "Cosmogony", Appendix 7, 208; see John of Damacus, Exposition of the Orthodox Faith, trans. S. D. F. Salmond, v. 9, 2nd Series, A Select Library of Nicene and Post Nicene Fathers; see De Fide Orthodoxa;

Versions of Burgundio and Cerbonus, ed. Eligius M. Buytaert, (St. Bonaventure: Franciscan Institute, 1955).

15. Thorndike, I, 483; St. Ambrose included the error of St. Basil of omitting the discussion on the birds and then after apologizing going back to take up that part of the discussion.

16. For the works of Augustine see the Patrologia Latina, XXXIV, t. 3 (Paris: 1841).

17. Thorndike, I, 504

18. Ibid., 483

19. Petrus Abelardus, "Expositio in Hexaemeron" in Opera ed. Victor Cousin, assisted by C. Jourdain et E. Despois, tomus prior, reprint, (N.Y.: George Olms, 1970) 625 - 679

20. Beryl Smalley, The study of the Bible in the Middle Ages, reprint, (Indiana: University of Notre Dame Press, 1970), 35 - 36.

21. Etienne Gilson, The History of Christian Philosophy in the Middle Ages, 314

22. Ibid.

23. Magister Petrus Lombardus, Sententiae in IV Libris Distinctae I. Pars I, "Prolegomena", (Rome: Collegii S. Bonaventurae ad Claras Aquas, 1971), 118

24. David Knowles, The Evolution of Medieval Thought, (New York: Vintage Books, 1962), 179 - 180.

25. Ibid., 181

26. Ibid., 180

27. Ibid.

28. Petrus Lombardus, "Prolegomena", 119

29. Ibid.

30. Ibid.

31. Ibid.

32. Knowles, The Evolution of Medieval Thought, 181

33. Petrus Lombardus, "Prolegomena", 120

34. Ibid., 120 - 121; Knowles, The Evolution of Medieval Thought, 180

35. Smalley, The Study of the Bible, 51 - 52

59. Ibid., 328 - 30
60. Ibid., 331 - 37
61. Ibid., 337 - 40
62. Ibid., 340 - 42
63. Bonaventure, Liber II Sententiarum, 211 - 213
64. Ibid., 214 - 17
65. Ibid., 317 - 18
66. Ibid., 319 - 22
67. Ibid., 323 - 26
68. Ibid., 327 - 29
69. See above, Ordinatio, on p. 24
70. William A. Wallace, "Thomas Aquinas", Dictionary of Scientific Biography, I, (New York: Charles Scribner's Sons, 1970), 196; James A. Weisheipl, Friar Thomas D'Aquino, His Life, Thought, and Work, (Garden City: Doubleday and Co., 1970), 4
71. Wallace, "Aquinas", 196
72. Ibid., Weisheipl, 4 - 8
73. Weisheipl, 10 - 12
74. Wallace, "Aquinas", 196; Weisheipl, 13
75. Wallace, "Aquinas", 196; Weisheipl, 15 - 18
76. Wallace, "Aquinas", 196
77. Weisheipl, 28 - 36
78. Wallace, "Aquinas", 196; Weisheipl, 36 - 37; 39
79. Weisheipl, 39
80. Weisheipl, 49
81. Wallace, "Aquinas", 196; Weisheipl, 49 - 50
82. Wallace, "Aquinas", 197; Weisheipl, 80 et sq.
83. Wallace, "Aquinas", 197; Weisheipl, 90 et sq.
84. Wallace, "Aquinas", 197

36. Ibid., 72 - 76
37. Ibid., 75
38. Ibid.
39. Petrus Lombardus, "Prolegomena", 122 - 129
40. Ibid., 117
41. Ibid., 118
42. Magister Petrus Lombardus, Sententiae in IV Libris Distinctae, t. I, Pars II "Liber I et II", (Rome: Collegiū S. Bonaventurae ad Claras Aquas, 1971), 389
43. Ibid., 390
44. Ibid., 390 - 91
45. Ibid., 291
46. Ibid., 392 - 93
47. Ibid., 393
48. Ibid., 393 - 95
49. Ibid., 389 - 91
50. Thomas Aquinas, Scriptum Super Libros Sententiarum, vol. 2, Ed. Nova, ed. R. P. Mandonnet O.P., (Paris: 1929): "Divisio Texus", 325; Thomas' Articles, 326 - 342; "Expositio Textus" 342.
51. S. Bonaventure, Liber II Sententiarum, Opera Omnia t. 2 (Florence: Ad Claras Aquas (Quaracchi 1885); Text of P. Lombard, 308 - 310; "Divisio Textus", 310 - 311; Articles I - III, 311 - 329; "Dubium", 330 - 333.
52. Albertus Magnus, Commentarii in II Sententiarum, Opera Omnia, vol. 27, ed. Stepen C. A. Borgnet, (Paris: Vives Press, 1894), 241 - 242.
53. Ibid., 242 - 54
54. Ibid., 242 - 44
55. Ibid., 245 - 48
56. Ibid., 250 - 51
57. Ibid., 253 - 54
58. Aquinas, Scriptum Super Libros Sententiarum, 2, 326 - 28

85. Ibid.
86. Ibid., Weisheipl, 151
87. Ibid., Weisheipl, 241 et sq.
88. Wallace, "Aquinas", 197
89. Ibid.
90. William S. Wallace, "Albertus Magnus", Dictionary of Scientific Biography, I, (New York: Charles Scribner's Sons, 1970), 99
91. Wallace, "Aquinas", 197
92. Wallace, Aquinas, "Cosmogony", Appendix 9, 223.
93. Ibid., 222
94. Ibid., 194
95. Ibid., see also page 223
96. Ibid., 216 - 18
97. Aquinas, Scriptum Super Libros Sententiarum, 2, 328 - 29
98. Ibid., 329 - 30
99. Ibid., 331 - 32
100. Ibid., 332
101. Ibid., 332 - 33
102. Ibid., 333. Thomas says this would be the case unless other principles of natural science could be found (...nisi aliis principiis naturales philosophiae inventis.) Thomas is either acknowledging the possibility of a vast growth in scientific knowledge yet to come or he is jesting with his audience.
103. Ibid., 333 - 34
104. Ibid., 334. Thomas used the firefly as an example. At night when their light (fire) appears you cannot see their color; in the day time, when their color is perceptible through light, you do not see their light (fire) anymore. Thus it is through lux that the color is seen.
105. Ibid.
106. Ibid.
107. Ibid.

108. Ibid.
109. Ibid., 334 - 35
110. Aquinas, "Cosmogony", 53 - 64
111. Ibid., 53; Scriptum Super Libros Sententiarum, 2, 328
112. Aquinas, "Cosmogony", 55; Scriptum Super Libros Sententiarum, 2, 331
113. Aquinas, "Cosmogony", 59
114. Aquinas, "Cosmogony", 61
115. Ibid.
116. Ibid., 63; Scriptum Super Libros Sententiarum, 2, 337
117. See Ordinatio on p. 30; See Reportatio on p. 42.
118. Supra, Chapter III, 104
119. Wallace, "Albertus Magnus", 99
120. Ibid.
121. Ibid.
122. Ibid.
123. Ibid.
124. Ibid.
125. Ibid.
126. Albertus Magnus, Commentarii II Sententiarum, 247
127. Wallace, "Albertus Magnus", 99
128. Albertus Magnus, "De Anima", tract III, Opera Omnia v. 5, 240 - 256; De Meteoris, Opera Omnia, v. 4, 666 - 700
129. Albertus Magnus, Commentarii in II Sententiarum, 245
130. Ibid.
131. Ibid., 245 - 46
132. Ibid.
133. Ibid., 245

134. See Albertus Magnus, II De Anima, tract III, chapters 9 - 14. In chapters 9 - 11 he reviewed the opinions of Democrites and 4 others on the subject. In chapter 12 he presented his own view on intromission and extromission. In chapter 14 he again rejected intromission in a discussion on color.
135. Ibid., 246
136. Ibid., 246 - 47
137. Ibid., 247
138. Ibid.
139. Ibid.
140. Ibid.
141. Ibid.: One wonders who this author of Perspective might be. Albert probably wrote his Sentence Commentary in the 1240's. Pecham and Witelo wrote their Perspectives too late to have been the object of Albert's criticism (see Chapter 5, pp. 225-226). Bacon is a likely candidate, since he was in Paris in the 1240's. However Miss Sharp dates his scientific works after 1247 and Easton suggests 1262 - 63 as the probable dates for the composition of the De Multiplicatione Specierum and Perspectiva (see Chapter 5, pp. 207 to 208). Thus he must be rejected as a candidate. Alhazen is the most likely target of Albert's criticism. He was available and his intromission theory of vision does place him in conflict with Aristotle. Al-Nairizi was a 9 - 10th. c. commentator on the works of Ptolemy and Euclid. His Commentary on Euclid was translated by Gerard of Cremona. See George Sarton, Introduction to the History of Science, v. I (Baltimore: The Wilkins and Wilkins Co., 1929), 598 - 99: "Anaritii in decem libros priores Elementorum Euclides commentarii ex interpretatione Gherardi Cremonensis in codice Cracoviensi 569 servata edidit M. Curtze".
142. Ibid., 248
143. Ibid.
144. A. C. Crombie, Robert Grosseteste and the Origins of Experimental Science, (Oxford: Clarendon Press, 1962), 191 - 200; Carl B. Boyer, The Rainbow from Myth to Mathematics, (New York: Thomas Yoseloff, 1959), 94
145. Boyer 94; see also Crombie 191. In regard to the interrelationship between Albert and Grosseteste see Crombie 194: "In his conception of the material universe Albertus resembled Grosseteste in accepting the Neo-Platonic theory that materia prima was actual extension underlying all other accidents, especially sensible qualities. He discussed but rejected Grosseteste's theory that light (lumen vel lux) was the first form that gave dimensions to matter and acted also as the first principle of movement and as the intermediary between mind and body."; See also Wallace, "Albertus Magnus", 99 -100; Wallace in reporting on the difference between

the two men wrote: "J.A. Weisheipl, in particular, has stressed the differences between the thirteenth-century Oxford masters such as Robert Grosseteste, Robert Kilwardby, and Roger Bacon (all of whom were more pronouncedly Platonist in scientific views) and Paris masters such as Albert and Aquinas (who were more purely Aristotelian). Whereas the former held that there is a successive subalternation between physics, mathematics, and metaphysics (so that the principles of natural science are essentially mathematical and the principle of mathematics is the unity that is identical with Being), the latter held for the autonomy of these sciences, maintaining that each has its own proper principles, underived from any other discipline."

146. Crombie, 197; Boyer, 94

147. Crombie, 197

148. Ibid.

149. Ibid., 197 - 98

150. Ibid., 198

151. Boyer, 95

152. Ibid.

153. Ibid., 96; Crombie, 199

154. Crombie, 198; 200

155. Boyer, 95 - 96; Crombie, 196

156. Albertus Magnus, De Anima, 247

157. Ibid.

158. Ibid., 248

159. Ibid.

160. Ibid.

161. E. Smeets, "Bonaventure (Saint)", Dictionnaire de Théologie Catholique, 2, (Paris: 1910), 962

162. Ibid.

163. Ibid., 963

164. Ibid.; see 968, for Bonaventure's dependence on Alexander of Hales in his writings, especially the Sentence Commentary.

165. Ibid., 963

166. Ibid.
167. Ibid., 963 - 64
168. Ibid., 964
169. Ibid.
170. Ibid.
171. Ibid., 964
172. Ibid.
173. Ibid.
174. Ibid.
175. Ibid., 965
176. Ibid.
177. Ibid.
178. Ibid.
179. S. Bonaventure, Opera Omnia, 10 vols. (Florence: Ad Claras Aquas (Quaracchi), 1882 - 1901).
180. Smeets, "Bonaventure (Saint)", 967 - 71
181. Knowles, The Evolution of Medieval Thought, 240
182. Ibid.; the light metaphysics was probably derived from Alexander of Hales.
183. Smeets, "Bonaventure (Saint)", 972
184. Bonaventure, Liber II Sententiarum, Opera Omnia, t. 2, 311 - 12.
185. Ibid., 312 - 13
186. Ibid., 313
187. Ibid., 314
188. Ibid., 315
189. Ibid.
190. Ibid., 316
191. Ibid., 317

192. Ibid.
193. Ibid., 318
194. Ibid., 319 - 20
195. Ibid., 320
196. Ibid., 321
197. Ibid.
198. Ibid., 322
199. Ibid., 323
200. Ibid., 323 - 24
201. Ibid., 325
202. Ibid.
203. Ibid.
204. Ibid.
205. Ibid., 325 - 26
206. Ibid., 326. The first recorded reference to glass mirrors in the middle ages was made by Alexander Necham (1157 - 1217); see Thorndike, II, 199
207. Ibid.
208. Ibid.
209. Ibid.
210. Ibid., 327
211. Ibid.
212. Ibid.
213. Ibid., 328
214. Ibid.
215. Ibid.
216. Ibid.
217. Ibid.
218. Ibid.

- 219. Ibid., 328 - 29
- 220. Ibid., 329
- 221. Ibid., 330 - 33
- 222. Bonaventure, "Collationes In Hexaemeron", Opera Omnia, t. 5,
(Florence: Ad Claras Aquas (Quaracchi), 1891), 349 - 53
- 223. Ibid., 349
- 224. Ibid.
- 225. Ibid., 351 - 52
- 226. Ibid., 352
- 227. Ibid., 363, see #20

CHAPTER V

Light Theory and Optics According to
Grosseteste, Bacon, and Pecham

In the previous chapter we compared the treatment of Distinction 13 by Duns Scotus with that of three theologians of the thirteenth century. Our line of inquiry in this chapter will be to contrast the light theory and optical details found in Duns Scotus' exposition with that of three men, who approached the study of light apart from theological considerations. The three men chosen for this inquiry are Robert Grosseteste, Roger Bacon and John Pecham.¹ Coincidentally all three of these men also share an important place in the history of the Franciscan Order and the University of Oxford in the thirteenth century. In addition they have also been singled out as the leading members of the "so called" scientific tradition at Oxford in the 13th century.

Robert Grosseteste

The study of the natural phenomenon of light at Oxford during the thirteenth and fourteenth centuries exhibited a notable predilection for the fusion of light metaphysics rooted in Neoplatonic philosophy with geometrical optics. Robert Grosseteste (1168 - 1253)² is acclaimed by many as founder of this trend, since it was in his scientific writings that we find the first signs of this new trend. Moreover as a teacher, and Chancellor of the University, he became the founder of a school of thought.

The early life of Robert Grosseteste prior to the time he became the Bishop of Lincoln is relatively unknown.³ Evidence for this period of his life has to be gleaned from Mathew Paris' Annales Monastici, chronicles, and letters, as well as Episcopal rolls.⁴ A biography of Grosseteste was done by Richard of Bardney⁵ but for the most part it must be regarded as fiction.⁶ J. C. Russell, however, believes that some reliable information may be extracted from this tale, but still it

is very meagre.⁷

Adopting the reconstruction of Grosseteste's life as presented by D.A. Callus,⁸ the probable date of his birth is 1168 in the county of Suffolk.⁹ In all likelihood, he received his early education at Lincoln and subsequently went to Oxford and Paris.¹⁰ Robert Grosseteste's name appears on a witness list in a charter of Hugh of Avalon, Bishop of Lincoln. In the charter, which was issued sometime between 1186 and 1190, Grosseteste is described as "Magister Robertus Grosseteste".¹¹ From this we gather that by this time he was already a master. It is also possible on the basis of evidence contained in a letter of Gerald of Wales to place Grosseteste in the household of William de Vere, Bishop of Hereford, not later than 1198.¹² Moreover Grosseteste is described in the letter as being skilled in law and medicine. Bishop William de Vere died in 1198 and it is believed by Callus that Grosseteste went to teach in the Arts Faculty at Oxford until the Secession of 1209 - 1214.¹³ It was during this time that Grosseteste probably went to Paris. After 1214 he returned to Oxford and served as Chancellor, although at first Bishop Hugh of Wells, Grosseteste's predecessor as Bishop of Lincoln (1209 - 1235), did not allow him to use the title.¹⁴ However, by 1221, someone was using the title of Chancellor, as evidenced in a 1221 letter of Pope Honorius addressed to the Chancellor of Oxford.¹⁵ That this someone was Grosseteste is attested to by a statement made by Oliver Sutton, Grosseteste's successor in the Diocese of Lincoln (1280 - 1299), in which he said that he had been informed by Grosseteste himself, that Bishop Hugh of Wells had not allowed Grosseteste to use the title of Chancellor.¹⁶ It is not certain when his tenure as Chancellor ended but we do know that in 1231 Ralph of Maidstone was the Chancellor.¹⁷ Grosse-

teste was the first lecturer for the newly established Franciscan house of studies at Oxford from 1229 - 1235.¹⁸ In that latter year he was elected Bishop of Lincoln.¹⁹ During his episcopate he attended the Council of Lyons in 1245.²⁰ Robert Grosseteste died in 1253.²¹

The works of Bishop Grosseteste can be divided into two categories: his scientific writings and his philosophical - theological works.²²

Among his scientific works are included the following: the De Luce; De Colore; De Lineis, Angulis, et Figuris; De Sphaera; De Motu Super Caelestium; De Iride; De Cometis; De Calore Solis; De Generatione Stellarum; De Generatione Sonorum; De Impressionibus Elementorum; De Accessu et Recessu Maris; and the unfinished Commentarius in VII Libros Physicorum Aristotelis.²³

Grosseteste did not write a Summa or create a comprehensive philosophical system. His philosophical teachings have to be extracted from his works. Grosseteste's longer philosophical - theological works would be his Hexaameron; the Commentary on the Posterior Analytics; and the Commentary on the Works of Dionysius.²⁴ Some of Grosseteste's shorter works are: De Unica Forma Omnium; De Intelligentiis; De Potentia et Actu; De Veritate; De Ordine Emanandi Causatorum a Deo; and De Libero Arbitrio.²⁵ Grosseteste was also active as a translator, or better said, as a retranslator, of Greek texts such as the Nicomachean Ethics; De Caelo et Mundo; the Ps. Aristotelian De Virtutibus et Vitriis; the De Indivisibilis Lineis; and the works of J. Damascene and Ps. Dionysius.²⁶

The scientific part of his production is believed to have taken place between 1215 and 1235. The major portion of Grosseteste's theological works apparently were written between 1225 - 35. He was elected Bishop in 1235 and it was during his reign as Bishop, 1235 - 1253, that

most of his translations were done.²⁷ A. C. Crombie and S. H. Thomson agree in dating Grosseteste's scientific works between 1215 and 1235.²⁸ However Richard D. Dales dates the scientific period of Grosseteste's career between 1220 and 1235.²⁹ He also differs with Crombie on the dating of the Commentary on the Posterior Analytics, the supposed foundation stone of Grosseteste's scientific method. Dales regards this work not as a prelude to the early scientific writings but rather as a work of the late 1220's.³⁰

The most original and novel part of Grosseteste's teaching is his theory of light metaphysics. This novel interpretation of the phenomenon of light was used to explain the formation of the world, the cognitive process and the relationship between soul and body. This theory is clearly set forth in his treatise, De Luce seu de Inchoatione Formarum. However parts of the same doctrine and related optical subjects may be found in his Hexaameron; De Colore; De Calore Solis; De Iride; and De Lineis, Angulis et Figuris.

Grosseteste's whole theory of light is steeped in Neo-Platonism. Ludwig Baur saw important parallels between Grosseteste's theory as expressed in his De Luce and the Hexaameron of Basil in regard to the light of the first day.³¹ J. T. Muckle has established that Grosseteste used Eustathius' translation of St. Basil.³² Naturally enough Augustine's works were another source of his Neo-Platonism, as well as the compiler of the Liber de Causis and the Ps. Augustinian tract, De Spiritu et Anima.³³ Muckle identified other sources utilized by Grosseteste in his Hexaameron, such as Gregory of Nyssa's De Hominis Opificio; John Damascene's De Fide Orthodoxa; and a spurious treatise which Grosseteste attributes to St. Basil, the De Hominis Structura.³⁴ Moreover in his

works Grosseteste cited the following works of Aristotle: De Caelo; Meteorologica; De Generatione et Corruptione; De Anima; De Sensu et Sensato; and De Animalibus.³⁵ In addition he reputedly used the Almagest of Ptolemy; the De Motu Accessionis by Thabit Ibn Cora; Avicbron's Fons Vita; and the Theorica Planetarum of Alpetragius.³⁶ Besides the above works Grosseteste was seemingly familiar with the works of Boethius, Bede, St. Anselem, and St. Bernard.³⁷

To understand Grosseteste's light metaphysics as presented in the De Luce, Clare Riedl tells us, we must realize that, while the terminology may be Aristotelian, the content of the ideas are definitely un-Aristotelian.³⁸ The important point of departure is that for Grosseteste matter is not pure potency, as it was for Aristotle. In Grosseteste's theory matter retains a certain minimal reality. Both corporeity and matter are in themselves simple substances.³⁹

The function of form in Grosseteste's metaphysics is to complete, perfect and actualize matter. It is referred to as the species or perfectio of the object. The term species as used by Grosseteste in the De Luce has a special connotation meaning more than just form in its static aspect. For him it is also an actualizing agent.⁴⁰ It appears in reference to the influence of forms on other bodies: "It is clear that every higher body, in virtue of the light (lumen) which proceeds from it is the form (species) and perfection of the body that comes after it."⁴¹ Species or form in Grosseteste's light theory has a dynamic function.⁴² The first corporeal form, which for Grosseteste is light, becomes the principle of extension and activity in the universe.⁴³ This notion of a first corporeal form is non Aristotelian because first implies a plurality of forms. This latter point became a tenet of

Franciscan philosophy.⁴⁴

Species (form) as used by Grosseteste was a power which emanated from lux and produced a variety of effects. In the De Lineis, Angulis et Figuris Grosseteste described the varied activity of species as follows:

For all cause of natural effects have to be expressed by means of lines, angles and figures, for otherwise it would be impossible to have knowledge of the reason (propter quid) concerning them. This is clear in this way: a natural agent propagates its power (virtutem) from itself to the recipient (patiens), whether it acts on the senses or on matter. This power is sometimes called species, sometimes a similitude,...; and it will send the same power into the senses and into matter, or into its contrary, as heat sends the same thing into the sense of touch and into a cold body.⁴⁵

Grosseteste said that there is no voluntarism in the action of species but that species act always, and out of necessity and in the same way. When received by the senses the power of the species produces an operation that is in some way more spiritual and more noble and when received by matter, the resulting operation is material.⁴⁶

Corresponding to matter and form are potency and act. Since matter has some degree of reality, then it follows that potency is purely passive. Potency here is not something that is not actual at all, but something which is only partially actual.⁴⁷ In the De Luce the actualization of matter is the same as the extension of matter and the agent doing the extending is light. It would seem that the only potency that exists in matter in a corporeal substance is the potency for extension.⁴⁸

The De Luce is divided into two sections. The first deals with light metaphysics proper with an explanation of light as the first corporeal form and the properties that this light enjoys. The second part is an explanation of the creation of the universe as a result of

the peculiar properties of light, namely self multiplication and extension, as well as the ability to extend matter.⁴⁹ Grosseteste explains the manner in which the 13 spheres of the material universe are propagated by light.⁵⁰

Since Johannes Duns Scotus did not discuss the creation of the universe in D. 13 of his Commentary, we will focus our attention on those properties Grosseteste identified in light and which can be related to the discussion of light in Duns Scotus.

The key to Grosseteste's theory of light lies in the first few lines of the De Luce:

The first corporeal form which some⁵¹ call corporeity is in my opinion light. For light of its very nature diffuses itself in every direction in such a way that a point of light will produce instantaneously a sphere of light of any size whatsoever, unless some opaque object stands in the way. Now the extension of matter in three dimensions is a necessary concomitant of corporeity, and this despite the fact that both corporeity and matter are in themselves simple substances lacking all dimension. But a form that is in itself simple and without dimension could not introduce dimension in every direction into matter, which is likewise simple and without dimension, except by multiplying itself and diffusing itself instantaneously in every direction and thus extending matter in its own diffusion. For form cannot desert matter, because it is inseparable from it, and matter itself cannot be deprived of form but I have proposed that it is light which possesses of its very nature the function of multiplying itself and diffusing itself instantaneously in all directions.⁵²

In the Lombard's Sentences the question is raised in Distinction 13, as to whether or not lux and lumen are substances. Duns Scotus answered that both were qualities and that lumen was the proper sensible species of lux. Ludwig Baur in regard to this points out that Grosseteste in his Hexaameron asked this question and that unlike Aristotle who saw light as a quality, Grosseteste held that light was a substance. Here Grosseteste is following Augustine in saying that light is first in

regard to substance.⁵³ In Grosseteste's De Luce by contrast, light (lux) is, "... the first corporeal form which some call corporeity..."; and "... both corporeity and matter are in themselves simple substances lacking all dimensions."; and again we read, "therefore light is not a form subsequent to corporeity, but it is corporeity itself."⁵⁴

This naturally raises the question as to whether or not Grosseteste differentiated between the application of the terms lux and lumen in regard to light. In Distinction 13 Duns Scotus clearly did. In Grosseteste's De Luce one reads the following passage:

When the first body, which is the firmament, has in this way been completely actualized, it diffuses its light (lumen) from every part of itself to the center of the universe. For since light (lux) is the perfection of the first body and naturally multiplies itself from the first body, it is necessarily diffused to the center of the universe. And since this light (lux) is a form entirely inseparable from matter in its diffusion from the first body, it extends along with itself the spirituality of the matter of the first body. Thus there produces from the first body light (lumen), which is a spiritual body, or if you prefer, a bodily spirit.⁵⁵

Hence Grosseteste also makes a distinction between lux and lumen. This looks somewhat analogous with what Duns Scotus wrote in his Commentary, although for the latter light in its source is lux and light outside the source is lumen. Other wise, Duns Scotus also said like Grosseteste that lumen is produced by lux. Grosseteste is not concerned with optics here and so does not discuss the medium or diaphanum as the authors of perspective do.

L. Baur saw a connection between lux as described by Grosseteste and the spiritual refined light of the first day described by Basil in his Hexaemeron. This latter light is a matterless light and it is prior to the light of the sun and stars.⁵⁶ Baur also viewed the discussion of light in Basil's Hexaemeron as the preparation ground for the distinction

between lux and lumen because Basil distinguished, he says between splendor and fulgor or light glow and light substance.⁵⁷ Moreover he recalled in speaking of the radiation of light (lumen) that Grosseteste viewed this light (lumen) as a spiritual body or bodily spirit.⁵⁸ Baur further related Grosseteste's notions on light to the Augustinian tradition. This is particularly true of Augustine's view of light as a psychological agent expressed in his doctrine of "Divine Illumination". In this doctrine light is the link between heaven and earth⁵⁹ and is the agent affecting the relationship between body and soul.⁶⁰ This material is present in most commentaries on the Sentences whose authors quoted from Augustine.

Grosseteste, like Duns Scotus and Thomas, saw light as generating and extending itself instantly and in all and any direction. Accordingly we read in the De Luce: "For light of its very nature diffuses itself in every direction in such a way that a point of light will produce instantaneously a sphere of light of any size whatsoever, unless an opaque object stands in the way".⁶¹ Further on, it will be remembered that the De Luce held that:

"... a form that is in itself simple and without dimension could not introduce dimension in every direction into matter, which is likewise simple and without dimension, except by multiplying itself and diffusing itself instantaneously in every direction and thus extending matter in its diffusion."⁶²

The same idea is also expressed by Grosseteste in his Hexaemeron, that is that light will multiply itself into all places instantly.⁶³ L. Baur also noted that Grosseteste did not see this self multiplication as taking place within a unit of time.⁶⁴ In addition he gives recognition to the fact that Grosseteste saw light traveling in a straight line.⁶⁵

The tendency on the part of Duns Scotus and William of Alnwick to

introduce mathematical concepts into the discussion on light has been noted earlier. R. Grosseteste is said to have been an early exponent of this tendency. In fact A. C. Crombie in Robert Grosseteste and the Origins of Experimental Science makes this tendency one of the key characteristics of Grosseteste's methodology.⁶⁶ We find in the De Luce the introduction of mathematics to explain the manner in which light can multiply itself to an infinite degree.⁶⁷ The mathematics in the De Luce seems to be that of proportions and progressions while that in J. Duns Scotus and William of Alnwick is geometry and perhaps a hint of dynamics.⁶⁸

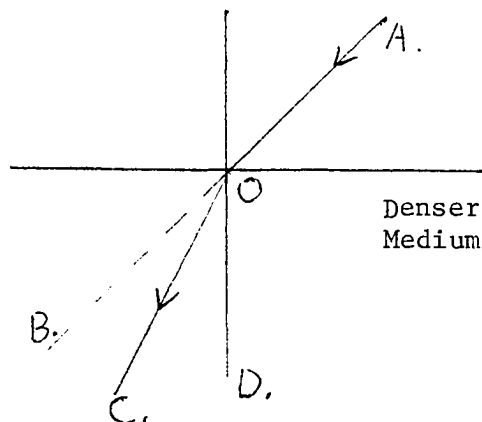
In the De Luce there is nothing to hint at an awareness on the part of Grosseteste of Alhazen's optical work.⁶⁹ The De Luce is wholly within the realm of a metaphysical explanation with the use of some mathematics in a supportative role. However in Grosseteste's other scientific works we do manage to glean certain notions concerning the medium, the laws of reflection and refraction and dispersal of light and here the mathematical explanations are geometrical.

Richard C. Dales has touched on these very aspects in his study of Grosseteste's scientific writings.⁷⁰ He reports for our benefit that in the De Ascessione et Recessione Maris, Grosseteste asserted that, "... a celestial body acts on lower bodies only through its luminous rays, and that these luminous rays are incorporated in some way with the elements and by reflecting they intersect themselves at one point and thus by scattering the parts of matter they generate heat."⁷¹ In the De Natura Locorum Grosseteste spoke of the lunar ray affecting tides. There, as reported by Dales, he spoke of rays being more powerful when acting through shorter lines and when acting at or close to the perpendicular, which idea is similar to a statement by J. Duns Scotus on the action of the ray at the perpendicular in regard to refraction.⁷² Grosseteste in

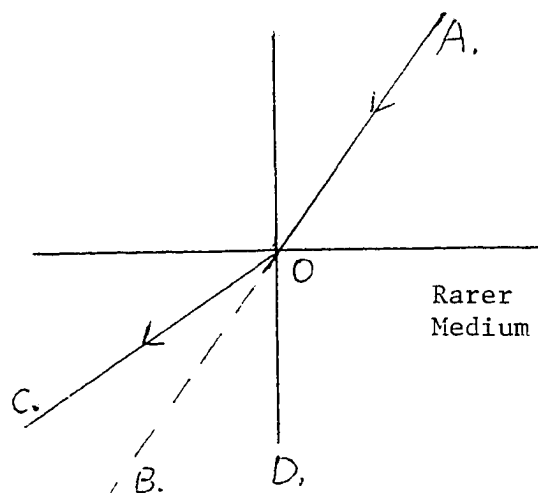
the De Natura Locorum also mentioned refraction.⁷³

The application of mathematical principles to optics is found in Grosseteste's description of the action of light rays in the De Lineis, Angulis et Figuris. We find in the De Lineis references to the fact that rays acting in shorter and straighter lines have more power;⁷⁴ that a smaller angle of incidence produces greater power; and that there is more activity produced by a concave surface than a plane or convex surface;⁷⁵ and that every agent multiplies its power spherically.⁷⁶ Grosseteste also discussed here in the De Lineis the laws of reflection and refraction by transparencies of different densities.⁷⁷ His explanation of refraction with respect to the perpendicular is reminiscent of that seen in J. Duns Scotus.⁷⁸ Crombie illustrated this point by the following diagram.

(a)



(b)



Moreover in this work Grosseteste described the properties of the pyramid and the cone.⁸⁰

In the De Calore Solis Grosseteste wrote about the collection of rays of light as a means of generating heat. Grosseteste in trying to explain the sun's heating affect wrote that, when rays are incorporated in a transparent medium, the degree of concentration of the rays is much greater in a dense medium than in a subtle one. In addition, when the rays, which draw with themselves parts of the air in which they are incorporated, are concentrated at one point (such as an opaque object), a great scattering of the rays takes place. It is from this scattering effect that a great heat results.⁸¹ Grosseteste holds that rays are incorporated in the transparent medium of the air, a dense body. When these solar rays fall on a plane, convex or concave surface of the earth, they are reflected according to equal angles (as seen from the De Speculis). If the rays fall at right angles they are reflected back along the right angle, the incident and reflected rays go along the same lines in opposite directions and there is a great scattering of the rays and thusly a great heat results.⁸²

The De Iride also contains optical considerations. It is interesting to note that in his discussion Grosseteste adheres to Aristotle's extromission theory, that is the rays emanate from the eye.⁸³ In this tract Grosseteste divides the study of perspective into three parts:⁸⁴

(1) The first is called De Visu. Here the study is the rectilinear transit of the visual ray through the transparent medium between the viewer and the thing seen.

(2) The second is called De Speculis. It is the study of the ray's rectilinear transit to a body which acts as a mirror and reflects the

ray and the study of the angles of reflection.

(3) The third which he says has remained unknown and untouched among us at the present time is the study of the ray's transit through many transparent bodies of diverse kinds in which the visual ray is bent at their points of contact forming an angle.⁸⁵

The study of the rainbow belongs to the latter part of the study of perspective.⁸⁶ Grosseteste in his exposition on the rainbow first reviewed the explanations of Seneca and Aristotle which were based on reflection. He dismissed these views because experience showed that they are not correct. Grosseteste's own theory was based on refraction which took place inside a moist cloud.⁸⁷ The exterior of this cloud is convex and the interior concave, as is clear he said, from the nature of light and heavy.⁸⁸ Grosseteste continued saying, "That which we see of a cloud must be less than a hemisphere, though it may look like a hemisphere, and when mist descends from the concavity of the cloud this mist must be pyramidally convex at the top, descending to the ground, and therefore more condensed near the earth than in the upper part."⁸⁹ Therefore he saw the ray passing through four transparent media: 1) pure air; 2) the cloud; 3) the moisture of the cloud; 4) the condensed moist air of the lower pyramidal cone. Since the sun's rays are refracted at each change of medium, there are then three refractions. It is because of this triple refraction according to Grosseteste, that the rays fan out to form an arc.⁹⁰

In the De Colore Grosseteste considered the transparent nature of the medium and how color is incorporated into the medium.⁹¹ He there explained the colors of the spectrum in terms of 7 colors descending from white and 7 colors ascending from black with red being the color in the center of the spectrum.⁹² In the De Iride he explained that the

range of the colors was determined by the intension and remission of three factors a) the purity of the medium from earthy matter b) the brightness of the light c) the amount of the rays present. The differences in ray density were due to the refractions which concentrated the rays in one region and dispersed them into another.⁹³ Another interesting aspect of Grosseteste's light theory appears in the tract De Generatione Sonorum. According to A. C. Crombie, Grosseteste here made what, "... was perhaps the first attempt to explain rectilinear propagation of light as a succession of waves or pulses analogous to sound"⁹⁴

This brief reivew of Grosseteste's explanation of the nature of light enables us to identify many optical principles about which he wrote in his philosophical as well as scientific treatises. In the De Luce and Hexaameron Grosseteste remained the metaphysician, explaining lux and lumen mostly in terms of the principles of ontology, that is, the essence and origin of being in nature and the universe. In his scientific works we find Grosseteste attempting to explain the operation of light rays and color in terms of geometrical optics, but only to a slight degree of development.

Roger Bacon

The next famous scholar and student of optics with whom one ought to contrast the ideas of Johannes Duns Scotus is Roger Bacon. Roger Bacon was born about 1214 near Ilchester in Somerset.⁹⁵ His family during his younger years, apparently was one of influence and wealth.⁹⁶ Bacon studied at Oxford in the 1230's and in the 1240's we find him at Paris until about 1250.⁹⁷ During this time he produced his Quaestiones on Aristotle's Physics and Metaphysics and lectured on the De Plantis.⁹⁸

According to Miss Sharp, sometime around 1247 Bacon's interests turned to science and philology.⁹⁹ It is believed that he entered the Franciscan Order about 1250 hoping thereby to gain support for his scientific endeavours.¹⁰⁰ J. H. Bridges places Bacon at Oxford from 1250 - 1257.¹⁰¹ From 1250 - 1266 Bacon withdrew from teaching activity because of ill health.¹⁰² Miss Sharp believes that this was the period of his scientific studies. To the later part of this period are assigned the following works: the De Speculis; De Mirabili Potestate Artis et Naturae; The Metaphysica; De Multiplicatione Specierum; and De Computo Naturali.¹⁰⁴ Easton suggests the dates 1262 - 1263 for his De Multiplicatione Specierum and Perspectiva.¹⁰⁵

In 1254 Gerard of Borgo San-Donnino published the heretical Joachimite tract Introductorius in Evangelium Aeternum.¹⁰⁶ In the furor that followed the publication of that work, Bacon was removed to Paris in 1257 for close observation because of his Joachimite sympathies.¹⁰⁷ Then in 1260 at the Chapter of Narbonne a rule was established, which required all Franciscan authors to have their works reviewed by the Order prior to publication.¹⁰⁸ In an attempt to circumvent the censorship of the Order, Bacon through an emissary approached Cardinal Guy de Foulque in the early 1260's seeking his support in publishing the results of his studies.¹⁰⁹ By 1266 Guy de Foulque had become Pope Clement IV.¹¹⁰ Bacon again contacted the Pope and again proposed a publication. In 1266 he received a Papal communication to forward the text of his proposed publication. But Bacon had not yet written up his studies. Thus Bacon began to compose the Communia Naturalium, an exhaustive account of the various branches of knowledge. Realizing that the task was beyond him and feeling pressed to produce, Bacon

penned the less ambitious Opus Majus and in 1268 sent that plus the previously composed De Multiplicatione Specierum and Opus Minus to the Pope.¹¹¹

Bacon later proceeded to produce the Communium Naturalium; his introduction to the Ps. Aristotelian Secretum Secretorum; his Greek and Hebrew Grammar; and in 1272 undertook but never completed the Compendium Studii Philosophiae.¹¹²

In 1277 Bishop Stephen Tempier's condemnation of 219 erroneous theories circulating at Paris put Bacon on the wrong side of the authorities again. In conjunction with events at Paris Jerome Di Ascoli, Minister General of the Franciscan Order, called certain Franciscans to task for adhering to certain novelties. Among those named was Roger Bacon. However, Miss Sharp reports, that the strictures on Bacon were not motivated because of his support of suspect doctrines but because he had become an embarrassment to the Order by his attacks in his writings on his contemporaries both Franciscan and Dominican.¹¹³ Bacon entered the Order late in life and had been a secular Master of the Arts of some fame before that. He was contemptuous of what he considered the lesser education of those who entered the Order early in life and had been trained in the Franciscan schools.¹¹⁴ Moreover he was contemptuous of the program of studies at Paris and decried the decline of linguistic skills, especially Hebrew and Greek, among the theology scholars.¹¹⁵

From 1277 to 1292 Bacon was confined by Ascoli to his Convent and his works condemned. The ban was lifted in 1292 when he began the Compendium Studii Theologiae. He died shortly thereafter.¹¹⁶

In his approach to science Bacon was definitely in the Grosseteste tradition. His interest in mathematics, optics, languages, and

philology clearly indicate that he was a follower of Grosseteste.¹¹⁷

Although Bacon did not know Grosseteste personally, he was well acquainted with his works. This is eminently clear in the description of species in Bacon's De Multiplicatione Specierum and in his optical discussion in the Opus Majus.¹¹⁸ Bacon, who was not known for granting praise liberally, himself singled out Grosseteste and Adam Marsh as worthy of his admiration.¹¹⁹ In terms of his interest in scientific experimentation he seems to have also been influenced by the little known Peter de Maricourt.¹²⁰

Among the sources cited by Bacon in his optical works we find Euclid's Elements and Optica; the Ps. Euclidian Catoptrica; Theon; Ptolemy's Optica; Alhazen's De Aspectibus (Perspectiva) and De Speculis Comburentibus. In addition there are references to Tideus, Alkindi, Avicenna, the works of Aristotle and the commentaries of Averroes and Constantinus Africanus.¹²¹ By far the chief authority on optics to which Bacon constantly referred is Alhazen.¹²²

Bacon's foremost work is the Opus Majus. The Opus Majus is divided into seven parts. Part I considers the causes of human error and these are classified and treated in four categories: 1) undue regard for authority; 2) habit; 3) popular prejudice; 4) false conceit of knowledge.

Part II demonstrates the close relationship between philosophy and theology.

Part III emphasizes the importance and usefulness of the study of foreign languages so that ideas can be communicated.

Part IV urges that emphasis be placed on the study of mathematics as an aide to other sciences. Such sciences are described as astronomy, optics, theology, chronology, astrology, and the correction of the

calendar. This section ends with a treatise on geography.

Part V is the study of optics or perspective as it is frequently called. Here Bacon treats of the principles of vision, the anatomy of the eye, reflection, and refraction.

Part VI is a plea for the advancement of experimental science and an exposition on the correct scientific method to be used in solving natural problems.

Part VII deals with moral philosophy as the final and supreme science. Also dealt with here are man's relationships with God, other men, and himself. There is also a study of comparative religions at the end of this section.¹²³

Unique in Bacon's concept of light is the application of his notion of species to his light theory. Bacon's concept of species is explained in the De Multiplicatione Specierum and Opus Majus. Species is the word used by Bacon to describe the emanating force which he believed proceeded in all directions from every bodily object.¹²⁴ Every body has a force which is identified with its substance and essence; and it is this force that produces species as a likeness, image, intention, or impression of the object. The body is the center of activity radiating force or species which is the first result of that force.¹²⁵

The idea of a physical emanation from a body is not new. Lucretius, Laertius, Epicurus and Democritus all described this emission from an object.¹²⁶ However, Bacon's emission is somewhat different.

Epicurus in his often quoted letter to a certain Herodotus stated that there were moulds emanating from all solid bodies preserving the shape and arrangement of the bodies. This emanation was to take place at great speed.¹²⁷ For Lucretius it was shapes or rinds bearing a resemblance of the object.¹²⁸ Bacon differs from these ancient Greeks

because for him nothing solid is emitted from the body because, if that were the case, then the body would eventually be diminished or weakened.¹²⁹ Rather it is a force that is emitted which actualizes the potentialities of matter and reproduces thusly the species and this process of reproduction is continued in the activation of the matter of the medium as the species passes through the medium.¹³⁰ No vision then could take place in a vacuum following Bacon's theory because of a lack of a nature suitable for the multiplication of species.¹³¹

In the Opus Majus Bacon gave the following definition of species:

For every efficient cause acts by its own force which it produces on the matter subject to it, as the light of the sun produces its own force on the air, and this force is light diffused through the whole world from the solar light. This force is called likeness, image, species, and by many other names, and it is produced by substance as well as accident and by spiritual substance as well as corporeal. Substance is more productive of it than accident, and spiritual substance than corporeal. This species causes every action in this world; for it acts on sense, on the intellect, and all the matter in the world for the production of things, because one and the same thing is done by a natural agent on whatsoever it acts, because it has no freedom of choice; and therefore it performs the same act on whatever it meets. But if it acts on the sense and the intellect, it becomes a species, as all know. Accordingly, on the other hand, if it acts on matter it also becomes a species.¹³²

From this passage we can see that species as used by Bacon is not the same as the eidola or rinds or moulds emanating from the surface of bodies as advocated by Lucretius and Democritus. The species of Bacon are produced by a force in the essence of the object and this force does not diminish in usage. Once produced, Bacon's species by self multiplication play an important role in the world of generation of things.¹³³ Bacon said that multiplication of necessity takes place in the form of a sphere with the lines of multiplication going in every direction equally.¹³⁴ This explanation sounds reminiscent of the role ascribed to the species of light in Grosseteste's De Luce. In regard to the process

of multiplication, Bacon stated that every multiplication takes place by way of lines, angles, or figures. In addition he said that species travel in straight paths, because nature works best in the shortest way possible; and that the straight line is the shortest of all. He cites Aristotle in the fifth book of the Metaphysics and the 20th proposition of the first book of Euclid's Elements to illustrate this point.¹³⁵ This source material was readily available in the 13th century and since this notion appears in Grosseteste, Pecham, and Duns Scotus, as well as Bacon, it can be regarded as common stock material to which the authors of light theory and perspective could turn. Thus the study of species can be related to mathematics, particularly geometry and the whole theory was applied by Bacon to his study of optics.

Bacon applied his doctrine of species to light and geometrics to the action of light rays in the medium. This is especially obvious in Bacon's discussion of the visual rays of light and color that affect the eye. In the Opus Majus, Part VI (Perspectiva), Dist. 5, chapter 1, Bacon said that light is the essential ingredient for vision and without it nothing is seen: "... the first and principle visible thing is light, and therefore nothing can be seen without its help; ..." ¹³⁶ And elsewhere in Part V: I dist. 5, chapter 1, we read:

For a very bright light hides other visible objects, and even injures and oppresses vision and weakens the action of sight. But a very weak light does not change vision as it should, nor does it reveal objects. A moderate light greatly strengthens vision in its action and reveals objects sufficiently, wherefore the species of light is especially essential for vision.¹³⁷

The origin of visual rays is discussed in Distinction 7 of Part V:I (Perspectiva) of the Opus Majus. There Bacon stated that the origins of the species of vision has always been a doubtful matter. Aristotle in the ninth book of the De Anima stated that the visual rays were emitted

from the eye. Bacon said that Ptolemy, Tideus, Alkindi,¹³⁸ Euclid and Augustine all agreed with this emission theory but that Alhazen and Avicenna in III De Anima and Averroes in the De Sensu et Sensato favored an intromission theory. Bacon himself seems to follow Alhazen's intromission theory.¹³⁹ We read in Part V (Perspectiva), Dist. 5, chapter I of the Opus Majus, "For a very bright light hides other visible objects, and even injures and oppresses vision"¹⁴⁰ Like Alhazen he is stating that a bright light will injure the eye because the rays are entering the eye. Bacon also stated that, if the eye looks at strong colors and then looks away, the species of that strong color will remain in the eye. It is a case of an excess of light changing the judgement of color.¹⁴¹ Again he cited Averroes to the effect that gazing into the brilliancy of the sun confuses vision.¹⁴² Yet on other occasions he seemingly lapses into the old emission theory. Consequently we read in Part V (Perspectiva), Dist. 9, chapter 1, of the Opus Majus:

Now from this chapter it is clear to him who gives it due consideration that vision must take place by means of its species emitted to the visible object. For if a single continuous transparent medium in extreme distance terminates vision, and does not terminate it owing to a perfect density, which independently is perceptible in every distance, but terminates it because of the weakness of the species of vision, which fails at too great a distance, then vision must be produced by sending forth its species; that is, by emitting its species owing to the act of seeing.¹⁴³

Elsewheres, in chapter 4 of Distinction 7 of Part V, Bacon offers a compromise between the two theories. Here one reads:

Moreover, the species of the things of the world are not fitted by nature to effect the complete act of vision at once because of its nobleness. Hence these must be aided and excited by the species of the eye, which travels in the locality of the visual pyramid, and changes the medium and ennoble it, and renders it analogous to vision, and so prepares the passage of the species itself of the visible object, and, moreover, ennoble it, so that it is quite similar and analogous to the nobility of the animate body, which is the eye.¹⁴⁴

In the sixth Distinction, chapter 1 of Part V Bacon speaks of the visual pyramid whose base is on the object and whose vertex is on the eye and of the one to one correspondence between the individual points of species on the object and the points of the linear species on the interior of the eye.¹⁴⁵

Bacon tells us that many philosophers, among whom are Aristotle and Averroes, hold the view that species has a spiritual existence in the medium and sense. However Roger Bacon himself said, "I say, therefore, that species have a material and natural existence in the medium and in the sense; ...".¹⁴⁶ Further on he wrote:

But when they say that species has a spiritual existence in a medium, this use of the word spiritual is not in accordance with its proper and primary signification, from spirit, as we say that God and angel are spiritual things; because it is plain that the species of corporeal things are not thus spiritual. Therefore of necessity they will have a corporeal existence, because body and soul are opposed without an intermediate.¹⁴⁷

He pointed out that if the species had a corporeal existence they then also had a material one and were subject to the laws of material things. So, when Aristotle and Averroes use the word spiritual in regard to species, they are using the word equivocally and improperly.¹⁴⁸

In continuing, we must also note that Bacon stated in Distinction 9, chapter 3 of Part V of the Opus Majus that the species of vision and of the visible are produced in time.¹⁴⁹ He acknowledged that there was some difference of opinion on this as to whether or not the species of sight and of the visible object are produced suddenly and instantaneously or in time; and whether or not the multiplication, if it be in time, was perceptible. Bacon cited Aristotle from II De Anima and Alkindi from the De Aspectibus to the effect, that species are not produced in time but in an indivisible instant. Moreover Aristotle stated that the

multiplication was not perceptible.¹⁵⁰ Bacon reports that Alhazen said in Books II and VII of his De Aspectibus, that light passes from one terminus of a line to another in linear space in time. Bacon refuted Alhazen's arguments in support of light traveling in time because Alhazen's arguments are ultimately founded on the assumption that light is corporeal. Bacon agrees with all the theologians that light is essentially non corporeal.¹⁵¹ In addition Bacon wrote, "... the multiplication does not occupy a sensible time or one perceptible by vision, but an imperceptible one, since any one has experience that he himself does not perceive the time in which light travels from East to West."¹⁵² Thus in effect refuting Aristotle's argument to the contrary. Bacon enlarged on this principle in Distinction 9, chapter 4 of Part V of the Opus Majus:

For all authors, whether sacred or others, who state that light is multiplied instantaneously, are to be understood in regard to a divisible instant, which is imperceptible time, and not in regard to a real instant, which is the indivisible terminus of time, just as the point is of the line. If, therefore, the vision of the species and the visible multiplication take place in imperceptible time, how was it said above that vision will take place in a perceptible time? It is evident that beside the multiplication there is a judgment of vision in regard to the object seen, and this judgment must be known to the sense; wherefore the judgment must be made in perceptible time.¹⁵³

Thus for Bacon while light itself does not travel in time the judgment of vision in the mind of the viewer requires the passage of time. Bacon also cited Alkindi saying that each multiplication of the species remains imperceptible in time even to the thousandth multiple and that the motion of the species in self multiplying itself through the medium is at a great velocity.¹⁵⁴ Bacon observed that the species of light travels more quickly in air than odor or sound.¹⁵⁵

One finds in reading Bacon that he like other medieval authors

spoke of the efficacy of action along a straight line and at the perpendicular.¹⁵⁶ In regard to the straight line, he stated that nature works more effectively through a straight line than in a curve, because a straight line is a shorter route between two points and so an agent can exert greater force through a straight line. Moreover from the Book of Causes Bacon pointed out that the straight line has equality and unity which gives it greater strength. To reinforce his point, he gives reference to Aristotle in the fifth Book of the Metaphysics.¹⁵⁷ Bacon in continuing to describe the character of the straight line said:

For in the curve is an angle, which causes dispersion and irregularity in form and resists unity. Therefore nature acts with more force in the straight line than in the broken line and reflected one. But the straight line, which falls at equal angles and perpendicularly either on planes or on spherical bodies, is the one on which nature chooses to work both on account of its equality and greater uniformity, and on account of its shortness.¹⁵⁸

To demonstrate the foregoing he had recourse to Propositions 19 and 17 of the first book of Euclid's Elements.¹⁵⁹

The perpendicular line, according to Bacon, since it is the shortest line for acting is the stronger.¹⁶⁰ Applying this dictum to optics Bacon stated, that the action of a light ray is stronger when it falls and is reflected at right angles; and is weaker, when it falls at angles less than a right angle; and it is much weaker, when it falls at very acute angles.¹⁶¹

Now this naturally brings us to Bacon's position on the laws of reflection and refraction, since they also involve the principle of the perpendicular line. In addition the understanding of the multiplication of the species of light is tied to a study of the three types of light rays, the straight line ray, the reflected ray and the refracted ray.

In Chapter 3 of Distinction 6 of Part V (Perspectiva, Part III) Bacon said that the species of a visible object has a principle and

primary multiplication but that the other species in the medium have an accidental multiplication. Moreover, the principle or primary multiplication is straight, refracted or reflected and comes from an agent. The accidental or secondary multiplication comes from the principal species and not an independent agent.¹⁶² Which coincides with what Duns Scotus said on the subject.¹⁶³ Interestingly enough, to illustrate this point Bacon used the example of the solar ray in the window of a house in much the same manner as seen in the Additiones Magnae.¹⁶⁴ Like Scotus, Roger Bacon also spoke about accidental light but does not make the same distinctions in terminology that Duns Scotus did. Bacon said that light is called accidental:

... with respect to the principal light coming from an object, since it does not come from an agent, but from principal multiplications, as in a house the principal multiplication falls through the window from the sun, but in a corner of the house the accidental light comes from the ray of the window.¹⁶⁵

To this Bacon added the comment that humans could not stand to be exposed to principal species and so God tempered the effect of these by accidental species.¹⁶⁶

Concerning the laws of reflection and refraction Bacon does not add anything to what might be found in Alhazen and Euclid in regard to these phenomena. Bacon's statement and demonstrations of the principles involved are more verbose than Pecham's.

Bacon stated that nature acts on the broken line more strongly than on the reflected one because refraction is in the direction of the straight ahead path, while reflection proceeds in the opposite direction of the incident ray and thus against nature.¹⁶⁷ Reflection then, for this reason, weakens species and force more than refraction.¹⁶⁸

Refraction takes place, when the ray travels in two different media

of varying densities, thus providing a double impeding action to the advancing ray.¹⁶⁹ If the species of the advancing ray should strike the second medium perpendicularly, it will advance in a straight ahead path along the perpendicular as in the first medium.¹⁷⁰ Bacon also described the action that takes place, when the ray does not strike the second medium at the perpendicular. Here, in order to maintain the dictum concerning the efficacy of the power of the perpendicular, he presents an explanation of refraction that is odd by modern standards. He stated that refraction which takes place when the second medium is denser, weakens the ray less than when the second medium is a rarer medium. In the case of the second medium being more dense, the declination of the line of refraction is toward the perpendicular. Since the perpendicular is the strongest line of action, this ray will be stronger than the one passing into the rarer medium where the line of declination is away from the perpendicular.¹⁷¹ Thus this latter line according to the principle of the perpendicular will be weaker.

Again, Bacon describes refraction in terms of the eye viewing a rod placed in water. The eye is residing in a medium less dense than that in which the lower part of the rod is residing and so:

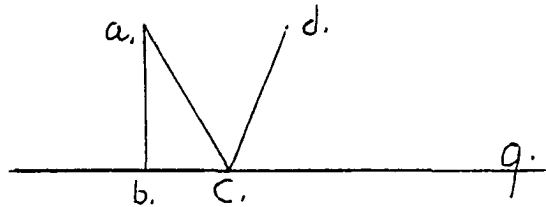
...the part of the rod which is in the water will not appear to the sight as continuous and in a straight line with the other part, but nearer the eye, therefore the rod of necessity must appear of a curved and angular shape, as if it had broken on entering the water, ...¹⁷²

Bacon's description of reflection is as follows: "... when, however, the second body is so dense as in no way to permit the passage of the species, - I am speaking of a passage appreciated by human vision,¹⁷³ - we say that the species is reflected."¹⁷⁴ Because of the difficulty of the passage, the species multiplies itself back in the direction from

which it came.¹⁷⁵ This action occurs either of two ways. First, if the ray falls perpendicularly on the dense body, it returns along the path from which it came. Secondly, if the ray falls at an oblique angle and not perpendicularly, it does not return upon itself but at an angle equal to the angle of incidence.¹⁷⁶ In continuing his description Bacon wrote:

Whenever the ray falls at oblique angles, the acute angle is called the angle of incidence; and from the obtuse angle an angle equal to the angle of incidence is cut off by the reflected line. The angle so formed is contained between the reflected line and the dense body, as is the angle *dcb*, and it is called the angle of reflection, which of necessity must equal the acute angle on the other side, and we prove this to the sight in mirrors.¹⁷⁷

He illustrated this explanation by the following diagram:



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Line *ab* represents a ray falling along the perpendicular path and which is reflected back over the same path along line *ba*. Line *ac* represents a ray falling at an oblique angle and which when reflected returns along the line *cd* with the angle of reflection *dcb* being equal to the angle of incidence *acb*. The equality of the angles of incidence and reflection is demonstrated, according to Bacon, by Proposition 15 of the first book of Euclid's Elements.¹⁷⁹

Moreover Bacon like J. Duns Scotus acknowledged that in plane mirrors the image in the mirror appears at a distance equal to the distance of the object from the mirror.¹⁸⁰ Bacon's treatment of optics is more elaborate than J. Duns Scotus. Unlike Duns Scotus, he also discussed the action of the rays in concave and convex mirrors, the production of images and the formation of the rainbow. In addition he

described the phenomenon of burning mirrors which was alluded to by Duns Scotus.¹⁸¹ Likewise Bacon gave a description of a demonstration used to show the convergence of rays passing through a water filled urinal. An allusion to this demonstration also appears in Duns Scotus' Commentary.¹⁸² Bacon also agrees with Duns Scotus, who came after him, that light and color in the medium are qualities.¹⁸³ He stated that there are 22 sensible qualities perceived by the senses.¹⁸⁴ Some sensibles are perceived per se and others per accidens. Sensibles per accidens, according to Bacon, were those that could be determined by other faculties of the sensitive soul such as the estimative and memorative faculties. Qualities which are perceived per se are sensed by the sense alone.¹⁸⁵ He stated, as did Duns Scotus, that light and color are perceived through the sense of sight alone and when the conditions for vision are present,¹⁸⁶ light is seen as it is and the same for color.¹⁸⁷ Further reference can also be found in the Opus Majus to the need of the transparency or rarity of the medium, as a necessary prerequisite for vision. Duns Scotus also touched on this point in D. 13.

Bacon also spoke about the division of quantity which was also alluded to by Duns Scotus in the Lectura¹⁸⁹ and which was also seen in the Additiones Magnae¹⁹⁰ indicating a common tendency to mix mathematics with the study of optics. Bacon claimed that every body and every quantity are infinitely divisible. He cited Aristotle from the sixth book of the Physics that there is, "... no division of a quantity into indivisibles nor is a quantity composed of indivisibles, and therefore there are as many parts in a grain of millet as in the diameter of the world,...."¹⁹¹

In both the Opus Majus and the De Multiplicatione Specierum Bacon

gave recognition to the ontological distinction between lux and lumen. In the De Multiplicatione Specierum Bacon stated that lumen is the species of the sunlight in the air; that lux is a quality of the shining body; and that lumen is produced by lux, all of which corresponds to the view of the theologians seen in the previous chapter. Immediately after making this statement Bacon said that the two words lux and lumen could be used interchangeably.¹⁹² Bacon however was not as cavalier about the use of this distinction as the foregoing statement might incline one to believe. For instance in the Opus Majus, Part IV (Mathematics), Distinction 2, chapter 1, Bacon said that every efficient cause acts by its own power which it produces on the matter subject to it, as the lux of the observed object produces its own power in the air, and this power is lumen diffused throughout the whole world from the solar lux.¹⁹³ Again in the Opus Majus, Part V (Perspectiva), Distinction 1, chapter 2, one reads: "And since this is so, then, if the lumen coming from the moon and the stars were the lux of the sun reflected from their surfaces, as all philosophers believe, then in seeing the moon and a star we should see the sun."¹⁹⁴

There are however other occasions where Bacon did use the terms lux and lumen in an indiscriminate fashion. Two such instances are as follows: 1) in the De Multiplicatione Specierum, Pars Secunda, cap. VII, during the course of discussing the equality of the angles of incidence and reflection, Bacon used the word lux for light coming from the moon instead of lumen.¹⁹⁵

2) in the Opus Majus, Part IV (Mathematics), Distinction 2, chapter 2, while describing accidental light, he used lumen accidentale in one part of the discussion and lux accidentalis in another.¹⁹⁶

Moreover when discussing motion and the scintillation of the stars and planets he used the words splendor and fulgor synonymously meaning the brilliancy of the light in the scintillating body,¹⁹⁷ which is closer to Bonaventure's definition of fulgor, as the shining effect of lux in a light source, than Thomas' definition of splendor as the projection of a ray by reflection.

Thus from the accumulated passages from Bacon's thought one sees the complicated interdependence of the theory of species and geometrical optics. In addition there is noticeable concurrence between Bacon and Duns Scotus on the larger issues, such as rectilinear propagation; reflection and refraction of light rays; the nature of the visual rays; primary and secondary light as well as some lesser points of correspondence.

John Pecham

Like Duns Scotus, the early life of John Pecham has to be reckoned from the known dates of events in his later life and from chance bits of information culled from the few existing references to him and to his life found in letters. Pecham was probably born in the mid 1230's.¹⁹⁸ The identification of his place of birth based on a letter written in 1285 by Pecham, points to the village of Patcham near the Priory of Lewes in Sussex County.¹⁹⁹ This same letter also informs us that he received his early education at the Priory of Lewes.²⁰⁰ He received his Liberal Arts training at both Paris²⁰¹ and Oxford.

As to John Pecham's stay and reputation at Oxford we have evidence from a letter written by Adam Marsh c. 1299.²⁰² It is also from this letter that we ascertain that Pecham joined the Franciscan Order between 1257 - 59.²⁰³ John Pecham returned to Paris shortly after joining the

Order.²⁰⁴ In 1269 he received his degree in theology at Paris and spent the next two years at Paris as a Regent Master in theology and as lector at the Franciscan friary.²⁰⁵

We find Pecham enbroiled in the 13th century philosophical - theological squabbles at the University of Paris. He took an active part in the struggles between the seculars and mendicants at the University of Paris.²⁰⁶ In the furor over Averroism,²⁰⁷ Pecham became a leader of the conservative party opposed to certain Thomistic novelties, notably Thomas' teaching on the unity of form.²⁰⁸ Later on he became involved in the dispute between the Dominicans and Franciscans which grew out of the condemnations of 1277.²⁰⁹ John Pecham was typically Franciscan in his philosophy and accepted the doctrines of Augustinian - Platonism characteristic of most Franciscan philosophy.²¹⁰

The active later years of John Pecham's life are easier to record. He left Paris sometime during 1271 - 72 and became a member of the theology faculty at Oxford. He also served as the eleventh lecturer to the Franciscan school at Oxford.²¹¹ In 1275 Pecham became Provincial Minister of the Order until his appointment as Master in theology to the Papal Curia in 1277.²¹² Two years later in 1279, over the objections of King Edward I of England, John Pecham became the Archbishop of Canterbury.²¹³ As Archbishop, Pecham was a zealous defender of Ecclesiastical privilege in England and a foe of clerical abuse, as well as, what he considered to be dangerous philosophical novelties. Once again under that latter category we find the doctrine on the unity of form to be the object of his special concern.²¹⁴ John Pecham died at Martlake manor, in Surrey, on December 8, 1292.²¹⁵

Pecham's career was highly productive as attested to by the long

list of his works. The treatises written at Paris are of a religious nature,²¹⁶ but those done at Oxford are within the Oxford tradition, since the days of R. Grosseteste, for mathematics and science.²¹⁷ It is this latter group of writings that will absorb our attention for the moment. Pecham's scientific writings include the all important Perspectiva Communis, the Theorica Planetarum, the Tractatus de Sphaera, and Tractatus de Numeris.²¹⁸ It is the Perspectiva Communis, which became the basic textbook on optics in many Mediaeval Universities,²¹⁹ that will be used here to compare the ideas of J. Pecham on light with those of Johannes Duns Scotus and others.

David C. Lindberg places the date of composition for the Perspectiva Communis in the late 1270's. He does so on the basis of Pecham's knowledge of the Opus Majus; the earlier date of the composition of Witelo's Perspectiva; and the intended audience of Pecham's own Perspectiva.²²⁰

Lindberg demonstrated Pecham's awareness of Bacon's Opus Majus from his attack on Bacon's discussion of the rainbow.²²¹ Since the Opus Majus was probably written about 1263, Pecham's Perspectiva had to be later.²²²

In his researches Lindberg found only one passage of parallel wording with Witelo's Perspectiva.²²³ It is known that Witelo used, among other sources, William of Moerbeke's translation of Hero of Alexandria's De Speculis, which translation was completed on December 31, 1269, at the Papal Court at Viterbo.²²⁴ Moreover, Lindberg points out that Witelo dedicated his Perspectiva to Moerbeke, while the latter was still a Papal Confessor. Moerbeke held that post until 1278.²²⁵ In all likelihood Witelo began his Perspectiva shortly after receiving the translation, which places its date of composition early in the 1270's about 1272 - 73.²²⁶

Since Pecham stated that he was writing for the benefit of young scholars, then his Perspectiva had to be written during one of the three periods in his life where he taught. That would have to be either in Paris and Oxford during 1269 - 75; the Papal University, 1277 - 79; or during his term as Provincial Minister, 1275 - 79, when he may have written it for the students at the Franciscan convent schools.²²⁷

To narrow the choice, Lindberg argues that Pecham borrowed from Witelo and not vice versa.²²⁸ Lindberg also pointed out that the place of contact between Pecham and Witelo had to be the Papal court at Viterbo where Pecham stayed from 1277 - 79.²²⁹ Hence he either met Witelo or more likely came in contact with his work while at the Papal University. Lindberg then concluded that Pecham probably composed his Perspectiva between 1277 - 79.²³⁰

As to the other sources utilized by Pecham the most outstanding, influential and frequently cited work is the De Aspectibus of Alhazen.²³¹ David C. Lindberg remarks: "Repeatedly Pecham appeals to the authority of the author or 'the Physicist', the terms by which he identifies Alhazen; ...".²³² The content and organization of Pecham's Perspectiva suggest a close reliance on Alhazen. In fact at times he quoted Alhazen verbatim.²³³ Pecham's theory of vision, anatomy, and physiology of the eye, psychology of perception, theory of image formation by reflection and refraction are derived almost entirely from Alhazen.²³⁴

John Pecham's debt to Robert Grosseteste is difficult to pin down because it had become part of a general fund of knowledge available to thirteenth century students of optics.²³⁵ However the stress on the mathematical demonstrations²³⁶ and the use of the concept of species - which Grosseteste developed out of his Augustinian - Neoplatonic back-

ground²³⁷ - indicate the reality of an indebtedness to Grosseteste.²³⁸ Lindberg does identify a passage from Grosseteste's De Natura Locorum,²³⁹ which Pecham does seem to have borrowed. Moreover Pecham also adopted the threefold propagation of rays found in the De Iride and in Alhazen and Bacon.²⁴⁰ In addition Pecham admits, "... with Grosseteste and Bacon, that species issue from the observer's eye as well as from the observed object."²⁴¹

Likewise his dependence on Roger Bacon is hard to describe because of optical material available to both of them in the 13th century. That there was a chance for contact and some borrowing, there can be no doubt.²⁴² We have already made reference to Pecham's knowledge of and attack on Bacon's description of the rainbow.²⁴³ But, as Lindberg wrote, the line of dependence is more telling in the fact, "... that Pecham's reconciliation of Alhazen's theory of vision with Grosseteste's conception of species is of the same genre as Bacon's and was doubtless influenced by the Opus Majus and De Multiplicatione Specierum."²⁴⁴ Pecham also follows Bacon in his explanation of refraction²⁴⁵ and his treatment of pinhole images is based to a large extent on Bacon.²⁴⁶

Among the other sources Pecham referred to by name are Euclid, Alkindi; Augustine; Aristotle; a certain Gregory; and Moses Maimonides.²⁴⁷ He cited a book on anatomy called De Elementis and Aristotle's De Caelo et Mundo; the Catoptrica of Ps. Euclid, referred to by Pecham as De Speculis.²⁴⁸ He refers to a work called De Visu, which Lindberg believes is an abridged version of Euclid's Optica.²⁴⁹ There is also a work entitled De Speculis Comburentibus, which probably is that of Alhazen.²⁵⁰

John Pecham in the Perspectiva Communis, according to Lindberg, is not interested very much in the ontology of light,²⁵¹ while the

discussion in Duns Scotus seems to be more concerned with the ontological aspects of the subject. Pecham presents in his Perspectiva a compendium of information found in Alhazen.²⁵² His focus in writing the Perspectiva Communis was to describe how an object appears to an observer through the operation of the three rays.²⁵³ The work is divided into three parts: Part I deals with vision by direct rays and included in this section is a discussion of the anatomy and physiology of the eye; Part II treats of vision by reflected rays; Part III discusses vision by refracted rays.²⁵⁴

Pecham like Alhazen begins his Perspectiva by demonstrating in the very 1st Proposition that, when a person looks into a bright light, pain is felt in the eye.²⁵⁵ In the next proposition Pecham wrote that:

... if the eye after being directed with a fixed gaze on a bright color illuminated by an intense light is turned aside to a color illuminated more weakly, it will find that the first and second colors appear intermixed because traces of the aforesaid have been left behind in the eye.²⁵⁶

The purpose of this discussion is to demonstrate that light rays come from outside and do not emanate from within the eye. Pecham touches on this point again in Proposition I:43 (46) when discussing the difference in the approach to light and vision between the physicists and philosophers.²⁵⁷ The argument appears again that any intense or prolonged observation of light can cause pain in the eye.²⁵⁸ He begins Proposition I:44 (47) affirming the external origin of light rays but then returns to Alkindi and Augustine, who taught an emanationist theory of rays.²⁵⁹ In Proposition I:46 (49) he cites Aristotle to the effect that rays do issue from the eye.²⁶⁰ Lindberg points out that while having seemingly contradictory positions on the origins of light rays, Pecham resolves the contradiction by denying to the visual rays of the emanationist theory

those functions which would destroy Alhazen's system of sight based on external rays.²⁶¹ This moderation of views is seen in Proposition I:45 (48).²⁶²

Pecham's concession to visual rays says Lindberg is closely tied to Grosseteste's doctrine of species.²⁶³ Grosseteste maintained that all natural agents propagate power from themselves to surrounding bodies. Hence, for him species becomes the basis for efficient causality in the universe. Pecham applied this doctrine to optics as seen in Propositions I:27; II:5; I:27 (26) in the Perspectiva.²⁶⁴ The doctrine of species maintains that every natural body multiplies its species and that included the eye. Hence an emanation of the species must take place from the eye. Pecham however assigned to the species of the eye in vision "...the minor task of altering and moderating the species of the visible object and making them commensurate with the visual power."²⁶⁵ Species play a key role in the process of vision in the Perspectiva of Pecham but the notion of emanation from the eye is not taken up again. Like Bacon, Pecham follows Galen and Alhazen in his discussion of the anatomy of the eye.²⁶⁶ He describes the four tunics, that is the consolidativa, the cornea, uvea, and arenea; and the three humors, namely the albugineous humor, glacial humor and vitreous humor. It is the glacial humor that receives the species of the visible object transmitted to the eye in a point for point correspondence between the object and the center of the eye by perpendicular and unrefracted rays.²⁶⁷ These species which are received in the eye are also non material.²⁶⁸ Thus Pecham's species are not at all like the husks or eidola of the ancient Greeks. In this he is following the lead of Alhazen through Bacon.

Pecham does speak of the multiplication of species but the termino-

logy used in describing the operation is not necessarily in direct imitation of Bacon. Pecham describes this operation in Proposition 1 of Part II of the Perspectiva:

... rays of light and color are so constituted as to proceed through a transparent body, and the power of radiating and the onward flow of rays are not brought to an end by the opposition of a dense body of negligible transparency. Since the rays cannot continue in a straight line - when opposed not only by opaque and terrestrial bodies, but also by transparent bodies having a weaker kind of transparency such as water and glass - the impulse to diffuse produces reflection.²⁶⁹

This impulse to diffuse is the same as the multiplication of species as was seen in Bacon and Scotus.²⁷⁰ However in reading Prop. I:27 we notice that the language there is clearly like that witnessed in Bacon and in Grosseteste's De Lineis. Thus we read: "And since action in a straight line is easier and stronger for nature, every natural body, whether visible or not, must multiply its species in a continuous straight line; and this is to radiate."²⁷¹

Species behave according to geometrical rules and so the descriptions of rectilinear propagation, reflection, and refraction are in terms of geometrical optics.

What is rectilinear propagation according to John Pecham? In Prop. I:27 (26) he defined a ray as:

... nothing but the species of a visible object fashioned into a straight line by extension. Nevertheless, chiefly luminous bodies are said to radiate (and especially the sun, whose rays are sensible) because with their rays they illuminate other things.²⁷²

In Prop. I:14 Pecham wrote:

Rays of primary light and color are always propagated in straight lines unless bent by variations in the medium; yet all the while they are also diffusing themselves accidentally. Light that proceeds as direct radiation from a luminous object is called primary; light that passes laterally outside the incident pyramid of rays and diffuses itself obliquely and in every direction is called secondary and accidental.²⁷³

Pecham discussed reflection in Book II of the Perspectiva. He gives there the law of reflection plus a great deal of information on types of mirrors and the reflective properties of the convex and concave mirrors. Since Duns Scotus in his exposition did not go into the optics of mirrors the present treatment of Book II of Pecham's Perspectiva will be on the law of reflection alone.

Pecham states that it is the property of the rays of light and color to diffuse themselves only through transparent media. When such rays strike an opaque object or an object of negligible transparency and are unable to continue an onward flow in a straight line, they diffuse themselves back through the transparent medium.²⁷⁴ In the case of a solar ray striking water, which has a weaker kind of transparency than air, the rays diffuse in two directions: part of the ray penetrates and illuminates the water; and the other part is reflected backwards into the medium.²⁷⁵ In Prop. I:2 Pecham said, that only reflection from regular surfaces can be seen by the eye.²⁷⁶

The law of reflection is explained in Proposition II:6. Here Pecham wrote:

The angle formed by the incident ray and either surface of the mirror (on one side) or the imaginary line erected perpendicularly at the point of reflection (on the other side) is called the angle of incidence; the angle formed by these i.e. the surface of the mirror and the imaginary perpendicular and the reflected ray is called the angle of reflection.²⁷⁷

He continued, "... the ray recoils in the same mode as that in which it would be transmitted, if it were not deflected by a reflecting surface, and consequently it must rebound at an equal angle to the angle of incidence."²⁷⁸ In this proposition he also repeats the dictum that the perpendicular ray is the strongest.²⁷⁹

The subject of refraction is dealt with in Book III of the Perspectiva Communis. Pecham's discussion of refraction is in qualitative and not quantitative terms. Refraction he said was caused by the traversal of a ray at an oblique angle from one medium into a second medium of either greater or lesser density. His basic principles are that the rays of light and color being obliquely incident to the second medium bend, when passing into a denser medium, toward the perpendicular; and, when passing into a less dense medium, they bend away from the perpendicular. The size of the angle of deviation from the perpendicular varies according to the angle of the incident ray and the degree of density of the new medium.²⁸⁰ Moreover he held that, "... a ray perpendicularly incident on any medium is unrefracted because it is not weakened by the interposition of the transparent body, for every ray is more suited to the perpendicular than to oblique motion".²⁸¹ This dictum that action at the perpendicular is natural and strongest seems to have been accepted by all scholars and that bending always is a weakening process. Bacon and Pecham take this further so that a ray obliquely incident gains strength the closer the line of declination comes to the perpendicular in deviating from rectilinearity.²⁸² Pecham, like the other Oxfordians Grosseteste, Bacon, and Duns Scotus, applied common stock geometry and the doctrine of species developed by Grosseteste to explain the passage of light rays through the media in which they find themselves.

In comparing Pecham with Duns Scotus, we find between them many points of similarity. They both adhere to the intromission theory of vision although it is not so explicit and at one point Pecham does lapse into an emanationist theory as discussed above.²⁸³ Scotus and Pecham likewise hold to the doctrine of species being multiplied from all

natural bodies to the eye.²⁸⁴ Both claim these species are non corporeal. They are also in agreement on the rectilinear propagation of light rays, although the demonstration found in Duns Scotus' Commentary concerning the passage of a ray through a darkened box is not in Pecham's work.²⁸⁵ They also agree that light travels instantaneously as seen in Pecham's Proposition I:3 (3): "any point of a luminous or illuminated object simultaneously illuminates the whole medium adjacent to it."²⁸⁶ There is also agreement between them on the law of reflection and the basic principles of Pecham's discussion of refraction.²⁸⁷ However it must be pointed out that while Pecham dedicated a good part of Books II and III of the Perspectiva Communis to a discussion of images, such as the images produced by concave and convex mirrors and the location of an image seen by refracted rays. These subjects are entirely omitted by J. Duns Scotus. This difference is due to the context of their works, namely theology versus science. However in Duns Scotus' treatment of light within a theological - philosophical context there is an evident scientific approach which is in essential agreement with principles found in Pecham and the authors of Perspectives; and a striking departure from the content found in traditional Sentence Commentaries and Hexaemerons.

There appears in the texts of both Pecham and Scotus a number of thirteenth century common stock notions on optics and light theory. For instance in Propositions I: 6 - 8 of the Perspectiva Pecham expounded on the property of hemispherical irradiation, which was also touched on by Duns Scotus. Pecham says that:

... a point of light placed in a transparent medium diffuses itself spherically. However, when the point is situated on the surface of a dense body, it is excluded from half the space insofar as it is cut off by the density of the body on which it is situated. Therefore it can diffuse itself only hemispherically.²⁸⁸

Another point derived from this common fund is found in Proposition I:47 (50) where Pecham stated clearly that without light nothing can be seen and that color needs light to irradiate.²⁸⁹ Both of these principles are found in Scotus' Commentary. Moreover in Prop. I:48 (51) we find concurrence in regard to another aspect which Duns Scotus expounded on, namely that an object placed on the eye impedes vision.²⁹⁰ Again, in Proposition I:51 (54) the same explicit statement is made by Pecham and Duns Scotus that there must be a transparent medium in which the species of a visual object can multiply themselves to the eye without matter.²⁹¹

Pecham also gets into a discussion of visible intentions and lists them in Prop. I:55. These intentions are received both primarily and secondarily.²⁹² In Prop. I:61 (64) Pecham states that no visible intention except light and color is perceived by one sense alone,²⁹³ which point was also made by Duns Scotus.²⁹⁴ Pecham defines shadow in Prop. I:25 (23) as being an area of diminished light which he describes as the privation of primary light but that a derived secondary light is present.²⁹⁵ Which statement on the surface seems to correspond to J. Duns Scotus' position.²⁹⁶ However there are some subtle differences in the use of the Latin word for light, which we will take up shortly. But first we must note that Prop. I:14 (29) of the Perspectiva Communis, seen earlier,²⁹⁷ contains Pecham's definitions of primary and secondary light. Here he indicates that primary light is that which can be traced back to a luminous body by a straight line. Secondary light or accidental light is identified as those rays that have been reflected or broken because of having met an object of a different density and thus departed from the straight line advance. We read further in Prop. I:15:

During an eclipse, however, the aforementioned crescent shape is produced because the accidental and secondary diffusion of

light is prevented in the region from which the solar rays are cut off; or when the principal light is removed, the secondary light must cease.²⁹⁸

Whence we see that for him secondary light is produced by primary light. In every case where Pecham refers to primary and secondary in the passages cited above, the latin term for light is lux. In Duns Scotus it is lumen. As noted earlier in discussing J. Duns Scotus' Commentary on D. 13, Duns Scotus makes a point that light in its source is lux and light in the medium is lumen. Hence Duns Scotus is speaking of primary lumen produced by lux, from a luminary. Moreover he says that it is primary lumen, which gives rise to secondary lumen. According to Scotus, it is secondary lumen which is the light of the shadow. However apart from this difference between the terms lux and lumen, Pecham also gives secondary or accidental light (lux in Pecham's usage) another characteristic not found in Duns Scotus' treatment of the subject. That characteristic is the property of bending around opaque objects as seen in Proposition I:25: "As proposition 14 above shows, although an opaque object impedes the direct and principal propagation of light, it does not impede the secondary propagation which proceeds circumferentially."²⁹⁹ Hence rays bend around objects.

Footnotes

1. Witelo is another 13th century author noted for his optical studies. However he used Alhazen and Bacon and therefore offers approximately the same tradition in regard to the topics selected for points of comparison. See David C. Lindberg, "Lines of Influence in Thirteenth-Century Optics," Speculum, LXVI, (1971), 74 - 75; see also Alexander Birkenmajer, "Robert Grosseteste and Richard of Fournival" in Medievalia et Humanistica, V, (1948), 36.
2. Daniel A. Callus, "Robert Grosseteste as Scholar," in Robert Grosseteste, Scholar and Bishop; Essays in Commemoration of the seventh Centenary of His Death. Ed. D. A. Callus, (Oxford" 1955), 3; see also A. C. Crombie, Robert Grosseteste and the Origins of Experimental Science 1100 - 1700. (Oxford: Clarendon Press, 1961), 44; for a rather full listing of biographical data.
3. Callus, "R. Grosseteste as Scholar", 1.
4. Ibid.
5. Ibid.; see Josiah Cox Russell, "Richard of Bardney's Account of Robert Grosseteste's Early and Middle Life", in Medievalia et Humanistica, ii, (1944), 45; see J. C. Russell, "Some notes Upon The Career of Robert Grosseteste" in The Harvard Theological Review, XLVIII, (1955), 197 - 211.
6. Callus, "R. Grosseteste as Scholar", 1 - 2.
7. Russell, "Some Notes", 1 - 2; Bardney wrote 250 years after the death of Grosseteste; see Callus, "R. Grosseteste as Scholar," 2.
8. Callus, "R. Grosseteste as Scholar", 1 - 11; see also Callus, "The Oxford Career of Robert Grosseteste" in Oxoniensia, X, (1945), 42 - 72.
9. Callus, "R. Grosseteste as Scholar", 2 - 3; see also Crombie, 44.
10. Callus, "R. Grosseteste as Scholar", 3 - 4.
11. Ibid.
12. Ibid., 5; see Crombie, 44.
13. Callus, "R. Grosseteste as Scholar", 5; Crombie, 44.
14. Callus, "R. Grosseteste as Scholar", 7 - 8; see Callus, "The Oxford Career", 48, 49.
15. Callus, "R. Grosseteste as Scholar", 9.
16. Ibid., 7.
17. Ibid., 9; Crombie, 44: Crombie states that he was in Leicester in 1229 but also lecturing in Oxford in 1229 - 35.

18. Callus, "R. Grosseteste as Scholar", 9.
19. Crombie, 44.
20. Crombie, 45.
21. Ibid.; Callus, "R. Grosseteste as Scholar", 3.
22. For a full listing of Grosseteste's works see S. H. Thomson, The Writings of Robert Grosseteste, Bishop of Lincoln 1235 - 1257.
23. Clare C. Riedl, "Robert Grosseteste, On Light" in Mediaeval Philosophical Texts in Translation, no. 1 (Milwaukee: Marquette Univ. Press, 1942), 2; see also Richard C. Dales, "Robert Grosseteste's Scientific Works", in Isis, 1961), 402.
24. Riedl, 2.
25. Ibid., 2 - 3.
26. Callus, "R. Grosseteste as Scholar", 33 - 34.
27. Ibid., 12; see J. C. Russell, "The Phases of Grosseteste's Intellectual Life", in The Harvard Theological Review, XLIII, no. 1, (1950), 97; see Sir Maurice Powicke, "Introduction" in R. Grosseteste, Scholar and Bishop; Essays in Commemoration of the Seventh Centenary of His Death p. xiv. Here Powicke marveled in regard to Grosseteste's activity, "I have always found it hard to believe that the busiest and most active bishop of his time did his hardest work when he was between sixty-five or seven and eighty-three or five years of age."
28. Crombie, 46 - 47.
29. Dales, "R. Grosseteste's Scientific Works", 382.
30. Ibid.
31. Riedl, "R. Grosseteste, On Light", 5; see Ludwig Baur, "Das Licht in Der Naturphilosophie des Robert Grosseteste" in Abhandlungen aus dem Gebiete der Philosophie und ihrer Geschichte, eine Festgabe zum 70 Geburtstag Georg Freiherrn von Hartling, Freiburg im Breisgau: Herder, (1913), 41 - 55; L. Baur, "Die Philosophie des Robert Grosseteste" in Beiträge zur Geschichte der Philosophie des Mittelalters. 18, (4 - 6), (1919), 79 - 93.
32. J. T. Muckle, "Robert Grosseteste's Greek Sources" in Medievalia et Humanistica; Fasc. 3 (1945), 38. It is from the marginal notes in a ms. from the Abbey of St. Edmund's, that we know that Grosseteste used Eustathius' translation of Basil.
33. Callus, "R. Grosseteste as Scholar".
34. Muckle, "R. Grosseteste's Greek Sources", 33.

35. Ibid.

36. Dorothy E. Sharp, Franciscan Philosophy at Oxford in the Thirteenth Century. (New York: Russell and Russell Inc. 1964), 11; see Crombie, 105. Crombie believes that certain of his ideas may have come from the school of Chartres and Wm. Auvergne and Alexander of Hales; Baur in part also subscribes to this view, see "Das Licht", 42.

37. Sharp, 10.

38. Riedl, "R. Grosseteste, On Light", 3; see also Crombie, 106 - 110, 128 - 134.

39. Riedl, 3.

40. Ibid.

41. Ibid.; see also pp. 13 and 15. Lux is the first corporeal form which extends first matter. This first matter is the firmament. The lumen, which is the light of the firmament creates through the extension of matter the first sphere and the subsequent second and third etc. Hence these are celestial forms which influence bodies ranked below them in the sublunary world.

42. The notion of species becomes important in the works of Bacon and Pecham.

43. Riedl, 3.

44. Ibid.

45. See Crombie's translation in R. Grosseteste and the Origins of Experimental Science, 110.

46. Ibid.

47. Riedl, 4.

48. Ibid.

49. Ibid.

50. Ibid., 5; see also p. 15.

51. Perhaps he is referring to Herman of Carinthia, who in the De Essentiis touched on this with a lot of bewilderment.

52. Grosseteste, De Luce, Riedl translation, 10.

53. Baur, "Die Philosophie des R. Grosseteste", 78; "Das Licht", 43.

54. Grosseteste, De Luce, Riedl translation, 10.

55. Ibid., 13

56. Baur, "Die Philosophie", 78 - 79; Baur, "Das Licht", 43.
57. Baur, "Das Licht", 44.
58. Baur, "Das Licht", 46; Grosseteste, De Luce, Riedl translation, 10; see also above pp. 200 - 201
59. Baur, "Die Philosophie", 79; "Das Licht", 44.
60. Baur, "Das Licht", 47; 48; 54.
61. Grosseteste, De Luce, Riedl translation, 10.
62. Ibid.
63. See Robert Grosseteste, Hexaameron, in Bodleian Library ms. Latin, Th. C. 17, f. 203rb lines 37 - 47: "Est itaque lux sui ipsius naturaliter undique multiplicativa et ut ita dicam generativitas quedam sui ipsius quodamodum de sui substantia. Naturaliter enim lux undique se multiplicat gignendo et simul cum est generat. Qua propter replet circumstantem locum subito, lux enim prior secundum locum gignit lucem sequentem et lux genita simul gignitur et est; gignit lucem sibi primo succedentem et illa succedens adhuc succedentem ulterius et ita consequenter. Unde in instanti uno, unus lucis punctus replere potest orbem lumine." See Ludwig Baur, "Das Licht", 47; "Die Philosophie", 81; 83.
64. Baur, "Das Licht", 49.
65. Ibid., 45; 54; see also, "Die Philosophie", 81.
66. Crombie, R. Grosseteste and Origins of Exp. Sc., 90 et sq.; N.B. p. 104; Dales, "Grosseteste's Sc. Works", 394.
67. Grosseteste, De Luce, Riedl, Translation, 11: "It is possible, however, that an infinite sum of number is related to an infinite sum in every proportion, numerical and non-numerical. And some infinities are larger than other infinities, and some are smaller. ...But if we posit an infinite sum of all doubles starting with one and an infinite sum of all the halves corresponding to these doubles, and if one, or some other infinite number, be subtracted from the sum of halves, then, as soon as this subtraction is made, there will no longer be a two to one proportion between the first sum and what is left of the second sum."
68. See the Additines Magnae above on pp. 55 - 56; Lectura on pp. 49 - 50; Reportatio on pp. 41 - 42.
69. Crombie, 116 - 117; "For his knowledge of optics he relied on Aristotle's Meteorologica, Euclid's Optica and Catoptrica, the Optica attributed to Ptolemy, Avicenna's Canon, and perhaps Alkindi's De Aspectibus and Averroes' commentaries on the Physics and probably also on the Meteorologica of Aristotle. He made no reference to Alhazen and it seems improbable that he knew of his work."

70. Dales, "Grosseteste's Sc. Writings", 381 - 402.

71. Ibid., 390. For the background for this theory on the tides see Abu Ma' Shar's Introductorium Maius, Book III, chapters 4 - 8 inclusive for the discussion on the influence of the moon; see chapter 3 for the discussion on the influence of the sun on the sea. See Pierre Duhem, Le Système du Monde, II, Histoire Des Doctrines Cosmologiques De Platon à Copernic, (Paris: Hermann, 1965), 369 - 386. Duhem in analyzing Abu Ma' Shar's theory gave the shortened translation by Herman of Carinthia (printed 1506). The medieval world however also had available to it the full translation of the Introductorium Maius by John of Seville.

72. Dales, "Grosseteste's Sc. Works", 391; see Grosseteste, De Naturum Locorum found in L. Baur, "Die Philosophischen Werke Des Robert Grosseteste Bischofs von Lincoln" in Beiträge zur Geschichte de Philosophie Des Mittelalters 9, (1912) 65 et sq. In regard to Duns Scotus see the Ordinatio above on p. 27.

73. Dales, "Grosseteste's Sc. Writings", 391.

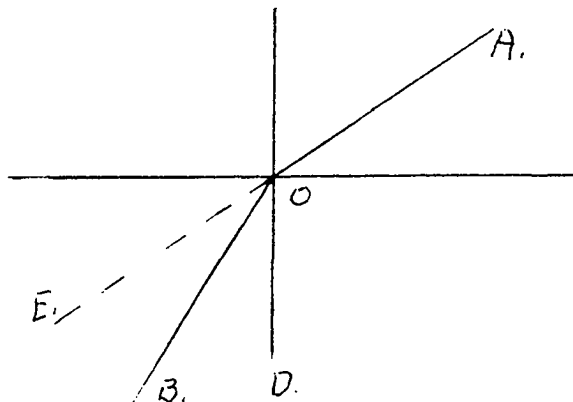
74. Grosseteste, De Lineis found in Baur, "Die Philosophischen Werke", 60 - 61; see also Dales, 394.

75. Grosseteste, De Lineis found in Baur, "Die Philosophischen Werke", 62 - 63; see also Dales, 394.

76. Grosseteste, De Lineis found in Baur, "Die Philosophischen Werke", 64.

77. Ibid., 62 - 64; see also Crombie, R. Grosseteste and the Origins of Exp. Sc., 120 - 123.

78. See the Ordinatio above on p. 27. Bruce Eastwood has suggested that Grosseteste attempted in the De Irade to present a quantative law of refraction. It is his belief that Grosseteste applied the principle of the law of reflection, namely that the angle of incidence is equal to the angle of reflection in the case of refraction. This he did because of the fundamental principles of economy and unity found in nature. Thus according to Eastwood once refraction has taken place at the perpendicular, the new line of advance will equally divide the angle between the perpendicular and the imaginary direct extension of the ray. We can illustrate this by the following figure:



The angles EOB and BOD are thus equal. See Bruce Eastwood, "Grosseteste's 'Quantative Law' of Refraction" in Journal of the History of Ideas, 28, (1967), 105.

79. Crombie, 121; see Grosseteste's De Lineis found in Baur, "Des Philosophischen Werke", 63.

80. Grosseteste, De Lineis, in Baur, 64 - 66; see Dales, "Grosseteste's Sc. Works", 394 - 95.

81. Grosseteste, De Calore Solis found in Baur, "Des Philosophischen Werke", 81; see Dales, 398; Obviously he does not have an inkling of the modern notion of energy and tries to explain heat in a mechanistic way.

82. Grosseteste, De Calore Solis found in Baur, "Des Philosophischen Werke", 83; see Dales, 398.

83. Grosseteste, De Iride found in Baur, "Des Philosophischen Werke", 74 - 75. In regard to this extromission theory we read in the De Iride: "Intelligamus radium ab oculo per medium aeris secundum diaphanum incidentem"; "... sed apparet esse in concursu radii egredientis ab oculo in continuum et directum protractum"

84. Ibid., 73.

85. Ibid., 74 - 75.

86. Ibid., 75 et sq.

87. Ibid., 76 see the translation by Crombie in R. Grosseteste and the Origins of Experimental Science, 125 - 126; see also Carl Boyer, The Rainbow, 91.

88. Grosseteste, De Iride in Baur, "Des Philosophischen Werke", 76; see Crombie translation p. 125.

89. Grosseteste, De Iride, in Baur, "Des Philosophischen Werke", 76; Crombie, 126.

90. Ibid., see also Boyer, The Rainbow, 91.

91. Grosseteste, De Colore, found in Baur, "Des Philosophischen Werke", 78; see also there De Iride, p. 79; see Dales, "Grosseteste's Sc. Works", 398.

92. Grosseteste, De Colore, found in Baur, "Des Philosophischen Werke", 78; see Dales, 398.

93. Grosseteste, De Iride, found in Baur "Des Philosophischen Werke", 77; see also the application in the De Colore, in Baur, pp. 78 - 79; on the subject of color see Boyer, The Rainbow, 93; and Crombie, Grosseteste and the Origins of Exp. Sc., 111.

94. Crombie, Grosseteste and the Origins of Exp. Sc., 115. In this work Grosseteste tried to establish light as the basis for sound; see Boyer, The Rainbow, 91 - 92; note Bonaventure's odd explanation of reflection in terms of sound, see above Chapter IV, p. 180.
95. Sharp, Franciscan Philosophy at Oxford, 115; John Henry Bridges ed. The Opus Majus of Roger Bacon, I, "Introduction", (Frankfurt/Main: Minerva G.m. b. H., 1964), xxi.
96. Stewart C. Easton, Roger Bacon and His Search of a Universal Science. (New York: Russell and Russell Inc., 1952) 9 - 10; Bridges, "Introduction", xxii.
97. Sharp, 115; Easton, 13 - 18, 25 - 26, 35, 88, 93 - 96; 120; Bridges, "Introduction", xxviii.
98. Sharp, 115.
99. Ibid.
100. Bridges, "Introduction", xxiii. He places the date of entry between 1245 - 1250. See also Easton, 118 et sq.; David C. Lindberg "The Lines of Influence", 67; Thorndike, A History of Magic and Experimental Science, II, 620.
101. Sharp, 115; Thorndike II, 620.
102. Ibid.
103. Sharp, 115; Thorndike II, 620; Easton, 25: "Miss Sharp, from a similar study of the sources, comes to the same conclusion that Bacon's scientific and philological interests appeared late, and only after he had become a Franciscan. I think, however, that she goes to the other extreme and puts them too late, since Bacon must have spent 2,000 pounds before he became a friar." The £ 2,000 refers to money Bacon spent on scientific experiments.
104. Sharp, 115 - 116; Easton, 111.
105. Easton, 111; 107 - 108.
106. Thorndike, II, 626; Easton, 137 - 140.
107. Easton, 138.
108. Ibid., 136 - 140; Thorndike, II, 626.
109. Easton, 136.
110. Ibid., 147.
111. Easton, 148 - 149; see 149 et sq. for the order of composition; Sharp, 116; Bridges, "Introduction", Opus Majus I, xxix; Lindberg, "Lines of Influence", 68; see also Thorndike, II, 624 - 5.

112. Sharp, 116.

113. Ibid., 116 - 117: "Thus he refers to Richard of Cornwall as an absolute fool (Comp. Stud. Theol. p. 52), to Alexander of Hales, who he admits was one of the great promoters of the Order, as ignorant of natural philosophy and metaphysics (Op. Tert. p. 326), to Albert the Great or Thomas, as a teacher yet unschooled and one whose works are full of 'puerile vanity and voluminous superfluity' (Op. Tert. p. 30) to William of Moerbeke as an ignorant man undermining philosophy by his false translations (Comp. Stud. Theol. p. 471), to the Dominicans of Paris as the greatest corruptors of the Biblical text (Op. Tert. p. 93), and lastly to the seculars as neglecting theology and philology and relying on the Orders (Comp. Stud. Phil. p. 428)."

114. Easton, 21, see note 2.

115. Bridges, "Introduction" to ed. of Opus Majus, I, xxxi, xxxii.

116. Sharp, 116.

117. Ibid., 118 - 119.

118. Easton, 189 - 91.

119. Ibid.

120. Ibid. 118, 114, 112, 120 - 21; Bridges, "Introduction", xxvii.

121. Bridges, "Introduction", Lxxi; David C. Lindberg, "Alhazen's Theory of Vision and Its reception in the West", in Isis, LVIII (1967), 331.

122. Lindberg, "Alhazen's Theory", 331.

123. Robert Belle Burke, transl. The Opus Majus of Roger Bacon, I, "Introduction" (New York: Russell and Russell Inc., 1962), xii - xiii.

124. Bridges, "Introduction", lxv.

125. Ibid.

126. Ibid., lxii - lv; see Vasco Ronchi, The Nature of Light, trans. V. Barocas, (Cambridge: Harvard U. Press, 1970), 2 - 37; see Rudolph E. Siegel, "Did the Greek Atomists Consider a Non Corpuscular Visual Transmission" in Archive Internationales D'Histoire Des Sciences, Jan. - June, 1969, 3 - 16; Lindberg, "Alhazen's Theory", 321 - 322.

127. Bridges, "Introduction", lxv.

128. Ibid., lxvi.

129. Ibid., Thomas Aquinas also rejects this view of physical emanation. See above Chapter IV, pp. 149 - 150.

130. Ibid., lxvii; see De Multiplicatione Specierum, in vol. II, Bridges ed. of Opus Majus, 457; see also p. 439.
131. Bacon, Opus Majus, Burke transl. II, 485.
132. Bacon, Opus Majus, Part IV (Mathematics) Dist. 2, ch. 1 in Burke transl., I, 130; see above p. 199 where the same line of thought was presented by Grosseteste in a less developed fashion.
133. Ibid.
134. Bacon, Opus Majus, Part IV (Mathematics) Dist. 2 ch. 3, in Burke transl. I, 136.
135. Bacon, Opus Majus, Part IV, Dist. 2, ch. 2, Burke transl. I, 131; see below page 312 in regard to Pecham's use of Euclid.
136. Bacon, Opus Majus, Part V:I (Optics) in Burke transl. II, 473.
137. Ibid., 450.
138. See Alkindi, Tideus, and Pseudo-Euklid: Drei Optische Werke, ed. A. A. Bjornbo and S. Vogel, (Leipzig: B. G. Teubner, 1912).
139. Bacon, Opus Majus, Part V:I, in Burke transl., II, 468 - 69.
140. Ibid., 450.
141. Ibid., 449; see also Distinction III chapter 1 of second section of Part V, in Burke transl. II. 450.
142. Bacon, Part V:I, Dist. 9 ch. 1, Burke transl. II, 483; see Dist. 7 for a full review of the theories of extromission and intromission.
143. Bacon, Opus Majus, Burke transl., II, 484.
144. Ibid., 471.
145. Ibid., 454 - 455.
146. Bacon, Dist. 6, Chapter 3 Part V:I, Opus Majus, in Burke Transl., II, 459 - 60.
147. Ibid., chapter 4, in Burke transl., II, 462.
148. Ibid., 462 - 63.
149. Burke transl., II, 486 - 89.
150. Ibid., 487.
151. Ibid., 486 - 89.
152. Ibid., 484; see page 149. This is an opinion held by Aquinas and most school men.

153. Burke transl. II, 491.
154. Bacon, Opus Majus, Part V:I Dist. 9, ch. 3, in Burke transl. II, 489.
155. Ibid., ch. 4, in Burke transl. II, 491.
156. This notion also appears in Grosseteste, see above p. 203; for Pecham, see below p. 232; and Duns Scotus, see the Ordinatio on p. 27.
157. Bacon, Opus Majus, Part IV (Mathematics), Dist. 3 ch 1, in Burke transl., I, 139.
158. Ibid., 139 - 40.
159. Ibid., 140.
160. Ibid.
161. Bacon, Opus Majus, Part V:III, Dist. 1, ch. 5, in Burke transl. II, 557.
162. Bacon, Opus Majus, Burke transl. II, 460.
163. See the Ordinatio above on p. 28.
164. See the Additiones Magnae above on pp. 55 - 56.
165. Bacon, Opus Majus, Part IV (Mathematics) Dist. 2, ch. 2 in Burke transl., I, 135: This seems like the old theological view which saw lux as the light of God and which according to the Bible was too overpowering for humans to look upon.
166. Ibid., 136.
167. Bacon, Opus Majus, Part IV, Dist. 3, ch. 1 in Burke transl. I, 141.
168. Ibid.; see also the De Multiplicatione Specierum, in the Bridges ed., II, 546 - 7.
169. Bacon, Opus Majus, Part IV, Dist. 3, ch. 1, in Burke transl. I, 141.
170. Ibid., Dist. 2, ch. 2 in Burke transl., I, 131.
171. Ibid., Dist. 3, ch. 1 in Burke transl., I, 141.
172. Bacon, Opus Majus, Part V:III, Dist. 2, ch. 4; in Burke transl. II, 570 - 71.
173. Bacon, De Multiplicatione Specierum, Bridges, ed., II, 478. Bacon tells us that Boethius believed that the lynx's eye could penetrate thick walls.
174. Bacon, Opus Majus, Part IV, Dist. 2, ch. 2, in Burke transl. I, 133.

175. Ibid.
176. Ibid., 133 - 34.
177. Ibid., 134.
178. Ibid., 133.
179. Bacon, Opus Majus, Part V:III, Dist. 1, ch. 1; in Burke transl. II, 547.
180. Bacon Opus Majus, Part V:III, Dist. 1, ch. 3; in Burke transl. II, 550 - 51.
181. Bacon, Opus Majus, Part IV, Dist. 3, ch. 1; in Burke transl. I, 141; See the Reportatio above on p. 42.
182. Bacon, Opus Majus, Part IV, Dist. 2, ch. 2; Burke transl. I, 132; see the Reportatio above on p. 42.
183. Bacon, Opus Majus, Part V:I, Dist. 6, ch. 3; Burke transl. II, 459.
184. Bacon, Opus Majus, Part V:I, Dist. 10, ch. 1 in Burke transl. II, 495.
185. Ibid., 493, 495.
186. Bacon, Opus Majus, Part V:II, Dist. 3, ch. 1 in Burke transl. II, 517.
187. Ibid.
188. Bacon, Opus Majus, Part V:I Dist. 9, ch. 2, in Burke transl. II, p. 484; see Reportatio above on p. 39 and Lectura on p. 46.
189. See above, Lectura, on pp. 48 - 49.
190. See the Additiones on p. 36.
191. Bacon, Opus Majus, Part V:I, Dist. 6, ch. 1, in Burke transl. II, p. 455. In this chapter Bacon explained that the linear species of a large object in the real world can enter the pupil of the eye and organize itself on the surface of the glacialis owing to the divisibility of quantity into infinity.
192. Bacon, De Multiplicatione Specierum, Pars Prima, c. 1, in Bridges ed., II, 409: "Et ut in exemplo pateat haec species, dicimus lumen solis in aere esse speciem lucis solaris, quae est in corpore suo, et lumen forte cadens per fenestram vel foramen nobis satis est visibile, et est species lucis stellae. Et Avicenna dicit tertio De Anima quod lux est qualitas corporis lucentis, ut ignis vel stellae, lumen vero est illud quod est multiplicatum et generatum ab illa luce quae sit in aere, et in caeteris corporibus raris, quae vocantur media, quia mediantibus illis multiplicantur species. Sed tamen usualiter lucem accipimus pro lumine

et e contrario." In regard to this passage see Lindberg, "Alhazen's Theory", 337.

In the citation above Bacon makes reference to Avicenna for the distinction between lux and lumen but the distinction was already in the hexaemeral tradition. Avicenna is only a corroboration of this distinction found in the hexaemeral tradition.

193. See Bridges ed., I, 111: "Omne enim efficiens agit per suam virtutem quam facit in materiam subjectam, ut lux solis facit suam virtutem in aere, quae est lumen diffusum per totum mundum a luce solari."

194. See Bridges ed., II, 133: "Et cum ita sit, tunc si lumen, quod venit a luna et stellis esset lux solis reflexa a superficiebus earum, ut vulgus philosophantium aestimat, tunc in videndo lunam et stellam videremus solem."

195. See Bridges ed., II, 486: "Et non solum sic ostenditur per effectum aequalitatis angulorum incidentiae et reflexionis, sed per alium effectum in coelestibus. Quia enim talis aequalitas est necessaria, ideo lux veniens a luna illuminans totum hemisphaerium habitationis impossibile est quod sit lux solis reflexa a superficie lunae."

196. See Bridges ed., I, 117: "Nam lumen accidentale vocatur respectu lucis principalis venientis a re, quoniam hoc non venit ab agente, sed a multiplicationibus principalibus, ut in domo cadit per fenestram multiplicatio principalis a sole, sed in angulo domus venit a radio fenestra lux accidentalis."

197. Bacon, Opus Majus, Pars V (Perspectiva), II, Distinction 3, c. 7, in Bridges ed., II, 121: "... unde Averroes dicit, quod sol habet illum motum, de quo dictum est superius, plusquam alii planetae, propter fulgorem sui luminis. Et si dicatur quod non omnes stellae fixae scintillant, cum tamen plus distent quam planetae; dicendum est quod illae quae majores sunt et plus habent de lumine scintillant abundantius quam stellae aliae. Unde ad scintillationem requiritur splendor sufficiens, eo quod visio manifesta et sensibilis accidit in scintillatione." See also p. 125: "...; dicendum est, quod sicut splendor debitus, nec superfluous nec diminutus, requiritur ad scintillationem, ut superius dictum est; (et sicut distantia certa similiter: nam tantum possent stellae distare quod non scintillarent, sicut tam parvum lumen aliqua habent quod non scintillant;)"

198. A. B. Emden, A Biographical Register of the University of Oxford to A.D. 1500., vol. 3 (Oxford: 1945), 1445; and David C. Lindberg, Pecham and the Science of Optics (Madison: U. of Wisconsin Press, 1970), 3; placed his birth in the mid 1230's; David Knowles "Some Aspects of the Career of Archbishop Pecham" in English Historical Review, 57, (1942), 3, placed the date of birth about 1220 - 25; Decima Douie, Archbishop Pecham (Oxford: Clarendon Press, 1952) 3, preferred the date 1210 - 20.

199. Knowles, "Some Aspects" 3; Lindberg, Pecham, 5; Emden, 1445; Douie, 1 - 2.

200. Emden, 1445; Knowles "Some Aspects", 3; Lindberg, Pecham, 5.
201. Emden, 1445; Lindberg, Pecham, 5.
202. Emden, 1445; Lindberg, Pecham, 5; Knowles, "Some Aspects", 4.
203. Emden, 1445; Lindberg, Pecham, 5.
204. Lindberg, Pecham, 5; Douie, Archbishop Pecham, 8.
205. Emden, 1445; Lindberg, Pecham, 5; Knowles, "Some Aspects", 4.
206. Emden, 1445; Knowles, "Some Aspects"; Lindberg, Pecham, 6.
207. Emden, 1445; Douie, Archbishop Pecham, 18; Fernand Van Steenberghen, Aristotle in the West, (Louvain: Nauwlaerts Pub. House, 1970) 201 - 228; 89 - 93.
208. Emden, 1445; Knowles, "Some Aspects", 12 - 15; Lindberg, Pecham 6.
209. Knowles, "Some Aspects", 15 - 17; Decima Douie, "The Conflict Between the Seculars and the Mendicants at the Univ. of Paris in the Thirteenth Century" The Aquinas Society of London, Aquinas Paper #23, (London: Blackfriars Pub., 1954), 3 - 30.
210. Knowles, "Some Aspects", 5; Lindberg, Pecham, 6 - 7.
211. Emden, 1445; Lindberg, Pecham, 7.
212. Emden, 1445; Lindberg, Pecham, 7.
213. Emden, 1445; Lindberg, Pecham, 7 - 8.
214. Emden, 1445; Lindberg, Pecham, 8.
215. Emden, 1446; Lindberg, Pecham, 9.
216. Emden, 1446; Lindberg, Pecham, 5 - 6.
217. Knowles, "Some Aspects", 5; Lindberg, Pecham, 9.
218. Lindberg, Pecham, 9.
219. Ibid., 29 - 32.
220. Ibid., 14; see also Lindberg, "Lines of Influence", 81.
221. Lindberg, Pecham, 14; "Lines of Influence", 75 - 77.
222. Lindberg, Pecham, 15; "Lines of Influence", 71.
223. Lindberg, Pecham, 15 - 16; "Lines of Influence", 77 et sq.
224. Lindberg, Pecham, 16; "Lines of Influence", 73, 80.

225. Lindberg, Pecham, 16; "Lines of Influence", 73, 80.
226. Lindberg, Pecham, 17; "Lines of Influence", 73, 80.
227. Lindberg, Pecham, 17; "Lines of Influence", 81.
228. Lindberg, Pecham, 18; "Lines of Influence", 81 - 82.
229. Lindberg, Pecham, 18; "Lines of Influence", 82.
230. Ibid.
231. Lindberg, Pecham, 24; D. C. Lindberg, "Alhazen's Theory", 331.
232. Lindberg, Pecham, 25.
233. Ibid.
234. Ibid.
235. Ibid., 26.
236. See above pp. 203 - 04; and p. 72.
237. See above pp. 198 - 199.
238. Lindberg, Pecham, 25.
239. Ibid., 26, see notes 46 and 47.
240. Ibid., 25, see note 45.
241. Ibid.
242. Ibid., 26; Lindberg, "Lines of Influence", 76, 71 - 72.
243. See above p. 225; Lindberg, "Lines of Influence", 76; see also Lindberg, "Alhazen's Theory", 76.
244. Lindberg, Pecham, 27.
245. Ibid.; "Lines of Influence", 75.
246. Lindberg, "Lines of Influence", 76.
247. Lindberg, Pecham, 27.
248. Ibid.
249. Ibid., 27 - 28.
250. Ibid., 28; For some other works dealing with optics and the anatomy of the eye which were available in the thirteenth century, see pp. 28 - 29; see "Alhazen's Theory", 331.

251. Lindberg, Pecham, 40.
252. Ibid., 20.
253. Ibid., 33.
254. Ibid; see above p. 205 - 206 for a similar division in Grosseteste's De Iride.
255. Pecham, Perspectiva Communis, in Lindberg, Pecham, Prop. I: 1, p. 63.
256. Ibid., Prop. I:2. The numbering of the propositions is that employed by David C. Lindberg in Pecham and the Science of Optics, see pp. xiii - xiv for his explanation.
257. Pecham, Perspectiva, in Lindberg, Pecham, p. 127. Albertus discussed the conflict between the two views of the physicists and philosophers, see chapter IV p. 158 - 159.
258. See above p. 213 - 214.
259. Pecham, Perspectiva, in Lindberg, Pecham, 127.
260. Ibid., 129.
261. Lindberg, Pecham, 35.
262. Pecham, Perspectiva, in Lindberg, Pecham, 129.
263. See above p. 199.
264. Lindberg, Pecham, 36; see also Bacon's De Multiplicatione Specierum.
265. Lindberg, Pecham, 36.
266. For background on what was available in Arabic Medical texts covering the anatomy of the eye and understanding of Galen see: Manfred Ullmann, Die Medizin Im Islam in Handbuch Der Orientalistik, Ergänzungsband VI, Erster Abschnitt, (Leiden/Koln, E. J. Brill, 1970); see especially p. 204 et sq. and 115 et sq., where the activity of Hunain Ibn Ishaq is treated.
267. Lindberg, Pecham, 37; see also Prop. I: 34 - 38 of the Perspectiva, in Lindberg, Pecham, pp. 113 - 121.
268. Pecham, Perspectiva, Prop. I:37, in Lindberg, Pecham, p. 121.
269. Lindberg, Pecham, p. 157.
270. See above pp. 212 - 13; see above the Ordinatio on p. 27.
271. Pecham, Perspectiva in Lindberg, Pecham, p. 109; see p. 108, Prop. 27: "Et quia actio in directum est faciliior et fortior nature, necesse est ut omne corpus naturale seu visibile seu non visibile suam speciem

multiplicet in continuum et directum, et hoc est radiare."; see above p. 217 and p. 203.

272. Pecham, Perspectiva, Prop. I:27(26), in Lindberg, Pecham, 109.

273. Pecham, Perspectiva, Prop. I: 14(29), Lindberg, Pecham, 89.

274. Pecham, Perspectiva, Prop. II:1, in Lindberg, Pecham, 157; see also there p. 45.

275. Ibid.; this is empirically evident. The upper layers of a body of water are illuminated while some of the rays are reflected from the surface of the water.

276. Pecham, Perspectiva, Prop. II:2, in Lindberg, Pecham, 159.

277. Pecham, Perspectiva, Prop. II:6, in Lindberg, Pecham, 161.

278. Ibid.

279. Ibid.; see also Prop. I:15, in Lindberg, Pecham, 91.

280. Pecham, Perspectiva, Prop. I:14 - 16, in Lindberg, Pecham, 89 - 93; and Prop. III:1 - 3 of the Perspectiva, in Lindberg, p. 213; see also in Lindberg, pp. 49 - 50.

281. Pecham, Perspectiva, Prop. I:15, in Lindberg, Pecham, 91; see also Prop. I:6 on p. 65.

282. Lindberg, Pecham, 49.

283. See above the Reportatio, on p. 15.

284. See the Ordinatio, on p. 28.

285. See the Lectura, on p. 47.

286. Pecham, Perspectiva, in Lindberg, Pecham, 63; see the Lectura, on p. 48.

287. See above the Ordinatio, on p. 27.

288. Pecham, Perspectiva, Prop. I:6 in Lindberg, Pecham, 83; see Lindberg, p. 245 note 32. Alkindi's De Aspectibus is the probable source of this idea; see also page 42, note 46 in regard to Grosseteste's discussion of sphericity in the De Luce, which is somewhat different.

289. Pecham, Perspectiva, in Lindberg, Pecham, 131; see also Lindberg, p. 252. This notion is seen in Alhazen; see the Opticae Thesaurus, Risner ed., Book I, sec. 4, p. 7; see also sec. 39, pp. 22 - 23.

290. Pecham, Perspectiva, in Lindberg, Pecham, 131. This is found in Aristotle's De Sensu; see above in the Ordinatio on p. 26. It is also found in Averroes' Commentary on the De Sensu.

291. Pecham, Perspectiva, in Lindberg, Pecham, 133; see above the Lectura, on p. 47 and Ordinatio, on p. 26.

292. Pecham, Perspectiva, in Lindberg, Pecham, 135; see also Prop. I: 55(58) to 57(60).

293. Ibid., 137.

294. See above the Ordinatio on p. 26 - 27.

295. Pecham, Perspectiva, in Lindberg, Pecham, 103.

296. See the Ordinatio, on p. 28.

297. See above p. 230.

298. Pecham, Perspectiva, in Lindberg, Pecham, 71.

299. Pecham, Perspectiva, in Lindberg, Pecham, 103; see also pp. 44 - 45.

CONCLUSION

The results of the inquiry conducted in the preceeding chapters and Appendixes I and II are of a twofold nature. In the first instance, which deals with the biography of Johannes Duns Scotus and the history of the transmission of his works, we tried to revise, clarify and reevaluate previously presented information. In the second, which is a presentation and analysis of Duns Scotus' light theory as found in Distinction 13 of Book II of the Sentence Commentary, we aimed at breaking new ground.

In regard to the biography of J. Duns Scotus, we tried to demonstrate that contrary to certain opinions held by Luke Wadding, Fr. André Callebaut, and Fr. Ephrem Longpré, Duns Scotus was born in Scotland about 1265, in the town of Duns, in the county of Berwick. Moreover the "Littledean Theory", initially espoused by Fr. Ephrem Longpré, was shown to have been based on forged documents. Furthermore in regard to the history of Duns Scotus' education it has been pointed out that the previously accepted practice of following the reconstruction of his academic career as developed by Fr. Callebaut is no longer acceptable. C. K. Brampton developed a more logical sequence of events in keeping with the academic regulations of the Universities of Oxford and Paris. Brampton's reconstruction has Duns Scotus reading Books I through IV of the Sentences at Oxford in the Scholastic year of 1298 - 99. As for the Paris reading, Brampton saw Duns Scotus delivering an incomplete reading of the Sentences in 1302 - 03 before having to leave Paris due to local political problems. Duns Scotus returned to Paris and read all four Books in 1304 - 05.

As pertains to the historical transmission of his Sentence Commentary, it has been clearly set forth that the editions prior to 1950

were all derived from faulty manuscript texts. Consequently it was indicated that for an accurate reading of the true thought of J. Duns Scotus, one must go back to the manuscript tradition. After discussing the relative merits of the Critical Edition of the Sentence Commentary being produced by the Scotist Commission, it was concluded that the Commission's reliance on the Assisi 137 ms. was indeed probably well founded but, because of a lack of a codicological study and a diplomatic reproduction of the text, the edition showed some weaknesses.

In studying the manuscript tradition it was determined that there exists four versions of the Sentence Commentary for Books I and II under the titles, Ordinatio, Reportatio, Lectura, and Additiones Magnae, and each with its own manuscript tradition. The text of the "Liber Scoti", Duns Scotus' own partially reedited text of the Oxford reading, with its lacunae exists under the title Ordinatio. In the light of the medieval use of the term "reportatio", as applied to a text of a university lecture, it was shown that it represented a copy of student notes on the lecture, which were generally taken down verbatim. The Lectura could thus be identified as a reportation of the Oxford lecture and the Reportatio that of the Paris reading of the Sentences. The fourth version, the Additiones Magnae presents a special case. It is an abbreviation by its editor William of Alnwick of the text of the Ordinatio, as well as an attempt to fill in some of the lacunae in the Ordinatio by borrowing from the Paris Reportation.

In presenting J. Duns Scotus' light theory as seen in D. 13 of the Second Book of the Sentences, the approach taken was to establish a reliable Latin text for all four versions based on the key manuscripts within each tradition. By comparing the Ordinatio and the two repor-

tations, we have tried to produce an integrated picture of his thought on the subject. It was established that this discussion on light in the Second Book of the Sentences is within a long standing tradition of Christian inquiry about the natural world stemming from the hexaemeral literature, exemplified by the Hexaemerons of Basil and Ambrose. Moreover it was pointed out that Peter Lombard incorporated the traditional hexaemeral themes on light and other issues into the Second Book of the Sentences. Duns Scotus unlike the thirteenth century theologians, Thomas, Albert, and Bonaventure, did not include in his exposition all the usual theological considerations found in the Sentence format of Peter Lombard for D. 13.

Central to Duns Scotus' thought on light in D. 13 is the ontological differentiation between the two latin terms for light, lux and lumen. In his exposition he cites Augustine and J. Damascene but not in a theological context. Surprisingly there is no reference made here to the Augustinian - Franciscan doctrine of "Divine Illumination". However, the format of Duns Scotus' discussion remains within the Scholastic framework with a heavy application of Aristotelian logic. In his examination of lux and lumen, Duns Scotus identified light as it exists in the light source as lux. Lux for him was a sensible quality of a substantial form of a celestial body, namely the sun. Lumen was defined as light as it exists in the medium. Lumen is a species or intention of lux. He recognized two types of lumen, primary and secondary. Primary or essential lumen is directly produced by the light (lux) of the sun which is known through the three types of light rays. Secondary or accidental lumen he defined as scattered or diffused light which was produced by primary lumen. When compared with the three

representative theologians, Albert, Thomas, and Bonaventure, it was seen that Thomas and Albert expanded this ontological differentiation to include splendor and radius. Bonaventure added only his unique interpretation of fulgor to the distinction between the types of light. With respect to the students of Optics, it was seen that Grosseteste employed the distinction as seen most clearly in his Hexaemeron and De Luce. Bacon also used the distinction but with some degree of inconsistency, while the distinction between lux and lumen was not employed at all by Pecham in his Perspectiva Communis.

Two other points in Duns Scotus' exposition on light were that light was visible per se and that lumen is a species of lux. In both he refuted Aristotle's position in Liber II De Anima, chapter 7, relying on Avicenna as a corroborating authority.

Inherent in his refutation of Aristotle is the rejection of the extromission theory of vision. This subject was not one of the topics usually discussed in D. 13 of the Sentences. However, we noticed Albert's vehement defense of Aristotle's extromission theory in his Commentary on Liber II De Anima against the natural philosophers and authors of perspective, particularly Alhazen. Albert's defense of Aristotle indicates the hold that the authority of Aristotle had on medieval scholars. Thus we saw both Bacon and Pecham, who followed Alhazen, attempting at one point to work out a compromise between the two theories. This compromise between Alhazen's intromission theory and the extromission theory of the Western Aristotelians was again in evidence in Duns Scotus' text at the point where he introduced the discussion on the three rays.

Of particular interest in the tracts of the Oxfordians, Grosseteste,

Bacon and Pecham, is the use of the word species. This particular use of the word was derived from Grosseteste's metaphysical discussion of light in the De Luce. As used by these authors, species is an actualizing agent, a force emanating from the essence of an object which actualizes the potentialities of matter in the medium as the species traverses the medium. It is a corporeal form without dimension or matter per se. It was discovered that Duns Scotus utilized this meaning of the term in Distinction 13.

In the second part of Duns Scotus' discussion, which deals with the description of the three light rays, there are frequent referrals to the medieval authors of Perspectives. Duns Scotus' familiarity with Alhazen was probably not direct but through the works of the Latin authors of Perspectives who utilized Alhazen. Duns Scotus exhibited an understanding of the basic principles of the laws of reflection and refraction. Albertus, while being aware of these principles, did not fully comprehend them. Bonaventure's understanding of these principles, as evidenced in the texts examined, was minimal. Also in evidence was the common tendency on the part of Grosseteste, Bacon, and Pecham to explain these principles in terms of geometrical optics. In Duns Scotus' Ordinatio and the two reportations, this tendency was not so pronounced. However, in the Additiones Magnae the introduction of mathematical considerations were more visible. In addition the Additiones offered more specific references to Alhazen and Euclid and a deeper understanding of optical principles. This is perhaps a reflection of the mathematical and scientific interests of William of Alnwick.

Writing at the opening decade of the fourteenth century Duns Scotus abandoned in his exposition on Distinction 13 the traditional

theological considerations. He pursued a line of discussion more in the realm of a natural science, which rejected the traditional medieval reverence for the authority of Aristotle. It was a harbinger of things to come in the later fourteenth century. Indeed the text of the Additiones Magnae, compiled by William of Alnwick, since it deletes the initial logical propositions and introduces more mathematical and optical considerations, points in the direction that the students of natural questions were going. The fourteenth century scholars were heading in their investigations of natural world in a direction that was less theological and logical and more mathematical and scientific.

APPENDIXES

Appendix I.

The Biography of Johannes Duns Scotus

The biographical details of the life of Johannes Duns Scotus have been the object of controversy for years, while historians and biographers have tried to reconstruct his life as accurately as possible from the meager reliable sources available. The areas of controversy touch on four points: first, the country of his birth; second, whether Duns is a place name or family name; third, the date of his birth; and fourthly, the details of his education.

His Nationality

As early as the seventeenth century, one sees evidence of various schools of thought on the origins of J. Duns Scotus and the various national claims to the Subtle Doctor. England, Scotland, and Ireland have all claimed him for themselves. Luke Wadding in his 17th century history of the Franciscans of England, Scotland and Ireland, known as The Annales Minorum¹ championed the Irish claim, while dismissing the claims of the other two nations. Here Wadding admitted, that there are uncertainties concerning the biographical details of Duns Scotus' life. He stated that national pride had caused the English, Scotch and Irish to offer rivalling claims to the illustrious doctor.² Wadding dismissed the position of those, who following Leland claimed, that the Subtle Doctor was English on the basis of an explicit from a Merton College manuscript. Wadding explained away this evidence by stating that it was only a scribal witness to the fact that Duns Scotus was English and this could easily have been a case of the scribe's national pride.³ Some champions of the English cause base themselves on evidence seen in the Liber Confirmatus (c. 1399) by Bartholomaeus Pisanus, who related that during the integration of the Scotist and English Provinces in 1260, the English came to the Scottish monasteries of, "... Dumfrisii, Bervici,

Adingtonae, Dundae et alii."⁴ Pisanus indicated that Johannes Duns Scotus was one of these English monks who came to Dumfries.⁵ Wadding rejected this view stating that because so much of his career was spent in England and the English Province of the Franciscan Order, he was easily mistaken for an Englishman.⁶

Wadding easily dismissed Scotland as the place of Duns Scotus' birth, stating that until recent times Hibernia was called Scotia and that many Irishmen were referred to as Scots.⁷ In support of his claim that Ireland is the birth place of Duns Scotus, Wadding cited a statement by Nicolus Vernuleus, a Belgian professor at Louvain to the effect that J. Duns Scotus was from Hibernia.⁸ This statement was drawn from a panegyric by Vernuleus in honor of the memory of Duns Scotus. Wadding also cites an Italian Paulus Amathaeus, c. 1490, who in an epigram praising Duns Scotus' Commentaries on the Metaphysics of Aristotle stated that Johannes Duns Scotus and the Irish archbishop Mauritius de Portu were countrymen.⁹ In fact Wadding points out that they were from the same region of Ireland.¹⁰ Moreover Wadding located the town of Duns as being situated on an extreme promontory of the Isthmus of Lecalia, an ancient Episcopal seat and an area famous for such Irish saints as Columban and Bridget.¹¹

Wadding also believed that Duns was the name of a town in Ireland, because as he pointed out, it was a common practice in Ireland, Scotland, Belgium and Italy to derive a family name from the town where the family originated.¹²

The later confusion obscuring Duns Scotus' Irish origin stemmed partly, he said, from the fact that in 1260, St. Bonaventure, the Minister General of the Franciscan Order put the Provinces of Scotland and

Ireland under the direction of the Province of England.¹³

Wadding's position then is that Duns Scotus was born in Ireland, then called Scotia, and came to England where he attained fame. This is borne out by the epitaph on the tomb of Duns Scotus, which Wadding quotes: "Scotia me genuit, Anglia me suscepit. Gallia me docuit, Colonia me tenet."¹⁴

During the early part of the twentieth century we find Fr. André Callebaut taking Wadding's position and basic argument namely that Scotia meant Ireland. Fr. Callebaut wrote an article championing the Irish claim to Duns Scotus but in later years he supported the view favoring Scotland.¹⁵

Other twentieth century researchers of the question seem to have amassed more substantial evidence contrary to the position espoused by Wadding in the 17th century and his one time 20th century adherent. Fr. Carlos Balic demonstrated how modern researchers have dismissed the Irish claim based on the Wadding thesis, as well as the claims of England to the Great Master, leaving us with Scotland as the place of his birth. Evidence will also be presented that has been amassed to substantiate the Scottish birth site.

Beginning therefore with the Irish claim, it is recognized that St. Isidore of Seville in Book 14 of the Etymologiae, chapter 65 - 66 stated that Ireland was called Scotland.¹⁶ The implication being that a person referred to as Scotus could have actually been Irish. However this was true only up to the ninth century.¹⁷ To confirm this point Fr. Balic made reference to evidence based on two documents, one of the 12th century and one of the 13th, which illustrate that Ireland and Scotland had separate and distinct titles. The first is from an 1188

Papal Bull of Pope Clement III addressed to the king of Scotland, "Clemens episcopus ... carissimo filio Guilelmo illustri Scotorum regi ...".¹⁸ The other is from Pope Innocent III addressed to king John Lackland, who was king of England and Lord of Ireland, "Johannes Dei Gratiae rex anglorum dominus Hyberniae."¹⁹ Hence by the late 13th century the association between Scotland and Ireland made by Isidore in the ninth century was no longer in use and so the use of Scotus in the 14th century actually indicated a person from modern day Scotland.

England's claim to Duns Scotus is based on manuscript evidence. In the explicit of ms. 12 of the Library of Todi there is a statement that Duns Scotus belonged to the English Province. It reads as follows: "Explicit Summa I. Duns Provinciae Anglicanae ...".²⁰ However this can easily be explained away in the sense that Duns Scotus was a member of the Franciscan religious Province of England. Scotland had ceased to be a separate Province of the Order in 1260. Thus the claim for England as the country of Duns Scotus' birth is weakened.

Balic presented us with some manuscript evidence to substantiate the modern position that Duns Scotus was born in Scotland. He observed that Johannes Duns Scotus was frequently called Johannes Duns in English manuscripts. However outside of England we find, in the manuscripts of his works and in the manuscripts of the works of his contemporaries, evidence that our man was called John Scotus. For example, the famous Assisi manuscript of the Bibliotheca Communale, number 137 and the Vatican ms. Latin 876 both read: "Expliciunt questiones fratris Johannis Scoti".²¹ Frequently one sees reference to the "Liber Scoti".²² Some documents explicitly state that he was called "Scotus" or "de Scotia", as for instance, the early fourteenth century poem "Scotia Plange",

which is preserved in the ms. B.I. of the Canterbury Library.²³ In this manuscript one may read, "De Scotia genitus Johannes".²⁴ Again in ms. 66 of Merton College we read, "Super I de Ordine [i.e. Ordinatione] Fr. I. Duns de Ordine Fratrum Minorum, natione Scoti."²⁵; and in ms. 1461 of Rottenberg Seminary we read, "Explicit tractatus primi principii parisiensis doctoris subtilis Johannis Dinis natione Scotis."²⁶ Lastly there is the evidence from the tomb in Cologne which reads, "... Scotia me genuit....".²⁷

Moreover, in the Roll of the Archives of Paris, which was discovered by Fr. Ephrem Longpré, the names of those who had to leave the University of Paris in 1303 due to the trouble between Boniface the Eighth and king Philip the Fourth of France, are listed by nationality. Here the Scots, English and Irish are clearly distinguished. Duns Scotus is among those listed: "...Fr. Johannes Scotus, Fr. Richardus Hibernensis, Fr. Odo Hibernensis, Fr. Thomas Anglicus, ...".²⁸

Hence on the basis of the foregoing modern biographers have concluded that Scotland was the native land of Duns Scotus.

Place of Birth

The next subject of scholarly controversy in the biography of Duns Scotus has been over whether or not Duns is a family name or a place name. Let us first note some manuscript evidence which highlights the problem. In the Balliol College ms. 208 and the Vatican manuscript Latin 876 we see the title, "Magister Johannes Duns." This would indicate that Duns was a family name. However in the Assisi ms. 137 the explicit indicates that Duns is a town, since we read in that manuscript, "Explicit tabula quaestionum super primum librum sententiarum de ordinatione unius quondam doctoris theologiae sollemnis, scilicet Fratris Johannis de Duns

Scoti de Ordine Fratrum Minorum."²⁹

Further evidence in favor of Duns being a town comes from the Liber Procuratorum Nationis Anglicanae, which is dated February 10, 1349. This document stated that a certain Thomas of Duns became the Proctor of that nation. The Latin reads, "... Dominus Thomas de Duns, Scotus ...".³⁰ The Liber Procuratorum also stated that this Thomas was a cleric of the Diocese of St. Andrew, which Diocese is in the Province of Berwick where there is a town called Duns.³¹ Thus we have two fourteenth century bits of evidence of the existence of a town called Duns.

The case of the town of Dunse in the county of Berwick, as the town of J. Duns Scotus' birth was championed by the Protestant Pastor of Dunse, 1760 - 1797, Dr. Robert Bowmaker, in his book, The Parish of Dunse County of Berwick.³² Dr. Bowmaker, claimed in accordance with a longstanding local tradition that Johannes Duns Scotus' family were the heritors of the Parish of Dunse and proprietors of that estate. According to Dr. Bowmaker, the father of Duns Scotus, who lived in the town of Dunse, was the younger brother of the Grueldykes family. The traditional family lands adjacent to the town were called "Duns half of Grueldykes". Balic felt that the weight of such a tradition could not be ignored.³³ R. G. Johnston added to this information in explaining that the house in which our man was born stood close to the West Lodge. Today, according to Johnston, this West Lodge is called the "Pavillion of Duns Castle".³⁴

Thus the explicit of the Assisi manuscript and the evidence seen in the Liber Procuratorum suggests that Duns is a place name. Moreover the evidence of the Liber Procuratorum places Duns in the county of

Berwick in Scotland. These facts are substantiated by local evidence and tradition attested to by Dr. Bowmaker's book to the effect that Duns is a place name and that the village of Duns in Berwick is often associated with Duns Scotus' family.

There has existed, especially since 1931, a school of thought which claims that Duns is a family name. The basis for this claim rests on the supposed existence of a document known as the Registrum Fratrum Minorum Conventualium. In 1929 after his discovery of the Paris Roll mentioned above,³⁵ Ephrem Longpré was introduced to what has since become known as the "Brockie Manuscripts."³⁶ Brockie is Father Marianus Brockie, an 18th century Benedictine, who wrote a ten volume unpublished History of the Religious Orders in Scotland. This work is frequently referred to as a Monasticon.³⁷ In this work, in the course of his treatment of the Franciscans of Scotland, Brockie used certain alleged manuscript sources which supposedly threw some light on the early life of Johannes Duns Scotus. These so called "Brockie Manuscripts" were kept at St. Mary's College near Aberdeen.³⁸ The manuscript source quoted by Brockie refers to a certain Elias Duns, who was the guardian of the Friary of Dumfries and who later became the Vicar General of the Conventuals of Scotland. Elias is also described as the uncle of Johannes Duns Scotus and his brother Ninian of Littledean is supposedly the father of Johannes Duns Scotus.³⁹ Littledean is in the parish of Maxton in Roxburgsshire,⁴⁰ which places the birth place of Duns Scotus in another town and county of Scotland.

Fr. Longpré announced this new information in 1929 in the "Miscellanea" of the Archivum Franciscanum Historicum entitled "Nouveaux Documents Franciscains d'Ecosse".⁴¹ This was followed in 1931 by an article by Fr. Callebaut, "A Propos du Bx. Jean Duns Scot de Littledean".⁴²

Others who were impressed by the Brockie manuscripts included such noted Scholastic, Franciscan, and Scotist scholars, as A. G. Little,⁴³ Dorothea E. Sharp,⁴⁴ Bettoni, Scaramuzzi, Copleston, Gilson, Callus, Delhay and others.⁴⁵ Among the leading skeptics and eventual debunkers of the "Littledean Theory" are Fr. Carlos Balic, Fr. L. Meier,⁴⁶ Fr. Henry Docherty and Fr. Anthony Ross.

The basis for the "Littledean Theory" rests on the authenticity of the Register of the Franciscan Conventual House at Haddington supposedly transcribed by a William Tweedy, a clerk or notary at Haddington toward the end of the 16th century.⁴⁷ Brockie claimed that he had received this document from a certain James Tweedy, an alleged descendent of William Tweedy.⁴⁸

Fr. Balic was suspicious of the Brockie evidence and asked Fr. Ludwig Meier to examine the manuscript closely. In February of 1950 Fr. Meier reported by letter to Carlos Balic that, on the basis of his, Fr. Anthony Ross' and other's investigations, the volumes of of Marianus Brockie's Monasticon were not to be regarded as having any historical significance in reference to Johannes Duns Scotus.⁴⁹ Carlos Balic in 1953 examined Brockie's Monasticon himself at St. Mary's College in Blairs. He came away convinced that the Monasticon was not reliable.⁵⁰ Balic reported:

I discovered that the author not only has a peculiar way of expressing himself but also contradicts himself on several counts. Thus on p. 9216 of Brockie's Monasticon Elias Duns is said to have been the son of Ninian Duns, while on p. 9248 he is called Ninian's brother, or at least the brother of a certain Ninian. On p. 2901 of the Monasticon the supreme ruler of the Order of Friars Minor is called Magister Generalis, while at the time of Brockie's writing the only name by which he was known was that of "Minister Generalis".⁵¹

In 1956 Fr. Henry Docherty undertook a full study of the Brockie

Monasticon.⁵² Fr. Docherty published the results of that study in a paper delivered at Edinburgh in 1966 at "The International Congress of Scotist Scholars".⁵³ We will present here a summary of his conclusive study on the historical value of the Brockie Monasticon in relation to Duns Scotus.

Brockie's Monasticon exists today in four forms; the author's working notebook, his autograph, and two copies, namely the Wilson Transcript, and the copy of Ratisbon.⁵⁴

Father Docherty, after searching through the 16th century public records of Haddington and the Tweedy family records, concluded that William Tweedy never existed.⁵⁵ Moreover he failed to arrive at any positive identification of James Tweedy, who allegedly supplied Marianus Brockie with the "Tweedy Codex".⁵⁶ Also Fr. Docherty noticed that the many charters mentioned in the historical summaries appearing at the beginning of each chapter in the Monasticon all seemed to be similar in construction. After careful analysis, he concluded that they all came from the same source, namely Marianus Brockie.⁵⁷ The Tweedy manuscript, which was the basis for the "Littledean Theory",⁵⁸ upon careful scrutiny also proved to be a forgery. Of more special interest is the fact that the section dealing with the early life of Johannes Duns Scotus was actually presented by Brockie three different times in his holograph and somewhat revised each time.⁵⁹ Hence following Docherty's conclusions, all information on the early life of Duns Scotus derived from Brockie, the whole "Littledean Theory", based on the Tweedy manuscript must be discounted.

Date of Birth

Thus far we have discussed the question of Duns Scotus' place of birth and nationality, leaving the question of the date of his birth

to be examined. Once again we are forced due to a lack of real evidence to arrive at that year by circuitous means, that is by computing the date from some known events in his life. The two known dates are the day he entered the Order and the date of his ordination. It is known that Elias Duns brought his nephew to Dumfries in 1278 - 79.⁶⁰ Since canonically no one could enter the Order, who was less than fifteen years of age,⁶¹ that minimum age would place the date of Duns Scotus' birth about 1263 - 1264. Again working from a known date, his ordination on March 17, 1291,⁶² we arrive at the date 1266 for his birth. The canonical age for ordination to the priesthood was thirty years of age but the Franciscans were allowed by Rome to ordain members of the Order at the age of 25 years. Accepting that Johannes Duns Scotus was 25 at the time of his ordination, then 1266 would have been the latest date for his birth. Some historians claim that he was born between December 23, 1265 and March 12, 1266.⁶³ However it is entirely possible that Duns Scotus was older both on the date of his entrance into the Order and at the time of his ordination than we have surmised above. Most Scotist scholars accept for now the middle year 1265 as the probable date of his birth.

His Education

In regard to Johannes Duns Scotus' education, we are again in the dark because of a lack of any substantial information, particularly for the years 1280 - 1302. Hence the biographical details we have for these years are a reconstruction established by Fr. André Callebaut and more recently a presentation by C. K. Brampton. Fr. Callebaut's reconstruction is based on the life of William Peter di Godino O.P., a contemporary of J. Duns Scotus;⁶⁴ whose career is known to us in detail.

Callebaut set up di Godino's academic career as a model for that of J. Duns Scotus. Thus it was reckoned by Fr. Callebaut that between 1281 and 1282, Johannes Duns Scotus was a student of the Arts. For the years 1283 - 84 he was a student of the natural sciences and from 1287 - 89, a student in the Studium Sollemne of sacred theology. Duns Scotus according to Callebaut was a Lector in some Seminary of studies from 1290 - 1291 and a Vice Lector in a Studium Sollemne 1291 - 1292.⁶⁵ It is the opinion of A. G. Little that in 1291 J. Duns Scotus was in England.⁶⁶ Little stated most definitely that at the time of his ordination, 1291, Duns Scotus was studying at Oxford.⁶⁷ According to Fr. Callebaut's biographical reconstruction, he was sent to the University of Paris in 1293,⁶⁸ since it was the custom of the Order of Preachers and Friars Minor to send specially qualified personnel there to complete their studies.⁶⁹ While at Paris, Duns Scotus studies under Gonsalvus of Spain and James of Carieto.⁷⁰ Between 1297 and 1300 Duns Scotus was back in England again.⁷¹ It has been stated by both Callebaut and Balic that during these years he commented on the Sentences of Peter Lombard at Cambridge,⁷² as evidenced in the Merton College ms. number 66. This ms. contains Books I and IV of the Sentence Commentary. On folio 120v one can read in the colophon: "Hec de ordinatione venerabilis fratris J. D. Duns de Ordine fratrum Minorum, qui floruit Cant [abrigie], Oxon[ie] et Parisiis et obiit in Colon[ia]".⁷³ The remains of his unpublished lectures are also found in ms. 12 of the Library of Todi in Italy.⁷⁴

While in England it is believed that Duns Scotus' Master was William of Ware.⁷⁵ Somewhere between 1300 and 1301 Duns Scotus lectured on the Sentences, Books I to III at Oxford.⁷⁶ Little placed him in the Oxford

area at this time basing himself on evidence found in the Liber Memorandum of John Dolderby, Bishop of Lincoln, that on July 26, 1300 Father Hugh of Hartlepool, Minister Provincial of England, presented to him 22 Friars Minor from the monastery of Oxford to receive permission to hear confession in the diocese. Among those friars was Johannes Duns.⁷⁷

In 1302 he was sent to Paris where he once more commented on the first and fourth Books of the Sentences in 1303.⁷⁸ In 1303, his studies were interrupted, because of the difficulties between Pope Boniface the Eighth and King Philip the Fourth of France. Duns Scotus returned to Oxford for one year, during which time scholars believe he completed Book IV of the Oxford Commentary.⁷⁹

The question has been raised as to whether or not Johannes Duns Scotus commented twice on Book III of the Sentences at Paris,⁸⁰ once in 1303, D. 1 - 17 and again in 1307. Luke Wadding claimed that at the end of 1307 Duns Scotus again expounded on Distinction 18 of Book III of the Sentences alone as part of a Disputatio in Aula. Furthermore, Distinctions 19 - 37 of the Third Book, Luke Wadding regarded as the work of a follower of Duns Scotus and not Duns Scotus himself.⁸¹

However after an examination of four manuscripts C. Balic contended that Duns Scotus did lecture on Distinctions 19 to 40 but at a date later than Distinctions 1 - 17, probably in 1307,⁸² as part of a full reading of that Book.

The four pieces of manuscript evidence are found in the Worcester Cathedral manuscripts F. 69 and F. 39; the Oxford Balliol College ms. 206; and the Oxford, Merton College ms. 62.⁸³ Manuscript F. 69 of Worcester contains all four Books of the Commentary on the Sentences.

Book III appears on f. 133va, "Incipiunt questiones tertii libri sententiarum. Queritur utrum possibile sit naturam humanam person-aliter uniri soli persone divine ...",⁸⁴ and ends on folio 157va with Distinction 17 which concludes with, "... est oratio exaudita in re petita."⁸⁵ The table of contents lists the 17 questions for Book III and goes on to list the questions for Book IV. The explicit in the table of contents, ff. 158ra - 160va, gives us the date of composition of the lecture on the Sentences. We read on f. 159ra, "Expliciunt questiones sententiarum date a fratre J. (in another hand there is written "hanc Duns") magistro in studio Parisius anno Domini M^oCCC^oIII^o".⁸⁶ Thus this manuscript supplies us with evidence of an incomplete commentary on the first 17 Distinctions of Book III probably done in 1303.

That a full presentation on all the Distinctions of Book III was done can be derived from information found in the Worcester Cathedral ms. F. 39, as supplied by Fr. Balic. We notice that folio 3r of this particular manuscript announces, "Scotus in 2^o et 3^o Sententiarum".⁸⁷ After Book II there followed a listing of the questions for Book III, which listing ends with Distinction 17. However, there then follows in a different hand, "Hucusque de alio scripto".⁸⁸ Book III on examination by Balic revealed Distinctions 1 - 17 ending with, "... oratio exaudita est in re petita", representing one lecture of J. Duns Scotus on The Sentences. This reading is immediately followed by a second beginning with D. 16 and continuing to D. 40. The reading for D. 1 - 17 corresponds to the course found in ms. F. 69 of Worcester and the second reading, D. 16 - 40, corresponds to the Opus Oxoniense or as it is commonly called the Ordinatio.⁸⁹ Hence we know of the existence of two

versions of Book III, one incomplete and another complete version which the editor of the Worcester Cathedral ms. F. 39 used to complete his manuscript text of Book III.

C. Balic confirmed this situation with his observations on the two Oxford manuscripts. The Merton College ms. 62 states clearly the case for an incomplete version done at Paris and a full version at Oxford. As Balic reported, f. iv of the Merton ms. reads:

Hec suscripta volumine continentur in isto.
Lectura Scoti doctoris subtilis super tertium librum
sententiarum in universitate Oxoniensi. Item lectura
eiusdem completa super eundem tertium in universitate
Parisiensi. Item eiusdem lectura super eundem tertium in
universitate Parisiensi incompleta. Cuiuslibet horum operum
tabula questionum finem eius sequitur.⁹⁰

The complete version begins on folio 174r with D. 1 and is abruptly ended in the midst of D. 37. The manuscript is reported to be mutilated at this point and it continues in the midst of the third Distinction of what is recognized to be the incomplete commentary identical to the Worcester ms. 69.⁹¹ The reading ends with D. 17: "... oracio exaudita in re petita. Explicit lectura incompleta Doctoris subtilis in universitate Parisiensi super tertium librum sententiarum...".⁹²

The Balliol College ms. 206 lends even greater clarification to the picture. The cover of the manuscript bears the inscription "Gulielmus Parisiensis in Opere Parisiensi super quatuor libros Sententiarum. Ms. 2 vol. 206".⁹³ This inscription Balic said was corrected in another hand to read "Duns Scotus instead of Gulielmus".⁹⁴ The manuscript has the complete Commentary of Johannes Duns Scotus on Book III, that is D. 1 - 40.⁹⁵ After Distinction 40 there appears, "Explicit lectura completa Doctoris subtilis in universitate Parisiensi super tertium librum sententiarum, sc. Doctoris Iohanis Duns, ...".⁹⁶ This is followed by Distinctions 1 - 17 which are identical with that incomplete

commentary found in the Worcester manuscript.⁹⁷ Distinction 17 ends with: "... oracio exaudita in re petita. Explicit lectura incompleta Doctoris Subtilis in universitate Parisiensi super tertium librum sententiarum, sc. doctoris Johannis Duns."⁹⁸

So it would seem that on the basis of the four manuscripts: the Worcester Cathedral mss. F. 69 and F. 39; the Balliol ms. 206; and the Merton ms. 62, that besides the Commentary done at Oxford on the Sentences, Duns Scotus lectured on Book III of the Sentences twice at Paris, once in 1303 on the first 17 Distinctions and a second time perhaps in Balic's opinion in 1307 on all the Distinctions, 1 - 40.

To return now to the development of the chronology of the events in the life of Duns Scotus. On April 18, 1304 Pope Boniface the Eighth revoked his decree depriving the University of Paris the privilege of granting degrees and so Duns Scotus returned to Paris.⁹⁹ It is at this time that he finished Books II and III of his Paris Commentary on the Sentences.¹⁰⁰ In 1304 Duns Scotus became a candidate for his theology degree as witnessed by the letter of Gonsalvo of Spain, Minister General of the Franciscans, to the Minister Provincial of France;¹⁰¹ which degree he received either in 1304 or 1305. Little suggests that 1305 - 06 was spent disputing questions with such notables as Hervé de de Nédellac and William Peter di Godino.¹⁰² Between 1306 - 1307 Johannes Duns Scotus was a Magister Regens at Paris until 1307, when he was transferred to be a Lector Principalis at Cologne, where he died on November 8, 1308.¹⁰³

The chronology, which we have just presented has in the past been generally accepted as the probable course of events in the life of Johannes Duns Scotus. However there have been some dissenters and those who felt that trying to make the student career of J. Duns Scotus

coincide with that of William Peter di Godino O.P. was far from suitable, and so in more recent years some retracing of old ground and some reevaluation has been done.

In 1964 C. K. Brampton published an article in Franciscan Studies entitled "Duns Scotus at Oxford 1288 - 1301". In this article Brampton presents several points of view on the biographical details of the life of Duns Scotus, which are at variance with the views of Callebaut, Little, and Balic, whose views we have just presented. Brampton differs on the following points: the length of Duns Scotus' stay at Oxford; the date of his initial stay at Paris; the order in which he read the Sentences at Paris; the so called neglected reading of Book IV at Oxford; and the additional reading of Book III of the Paris lecture in 1307.

First, in regard to his arrival at Paris and the length of his studies at Oxford, Brampton saw the year 1302 as an incontestable date in the biography of Johannes Duns Scotus. The Worcester Cathedral ms. F. 69 places Duns Scotus at Paris, reading the Sentences in that year.¹⁰⁴ Father Callebaut had Duns Scotus in Paris in the 1290's. Brampton cited the ordination list of 1291 and the application to Bishop Dolderby for permission to hear confession as a means of placing Duns Scotus in Oxford for the opening and close of the last decade of the 13th century.¹⁰⁵ He refuted Callebaut's contention that Duns Scotus had to be in Paris between 1291 and 1300. Callebaut had based his argument on the statutes of the faculty of Theology at the University of Paris as found in the Chartularium, which stated that for the theology degree one had to spend nine years at Paris and that the University regarded one year at Paris as equivalent to two years spent

anywhere else.¹⁰⁶ Following from this, if Duns Scotus read the Sentences in 1302, he therefore had to begin his studies at Oxford 18 years earlier in 1284. This would have been too early for Duns Scotus to be at Oxford, so Callebaut had Duns Scotus at Paris prior to 1302.¹⁰⁷ Brampton stated that Little in support of Callebaut had stated in reference to this statute, "By this however it is not intended to derogate in any way from the privileges of the mendicant friars or other privileged religious" and Little continued, "The privileges of the Friars in this regard are not, so far as I know, anywhere stated, ..."¹⁰⁸ However, Brampton says that they are so stated in the Char-tularium II p. 692: "Whereas the seculars were obliged to study for 9 years the mendicants were required to study 7 years." So therefore Duns Scotus would have spent only 14 years at Oxford, and said Brampton, we can easily place him at Oxford for thirteen years leaving only one more year needed for Duns Scotus to be admitted to the reading of the Sentences at Paris in 1302.¹⁰⁹

Furthermore, Brampton plays down the importance of the letter of Gonsalvo de Valboa as part of the evidence placing Duns Scotus in Paris prior to 1302. He pointed out that as other Minister Generals of the Franciscan Order before him had at some time traveled across the English Channel, so it is possible that Gonsalvo had done the same and in so doing had gained personal knowledge of Duns Scotus' ability in Oxford rather than Paris.¹¹⁰

As a further argumentation against an earlier stay at Paris, Brampton questions why the Order did not send Duns Scotus to Paris right at the beginning of his education, if a Paris degree was more advantageous? Again Brampton asked, why did the Order once starting Johannes Duns

Scotus at Oxford send him to Paris when he was so close to completion at Oxford? He doubts the latter case ever took place, since there is no real evidence to place the Subtile Doctor at Paris prior to 1302.¹¹¹

The question then is, if Johannes Duns Scotus did not go to Paris prior to 1302, when did he begin the course at Oxford?

Wadding had presented evidence from the Pars Secunda of the Prologue of the Ordinatio of Book I to the effect that J. Duns Scotus had begun lecturing on the Sentences in 1300.¹¹² However Brampton demonstrated that if one examined the Lectura,¹¹³ that is the text given by Duns Scotus in the Oxford classroom as opposed to the Ordinatio, which is the same work but reworked and reedited by Duns Scotus afterwards, one would find that the Lectura has four parts and that the Ordinatio has five parts. The Pars Secunda found in the Ordinatio does not appear in the Lectura. It is this Pars Secunda that refers to the Battle of Medjamaa in 1300. Since the Lectura was given first before the Ordinatio was reedited, the Master then began his Oxford lectures prior to 1300.¹¹⁴

Following the outline of the academic practices at Oxford, Brampton developed J. Duns Scotus' Oxford years along the following lines. The first 6 of the thirteen year program were given over to the study of theology. After this the student spent two years learning to oppose and one year in learning to respond. Each year says Brampton one student was required to remain at Oxford for one year longer as a "baccalaureus theologiae". Thus in the tenth year the student prepared his course on the Sentences and read the Sentences in the eleventh year. This was followed by a year of lecturing on the Bible and then the student disputed in the thirteenth year. At Oxford the student on receiving

the degree spent the remainder of the graduating year and the following year teaching.¹¹⁵ We know from the Worcester Cathedral ms. 99 that Duns Scotus took part in a Disputation under Richard of Bridlington on July 26, 1300. If this was Duns Scotus' thirteenth year then he would have begun the Oxford program in October of 1288 and finished it in June of 1301, lecturing on all 4 Books of the Sentences between October 1298 and October 1299.¹¹⁶ Duns Scotus still had one year to go to meet the fourteen year requirement of the University of Paris. Brampton suggested that Duns Scotus spent 1301 - 1302 in all likelihood lecturing on Propyry, the Predicaments, the Perihemenias and the Elenchi, as in the case of William of Ockam.¹¹⁷

We have evidence from the Merton College ms. 66 that Johannes Duns Scotus also attended Cambridge.¹¹⁸ Brampton suggested the years 1284 - 1288 for his stay at Cambridge, since the Friars before entering the theology program at Oxford were obliged to have studied philosophy for eight years, four years for the B.A. and four years for the M.A. degree.¹¹⁹ Brampton discounted the contention of Balic, Callebaut and J. F. Bonnefoy that Duns Scotus also read the Sentences at Cambridge between 1298 and 1300, because of Scotus' prior commitment to the Oxford program.¹²⁰

Following the order supported by Balic, Callebaut and others, Duns Scotus did not lecture on Book IV at Oxford until after 1302. Moreover in his Paris lecture of 1302 - 1303 Duns Scotus jumped from Book I to Book IV breaking the sequence ostensibly because at that time he had not as yet read Book IV at Oxford. Following from this, it is only reasonable that during the time of his exile from Paris in 1303, Duns Scotus read Book IV at Oxford.¹²¹

Brampton took exception to the above outline of events. He pointed out that during the academic year there were only certain legible days set aside for the reading of the Sentences. Once a bachelor began his reading on the first legible day, he was expected to follow apace, Book after Book, and to complete his reading within one academic year.¹²² Brampton pointed out that the Universities took their regulations seriously. He reasoned that the University of Oxford would not upon Duns Scotus' sudden return to England in 1303 take away a legible day from a student already scheduled to read his Commentary on the Sentences to enable Duns Scotus to read his Commentary on a neglected Book IV of the Sentences. The truth of the matter according to Brampton is that there was no neglected reading of Book Four, because Duns Scotus read all four Books at Oxford before going to Paris.¹²³ In addition Brampton believes it unlikely that the University of Paris would allow Duns Scotus to lecture on Book IV out of order simply because he had not read that Book earlier at Oxford. To support the position that Duns Scotus did not read Book IV after Book I at Paris, Brampton examined the manuscript evidence produced by the supporters of the theory from the Worcester Cathedral ms. F. 69. He indicated that the unique order of this ms. is in all probability nothing more than a scribe selectively choosing from 3 or 4 different manuscript copies of Duns Scotus' Paris reading in putting together his codex. As to the use of the future tense in Book IV of this manuscript, Brampton suggested that his book was perhaps taken from Johannes Duns Scotus' second reading of the Sentences.¹²⁴ This second reading would have taken place after Duns Scotus had returned to Paris in April of 1304 and would have been read in all probability on

the third legible day in May and, "... to keep in step with the rest of the University, he would begin this second series with Book IV. Book I would have followed in October 1304, Book II in January, and Book III in March."¹²⁵

Brampton also rejected the theory that the Subtle Doctor read the Sentences for a third time at Paris. He reasoned that after having read the Sentences, a Friar would have been expected to spend four years as a "Baccalaureus formatus" in pursuing the "facta facultatis"¹²⁶ but in Duns Scotus' case this time was reduced, as witnessed in the letter of Gonsalvo de Valboa dated Nov. 18, 1304, pressing for a rapid advancement of J. Duns Scotus to the License. Therefore Brampton saw no reason why the Chancellor of the University of Paris would allow Duns Scotus to take over a legible day, already assigned to a bachelor, to read the Sentences for a third time.¹²⁷

The conclusion therefore that Brampton arrived at is that Johannes Duns Scotus progressed normally through the Oxford program between 1288 and 1301, lecturing on all four Books of the Sentences between October of 1298 and October of 1299. Duns Scotus then spent the remainder of 1299 and all of 1300 fulfilling the teaching tasks required by Oxford of a graduate. He suggested that he lectured for the year 1301 - 1302 and then went to Paris in 1302. Brampton has Duns Scotus giving an incomplete reading of the Sentences for the first time at Paris in 1302 and 1303 and a complete reading for a second time between October 1304 and the end of April 1305. Thus Brampton presents a picture of Duns Scotus studying and reading the Sentences at Oxford and Paris in a manner that was not untypical nor full of interruptions as the picture presented by Callebaut and Balic.

We may sum up the foregoing presentation by returning to the four points listed at the outset of the chapter, namely the controversies over the national origin of Duns Scotus; the place of birth; the date of birth; and the history of his education.

Scotland was definitely established as the country of his birth. The claims raised by Wadding for Ireland on the basis of Ireland being called Scotia have been rejected due to the fact that by the 13th century this practice had long since been abandoned. The association of the name of Duns Scotus with England stemmed from the fact that he was a member of the English Province of the Franciscan Order which had incorporated Ireland and Scotland within its jurisdiction in 1260. Thus his name is associated not with geographic England but with the English Province of a religious Order. Evidence was presented from manuscripts in support of the Scottish claim and more notably from the Paris Roll of 1303.

The evidence from the Liber Procuratorum and the explicit of the Assisi manuscript indicates that Duns was the name of a town and Duns Scotus' place of birth. The "Littledean Theory" was rejected on the basis of Fr. Henry Docherty's conclusions, that the manuscript basis for the claim that Littledean was the place of Johannes Duns Scotus' birth was a forgery.

Moreover we have verified that 1265 was probably the date of birth of Johannes Duns Scotus. This was done by working backwards from the two known dates in his life, the date of his entrance into the Order, 1278 - 1279 and the date of his Ordination March 17, 1291.

In regard to the history of Duns Scotus' education, we have demonstrated how in the past it was the accepted practice to follow the

reconstruction developed by Fr. André Callebaut. This reconstruction, was based on the educational development of William Peter di Godino O.P., a precarious practice in research. Following this reconstruction we had in the past been asked to accept the fact that Duns Scotus was continuously treated as an exception to the University Rules of Oxford and Paris so he could read the Sentences at varied intervals both at Oxford and Paris.

A more logical development has been presented by C. K. Brampton and seems to fit within the orderly operations of the University customs and practices. On the basis of Brampton's exposition it seems preferable to conclude that Duns Scotus was at Cambridge between 1284 - 88 studying for his Master's degree in the Arts Program. In October of 1288 it is believed that he began his course of studies at Oxford, which lasted for thirteen years, ending with his reading of the Sentences at Oxford in the Scholastic year of 1298 - 1299. Duns Scotus in 1302 was sent to Paris where he began to lecture on the Books of the Sentences. In 1303 he was forced to leave France, because of his support of Pope Boniface the Eighth in the latter's feud with King Philip the Fourth of France. Duns Scotus was back in Paris in 1304, finishing his lecture on the Sentences and obtaining his degree in 1304 or 1305. From 1306 to 1307 he performed the duties of a Magister Regens at Paris. Toward the end of 1307 the Order sent Duns Scotus to Cologne where he died on Nov. 8, 1308.

In accepting Brampton's presentation we must then also reject the extra reading of the Sentences done in 1307, which was discussed by Balic, as well as the reading of the Fourth Book of the Sentences at Oxford in the course of Johannes Duns Scotus' exile from France.

The biography of Johannes Duns Scotus has evolved over the course of some fifty years of modern scholarship and no doubt some new contributions will be made to the subject but for now the outline presented by Brampton seems to be the most logical having Duns Scotus going through the course at Oxford and Paris in a manner less extraordinary than had been previously believed.

Footnotes

1. Luke Wadding, Annales Minorum, VI, 2nd ed., (Rome: 1733), 40 - 45.
2. Ibid.
3. Ibid., 44: "Quod vero maximum ab Anglis, Lelando praesertim, affertum, ex inscriptione quam passim, ait, in codicibus Bibliothecae Martonensis Oxonii comparere nimirum: 'Explicit lectura Doctoris Subtilis in universitate Oxoniensi super libros Sententiarum, silicet Doctoris Joannis Dons nati in quadam villa de Emylden vocata Dunstane (contracte Duns) in comitatu Northumbriae pertinente ad Dominium Scholasticorum de Marton Bavule in Oxonio, et quondam dictae domus socii,' non adeo irrefragabile est, ut scriptorem, vel Scoti originis nescium, vel adscititiae gloriae cupidum, rejici non possit".
4. Ibid., 43 - 44: "... et anno MCCCXCIX quo scripsit Bartholomaeus Pisanus librum confirmatum, recensebantur Monasteria Scotiae sub praedicta Custodia Novicastro, videlicet Conventus Dumfrisii, Bervici, Adingtonae, Dundae et alii, quod dum observaret Frechius citatus, subjunxit: Quare ab Anglis religio migravit ad Scotos, et Franciscanorum Monasteria Scotorum Anglicanae Provinciae aggregata sunt et unita."
5. Ibid., 44.
6. Ibid.
7. Ibid., 41.
8. Ibid., 42.
9. Ibid.
10. Ibid.
11. Ibid., 42.
12. Ibid., 44.
13. Ibid., 43.
14. Ibid., 44.
15. André Callebaut, "La Patrie du Bx. Jean Duns Scot", in Archivum Franciscanum Historicum 10, (1917), 3 - 16; "L'Ecosse, Patrie du Bx. Jean Duns Scot", A.F.H., 13, (1920), 78 - 88; see further "A Propos du Bx. Jean Duns Scot de Littledean", A.F.H., 24, (1931), 305 - 329.
16. Carlos Balic, "The Life and Works of John Duns Scotus" in Studies in Philosophy and the History of Philosophy. (Washington, D.C.: Catholic U. Press, 1965) v. 3, 3. For the reference to Isidore see note 8.
17. Ibid.

18. Balic, "Life and Works", 4, see there note 9.
19. Ibid., 4; see there note 10: See A. Callebaut, "L'Ecosse, Patrie du Bx. J. Duns Scot", Archivum Franciscanum Historicum (henceforth to be quoted as A.F.H.), 13 (1920), 82 - 84."
20. Ibid., 3 note 4; see also L. Meier, "Die Skotusausgabe Des Johannes Reinbold von Zierenberg" in Scriptorium VII (1953), 113. Meier describes a series of manuscripts of the works of Duns Scotus compiled by John Reinbold in the middle of the fifteenth century which attest to Duns Scotus' activity at Oxford. According to Reinbold, Duns Scotus was born in Dunstanburg in Northumberland and entered Merton College of which he became its "socius".
21. Balic, "Life and Works", 3, see there note 6.
22. Ibid.
23. Ibid., 3, see there note 7.
24. Ibid., Balic in his article, "Quelques Précisions Sur Jean Duns Scot" in Revue D'Histoire Ecclésiastique, t. XXII, (1926), p. 552 reported that 34 verses of this poem were inserted just before the table of contents to Book IV of J. Duns Scotus' Commentary as seen in ms. B.I. of the Canterbury Cathedral Library, thus indicating a relationship between the Johannes of the poem and Duns Scotus. Moreover in the poem the appellation "Johanem Subtilem" is used. Duns Scotus was commonly referred to as the "Doctor Subtilis".
25. Ibid.
26. Ibid.
27. Ibid.
28. Ibid., 4; see Ephrem Longpré, "Le Bx. J. Duns Scot pour Le St. Siège et Contre Le Gallicanisme" in La France Franciscaine II, (1928), 155; Henry Docherty, "The Brockie Mss. and Duns Scotus" in De Doctrina Ioannis Duns Scoti: Acta Congressus Scotistici Internationalis Oxonii et Edinburgi., (Roma: 1968) vol. I, 328. André Callebaut identified the document as, "La piece J.488 n°595 des Archives Nationales de Paris ..." in his article "Le Bx. Jean Duns Scot à Cambridge vers 1297 - 1300" in A.F.H., 21, (1928), 608.
29. Balic, "Life and Wroks" 4, notes 12 and 13; see Ibid. p. 5.
30. H. Denifle, Auctarium Chartularii Universitatis Parisiensis, (Paris: 1894), t. I, col. 130 line 36; see also col 190 line 43. This information is reported by André Callebaut in "L'Ecosse Patrie de Jean Duns Scot", A.F.H., 13, (1920) pp. 87 - 88; see esp. Callebaut's note 2 on p. 87 and his note 2 on p. 88.
31. Ibid.

32. Balic, "Life and Works", 5.
33. Ibid.
34. Ibid., 5; see R. G. Johnston, Duns Dings A': The Town and its Environs, (Berwick, 1953), 46.
35. Supra p. 263
36. Docherty, "The Brockie Mss.", 328.
37. Ibid.
38. Ibid. 328; 333.
39. Ibid., 328.
40. Ibid.
41. Archivum Franciscanum Historicum 22, (1929), 588 - 89.
42. Archivum Franciscanum Historicum 24, (1931), 305 - 29.
43. Andrew George Little, "Chronological Notes on the Life of Duns Scotus" in The English Historical Review, 47, (1932), 569.
44. Miss Sharp later rejected the Littledean theory. See Docherty, "The Brockie Mss.", 329, note 9.
45. Docherty, "The Brockie Mss.", 329.
46. Ibid., 330; see Balic, "Life and Works", 6 - 8.
47. Docherty, "The Brockie Mss.", 337.
48. Ibid.
49. Balic, "Life and Works", 6, see note 19; Docherty, "The Brockie Mss.", 330.
50. Balic, "Life and Works", 6, note 19.
51. Ibid.
52. Ibid.
53. See above, note 28.
54. Docherty, "The Brockie Mss.", 334 - 5.
55. Ibid., 338.
56. Ibid., 339 - 41.

57. Ibid., 342 - 44.
58. Ibid., 345 - 47.
59. Ibid., 354 - 57.
60. Balic, "Life and Works", 8 - 9.
61. Ibid., 9, note 27.
62. Ephrem Longpré, "L'Ordination Sacerdotale du Bx. Jean Duns Scotus", in A.F.H. 22, (1929) 54 - 62; Balic, "Life and Works", 9, note 26.
63. Balic, "Life and Works" 9, note 3.
64. Callebaut, "A Propos Du Bx. Jean Duns Scot", 321 - 324.
65. Ibid., 323; see Balic, "Life and Works", 10, note 32.
66. Balic, "Life and Works", 10, note 33.
67. Little, "Chronological Notes:", 570 - 571: "On 17 March 1291 Fr. Johannes Duns was ordained priest in the Church of St. Andrew at Northampton by Oliver Sutton bishop of Lincoln. He must have been then not less than 25 years of age, and was residing in the diocese of Lincoln. There were 11 friars Minor ordained on this occasion (3 subdeacons, 3 deacons, 5 priests), and only a few of these can have belonged to the convent of Northampton, then a house of about 40 friars. There can be no doubt that Duns was at this time a student at Oxford."
68. Callebaut, "A Propos de Bx. Jean Duns Scot", 323.
69. Ibid.: "Les trente-quatre Provinces de l'Ordre n'envoyaient à Paris "ex debito" que deux étudiants, qui y suivaient généralement les cours pendant quatre années; alors le Provincial et son Chapitre désignaient deux co-provinciaux qui remplaçaient les premiers"; Little, "Chronological Notes", 572: "The province of England had the right to maintain two students de debito at Paris without any provision except that of books; other students might also be sent de gratia at the expense of the province. Both kinds of students were sent by authority of the provincial minister and chapter. The provincial minister who sent Duns was probably Roger of Marston, who was minister c. 1292 - 8, and had studied and taught at Paris, Oxford and Cambridge."; see also Balic, "Life and Works", 10.
70. Callebaut, "Le Séjour du Bx. Duns Scot à Paris" in La France Franciscaine, 12 (1929), 355; see Balic "Life and Works", 10, note 38.
71. Little, "Chronological Notes", 572.
72. Callebaut, "Le Bx. Jean Duns Scot à Cambridge Vers 1297 - 1300" in A.F.H. 21 (1928), 608 - 611; Balic, "Henricus de Harcley et Ioannes Duns Scotus", in Mélanges Offerts à E. Gilson: Etudes de Philosophie Médiévale, (Paris - Toronto: 1954), 95 - 121; see Balic "Life and Works", 11.

73. Callebaut, "Le Bx. Jean Duns Scot à Cambridge", 608.
74. Balic, "Life and Works", 11.
75. Ibid.
76. Little, "Chronological Notes", 579; Grey Friars in Oxford (Oxford: Clarendon Press, 1892), 63 - 64; Balic, "Life and Works", 11.
77. Balic, "Life and Works", 11, note 41; Little, "Chronological Notes" 572.
78. Balic, "Life and Works", 12; Little, "Chronological Notes", 579; 574; 575; 577.
79. Balic, "Life and Works" 12; Little, "Chronological Notes" 577 - 80.
80. Balic, "Life and Works", 13, note 52; "Quelques Précisions Fournies par la Tradition Manuscrite sur la Vie, Les Oeuvres et L'Attitude Doctrinale de Jean Duns Scot", in Revue d'Histoire Ecclésiastique, XXII, (1926), 551 - 566; see esp. 557 et sq.
81. Luke Wadding, Opera Omnia, XXII, (Paris: Vives Press, 1891-95), 2 - 3.
82. Balic, "Quelques Précisions", 557 et sq.
83. Ibid., 558 - 566.
84. Ibid., 559.
85. Ibid.
86. Ibid.: see 560: "Revenons à notre sujet. Le commentaire de Duns Scot sur le troisième livre des Sentences dans le ms. de Worcester est incomplet et ne porte que sur dist. 1 - 17, mais il semble bien que le copiste indique que ce commentaire date des environs de 1303. On remarquera, en effet, qu'en apportant cette date de 1303, au f° 160va, il n'écrit pas: 'Expliciunt questiones Quarti libri', comme il avait écrit f°. 158va: 'Expliciunt quaestiones super primum sententiarum', mais bien: 'Expliciunt questiones sententiarum ...'. Nous n'en sommes donc déjà plus, avec Wadding, à la fin de l'année 1307."
87. Balic, "Quelques Précisions", 560.
88. Ibid.
89. Ibid., 561; On the Ordinatio see our p. 293
90. Ibid.
91. Ibid., 561 - 62.
92. Ibid., 562.

93. Ibid.
94. Ibid.
95. Ibid.
96. Ibid.
97. Ibid.
98. Ibid.
99. Little, "Chronological Notes", 580; Balic, "Life and Works", 12, note 43.
100. Little, "Chronological Notes: 580.
101. Ibid., 577 - 578. The letter is from Gonsalvo of Valboa addressed to William, guardian of the monastery at Paris (or his vicar) and the masters; it is dated at Ascoli, 18 November 1304. Little gives a full translation, which is here reproduced. The original text may be seen in: Wadding, Ann. Min. VI, 51; Little, Grey Friars in Oxford. p. 220.

"In reference to the promotion of Fr. Gilles de Ligny, about whom I have been informed by your letters, we ought, as the custom is, to make provision for another similar presentation. Since, according to the statutes of the Order and the statutes of your convent, the Bachelor to be presented this time should belong to some province other than the province of France, I assign to you Fr. John Scotus - of whose laudable life, excellent knowledge and most subtle ability and his other remarkable qualities I am fully informed, partly from long experience and partly from report which has been spread everywhere - to be presented primarily and in the regular course (principaliter et ordinarie) after said Fr. Gilles. I enjoin you nevertheless that you make such presentation with due solemnity without much expense. If, however, you should be certain that the Chancellor be willing to license two of our friars at the same time, I desire that Fr. Albert of Metz, if he shall be able to return to the Convent, be promoted with the said Fr. John. In which case I rule that Fr. Albert on account of his seniority should incept first, Fr. John incepting afterwards under him. Farewell in the Lord and pray for me. Given in the place of Ascoli of the province of the March of Ancona, xiv Kal. Dec. 1304."
102. Little, "Chronological Notes: 578 - 581; esp. 579 and 581; Balic, "Life and Works", 13.
103. Balic, "Life and Works", 13.
104. C. K. Brampton, "Duns Scotus at Oxford", 1288 - 1301, in Franciscan Studies, 24, (1964), 5.
105. Ibid., 5 - 6.

106. Ibid., 6: see Chartularium Universitatis Parisiensis, t. II, ed. H. Denifle and A. Chatelain, (Paris, 1891), 699, #30. We read there: "Item, quod nullus legat Sententias Parisius, nisi compleverit ibi novem annos studendo in theologia, et audiendo lectiones magistrorum, sententiariorum et biblicorum, aut in alio solemnī studio, ubi duo anni pro uno computabuntur, vel per maiorem partem ordinarii singulorum annorum predictorum, et intraverit decimum annum. Per hoc tamen non intenditur privilegiis religiosorum mendicantium et aliorum religiosorum privilegiatorum, pro baccalariis ad lecturam Sententiarum, Biblie, aut cursuum presentandis, in aliquo derogare."
107. Ibid.
108. Ibid.
109. Ibid., 6 - 7; see Little, "Chronological Notes", 571. These regulations may be seen in the Chartularium, t. II, p. 692", (10) Item, nota, quod studentes in theologia, si sint seculares, habent ibi audire per septem annos antequam admittantur ad lecturam Biblie, sed regulares admittuntur in sexto anno.
(11) Item, nota, quod admissi ad lecturam Biblie debent solum legere duos libros, et tales sicut voluerint eligere, scilicet unum de veteri Testamento, et alium de novo, exceptis illis de quattuor Ordinibus Mendicantium qui debent Bibliam continue legere per duos annos, et etiam unus de Sancto Bernardo."
110. Brampton, "Duns Scotus at Oxford", 7 - 8.
111. Ibid., 8.
112. Ibid., 8; see Duns Scotus, Opera Omnia, ed. L. Wadding, 1639, t. V, Pars Prima, p. 51. There we read: "Si obicitur de permanentia sectae Mahometi, respondeo - illa incepit plus quam sescentis annis post legem Christi et in brevi Deo volente finietur, quae multum debilitata est anno Christi 1300 et eius cultores multi mortui et plurimi sunt fugati, et prophetia dicitur esse apud eos quod cito finiēdo est secta illa." The passage refers to the defeat of the Egyptians by an allied force of Christians and Turks at the Battle of Medjamāa el-Morudj on Dec. 23, 1299. The news of this victory reached England in June of 1300.
113. See Critical Edition. vol. 16 pp. 1 - 62; for a description of Lectura see our pp. 310 - 311; 317 - 318.
114. Brampton, "Duns Scotus at Oxford", 9.
115. Ibid., 16.
116. Ibid., 18.
117. Ibid., 17.
118. Ibid., 18; see above note 72; also page 269.
119. Ibid.

120. Ibid., See J. F. Bonnefoy, Le Ven. Jean Duns Scot (Rome: 1960), 123 and 448; see above p.

121. Brampton, "Duns Scotus at Oxford", 10.

122. Ibid., 11.

123. Ibid., 16.

124. Ibid., 12 - 15.

125. Ibid., 15.

126. This regulation may be seen in the Chartularium, II, p. 692 #13. It reads as follows: "(13) Item, nota, quod bachalarii qui legerunt Sententias, debent postea prosequi facta facultatis per quatuor annos antequam licentientur, scilicet predicando, argumentando, respondendo; quod verum est, nisi papa per bullas, vel facultas super hoc faceret eis gratiam, immo et per quinque annos aliquando expectat, scilicet quando annus jubileus non cadit in quarto anno post lecturam dictarum Sententiarum.

127. Ibid., 15 - 16.

Appendix II

The Manuscript Tradition for Books I and II of the Sentence Commentary

The manuscript tradition for the Commentary of Johannes Duns Scotus on the Four Books of the Sentences has confused scholars for centuries, because of the lacunae left in the text of the Commentary by Duns Scotus himself and because within the manuscript tradition there exists more than one version of the lecture on the Sentences. This confusion stems in a great part from the method utilized by Johannes Duns Scotus himself in commenting on the Sentences. Apparently, he had planned to organize under the title Ordinatio a summary of his doctrine within the framework of the Sentences of Peter Lombard.¹ To realize this goal he seems to have employed a secretary or socius to whom he dictated his responses to the various questions and objections covered within the framework of the Sentences. Duns Scotus did this, however, without necessarily completing fully the exposition of his views on any one given topic at the first instance of its treatment nor in a sequential order. Hence, there are lacunae left in Commentary on the Four Books of the Sentences for certain questions, because the author apparently did not find the correct response to a particular objection or the satisfactory formula for his thought. Moreover, there is the case of the response left incomplete in the first instance but to which additional information was seemingly added upon the author's rereading of the text. This additional information the secretary or author jotted down in the margin of the text under such sigla as "Scotus extra manu sua".² Unfortunately Duns Scotus died in 1308, while many of the Distinctions of the Commentary on the Sentences were still only in a rough draft.

Under normal conditions this holograph, the author's rough draft, would have been sent to a university stationer or publisher, where an exemplar, an edited copy proof read by the author and a university

committee,⁴ would have been prepared. This exemplar is also known as an autograph or editio originalis.⁵ The reproduction of this autograph by a copyist would have produced what has been called an editio princeps⁶ or in other words, once removed from the autograph. From this editio princeps then, there could presumably follow a host of other copies and copies of copies.⁷ As a result scholars at a later time who wished to find their way back to the original autograph, would have been obliged to establish a working text to compare these varied copies. This working text is called a recension. The final aim, the reproduction of the autograph with an accounting of all the variations in the readings accumulated over the centuries, is the critical edition of the text.⁸ In the present instance, Duns Scotus' Commentary on the Books of the Sentences, the problem is more complex, since the entire work was apparently never sent by the author to a stationer nor was it proof read by him. Possibly however, the First Book of the Commentary on the Sentences⁹ was so treated. Duns Scotus died leaving us only his incomplete holograph with its lacunae. The disciples of Duns Scotus seemingly anxious to present their teacher's thought at its best, filled in the lacunae by borrowing from the various reports of the lectures on the Sentences given at Paris and Oxford.¹⁰

The preparation of such reports by students was a customary practice. In the medieval universities it was common for students to take notes, usually verbatim, on the lectures of the Master. These notes were sometimes published. This work was then called a reportation.¹¹ In some instances, these notes were proof read by the master himself. In the case of Duns Scotus, this occurred only once for the Commentary on the First Book of the Sentences. There is only one manuscript copy of this

approved reportation on Book I in existence. It was found by Mgr. Auguste Pelzer in the Vienna, Nationalbibliothek ms., Latin 1453.¹²

It is evident that the two seventeenth century editors of the works of Johannes Duns Scotus, Luke Wadding and Mathew Ferkic, did not understand the scholastic usage of the terms Ordinatio and Reportatio or Reportata.¹³ Wadding believed that the term Ordinatio as applied to the Opus Oxoniense¹⁴ meant a rearrangement.¹⁵ He arrived at this opinion because he was aware that Book IV of the Oxford Commentary was incomplete and because he had discovered some blanks left by the Master in Book I of the Oxford Commentary. Moreover he recognized that the disciples of Duns Scotus in recopying the text subsequently filled in the blanks by borrowing passages from the Reportata Parisiensia.¹⁶ In addition, Wadding also claimed that the Oxford Commentary was called Ordinarium, because other authors used this commentary exclusively to the neglect of other works by Scotus.¹⁷ However, in reality, the term Ordinatio was given to the Opus Oxoniense not because it had been arranged and compiled from Duns Scotus' lectures at Oxford and Paris but, because the manuscripts that contain it are older and contain the purer form of his thought, since it is in fact, the text which Johannes Duns Scotus wrote or dictated himself.¹⁸

Wadding's explanation of the title Reportata Parisiensia arises from his belief that Duns Scotus had recopied or transcribed it to a large extent from the Oxford Commentary, and hence the meaning of the word reportare.¹⁹ August Pelzer in his article "Le Premier Livre des Reportata Parisiensia de Jean Duns Scot" has elaborately demonstrated the Medieval usage of the word, citing examples from the manuscript texts of several noted medieval scholars. He defined reportare as used in the

middle ages to mean, "... the action of repeating orally or by writing, although the second is accepted as the more common".²⁰ One such medieval scholar examined by Pelzer was Gerard d'Odon, Minister General of the Franciscans, 1329 - 42. The citation is from his Tractatus de Multiplici Visione Dei (ms. Ottoboni, 280ff. 1 - 53). Here Gerard stated, that he repudiated anything, which might be reported orally or in writing about his statement, except for that which will appear in his exemplar."²¹ Again Pelzer cited Pierre Roger, the future Pope Clement VI, who reported from a contemporary, a Master Hugh.²² For another example Pelzer utilized the Vatican ms., Latin 901 f. 104v. where the copyist, in transcribing a question of the Carmelite Guy Terreni or de Perpignan tells us that he has more notes in his quire done in the classroom than given here.²³ Furthermore, Pelzer also used reportations of works by William of Alnwick, Thomas Aquinas, Bonaventure and Albert the Great²⁴ to prove his point. One direct source of interest for our subject is the example from a Quodlibet of Duns Scotus.²⁵ On f. 85v at the end of Question 21 of the Munich manuscript, Latin 8717 we read: "This is the end of the quodlibet as found in his own notes; what follows is from the reportation."²⁶

According to Pelzer a reported work may be recognized by such evidence as the title, subscription, incipit, explicit, additions, marginal notes, the use of the third person for designating the author, as well as certain formulae for determining a question as, "Respondeo dicendum in libro magistri" and "Responsio in libro magistri".²⁷ When a reportation has been approved and corrected by an author then its value approaches that of an edition of the author. In the case of a simple reportation, however, its value depends on the attention, ability,

and fidelity of the auditor.²⁸

It is certain today, that the manuscript tradition for the Sentence Commentary by Johannes Duns Scotus presents us with four avenues for the manuscript transmission of the teaching of Duns Scotus. The first of these avenues is the Ordinatio or Opus Oxoniense; the second is the Great Reportation of Paris or Reportatio; the third is the manuscript texts referred to as the Secundae Additiones²⁹ or, as labeled in vol. I of the Critical Edition of the Opera Omnia of J. Duns Scotus, the Lectura;³⁰ the fourth is generally referred to as the Additiones Magnae or Additions of Paris.

Much work has been done in describing and analyzing these various avenues of transmission for Book I but to date, except for C. Balic's early description of the manuscript tradition for the Four Books of the Sentence Commentary³¹ and information in volumes I and VII of the Opera Omnia of J. Duns Scotus being prepared by the Scotus Commission, there exists very little published material on the manuscript history for Book II. The Scotus Commission's work so far tends to confirm that the transmission of the Second Book of the Sentence Commentary followed along lines similar to, if not identical with, that of Book I. Hence it would seem profitable to present here an outline of the history of the manuscript transmission of the Sentences as clarified in greatest detail for Book I.

There has existed in the past some interpretative differences on the history of the manuscript tradition for Book I in the studies done by two leading scholars on the subject, namely Auguste Pelzer and Carlos Balic. The focus of the study by each man is different. Fr. Balic's study is more of an internal analysis of the key manuscripts belonging

to each avenue of transmission for the four books, while Mgr. Pelzer's approach is more of a case of establishing just what were the reliable avenues of transmission for Book I for the various Reportations of the Paris reading both in the manuscript tradition and the early printed editions. We will present here the views of A. Pelzer first and then those of C. Balic on the First and Second Books of the Commentary. This review will illustrate the difficulty scholars have encountered in working with the manuscript tradition of Johannes Duns Scotus' Commentary on the Sentences of Peter Lombard and consequently at getting his genuine opinions.

Pelzer's Study of Book I

The early editors of the works of Johannes Duns Scotus overlooked the fact that his thought has come down to us in several forms not all of which are totally faithful to the Master's presentation. As regards the tradition for Book I of Duns Scotus' Commentary on the Sentences, we know from Pelzer's study that his work has come down to us in the following forms:

1. The Small Reportation of "Brother H. of Upper Germany".
2. The Great Reportation examined by Duns Scotus himself.
3. The Bad Reportation printed in Paris by John Major (Maior) 1517 - 18.
4. The Abridgement of the Great Reportation done by William of Alnwick (1333).³²
5. The texts derived from Alnwick's abridgement:
 - a) The Résumé of the Abridgement done by William di Missali.³³
 - b) The principal edition of the abridgement (Bologna, 1478) by Bartholomeo Bellati di Feltri.
 - c) The contaminated abridged edition by Luke Wadding called the Reportata Parisiensia.³⁴

A brief description will now be given of the various forms of Duns

Scotus' work as presented by August Pelzer. The Small Reportation of Brother H. of Upper Germany (#1) is found in the Vatican mss. Borghese 50 ff. 1r - 47r and Borghese 49 1r - 12v.³⁵ The Borghese manuscript 50 begins on f. 1r with, "q. Veritur utrum deus sub propria ratione deitatis possit esse subiectum alicuius scientie ..." and concludes after the last Distinction (number 48) with: "Explicit reportacio fratris h. de superiore alemannia super primum sententiarum lectum a fratre Jo(hanne) Scoto. Deo gratias."³⁶ That Brother H. was definitely a Franciscan is attested to by the expression Alemannia Superior in the explicit, which was a technical expression used only by the Franciscans to designate their Province.³⁷ Father Bihil, in a letter to A. Pelzer dated December 21, 1923, advanced the view that Brother H. was Henricus de Talheim, Provincial of the Province of Upper Germany or of Strasbourg (1316 - 1326). This Henry was a baccalaureus at Paris, while he was Provincial. Very late in his career Brother Henry became a partisan of Michael de Cesena³⁸ and hence the reason why this reportation is found in the Borghese Collection, which houses so many Franciscan writings from that controversial era.³⁹ Both the Borghese 50 and the Borghese 89 mss. are mutilated. It should be noted that the two manuscripts are in different hands.⁴⁰

The Great Reportation of the Paris Commentary on the Sentences (#2) was discussed by Pelzer in regard to Book I through the following examples: the Vatican ms. Borghese 325 ff. 1r - 92v; the Oxford, Merton College ms. 59 ff. 1r - 190v and the Vienna, Nationalbibliothek ms., Lat. 1453 ff. 1r - 125v. The text begins: "Circa prologum libri sententiarum primo queritur utrum deus sub propria ratione deitatis possit esse per se (p.s. omis Vienne) subiectum alicuius scientie."⁴¹ The text ends with Distinction 48: "Quia non comprehendit ideo non obligatur ad omnia ordinata ad illum finem, sed hoc pertinet tantum (omis Borghese) ad voluntatem

divinam comprehendere finem suum qui est beatitudo sua ad quam nos perducatur qui est benedictus in secula (saeculorum ajouté Vienne) amen (ter. Vienne)."⁴² If one compared the Great Reportation with that of the German Brother Henry one would see, according to Pelzer, that the two are different. The editing methods are different and sometimes the announcement of the questions are different. In general, Brother H. is short and concise. His work sometimes has information and explanations not seen in the Great Reportation.⁴³

Let us turn now to the case of the Bad Reportation (#3) of John Major published in Paris in 1517 - 18.⁴⁴ It is in the history of this text that we have a clearer chance to see how the works of Duns Scotus were misrepresented for posterity.

This edition of the Sentence Commentary by Duns Scotus was initiated by John Major,⁴⁵ (1469 - 1550), a Scotsman at the College of Montaigu in Paris, where he was a regent doctor in the faculty of theology, c. 1469 - 1509.⁴⁶ The completed work was published in Paris by Jean Granjon, the first three Books in 1517 and number 4 in 1518. At the end of the edition there is a letter addressed to François Belval, the guardian of the Franciscan convent at Paris.⁴⁷ In the letter John Major recounted the history of the edition. Apparently, from the details of the letter, John Major looked for a good copy of the Reportatio in the library of Paris and found two corrupt copies. For some unknown reason he never looked into the lecture given at Oxford. Due to the pressures of teaching, he gave two manuscript copies, unknown to us today, to two recent bachelors of Montaigu College and requested that they resolve the errors in the texts. When the two bachelors finished, they informed John Major by letter that their task was completed and that the text was without

error. John Major then sent this text to the publisher.⁴⁸

This 1517 - 18 edition was republished in Venice in 1597 by Friar Guido Bartolucci.⁴⁹ In the 17th century Mathew Ferkic doubted the credibility of John Major's edition and pronounced that it was not the work of Johannes Duns Scotus but of a Scotist. He based his conclusion on a comparison between the 1517 edition and the Opus Oxoniense. Ferkic concluded that the 1478 edition of Bartholomeo Bellati (#5,b) was the true Reportation of J. Duns Scotus' lectures.⁵⁰ August Pelzer concluded that for Book I John Major's Reportation was a compilation of Scotistic materials and some borrowings from Scotus.⁵¹

The next line of transmission is what Pelzer called the Abridge-ment of the Great Reportation done by William of Alnwick (#4). This work is referred to as the Additiones Magnae by C.Balic and the Scotist Commission.⁵² This title is derived from the manuscript tradition as seen in the explicits to Book I, as for example, in the Vatican ms. Latin 876 and Merton College ms. 87, where we read respectively. "... magnae addiciones primi ..."; and "... additiones primi libri ...".⁵³ In his discussion of this version Pelzer relied principally on three manuscript copies: the Vatican ms. Latin 876 ff. 226v - 291v; Oxford, Merton College ms. 87 ff. 1r - 36r; Vienna, Nationalbibliothek ms., Latin 1423 ff. 103r - 175v.⁵⁴

Evidence that Alnwick was indeed the abbreviator is seen in the Vatican ms. 876 where the Additiones for Book II of the Commentary appear between ff. 294r - 310v. We read in the explicit: "... addiciones secundi libri magistri Johannis De Duns subtilis doctoris, extracte per magistrum Willelmum de Alnewyk de ordine Fratrum minorum de lectura Paris(iensi). et Oxon(iensi) praedicti Magistri Johannes cui propicietur deus."⁵⁵

Further evidence can be seen in the Vatican ms. Latin 955, which contain the Commentary of Adam Wodeham on the Sentences. We read on folio 173r of the manuscript: "... Scotus in questione sua de hac materia que vocatur loyca scoti et abilnoik in additionibus scoti super primum sententiarum d. 33q. 1."⁵⁶ We know that Alnwick was in England prior to his trip to Italy in 1322 to attend a General Chapter of the Order at Perugia, where he became the Bishop of Guevenazzo (1330 - 33), which was the diocesan center for the Province of Bari.⁵⁷ During his stay at Oxford, Alnwick himself produced two works, a Quodlibet and the Quaestiones De Esse Intelligibili Creature ab Aeterno.⁵⁸

While at Oxford, Alnwick noticed that the students were already familiar with the Commentary of Johannes Duns Scotus. In order to increase interest in the course, he abridged parts of the Commentary of Oxford and drew from the Paris Reportation to fill in those parts of the Oxford Commentary that were incomplete or not sufficiently developed.⁵⁹ Pelzer stated in his study of Book I that William of Alnwick did more omitting than adding and that as a rule he announced the title of a question but did not present the development of the issue. Also as a rule, the abbreviator, when he did suppress material, gave an indication that he had done so. In referring to the course of Oxford, Alnwick sometimes used the word Ordinatio. Some of his editorial marks have been the subject of controversy, especially the zero bar, $\ominus$, which was interpreted by Pelzer to mean an omission.⁶⁰

That Alnwick was a good abbreviator is seen in the fact that he used the third person "dicit" rather than the first person "dico" as was the style of some of the authors of medieval reportations. Hence, we know that this work was not directly from Duns Scotus himself.⁶¹

There are some who have claimed that the abbreviator was not Alnwick but rather Albert of Metz.⁶² The basis for this claim is the fact that there exists a letter sent from Ascoli by Gonsalvo of Spain, the Minister General of the Order, to Guillaume, the guardian of the Franciscan House in Paris, dated Nov. 18, 1304,⁶³ recommending the advancement of J. Duns Scotus and Albert of Metz for the license in Theology. They reason that Albert, since he had prepared for the license with Scotus, was familiar with his ideas. Moreover they cite a 1512 printed edition of Henri Hoyta's abridgement of Adam Wodeham's Sentence Commentary. This text makes a reference to Scotus' doctrine of the formal distinction and also contains a statement to the effect that the additions to Scotus' Commentary were done by Albert.⁶⁴ However A. Pelzer pointed out that this evidence is faulty because in reading a manuscript copy of Wodeham's Commentary (Vatican ms., Latin 955 f. 73r) it is seen that the name Alnwick was distorted so that it appears as Abilnoik. It is evident that the 1512 editor read this distortion as Albert.⁶⁵

Now let us turn to an examination of a line of texts of the Commentary of Duns Scotus derived from the Additiones of William of Alnwick. Once again we are presenting Pelzer's description of the dissemination of Book I of the Sentences.

The first item in this category is the Résumé of the Abridgement (#5,a) which was done by William di Missali, a Friar of the Province of Aquitaine in the early fourteenth century.⁶⁶ This work is found in two fourteenth century manuscripts, the Vatican mss. Latin 889 and Latin 890.⁶⁷ In the explicit of the manuscript Latin 890 on f. 30r we read: "Explicit abbreviatio et diarticulatio questionum super 4^{or} libros sententiarum magistri Johannis Scoti et super quodlibet et super

questiones metaphysice quam composuit frater Guillelmus de Missali de provinc(ia) acquitanie ambo de ordine minorum. Deo gratias amen."⁶⁸

Apparently di Missali used Alnwick and retouched the Additiones where the latter omitted material. Di Missali, according to Pelzer, while curtailing the development of the questions, is very clear in announcing the topics to be treated in the course.⁶⁹ In retouching the Additiones of Alnwick di Missali relied on the Great Reportation and the Bad Reportation of John Major.⁷⁰

Once more stemming from the Additiones of Alnwick there is the Bologna Edition of 1478 (#5,b).⁷¹ The work is signed by Bartholomeo Bellati di Feltri, the Regent of the Convent of Bologna. It was printed by John Schreiber of Annunciata and of Augsburg and dated as having been completed in Bologna on April 6, 1478.⁷² This edition, said Pelzer, is not even a good reproduction of the Additiones of Alnwick which becomes evident when it is compared with the Vatican ms. Lat. 876.⁷³ The edition used the first person in places where Alnwick used the third person. Also the edition of 1478 gave only the titles to the questions and added its own formula of presentation, which differs from the formula of presentation seen in the manuscript, Vatican Lat., 876. In the edition of 1478 the θ was used to mean "instantia" instead of "omissa".⁷⁴ The Bologna text often omitted parallel or bad readings seen in Alnwick's text. It would seem that the editor of the Bologna 1478 edition did not realize that what he was using was an amalgam of the Reportation of Paris and the Opus Oxoniense, and at that, he had only an abbreviated version of the Commentary on the Sentences.⁷⁵ The result naturally is not a very good representation of the Additiones Magnae and still less a reproduction of the true thought of Johannes Duns Scotus.

Last to be considered is the contaminated edition of Alnwick published by Wadding in the Lyon Edition of 1639 (#5,c).⁷⁶

Luke Wadding at the start of the Reportata Parisiensia, stated that he had perfected the edition, removing all the errors from the bad reportations. To do this he rejected the Bologna Edition and relied on the Additiones Magnae as found in the Vatican ms. Lat. 876, which he regarded as the true Reportation of Paris.⁷⁷ However, there are differences seen between the Lyon Edition of Luke Wadding and that of Alnwick's Additiones Magnae. Again the interpretation of the θ is at stake and we find that in many instances Wadding interpreted this symbol as "instantia".⁷⁸ The Lyon edition used the first person instead of the third person in terms of such words as "praemisi", "induxi", and "quaesivi" indicating the successive movements of the presentation of the lecture.⁷⁹ Also Luke Wadding added material left out by the abbreviator and for this it seems he went to the edition of John Major rather than to the Great Reportation of Paris or the Opus Oxoniense (Ordinatio). This pattern of intermixture was clearly demonstrated by Pelzer.⁸⁰ It also shows how Wadding arbitrarily reconstructed the reading given at Paris at least for the first Book. The Wadding Lyon Edition was reprinted by the Vives Press in Paris in the 1890's, thus perpetuating these less than accurate texts. For three centuries this confused material was thought to be the true Reportatio.

August Pelzer has presented us with the following picture for the main lines of transmission for the Reportata Parisiensia of Duns Scotus: (A) the Great Reportation of Paris (Reportatio): (B) the Additions of William of Alnwick (Additiones Magnae), which is a re-edited work representing both an addition to and an abbreviation of the Ordinatio. Pelzer also demonstrated the unreliability of the early editions such as that of

John Major in 1517; the Bologna Edition of 1478 and the Wadding (Lyon) Edition of 1639; and of course the Wadding-Vives Edition of the 1890's. These faulty editions only perpetuated the confusion concerning the true teaching of Duns Scotus into modern times.

Carlos Balic's Study of Book I

Carlos Balic also made an extensive examination of the manuscript tradition of Book I and at times his study produced results which were at variance with that of A. Pelzer. In recent years however his views have been modified and are now in general agreement with those of A. Pelzer.

Father Balic like A. Pelzer saw the Ordinatio, which was read at Oxford, as the original thought of J. Duns Scotus. Balic also recognized the attempts by copyists and disciples of the Master to fill in the lacunae in the Ordinatio.⁸¹ He cites the Paris BN. ms. Latin 15854 as an example of a manuscript text of the Ordinatio with its lacunae. Balic pointed out in 1927 in his book Les Commentaires de Jean Duns Scot Sur Les Quatre Livres des Sentences that Distinctions 16 and 18 of Book I are missing and that D. 22 has a question missing. Moreover D. 3q. 4 is sixty lines shorter than the version found in the Vives Edition. Also the manuscript copy for Distinction 4 gives as the first question material, which appears as question 2 in the Vives Edition. In addition, the manuscript gives only a single rubrical statement for Distinctions 14-16.⁸² There are no editorial notes in the margins of this manuscript. This manuscript, stated Balic, is a rare case in the manuscript tradition, since most copyists tried to fill in the lacunae by borrowing from the Additiones Magnae (Additions of Paris done by Alnwick) and as a rule the copyist would overtly state that this was precisely his procedure.⁸³

An example of this latter approach to reproducing the Ordinatio of

Johannes Duns Scotus is best seen in the Assisi, Biblioteca Comunale ms. 137.⁸⁴ It was this ms. that the Scotus commission used as the base text for the Critical Edition of Book I. Here the copyist, who says that he had the "Liber Scoti" under his eyes filled in the lacunae in the Ordinatio.⁸⁵ However the copyist gave sufficient editorial notations to the text so that one can see what was added to the text of the Ordinatio. From the marginal notations we can see that the scribe added some of Duns Scotus' own editorial comments and additions and so indicated that fact. Hence we read on f. 4va "Hic extra de manu Scoti additio ...".⁸⁶ Where the scribe added from another source than Duns Scotus, we find a note such as that of f. 10va, "Vacat sic in libro Duns."⁸⁷ Balic presented in his book a full breakdown of the editorial organization of the 48 Distinctions of Book I.⁸⁸ He indicated that the Paris, BN. mss. latin 16360 and 3061 also delimited the additions to the text of the Ordinatio.⁸⁹

Unlike Pelzer, Balic did not believe in 1927, that the Additiones Magnae were a contraction of the Ordinatio of Oxford as well as an attempt to supply supplementary material for the lacunae in the Ordinatio from the Great Reportation of Paris, but rather, that it was a true and independent reportation of the Paris lectures.⁹⁰ Hence he did not disparage Wadding's efforts to reproduce the thought of Duns Scotus by relying on the Additiones Magnae as found in the Vatican ms., Latin 876 to obtain the true thought of J. Duns Scotus.⁹¹

Carlos Balic described the manuscript tradition for the Additiones through the following manuscripts: the Paris, BN. mss., Latin 15907 and 3061 and the Vatican ms., Latin 876. Balic viewed the text of the Paris ms., 15907 as a primitive form of the Additiones, which he believed to be close to the oral teaching of J. Duns Scotus at Paris.⁹² The text in

the 15907 ms. is not complete and the author seems to have supposed the existence of another Commentary. Consequently, he frequently announced only the title of a question, as for instance on f. 12v D.1. q.2.⁹³ The author also gave notice of other pro and con arguments for a particular question and just added the editorial note "quere alibi" or "quere" rather than give the full argument there.⁹⁴ Therefore Balic concluded that the Commentary on Book I of the Sentences, as seen in the Paris BN. 15907, is a reportation of the Paris teaching designed to be more precise and complete than a pre-existing text of the Commentary.⁹⁵

Next to be examined by C. Balic was the very important Paris, BN. ms., Latin 3061. This manuscript belongs to a category of manuscripts that give the Ordinatio (Opus Oxoniense) followed by the Additiones Magnae (Additions of Alnwick).⁹⁶ Balic deduced from scribal notations that the ms. Latin 3061 of Paris represented a re-editing of both the Ordinatio and Additiones. If one compared the Additiones as seen in the Paris mss. 15907 and 3061, one would see a great difference in the references to the Ordinatio. The ms. 3061 offers a shorter text of the Commentary but the editor indicated by the sign (S) that the missing sections on the subject could be found in the Ordinatio, which he had presented in some preceding folios.⁹⁷ The copy of the Additiones found in the Vatican ms., Latin 876 (which was also studied by Pelzer) represents, according to Balic, the tendency to present the oral course at Paris, namely the Additiones (which Balic regarded as a bona fide reportation) after the presentation of the Ordinatio or Oxford reading.⁹⁸ In editorial procedures this manuscript is like the two previously discussed manuscripts. Like the Paris, ms., Latin 15907, the Vatican ms. has such editorial notes as "quere" and "quere alibi". In places, where the Paris

ms. Latin 3061 used the sign (s) to refer to the Ordinatio, the Vatican ms. Lat. 876 used the sigla θ or "quere θ ".⁹⁹ The Vatican ms. also used the word Ordinatio in places where the Paris ms. used the (s). Moreover the Vatican ms. occasionally announced questions that the Paris ms. 3061 skipped and vice versa.¹⁰⁰

Balic's interpretation of the sigla (s) to mean Ordinatio and the θ to mean "instantia"¹⁰¹ was contrary to Pelzer's interpretation of the θ sigla as meaning "omissa."¹⁰² Balic also believed the θ to be a primitive form of the editorial sign (s), meaning Ordinatio.¹⁰³ The (s) symbol then is simply used, according to Balic, to tell us what is not treated in the Additiones but can be found in the Ordinatio.¹⁰⁴ The Vatican ms., Latin 876 represented in Balic's opinion a later re-edition of an early edition of Book I of the Commentary.¹⁰⁵

A Franciscan tradition that J. Duns Scotus had lectured twice on the Sentences at Paris, as well as F. Callebaut's reconstruction of the chronology of the life of Duns Scotus lent support to Balic's belief that the Additiones Magnae was a Reportation of the second reading of the Sentences at Paris and not as A. Pelzer held, an amalgam of the tradition of Oxford and Paris. The crucial point in Balic's early research centers on the difference between his interpretation of the nature of the Additiones Magnae and that of Pelzer.¹⁰⁶ Balic's evidence led him to believe that the supposed two Reportations of Paris varied in content and expression because J. Duns Scotus expounded on Book I twice, once in 1302 - 1303 as a bachelor and again in 1305, only this time as a Master. In the 1305 reading (the Additiones Magnae) it is apparent that Duns Scotus expounded on some questions in greater detail while for others he offered only a review of the Ordinatio. Balic pointed out that the 1305

Reportata (the Additiones Magnae) is a more concise reportation.¹⁰⁷

Balic placed four texts of the Paris teaching in parallel columns for the purpose of comparison.¹⁰⁸ The two texts in columns 1 and 2 represented the Reportation of 1302 - 03 and the other two texts in columns 3 and 4 represented the Reportation of 1305 (the Additiones Magnae). In the first column the text is that found in the edition of 1597, which is a reprinting of the 1517 Edition of John Major, which is faulty in itself as seen earlier.¹⁰⁹ Balic also discovered in his research of this tradition a manuscript version of suspicious similarity to the 1517 and 1597 editions in the Worcester ms. F. 69. By juxtaposing the Editions of 1517 and 1597 with the Worcester F. 69 ms., Balic sought to demonstrate that the manuscript text was only a fair representation of the 1302 - 03 reading of the Sentences.¹¹⁰ Balic also concluded that the editions were more reliable than the manuscript but at the same time he also said that the Editions of 1517 and 1597 ought to be used only with grave reservations.¹¹¹

In the second column is the text of the Small Reportation of 1302 as found in the Vatican Borghese ms. Latin 50,¹¹² which is the same text Pelzer discussed as the "Reportation of the German Brother".

The third column contains a text of the supposed 1305 reading at Paris, which is actually the Additiones Magnae, as seen in the Paris BN. Latin 15907.¹¹³

The fourth text is the Vatican Borghese ms. Latin 325, which is a copy of the same text found in the Vienna, Nationalbibliothek, ms. Lat. 1453 by A. Pelzer, which has the scribe's statement that J. Duns Scotus examined the text himself.¹¹⁴

In the comparison of the two texts of the 1302 reading, the Small

Reportation naturally enough appeared to be more concise and the Reportata Examinata (Vienna, ms. Lat. 1453) seemed to be a synthesis of the Reportation of 1302 and 1305. Balic thought in regard to the evolution of the texts that: first, the text of 1302 is the most concise; second, that the text of the Additiones Magnae is more developed but less complete; and third, that the Reportata Examinata is a synthesis of the elements in the other two.¹¹⁵ All in all the comparison of the four texts clearly indicated to Balic that it was the same professor, the same material, procedures and conclusions for all four versions of the Sentence Commentary.¹¹⁶

There is a degree of inaccuracy in Balic's evaluation due to a less than accurate assessment of the nature of some of the texts involved. First, he did not realize that the 1302 - 03 Paris readings, as seen in the Editions of 1517 and 1597, were faulty in themselves.¹¹⁷ Naturally enough there were to be found some points of correspondence when compared with the Worcester ms. F. 69. His judgment on the reliability of the ms. copy is thus suspicious but his reservations in regard to the Editions although not based on an understanding of the manner in which the Edition of 1517 was composed are accurate. Second, he failed to grasp at that time that the Additiones Magnae (his Reportata of 1305) were an abbreviation of the text of the Ordinatio and an attempt to fill in the lacunae in the text of the Ordinatio by borrowing from the Paris lecture. Hence his judgment that the supposed 1305 reading was at points more developed and yet as a whole more concise was accurate. Third, his statement that the Reportata Examinata was a synthesis of the other two versions is inaccurate. Actually this is the true Paris Commentary on the Sentences and the Additiones Magnae (his Reportata of 1305) and the Editions of

1517 and 1597 are not true texts of that lecture.

There is one last link in the manuscript tradition for Book I as treated by Balic and that is the unedited Commentary of Duns Scotus found in ms. 178 of the Library of St. Anthony in Padua.¹¹⁸ The text can also be found in the Vienna, Nationalbibliothek ms. Latin 1449 and the Vatican ms. Palatine Latin 993.¹¹⁹ This text represents, according to Balic, a new commentary which differs from all the previously mentioned versions of the Sentence Commentary.¹²⁰ The editors of the Critical Edition refer to this version as the Lectura.¹²¹ The text according to Balic showed a commonality of source with the Opus Oxoniense but it differs from the Opus Oxoniense in the arrangement of the text. For instance, the Padua ms. does not give question two of the Prologue. The first line of the question given there agrees with the Opus Oxoniense but that is all.¹²² For question three of the Prologue the Wadding-Vives Edition gives the opinion of William of Ware but this does not appear in the Padua manuscript.¹²³ The Padua ms. in Balic's opinion dates from the year 1300.¹²⁴ All three texts, the Padua, Vienna, and Vatican, asserted Balic have a common source, but differ in their editing arrangements. Moreover it is clear that they more or less agree.¹²⁵

Balic observed that Thomas of Sutton, a contemporary of J. Duns Scotus, quoted an unrecognized text different from the Opus Oxoniense for D. 26.¹²⁶ Through an elaborate comparison between the text of Sutton (Vatican ms. Lat. 872) and the text of this unedited version of the Commentary quoted by Sutton (Vat. ms., Palatine 993; Vienna ms., Lat. 1449); the Great Reportation (Paris, BN., Lat. 15854); and the Small Reportation (Florence, Laurent., Plut. 31, dext. cod.3),¹²⁷ Balic concluded that the text quoted by Sutton represented an elaborate résumé

of the Opus Oxoniense (Ordinatio).¹²⁸ Moreover he suggested that the new text found in the Padua, Vienna, and Vatican mss. was probably the work of Duns Scotus.¹²⁹ Balic suggested that perhaps they represent an early rough draft of the Opus Oxoniense done in 1300.¹³⁰

In more recent years the Scotist Commission has produced in volumes XVI (1960) and XVII (1966) of the Critical Edition of the Opera Omnia of J. Duns Scotus a text for Book I of the Lectura. In the Preface of vol. XVI and in the Prolegmena in vol. XVII one finds repeated the opinions that the Lectura is an authentic text of Duns Scotus and that it was written prior to the Ordinatio.¹³¹ C. K. Brampton believes that the Lectura represents the actual original Oxford Lecture, while the Ordinatio, is a text re-edited by J. Duns Scotus himself sometime later.¹³² Hence, the Lectura in all probability is a reportation done by a student and this would seem to be quite plausible. The differences between the two texts can then be explained by the fact that Scotus reworded his original lecture in producing the Ordinatio, making some additions to it and perhaps some subtractions from it. Moreover, the accuracy of the text of a reportation (the Lectura in this case) depended on the ability and fidelity of the recording student.

From the foregoing studies on Duns Scotus' Commentary on the Sentences, it would seem that Duns Scotus' purpose in developing his Commentary on the Sentences in the manner in which he did was to fit a higher design, that is, the production of a summa of his knowledge within the framework of the Sentences. Unfortunately due to the brevity of his life Duns Scotus never produced an autograph of his work. For Book I there has been discovered only one manuscript text whose explicit claims that the text had the approval of Duns Scotus but some hesitate to rally

round that subscription precisely because there is only one such manuscript subscription out of all the manuscript texts of Book I.

We have seen A. Pelzer's definition of the term reportatio. From Pelzer's investigation of the medieval use of the word we know that a reportation is a written repetition of a master's classroom lecture as taken down in note form by a student.

In addition, we have seen that the Commentary for Book I of the Sentences has come down to us in the following manuscript versions:

- (1) The Ordinatio (Opus Oxoniense), which is the lecture given by J. Duns Scotus at Oxford and partially re-edited by him;
- (2) The Lectura, which Balic suggested was an early draft of the Ordinatio and which Brampton sees as a reportation of the Oxford reading of the Sentence Commentary;
- (3) The Small Reportation of the Paris Lectures by Friar H. on Book I;
- (4) The Great Reportation of the Paris Lectures (the Reportatio);
- (5) The Additiones Magnae edited by Wm. of Alnwick, which is regarded by Pelzer as an attempt to abbreviate the Ordinatio, while at the same time providing supplementary readings to it from the Reportation of Paris. Balic on the other hand believed this to be a true reportation of a second reading of the Sentences at Paris in 1305.

From the research of both men it is evident that all the available editions, such as those of 1517, 1468, 1597, the Lyon 1639 and the Wadding-Vives Edition are not reliable renderings of Duns Scotus' Commentary. Except for the Scotist Commission's Critical Edition of Book I of the Ordinatio and Lectura, we are left with the conclusion that to get an accurate reading of the texts of Duns Scotus one must return to the various manuscript traditions.

Carlos Balic's Study of Book II

Of necessity the next tasks in our study are to provide a summary of C. Balic's early internal investigations of some of the key manuscripts pertaining to the four avenues of manuscript transmission for Book II and to conclude with a presentation of some of his recent revisions on his earlier views.

Information on the manuscript tradition for Book II of the Sentence Commentary of J. Duns Scotus can be found in three places: the Prologue of Vol.I of the Critical Edition of the Opera Omnia of Duns Scotus, where there is a listing of the manuscripts pertaining to Book II;¹³³ volume VII of the same Critical Edition,¹³⁴ where Distinctions 1-3 of Book II are published in critical form; and the chapter on Book II that appears in C. Balic's Les Commentaires de Jean Duns Scot Sur Les Quatre Livres des Sentences (pp. 92 - 134) where Balic presents an internal critique of the vagaries of the manuscript traditions for this book. The main avenues of manuscript transmission for Book II will be identified as the Ordinatio, Lectura, Reportatio of Paris, and the Additiones Magnae.

As in the case of Book I, C. Balic and the Scotist Commission turned to the Assisi ms. 137 for the basic presentation of Book II of the Ordinatio. Book I ends in that ms. on folio 96vb and Book II immediately begins and continues up to folio 139rb. The copyist made the claim there on f. 139rb, that he had under his eyes the book of Johannes Duns Scotus. The Bibliothèque Mazarine, ms. 881, dating from the early fourteenth century, is similar to the Assisi text.¹³⁵

Book II of the Opus Oxoniense in the Vives Edition, vol XI - XII contains about 350 pages of material that does not exist in the manuscript tradition for the Ordinatio, but was added by the editor, Luke

Wadding.¹³⁶ The following questions are missing in most manuscript copies of the Ordinatio: D. III q. II; D. V, q. 2; D. XII q. 1 and 2; D. XIV q. 3; D. XV - D. XXVI; D. XLII q. 1 - 4.¹³⁷

For Distinction 12 q. 1 the two above mentioned mss. give a short text which is comparable to that found in the Reportatio of Paris, as found in the Venice 1597 edition.¹³⁸ Some manuscripts such as the Munich, Nationalbibliothek ms., Latin 8717 omit all the questions between D. XIV q. 3 and D. XXV but indicate in a marginal note that the material is to be found in the Reportations.¹³⁹ Many manuscripts after giving the incomplete Ordinatio follow immediately with the Additiones, "Incipiunt Additiones secundi libri." This situation is illustrated in the following manuscripts: The Paris, BN. ms., Latin 3061; the Vatican ms., Latin 883; the Balliol College ms. 208;¹⁴⁰ the Merton College ms. 87.¹⁴¹

In the Additiones Magnae, as found in the Paris ms., Lat. 3061 and the Balliol College ms. 208, we notice that all the lacunae mentioned earlier as existing in the Ordinatio are filled into the normal framework of the lecture as presented in the Additiones. Hence we find there D. III, q. 2; D. V, q. 2; D. XII, q. 1 and 2; D. XIV, q. 3; D. XV - XXVI, q. 1; and D. XLII, q. 1 - 4.¹⁴² Balic observed that there was a resemblance, sometimes literal and sometimes quite different, between these questions and those added to the text of the Ordinatio as found in the Opus Oxoniense of the Vives Edition.¹⁴³ It is interesting that for Distinction 25, which is concerned with Duns Scotus' doctrine on the will, the Additiones Magnae of Alnwick as found in the Paris ms. Lat. 3061 gives the doctrine three times; the first time on folio 261rb; the second time is on folio 262va and the third time is on folio 264va.¹⁴⁴

Folio 262va states that this second version is an improvement over the Oxford doctrine of the Master.¹⁴⁵ This important text ends on column 2 of folio 263ra. On folio 263rb there is another question on the subject, "sed qualiter concurrant illa plura ad volitionem" and on f. 264 we find the definitive conclusion.¹⁴⁶ The text that Alnwick claimed to be the Oxford reading does not agree with the Opus Oxoniense in the Vives Edition but reads more like the Paris Commentary.¹⁴⁷ It seems that Alnwick juxtaposed the doctrine as given at Oxford¹⁴⁸ with that given at Paris for Distinction 25.¹⁴⁹ This same situation also exists for Distinction 18.¹⁵⁰

To Balic it was clear that the Additiones Magnae (his Reportata of 1305) were used to complete the Ordinatio and that the Additiones were made by Alnwick, who heard Duns Scotus at Paris and made a reportation of his lectures. That this is so is supported, said Balic, by the fact that we find on folio 253 of the Paris, ms. Latin 3061 "Nos existentes Parisiius ...".¹⁵¹ There is, however, one question whether there were one or two readings on Book II at Paris and for this answer Balic supplied us with additional manuscript evidence. We know that J. Duns Scotus revised his doctrines on the will so that there are actually 3 opinions on this subject. It is also known that Alnwick juxtaposed the presentation of the teaching at Oxford with that of Paris so that these two are identifiable.¹⁵² In the Cambridge, Gaius et Gonville College ms. 287 the three statements on the doctrine on the will appear between ff. 80r and 81va. One agrees with Alnwick's Paris version of the doctrine and the other with the Oxford opinion but the third is not identified. However in the Vatican ms. 883 there is a reading which corresponds to this third opinion and in the margin there is a scribal note

identifying this statement as having been given at Paris.¹⁵³

Consequently Balic maintained in 1927 that for Book II we have the Ordinatio and the two readings done at Paris and reported by his students. Hence we see that his history of Book II falls into the pattern he saw for Book I which is also supported by Callebaut's chronology of the events in the life of Duns Scotus, namely: The Ordinatio read in 1300; a reportation of the Paris lecture of 1302 and a Second Reportation done by Wm. of Alnwick for a 1305 reading of the Sentences.¹⁵⁴

Many medieval copyists did not present the full course of the incomplete Ordinatio followed afterwards by a complete rendering of the Additiones Magnae or vice versa. Instead they interrupted the Ordinatio to complete the lecture on the Second Book by supplying the omitted passages taken from the Additiones Magnae. The Vatican ms. Latin 876 represents this tendency. The Ordinatio is interrupted on folio 294ra by the Additiones which continue to folio 310va. Here the questions noted treated in the Ordinatio are represented as found in the Additiones Magnae. These questions as listed by Balic are as follows: D. XV (f. 303ra); D. XVII, q. 1 (f. 303ra - 303rb); D. XVII, q.2 (f. 303rb); D. XVIII, q.2 (f. 303rb); D. XIX, q.1-2 (f. 303rb); D. XX, q. 1-2 (f. 303va - vb); D. XXI, q.1 (f. 304ra); D. XXII, q. 1-2 (f. 304ra); D. XXIII, q.1 (f. 304ra); D. XXIV, q.1-2 (f. 304ra); D. XXV, q.1 (f. 305ra).¹⁵⁵

Some manuscripts are described by Balic as belonging in a category that gives the Ordinatio as a completed text without saying where the filled in material came from. Three manuscripts of this type are the Paris BN. mss. Lat. 3114¹; 8918 and 15856. These manuscripts and their own peculiarities were discussed in some detail by Balic.¹⁵⁶

Other manuscript evidence, as presented by Balic in his 1927 study indicated a second set of Additiones to the text of the Sentence Commentary on Book II. The appellation "Secundae Additiones" stems from references in Henri d'Oyta's (Hoyta's) summary of the Commentary of Adam Wodeham on the Sentences. Balic cited three examples of this, one of which we will reproduce here. The reference is found in the Paris incunabula BN. D. 34 (f. 48v): "Secunda via mixtionis est elementorum non remanentium in mixto quam ponit sco. in secundis additionibus secundi libri di.3; secum concordat Okam, quere ibi."¹⁵⁷ Balic stated that a full text of the "Secundae Additiones" can be found in the Vienna Nationalbibliothek ms., Latin 1449 and the ms. Q.II.21 of the Convent of St. Francis ad Ripas in Rome.¹⁵⁸ It should be noted, that in the discussion of Book I the Vienna manuscript was discussed in relation to the Lectura for Book I.¹⁵⁹ In addition, the Padua ms. 178 of the library of St. Anthony contains both Books I and II of the Lectura. That raises the question of just what are these so called "Secundae Additiones".

The Commentary on the Second Book begins in the Rome ms. on folio in "Circa dist. primam secundi libri queritur utrum causalitas prima respectu cuiuslibet causabilis de necessitate, requirat esse in tribus personis."¹⁶⁰ There are in these two manuscripts frequent references to Book I and a statement that certain passages would be developed further in Book III.¹⁶¹ Balic compared the so called "Secundae Additiones" of the Rome and Vienna mss. with the Additiones Magnae of Alnwick for Distinctions XV; XVII, q.2; XXIII;XX, q.2; XXV.¹⁶² The results of this comparison showed that there exists an organizational or rubrical difference between the Additiones of Alnwick as found in the Paris ms., Lat. 3061 and the ms. Q.II.21 of Rome. The Paris manuscript after announcing the

question introduces the arguments with the rubric "Quod non videtur", while the Rome ms. uses "Quod sic videtur". For Distinction XV, which deals with the creation of animals, we find in the section where J. Duns Scotus gave his opinion, that the Vienna and Rome mss. gave a text that is obviously a modification of Duns Scotus' thought and hence presents a different and longer reading than the Paris manuscript.¹⁶³ It should be pointed out that D. XV does not appear in the Ordinatio.¹⁶⁴

We have evidence that would indicate that Alnwick knew of the doctrine in the "Secundae Additiones" and this is illustrated by Fr. Balic's comparison between this version and the Additiones Magnae for D. XXV, which presents the doctrine on the will as stated earlier.¹⁶⁵ J. Duns Scotus offered a retraction of his early teaching on the will at Oxford. The text that Alnwick gave as the retraction in the Paris ms. 3061, while it does not read word for word, bears a strong similarity to the text found in the Vienna and Rome manuscripts of the "Secundae Additiones". Hence Balic suggested that Alnwick was aware of this tradition, although perhaps not directly, but through some intermediary channel.¹⁶⁶ Balic also suggested that the Vienna and Rome manuscripts represent a redaction of Johannes Duns Scotus himself on the Sentences.¹⁶⁷ Hence, these "Secundae Additiones" are not another set of additions done by some unknown editor but a work of the Master himself. It is this version found in the Vienna and Rome mss. that Adam Wodeham saw and quoted;¹⁶⁸ and which he mistook for another set of additiones to the Sentence Commentary of Duns Scotus. This text of Book II is actually a reportation of the Oxford reading of the Sentence Commentary. Moreover the title applied to this version for Book I namely, Lectura, also applies to Book II. Consequently, we have for Books I and II a version known as the Lectura which originated

with Duns Scotus.

The description of the manuscript tradition we have presented in the foregoing pages is based on the report given by Fr. Balic in 1927 in his book Les Commentaires de Jean Duns Scot Sur Les Quatre Livres des Sentences, and represents his early exploration into the channels of Scotistic transmission. Many of his opinions have been carried over into first volume of the Critical Edition. Over the years he has come to modify some of his views in regard to the nature of the Additiones Magnae and on the transmission of Book II.

In a "Relatio", which appeared in the Acta Ordinis Fratrum Minorum, January - April, 1973 pp. 53 - 56,¹⁶⁹ Balic related that there were some 350 pages in the Ordinatio, as presented in the Wadding-Vives Edition of Book II, which do not appear in the manuscript tradition of Book II. This material appears between Distinction 15 and Distinction 25 (Book II consists of 44 Distinctions). Balic stated that this extra material in the edition was gleaned from the Lectura and the Reportation of Paris. This material is none other than the Additiones Magnae, which Balic in 1927 declared to be a true and independent reportation of the Paris teaching on the Sentences. Now in 1973 in the "Relatio" he presented the view held by Pelzer back in 1923 that the Additiones Magnae of Wm. of Alnwick were an amalgam of the Oxford and Paris readings. Father Balic in 1973 was now of the opinion that, the ms. text Alnwick borrowed from to fill in the lacunae in the Ordinatio is that existing in the Padua Library of St. Anthony ms. 175, which text is the Reportation of Paris.

Moreover, in the "Relatio" Balic stressed the fact that the whole of Book II as offered in the Wadding-Vives Edition should be regarded as doubtful. In particular he cited the case of D. XXV. Balic stated that

throughout Book II of this edition it is difficult to separate the text of Duns Scotus from that of his disciples. While he believed the work of Alnwick to be valuable, Balic stated that it should not be considered as the authentic thought of J. Duns Scotus, but only an indirect presentation of the Lectures on Book II.

Thus it is clear that for Book II, as for Book I, the printed editions are not to be relied on for an accurate reading of Duns Scotus' lectures on the Sentences. In addition it is evident that there are for Book II four lines of manuscript transmission: (1) the Ordinatio, the re-edited text of the reading of the Sentences at Oxford; (2) the Lectura, a reportation of the Oxford reading; (3) the Reportatio or the Reportation of Paris; (4) the Additiones Magnae of Wm. of Alnwick.

Footnotes

1. Ioannis Duns Scoti, Opera Omnia, I, (Civitas Vaticana, Typis Polyglottis Vaticanis, 1950), 170* - 172*. Henceforth referred to as Critical Edition. See also Francois Masai, "Edition et Codicologie", in Scriptorium, VIII, (1954), 138. In regard to Opera Omnia see p. for full entry on the edition.
2. Masai, 138; Critical Edition, I, 172*.
3. Critical Edition, I, 176*.
4. Ibid.; in regard to the control imposed on the stationarii to insure the reproduction of accurate texts, see: Pearl Kibre, "The University of Paris and the Stationarii in the Thirteenth and Fourteenth Centuries" in The Columbia Library Columns, vol. IV, no. 1 (1954) pp. 12 - 18.
5. Critical Edition, I, 176*.
6. Ibid.
7. Ibid.
8. Ibid.
9. August Pelzer, "Le Premier Livre des Reportata Parisiensia de Jean Duns Scot" in Etudes D'Histoire Littéraire Sur La Scolastique Médiévale, (Louvain: 1964), 434 - 435.
10. Carlos Balic, Les Commentaires de Jean Duns Scot Sur Les Quatre Livres des Sentences. Bibliothèque de la Revue d'Histoire Ecclésiastique, I, (Louvain: 1927), xi; Pelzer, "Le Premier", 445 and 448.
11. Palemon Glorieux, "Répertoire des Maîtres en Théologie de Paris au XIII^e Siècle", in Etudes De Philosophie Médiévale vols. 17 - 18, (1933), 16; See Pelzer, "Le Premier", 422 - 23.
12. See above note 9; I personally examined this manuscript in the summer of 1974.
13. Balic, Les Commentaires, ix - xiii; Pelzer "Le Premier", 422.
14. The reading of the Sentences done at Oxford 1299 - 1300.
15. Balic, Les Commentaires, x; Pelzer, "Le Premier", 422 - 423; see especially note 1, p. 423; Critical Edition, 142*.
16. Balic, Les Commentaires, x; Critical Edition, 142*.
17. Balic, Les Commentaires, x; see also Balic, "Life and Works", 19.
18. Balic, Les Commentaires, xi.
19. Pelzer, "Le Premier", 422 - 423.

20. Ibid., 423; Pelzer here also expressed surprise that men who handled the manuscripts ignored the usages current in the works of the schoolmen. He also was surprised at the obstinacy with which these erroneous ideas have been held and propagated.
21. Ibid., 424; see also note 6 where an extract from folio iv of the ms. Ottoboni 280 is presented as follows: "... tertio protestor quod quaecumque reportabuntur verbo vel scripto de dictis meis preter illa que in quaterno presenti quem pro exemplari dabo habeo pro non dictis et ea non reputo dicta mea nec ex mea intentione dicta."
22. Ibid., 425, note 9: From the Vatican ms., Borghese 39 f. 318v: "... hec sunt dicta istius doctoris moderni prout potui habere a diversis reportatoribus, verum et quod magister fecit 12 rationes pro parte quam teneo et ad eas respondet secundum sua fundamenta et ideo improbatis fundamentis (répété) improbate erunt solutiones et propter hoc ipsa non repeto. Verum est quod in reportatione cuiusdam continebatur ultimo quod ipse dixerat quod relatio potest videri intuitive non viso termino etiam in creaturis ...".
23. Ibid., 426: "... de ista materia plus habeo in papiro meo quod reportavi in scolis."
24. Ibid., 428; see note 17.
25. Pelzer, "Le Premier", 428.
26. Ibid., see there note 19.
27. Ibid.
28. Ibid., 429; see also Glorieux, "Répertoire des Maîtres", 16.
29. Balic, Les Commentaires, 116 et sq.
30. Critical Edition, 157 et sq.
31. Balic, Les Commentaires de Jean Duns Scot Sur Les Quatre Livres des Sentences, Chapter II.
32. This work by Alnwick is referred to by Balic and the Scotist Commission as the Additiones Magnae; see Critical Edition, I, 38* - 40*; 145* - 147*; Balic, Les Commentaires, 9. On Alnwick see A. G. Little The Grey Friars in Oxford, (Oxford: Clarendon Press, 1892), 167: "William of Alnwick is possibly identical with the Friar called Roger of Alnwick in the list of Oxford Franciscans presented to the bishop of Lincoln in 1300. After lecturing at Oxford (c. 1315 - 1320), he was sent to the University of Naples, as Doctor of theology. He was present at the General Chapter of Perugia in 1322, and joined with the other leading men in the Order in declaring that the doctrine of evangelical poverty was not heretical. In 1330 he was made Bishop of Guevenazzo near Bari. He is said to have died at Avignon in 1332."
33. On William di Missali see p. 301.

34. It should be noted that the Reportata Parisiensia published by Wadding was used universally by scholars for centuries as the text of Johannes Duns Scotus read at Paris.

35. Pelzer, "Le Premier" 430, see there note 21.

36. Ibid.

37. Ibid., 430.

38. Michael de Cesena was elected Minister General of the Franciscans in 1316 and sought to quell the Spiritual Franciscan movement. Pope John XXII however felt that he was lax in this regard and perhaps had even joined the movement and so deposed him. Michael later joined forces with Louis of Bavaria against the Pope. See: John Moorman, A History of the Franciscan Order from Origins to the Year 1517, (Oxford: Clarendon Press, 1968) pp. 309, 319, 322 - 330.

39. Pelzer, "Le Premier", 430, see there note 22.

40. Ibid., 431.

41. Ibid., 432.

42. Ibid., 433.

43. Ibid., 434.

44. Ibid., 435.

45. His name is spelled Mair, Maior or Major; See Dictionary of National Biography, eds. Sir Leslie Stephen and Sir Sidney Lee, v. 12, (London: 1909), 830.

46. Ibid., see also Pelzer, "Le Premier", 435.

47. Pelzer, "Le Premier", 435.

48. Ibid., 436.

49. Ibid., 438.

50. Ibid., 439 - 440.

51. Ibid., 440.

52. Balic, Les Commentaires, 9: Critical Edition, I, 39*; 145*.

53. Pelzer, "Le Premier", 443.

54. Ibid., 441.

55. Ibid., 444.

56. Ibid. Note the distortion of Alnwick's name, Abilnoik; see p 301.

57. See note 32; Pelzer, "Le Premier", 445.
58. Pelzer, "Le Premier", 445.
59. Ibid., 446.
60. Ibid., 448 - 449; Balic, Les Commentaires, 16 - 17.
61. Pelzer, "Le Premier", 451.
62. Ibid., 443.
63. Chartularium Universitatis Parisiensis, ed. H. Denifle and E. Chate-
lain, II, no 652, p. 117; See Pelzer, "Le Premier" 443, note 40.
64. Pelzer, "Le Premier", 443 - 444.
65. Ibid., 444; supra p.300; see above note 56.
66. Ibid., 453.
67. Ibid.
68. Ibid.
69. Ibid., 454.
70. Ibid., 457.
71. Ibid.
72. Ibid., 458.
73. Ibid.
74. Ibid., 458 - 59.
75. Ibid., 459.
76. Ibid.
77. Ibid., 460.
78. Ibid., 461.
79. Ibid.
80. Ibid., 461 - 463.
81. Balic, Les Commentaires, 3.
82. Ibid.
83. Ibid.

84. Ibid.
85. Ibid., 3 - 4.
86. Ibid., 4.
87. Ibid.
88. Ibid., 4 - 6.
89. These three manuscripts, the Assisi 137, the Paris, BN. mss. 15360 and 3061, I have personally examined and they will be treated in greater detail in regard to D. 13 of Book II.
90. Balic, Les Commentaires, 8 - 9.
91. Ibid.
92. Ibid., 9 et sq.
93. Ibid., 9, note 4.
94. Ibid., 10.
95. Ibid.
96. Ibid., 10 - 11; other manuscripts in this category, according to Balic, are the Balliol College ms. 302, Vienna, Nationalbibliothek ms., Lat. 1423, the Vatican ms., Lat. 876 and the Cracow ms. 1605. The latter he said represents a later edition of the Additiones.
97. Ibid., 12.
98. Ibid., 13.
99. Ibid.
100. Ibid.
101. Ibid., 17.
102. Ibid., 16.
103. Ibid., 18.
104. Ibid., 17.
105. Ibid., 23.
106. Ibid., see pp. 300; 303
107. Ibid., 25; see our pp. 308 - 09; 319 - 20.
108. Ibid., 26 - 27.

109. Ibid., 26; 44; see our pp. 298 - 99.

110. Ibid., 51 - 55; 45 et sq.

111. Ibid., 45; 48.

112. Ibid., 26 - 27.

113. Ibid.

114. Ibid., 26; see note 1, Balic pointed out that of the 5 or 6 ms. texts of this reportata only one has the statement in its explicit that the work was examined by Johannes Duns Scotus. In my own examination of this manuscript and the Vienna, Latin 1449 it was noted that the physical makeup and marginal decorations seen in both manuscripts are remarkably similar and perhaps one could suggest that they came from the same scriptorium or locale.

115. Balic, Les Commentaires, 29 - 30.

116. Ibid., 30.

117. See above p. 299.

118. Ibid., 56.

119. Ibid., 57 - 58.

120. Ibid., 57.

121. Critical Edition, I, pp. 157* et sq.; vol. XVI (1960) and vol. XVII (1966).

122. Balic, Les Commentaires, 59.

123. Ibid.

124. Ibid., 59 - 61.

125. Ibid., 65.

126. Ibid., 69.

127. Ibid., 70 - 81.

128. Ibid., 81.

129. Ibid., 82 - 83.

130. Ibid., 86.

131. Critical Edition, vol. XVI, p. x - xi; Vol. XVII, pp. 1* - 19*; in particular note pages 1*; 4*; 10* - 11*; 13*.

132. Brampton, "Duns Scotus at Oxford", 9.
133. Critical Edition I, 145* - 147*.
134. Critical Edition, VII, (1973).
135. In regard to Distinction XIII of the Ordinatio of Book II, I have personally examined both of these manuscripts.
136. See our page 319.
137. Balic, Les Commentaires, 92.
138. Ibid., 93.
139. Ibid., see note one: "Ce ms. est du XIV^e siècle; il omet toutes les questions dist. XIV, q. 3 - dist. XXVI; mais là où cette lacune commence (f^o. 59rb), on trouve en marge la note suivante: "Residuum a. D. 14 usque ad 26 quere in reportationibus, quia illud non invenitur."
140. Ibid., 93; Balliol College ms. 208, f. 40va, "Expliciunt additiones secundi libri magistri Joh. Duns extracte per magistrum Gullielmum de Alnwik ord. fratrum minorum de lectura parisiensi et oxoniensi predicti magistri Johannis."
141. Ibid., 93: see note 2 on pp. 93 - 94, concerning Book II, the Merton College ms. 87 f. 1r states "... Contenta: Abbreviatio seu reportorium doctoris subtilis super primum et secundum sent. in opus paris. Item questio de bona fortuna in inicio libri. Item questio, utrum paradisus sit locus conveniens habitationi hominum."; see Ibid. p. 99; the text of the Additiones in the Vatican ms. Lat. 883 ends after D. 25 but in the Paris, BN. ms. Lat. 3061 and Balliol College ms. 208 the text continues through to the end of the book, which is D. 45. I have myself viewed these manuscripts.
142. Ibid., 95.
143. Ibid., 96.
144. Ibid., 96.
145. Ibid., 97.
146. Ibid.
147. Ibid., 97, note 1.
148. The Oxford version is probably to be found in the Lectura which as concluded on p. 64 is a reportation of the Oxford reading. However since the Scotus Commission has not produced a critical text for D. 25 as yet and since I have not pursued this question in the ms. tradition this observation must remain a suggestion.
149. Ibid., 96.

150. Ibid., 96 - 97.
151. Ibid., 100.
152. Ibid., 96.
153. Ibid., 100 - 101.
154. Ibid.
155. Ibid., 101 - 102.
156. Ibid., 103 - 104.
157. Ibid., 116.
158. Ibid., 117.
159. Supra p. 310 - 11 ; see "Critical Edition", I, pp. 145* - 146*.
160. Balic, Les Commentaires, p. 117.
161. Ibid.
162. Ibid., 117 et sq.
163. Ibid., 118.
164. Ibid., 119.
165. Supra pp. 314 - 15.
166. Balic, Les Commentaires, 119 - 125.
167. Ibid., 125; 127.
168. Ibid., 127.
169. Acta Ordinis Fratrum Minorum, (Rome: Curia Generalis Ordinis, Jan. - Apr., 1973).

Appendixes A - D
The English Translations

Appendix A

ORDINATIO

BOOK II

DISTINCTION 13

Concerning distinction 13, I am investigating whether lux can at the same time be lumen. And in respect to this, I inquire first, whether lux begets lumen as, so to speak, its own proper sensible species.

That this is not so:

(1) is seen in Augustine, Book 7 of Super Genesim Ad Litteram: "the soul directs the body through light (lux) and air etc."

(2) Besides lumen begets a substance, since it appears in the case of fire; therefore it is a substance.

(3) Besides, lumen is broken and reflected; ergo it is a body, because these are the phenomena of bodies.

Besides that, it is not a species, (1) because it designates the medium; nor is it the species of color

(2) For it excludes the opposite of course, darkness. It is not its species, because at the same time that they are the species of opposites, the species of white and darkness are in the medium.

(3) Third, because it has a real effect in the medium and the organ, that is, it is seen to be corrupted by color and gives rise to a real effect. But giving rise to a real effect is not suitable to a species; therefore etc.

Against this: Lux is part of the sensible, as seen in Book II of the De Anima; therefore it has from itself another sensible species not different from lumen; therefore etc.

Here three things must be considered; First, what is lux? Second, what is lumen? Third, in what manner is lumen produced by lux?

(1) Concerning the first: I say that lux is not a substance: because lux is through itself sensible so it is not a substance; a substance is sensible through its accidents. This is seen in the sacrament

of the altar, after the consecration, when it is not the substance of bread any longer but is being changed into the body of Christ and yet there remains there what ever was perceptible before by any sensible agent; therefore etc.

(2) Lux also in a subject is an accident; therefore it is not the substance of any thing, because a true substance is not attached to any-thing, as seen in the First Book of the Physics.

The antecedent is clear: because, if in fire lux is a substantial form, either therefore it is the ultimate specific difference or one more imperfect, which was in potency to the specific form. It is not the first way, because then whatever has light (lux), has the same species. It is not the second way, because then this form would be a more imperfect form than the specific form of fire and so it would not be a substantial form of any celestial body, in which there can be no substantial form less perfect than that of the elementary form of fire.

(3) It is the third way, that is, the probable substantial form of a celestial body following from an active form, just as active qualities follow from the substantial forms of generated and corrupted bodies. There is no other quality stemming from the substantial form of a celestial body other than lux.

(4) This is confirmed by Damascene, chapter 8.

II. A further inquiry: Concerning the second point, I say, (1) that lumen is not a complete substance, that is, subsisting through itself; because it is neither spiritual, since it is extendable, nor corporeal, because then it would be two bodies at the same time. For lux is totally in air. Nor is it necessary, that the air be moved itself by the arrival of lux and it is not necessary, that the air be moved when lumen

withdraws, because then in an illuminated medium the breathing of air would not happen, if that medium were moved locally on account of lumen.

(2) Nor is lumen a substantial form; because that to which it comes remains perfect in species, when it leaves, as is demonstrated by the air, both when it is illuminated and when it is in darkness. Neither is lumen matter and that is evident. Nor does it pertain to any genus of substance; nor is it likely that lumen pertains to any other genus except the genus of quality.

With respect to the genus of quality, the third type of species can be distinguished in a sensible quality and in a quality, in which there is the species or intention of the sensible quality. It should be noted that this word intention is equivocal. Intention is in one way said to be the act of the will. In another way, it is the formal distinction in re. However the intention of the thing from which the genus is derived, differs from the intention, from which the difference is derived. The third way, is said to be common. The fourth way, is said to be an inclination toward an object, as a likeness is called a relationship to that which it is alike.

Hence an intention is not said to be that, which is held by the senses, because this way the object would be the same as the intention. But the intention is said to be that, through which, as a formal principle it is connected with the object. So whatever is the sign is the thing. According to Augustine in De Trinitate and De Doctrina Christiana, it is not convertible. Therefore in the distinction between a thing and a sign, the thing is taken as it is in reality, which is not as a sign. Although that which is a sign is also the thing. So in the distinction between a thing and its intention, although the intention is the thing itself and

the sensible form to which this sense tends, that thing however is said to be the intention, which is not only the thing itself toward which the sense tends, but it is the inclination to something else, which is its proper similitude.

By this way I say that lumen is an intention or proper species of sensible light (lux) itself. Which is provable then, because, if it is not an intention, then when applied on the sense it would impede sensation, because what is only sensible is not the cause of sensation. If it were put on the sense, it would impede sensation, because the sensible alone applied to a sense is not perceived. Thus lumen applied to the eye would hinder vision. Which case is false and contrary to the statement of the Commentator of the De Sensu et Sensato, where the Commentator wants to say, that it is necessary for lumen to be applied to the eye, so that it can receive the species of color and thereby see.

The way this takes place is that as visible light (lux) is naturally prior to color, its species is naturally prior to that of color. So just as in the process of perfecting the medium, it occurs in such a way, that the medium that is not illuminated is not suitable for receiving color. Also in the perfection of sight, the organ which is not illuminated is not apt to see immediately.

III. With respect to the third article, which explains the second way, it must be noted that lumen is engendered by lux according to three types of rays: the straight line ray, the broken, and the reflected ray, according to Alhazen in his Perspectiva.

A straight line ray is that, which is diffused from a luminary in a medium of the same transparency in a straight line and finally touches a limiting body or a terminating body, as long as the strength of the

luminous body lasts.

A reflected ray is that, which occurs when an opaque body intervenes before the active power of the light source reaches its end, and so this power is sent back in the opposite direction. Not however through choice is it sent back but naturally because of a natural agent whose active power is not totally exhausted in one direction. The ray continues to act as it is able to and if it can not act in a straight line, then it acts in an oblique angle.

The refracted or broken ray occurs, when there is a medium of a different transparency but not totally opaque. The ray multiplies itself in the medium but not along a straight line but it bends there at an angle. When however a denser medium occurs, the ray is bent in the direction of the perpendicular, because due to the fact that the perpendicular is the strongest in action. When it is bent in order to act in a denser medium, the ray seeks a place closer to the perpendicular. Such is the location of the broken ray in respect to the perpendicular. When a less dense medium is met, the ray is bent away from the perpendicular for the opposite cause.

I say then, that lumen, which is multiplied according to these three rays, is directly produced by lux itself and also directly is the sensible species of lux itself. Concerning the straight line ray, it is clear. Concerning the reflected ray, it can be proven: either because through the ray the thing is seen in itself and not through the impressed species reflected in a mirror; or because we look for the four things about that which is. Similarly in the case of the ray broken by the medium, the thing itself, is seen multiplying itself. However this is not seen through a species of the thing, just as in the case of the

first luminaries, which were produced by multiplication by the immediate species of the engendering light, and hence immediately produced by it. Thus the rays are produced directly by it, speaking of the directness in respect to cause and not excluding the series of ordered effects in respect to this cause.

But beyond this there is another secondary lumen, which is said to be accidental lumen, as in the case where there is a shadow. For in this case, the shadow is to be distinguished in act from darkness, because darkness is the deprivation of light (lumen), as much primary as secondary. A shadow is not the privation of secondary lumen but primary. This secondary lumen is diffused by reflection, not however from a polished body because reflection from such an object gives rise to primary rays and because it is the direct species of the producing lux itself. This is not so for secondary lumen, which on the contrary is being produced by primary lumen itself in such a way, as if through an impossible assumption a reflection remained in the lumen of a ray that creates the impression it produced. This secondary lumen produces a spherical or half spherical shape but it is not a reflected lumen produced by the primary ray, as a reflection from a polished body is. Whence all lumen is really a species; but primary lumen is the species of a producing lux; and secondary lumen is the species of a primary lumen.

With this it would seem with respect to the argument, which could be raised against this, that while lumen is being seen, it will not be a visible species.

I respond: that any real species, notwithstanding that it is an intention and species of another visible thing, can be visible in itself.

As the Commentator of the De Sensu et Sensato said in the first chapter after the beginning: that, when light (lumen) is being reflected to green plants, walls are being colored; such species are not visible until they strike an opaque object. So what does not strike the opaque object is not able to give rise to a species of itself by which it is seen. Like the species of color, while it is in the medium, it is not seen. But when it hits the opaque object, then it is able to be seen. As it appears in the case of a ray transmitted through colored glass; the color appears on a wall where the ray ends, and the wall is seen as colored the same as the glass. However in the medium this colored ray was not visible, nor can it be denied on this account, that this redness was the species that appeared on the wall. Because if the eye were there, to which, if this redness would be applied, the eye would see the red glass or the redness of the glass.

Hence this proposition is false: that, that which is the intention of the visible object is not visible; but this is true that any intention is not only visible, but the cause of sight.

Hence the form that illuminates the moon is lumen and not lux, because it is not a body ending in the moon. However it is sensible and the species of lux. Similarly, as seen from Aristotle in the beginning of the De Sensu et Sensato: a shaft of light (fulgor) sent out from the eye moving in the darkness is visible and is only the species of lux.

In the same way, lumen that does not end at the opaque object is not seen. Which fact is clear then because: first, the rays of the sun at night are not perceptible, which rays are intercepted between us and the heavens above the cone of the pyramid of the shadow of the earth; secondly, because lumen existing in a body imprisoned in a dark opaque

object, where through opposite holes a ray of the sun could travel and not be seen; and so if it would never reflect itself against an opaque object the ray would never be seen, if that small body is not broken. Similarly, if the illuminated medium is infinite and not limited at the opaque body, while the sun is above the horizon, nothing is seen because it is not ending at an object. Therefore lumen has this same condition that all other principal species of color have to be seen and not to be seen. Just as the principal species of color, multiplying themselves in the form of rays, are able to give rise to other secondary accidental species, which are not multiplied rays and are to be seen through these. However, it is not to be denied, that these first are intentions whereby they are likenesses of the prime colors that produced the rays. So it is in the proposition.

In arguing about the first, I say, that Augustine there accepted lux for a subtle body, as for example fire, which is a more subtle body in a mixture; or any subtle body agreeing with fire in nature. And so as scripture says, lux was made on the first day not because it was made an accident without a subject, but because it was made a luminous body, the form of which was more perceptible or that lux was more perceptible. Hence an unknown subject is being described in more notable terms.

For the second, I say, that a quality, that is altering, generates a substance in the end of the process of alteration but it is not that quality which alters alone but another which produces it.

To the third, I say, that these are metaphors on light (lumen), which is clear in Avicenna 6 Naturales chapter 3. For it is not the case that something unchanging would proceed in a straight line in the case

local motion and yet at some point be diverted by being broken or reflected. But on the contrary, when an active force is not totally exhausted, that is, it has not caused as much as it could cause; then if it can not act in a straight line, it acts according to that extreme limit given it by nature, since it is the shortest and most effective for operating. Then it acts according to another line which is closest to it and this is the broken line; or the refracted line. If it can not act further, it returns in the same path as it first traveled causing there together with what it had already produced something more perfect.

If you object, that together with a prior effect of a more perfect nature there cannot go a secondary effect of a lesser nature so that, when the entire medium is totally illuminated by a primary straight line ray, there cannot be lux nor when the medium is illuminated by a straight line ray is there able to be a reflected ray. I say that the falseness of this conclusion is evident. It is clear, that if a ray of the sun should fall on water and it is being reflected into any dark location, where there is no straight line ray, because as sensation tells us, . . . this reflection takes place up to that dark place. For it could not take place there unless there is a reflected ray in the medium illuminated by the straight line ray. In the same way, sense experience tells us, that the secondary lumen or species of primary lumen is diffused by the primary lumen once it touches any opaque body, as far as the eye. Otherwise this primary lumen would not be seen; and yet the primary lumen is present throughout the whole medium. Then therefore, that proposition must be denied, that where there is a more perfect form there cannot be multiplied in it a less perfect form or species, which are imperfect forms.

Another argument which could be made against species or against intention. (1) First of all I say: that every accident perhaps could denote its own subject in which it is, if it is imposing a designation, which it signifies, with respect to such a form and such a subject. It is not in this way that denomination is imposed by the species of color, because the names that are given to things are derived from their color. They denote a subject having color or they are real, that is real in themselves. If the denomination is imposed, that would designate a subject having an intentional form that is not a real form, then the denomination could be applied to the medium. Such a nature is imposed by lumen and perhaps even more here than in the colors themselves, because of the greater perfection and evidence of this character of the intention here, than in the other visible intentions. (2) A second additional objection: I say that one lumen does not exclude another lumen of any type whatsoever. Just as the lumen of the sun does not exclude that of the moon in the same part of the medium or for that matter the lumen of another star; as the species of white does not exclude the species of black or vice versa in the same part of the medium. But as any lumen excludes darkness, which is its privation from the medium, but does not exclude the contrary of a different type; so the species of any color excludes the privation of that color in the medium.

(3) Thirdly: I concede that a thing is and is able to have a real effect; not however in something that is not able to have an intention, because with its definition there also is the fact that by itself it is the cause of its inclination in an object and this suffices for it to be an intention.

That an entire ray would be produced directly by lux itself and not

only a part of the ray by a part of the ray, remains to be proved; because, if you posit that lumen in another part of the medium produced lumen from itself, as any point of lux multiplies itself from a sphere, because all natural force operates in the medium around it in a spherical way, if it is equally diffused in all directions and, if it has an opaque object obstructing one part of it, it at least multiplies itself in a half sphere.

Therefore in the same way, if lumen is productive in respect to another lumen from the fact that it does not have an opaque object impeding it at one point, it will multiply itself spherically. So just as principal lumen further produces another lumen, which is secondary and indirect, lumen will produce a secondary lumen all along a distant ray, which is contrary to the senses.

Moreover, any luminous body can act on a distant object, because, if it could not act unless it was directly present, it could only illumine something that is indivisible; if it is present in virtue of its power to affect something distant from it, it will be present to the whole medium, as far as its strength can reach. If it is present to this whole medium, then it can cause lumen in the whole medium, because this lumen is produced by itself. Granted, that, if it can cause another lumen, the first luminary is of greater virtue than the engendered lumen and so the luminary anticipates lumen itself in going into a remote part.

Appendix B

REPORTATIO

BOOK II

DISTINCTION

13

Whether lumen is the proper sensible species of corporeal light (lux).

First of all that lumen is not: lumen is a substance, it is not through itself sensible. The antecedent is obvious because lux was made first and then it was not made as an accident without a subject, because in the work of the first days of creation miracles were not made.

Likewise as Augustine has explained in Super Genesis, "The soul is directed ... everything is administered through light (lux) including more subtle bodies." Therefore lumen is among other bodies more subtle and therefore is a body and so not a sensible species.

Also lux begets bodies and substances, which will be treated in this lower world. Therefore it is not an accident because thus the effect would exceed its cause.

Likewise, lux has the properties of a body because it is able to be moved and to be broken; therefore etc.,

Also lumen has a real existence in the medium, therefore it is not the sensible species, since the sensible species has an intentional existence in the medium.

The antecedent is clear in three ways:

First: lumen really designates the medium; not however the species, which has an intentional existence, because if so, as is said, air is lucid. It could be said, that air is white by the species of white, which has an intentional existence in the medium.

Second: lumen excludes its opposite, namely darkness, in the medium. The species of white does not exclude the species of black, as real white does not exclude real black.

Third: lumen has a real activity in the medium because fire is

generated in the medium from the refraction of rays from a clean polished mirror; an intention does not generate a substance; therefore, etc..

Opposed to this:

We find in Avicenna 6 Naturalium part 3 chapter 1, that lux per se is sensible but all sensible things are seen through the multiplication of the species to the organ, according to the Second Book of the De Anima. Therefore lumen is the species by which lux is seen.

To this question, I say: that lux is an accidental form because it is through itself sensible so that we perceive it by the senses and as Avicenna holds, not a substance.

Besides, in an elementary body lux is an accident, because it is not an essential part of it as matter or form, nor a form prior to the substantial form of fire. Therefore in none of these is lux a substance, because what is in one case a substance cannot be an accident, according to the First Book of the Physics.

Likewise a celestial body has active qualities more noble than the lower bodies; of these only lux is seen to fit the description, because a transparency is a passive quality.

You ask how is lux per se visible, since color is the primary object of sight and lux is not seen through the nature of color; therefore sight will not be one single sense.

I say: that both are through themselves visible and moreover sight is still one single sense because the more powerful a sense is, the more objects it can reach than an imperfect one. Granted, that the more imperfect sense does not know all that the perfect one knows. Secondly, I say that a lower angel knows all things which a higher angel does, but

not to an equal degree of perfection. Sight shows us many differences in things. According to the first Book of the Metaphysics, things known by themselves have more distinguishable qualities from each other than contrary things in the physical order, such as are known through the other senses.

On that account, I say, that there is no adequate primary object for any of these but it is something indifferent to this and to that, and is unnamed as seen from the sense of touch. The sense of touch feels two opposites, of which none is reducible to the other. Yet they do not exceed the sense of touch nor is there to be several formal senses, while the common sense reduces this to one object. Moreover, it perceives whatever is sensible by itself and its adequate object becomes one common abstraction from all the particular sensibles, but is not a complete universal. Or in another way, it may be said that, when there are two objects of a single power in analogy, one of these will be the primary object and by the power of the first all others are known. However, it is not necessary that they should be contained under it, as in the case of the sense of touch. Supposing that sense will perceive only hot or cold, hot then is the primary object in virtue of which all others are sensed. And then it can be said, that lux has the first meaning of the visible object, not because it is an adequate formal object but because it is by virtue of it, that all these are to be seen, while not being of such a kind formally. Lux can be seen without color but color is not to be seen without lux.

Second, I say, supposing light be called lux in its source and lumen, when it is in the medium. I say, that lumen is not a substance, because it is not a body. For any body that is not transparent hides

what comes behind it, however luminous this last might be. But lumen does not hide but serves as the medium of sight, just as a transparent object does.

Furthermore, a corporeal substance is not at the same time naturally with another body, but lumen is together with the medium; therefore it is not a corporeal substance.

A proof of the minor proposition: if air gave ground to lumen when the latter is in the medium then man would not be able to breathe in an illuminated medium, because he can't inhale or exhale anything but air.

Also neither is lumen able to be a substantial form, because a thing does not retain its specific essence, when its substantial form withdraws and returns. When light (lumen) comes and goes, the air remains specifically the same.

Nor can it be a quantity because, if it were, it would not be able to be at the same time with air and also because it would not be an active quality. It is therefore a sensible quality and is the species of lux or its intention.

However this word intention is equivocal and in one way, it is said to be an act of the will. In a second way, it is a ratio formalis in re, as the intention of the thing from which the genus is taken, it differs from the intention from which the difference is taken. In a third way, it is said to be the concept. In a fourth way, it is an inclination to an object, just as similitude is said to be the inclination toward that of which it is the similitude. And in this way, lumen is said to be an intention or species of lux because a sensible applied directly to the organ impedes sensation, according to the Second Book of the De Anima:

but lumen in the eye does not impede sensation. On the contrary, according to the Commentator of the De Sensu et Sensato, it is required for the eye to see; and therefore lumen is not only sensible, but it is the intention or species by which the object is able to be seen. Therefore lumen per se is visible and yet it is an intention of the visible object.

Opposed to this last position: if lumen is per se visible it therefore is not the inclination toward the visible object, because then the same object is an inclination to itself. That lumen is through itself visible is demonstrated, because we do not see the lunar substance but only lumen which appears to us on the moon. Otherwise the substance of the moon would be corrupted in a new moon because it seems to us that nothing remains except that which we see. That lumen is visible through itself, is seen through an example of Aristotle: if the closed eye is moved, lumen appears there.

I say, that there are two kinds of visible intention or species. There is one type which is visible in itself and not merely the inclination toward an object on account of its greater power and another type of intention or species which is the basis of sight on account of its weakness, like the species of white or black.

A first example concerning lumen: When a ray passes through a red glass to a wall, the wall appears red. However, on account of this the wall is not being colored red because, if the eye were in the place of the wall, the eye would see the red glass but the eye would not become red. Therefore, sometimes a visible intention can be seen on account of its excellence, because, if the color would really be there and not merely as an intention, the eye placed there would be able to see,

because of the color being placed on the sense of sight. As the philosopher in the De Sensu et Sensato says, when a cloud passes over anything green, there appears there another color than at first, while in reality it is not different. An intention therefore, when it is weak, it is only the reason of sight; when strong, it is able to be the medium and the object.

By no means however are these species to be seen unless united with a visible body, nor is lumen to be seen unless joined to a body. This is demonstrated in two ways: First, because at night the sun's ray is not seen, however beyond the cone of the shadow, which the earth makes at night, is a ray; but it cannot be seen, because it is not being joined directly with a body that terminates vision. Second, suppose someone is in a deep well and at the top of the well the sun's rays are passing through a single hole; and unless an opaque body is placed there directly ending vision, that ray will not be seen; therefore it cannot be seen before vision is terminated by an opaque object. Third, I say, that there are two kinds of lumen: either a luminous ray or accidental lumen. For lux causes three rays: the straight line ray, the reflected ray, and the broken ray. Anyone of these is directly caused by a luminary in terms of the closeness of the cause, because one effect is not the cause of the other. But in terms of the proximity of the effect they are not equally directly from the luminary.

That a straight line ray is directly caused by a luminary, I can prove, because nature acts as far as it is able when left to itself. Therefore, if a straight line ray were in a medium and maintained there not by the sun but by the power of God, it would act to cause a sphere of lumen equally in all directions. But we see this to be opposed to

the senses because the ray acts through a straight line and does not illuminate behind a window as much as in direct sunlight. From this it appears that an agent is able to act directly, just as a cause on an object at a distance. Therefore, one ought of necessity to say, that the sun acts directly in any part of the medium, being itself the direct illuminating cause because, if it acted so directly, in that which it illuminates, only in as much as it is mathematically proximate to itself, then it would illuminate directly only the upper surface, which being illuminated, would in turn directly illuminate another. Thus an illuminated body would be made up of several surfaces or planes. It is necessary therefore, that an agent be able to act on a distant object which is not proximate to it in a mathematical way only. Therefore, a greater active power is able to go further. The sun is able to act over greater distances than a ray and does not act on these lower beings through the medium of a ray working as the active cause. For the ray then would have an action proper to it, but the sun anticipates the activity of a ray, And so, in the presence of a weakening agent, a stronger one is able to anticipate its action, producing sooner that same effect, which a weaker agent could produce over a longer period of time.

It is also evident, that a reflected ray is directly from a luminary through the experience of a burning glass because fire is not being caused by it but by the sun. Similarly, in regard to the visible species produced in the eye, by which an image is seen in a mirror, the species is not caused by the image but by its object.

The same is seen in the case of a broken ray, when filling a urinal with water, combustion is caused on the opposite side from the sun; fire

is not generated by water or glass but by the sun.

Besides, these luminaries, there is another, which is called secondary, where there is a shadow but not darkness, because in such lumen we see none of the three rays present and this lumen is not multiplied directly from a luminary but is through itself the sensible species of primary lumen.

As to the first principle point in the argument, I say, that this lux is a luminous body designated by a noble quality in it. This body will have its strength from that which is now said to be the sun and if it is not now shining so much as now being from the lux.

Furthermore, while Augustine accepted lumen as a spiritual luminescence, such a spirit Avicenna also called lumen or lux in Liber 6 Naturalium part 4.

Moreover, I say, that lux is a principle of change and preparation for the generation of a substance and in the end a substance produces a substance, as the final substance, and it is not lux producing a substance.

Furthermore, Avicenna responds in Liber 6 Naturalium part 3, chapter 2, when speaking of a ray being broken or moved, that these are things similar to bodies.

In addition, when it is said that lux is the real essence in the medium and not intentional, I say, that it has both essences in the medium, because it is both the real thing and the intention in the medium.

To the first problem, I say, that any form is able to denote a subject in which it is and as we say, air is illuminated; so if a name is imposed on air by which the species of color might denote the medium

intentionally, I concede, that air in that way is able to be named white or another name. But in this case, we do not have a name imposed for the purpose of denoting color, that can denote a subject unless according to the existence which it has in the subject where it is formally. Thus we have in the proposition a shining thing and an illuminated thing.

In regard to the other argument, when it is said that lumen excludes the object in the medium, I say, that what is proposed in the objection is true in the sense of privation, in such a way that there is no absence of lumen. Also the species of white in the medium excludes the object by privation because the species of white is not absent but does not exclude the species of the contrary object of white; so neither does one lumen exclude another lumen from the medium, because stars and the sun illuminate the medium simultaneously.

For the third problem, I say, that just as it has a real action in the medium, so it has just as much a real entity in the medium, which belongs to such action, because it alters and prepares for the production of a substance, and in the end a substance produces a substance.

Appendix C

LECTURA

BOOK II

DISTINCTION

13

About distinction 13, it is asked whether corporeal lux gives rise in the medium to lumen as its proper species.

That it does not is seen:

(1) when Augustine in the Second Book on Genesis said, that the soul and a more subtle body administers subtilior bodies and heavier bodies such as lux and air. This he also said in Super Genesim c 18 concerning the minor, that lux in the medium is like air, a body, and therefore not an accident.

(2) Besides this it is argued concerning lumen: that lumen gives rise to a substance, as is seen, because fire is generated from the convergence of rays but fire is not a substance; it is not able to generate a substance. Therefore it is a substance and not an accident.

(3) Besides lumen has corporeal properties because it is being broken and reflected. Therefore it is a body and not an accident.

(4) Besides it is argued that lumen is not the quality of an intention because it really denotes the medium. Indeed it is not a species.

(5) Likewise it excludes the opposite such as darkness.

(6) Likewise it has a real activity in the medium and in the organ.

Opposed to this:

Lux is per se sensible. Therefore through itself it gives rise to a species and not any other than lumen.

I respond:

First: that lux is not a substantial form but is a sensible quality, as is manifest in itself. Also, Lux in any body is an accident. Therefore it is not a substance, because a substance affects nothing. It is shown to be an accident because in an elementary body it is an accident.

Also, it is not a specific substantial form as in fire, because then it would have a different species from a celestial body through lux, which is false. Nor is any substantial form prior to the specific form in an element because then any substantial form that is in the heavens would be more imperfect than the substantial form of an element, which is not true. Also, celestial bodies are more perfect than lower bodies. Therefore the substantial form of celestial bodies follow from active qualities; and so also for lower bodies, the form is not another quality and it is not able to follow from any active celestial bodies unless lux. For a transparency is not an active quality but is more capable of receiving lux.

Second: saying, that lumen is not a complete substance and it has extension, that is subsisting per se, it is not a bodiless spiritual substance which would extend to the extent of the medium. Also, lumen is not a bodily substance, because at the same time it is with another body and with air. It is not a corporeal substance existing per se nor a corporeal substantial form because it occurs to something already specified, as the medium. Also because lunar light arrives and always remains the same according to its species. Neither is it a quantity because then it would not have activity; nor is it the cause of a sensible species. Therefore it is a quality in the third type of species.

But in what way is it a quality? I say, that lumen is not so much a sensible quality but a quality that is said to be an intention. But it is known that lumen is accepted as an intention in several ways.

One way: whatever is able to have a different objective formal existence in the intention is said to have different intentions, as the intention of truth is different from the intention of essence. And so it

is said together with Avicenna concerning intention, according to this it is well possible that this doctor is understood to have said that it is different according to intention and is not causing nor requiring a real composition of a term for a term.

In another way lumen is taken as an intention and quality for a species and is the reason for representing anything and not the thing itself in which the sense tends as a proper intention. And so I say, that lumen is an intention and the quiddity of an intention proper to intention.

Besides, in the visible, what is not an intention nor a sensible species, impedes sensation if placed over the organ of sight. But lumen placed on the organ of sight does not impede vision but makes for its promotion. So it is seen through the Commentator in his tract on the De Sensu et Sensato, because lumen is multiplied to the eye and it is received there in the organ, because it is transparent, and the same with this because lumen is sensible and is itself the species of lux.

Besides, lumen is not visible unless reflected. Whence, if the medium does not have a solid body anywhere, it is to be seen that lumen, if there were two openings opposite each other and the ray would pass through and would not be broken, then nothing would be seen. Therefore, lumen is not so much the visible object but rather the intention and species.

I say then, that lux is the first visible object, because it is not dependent on color so that it might be seen; but on the contrary color that it might be seen is dependent on lux and so the one is dependent on the other and not the contrary. So the effect of one depends on the effect of the other and not the contrary. Whence the species of color

depends on the species of lux and that is lumen, as much as in accomplishing reception as in operating. It is necessary to first illuminate the medium, which is to receive the species of color. Similarly for sight to perceive color through the species it is required that together with the species lumen be present in the eye. Therefore lumen is the species or intention of lux itself.

But against this it could be argued, that what exists only as intention like species is not seen. But lumen is seen when it is received intentionally, as in the case of the moon; therefore it is not so much a species. Similarly, when lumen is being reflected from water then lumen is always seen. This is seen in an example of the Philosopher of the De Sensu et Sensato, "because if the eye were to be moved from its place through motion a flash of light is produced which is lumen."

I respond: what is so much something visible, as lumen which is being received intentionally, and it is something, because it is so much the reason of sight as lumen in the eye. And similarly, lumen which is being multiplied according to a straight line to the eye perpendicularly and it is this lumen that is the reason of sight and also visible. Then I say, that lumen is seen and is visible and not merely as a species. Hence it is not against the reason of the species that it is seen. This I can prove: in the case of the ray passing through red glass to a wall and is there broken, the wall appears red and it is also a species. For if the eye were there it would be the reason of seeing the redness in the glass. This is also demonstrated in an example from the De Sensu et Sensato, because lumen passing from green plants causes greenness in the medium and if the eye were able to be placed there, it would there be the reason of sight, if it were there. Thus is known what are said to

be primary or essential lumen, and accidental lumen.

Primary lumen or essential lumen is said to be lumen which is being caused and multiplied by the straight line ray, the refracted or reflected ray. But accidental lumen is that, which is not being caused, but is produced in the manner of multiplication from lumen. Primary lumen also is totally generated directly from lux.

This is proved first of all, because as from a straight line ray so from every point of lumen in the medium, if it generates or does not generate a sphere of lumen, because all act naturally being dispersed equally in the medium. Lumen acts spherically by the reason it acts in one part, it acts in another. Therefore, if lumen, which is generated by lux, is being generated in the medium not the entire line is generated by lux. Therefore, the generated ray in that part of the medium, if it should generate, will generate anywhere spherically, which is false and contrary to the senses. Besides it is necessary, that should lux generate lumen directly in another part of the medium, it is generated in both the closest and furthest parts of the medium. Therefore lumen is generated directly. Indeed it is not according to an essence but it is so much according to power. By which reason it directly gives rise at one place and at another distant place to lumen directly in all parts of the medium by the same reason according to the greatness of the distance, if a luminous body of greater power is in position. And so the sun, since it is a luminous body of greater power, is able to directly illuminate the medium in which lumen is received according to the broken ray etc. And in the same way, I say, that generated lumen in the medium, according to the straight line ray and the reflected ray and broken ray is directly generated by lux. Moreover, there is an order

between generated lumen, according to the straight line ray and the broken ray. It is not so much the order of cause to effect but the order between effects, as the prior parts of the medium are naturally illuminated prior to the other farther parts. So the whole is illuminated by the sun, as there is an order between intellect and will, the order is not, as that of cause to effect, but like the order that is of the presupposed effect in respect to the other.

In regard to the first way, when it is argued according to Augustine, that lux is a more noble body, I say, that is, because bodies are not noted by us except through their accidents. Lux also is a most noble and primary quality and precedes the other four primary qualities and does not have an opposite unless privation. In the same way, this first luminous body is being extended through lux, because it is a celestial body, which is a more noble body, and so as is said in Genesis: "fiat lux".

As for the other way, when it is argued that lumen gives rise to a substance, it must be said, that though accidents do alter the substance of a subject undergoing corruption and preparing for the generation of a substantial form, they do not however induce a substantial form, because accidents do not follow a substance in generation; but it is the substance of which these are the accidents, as was said above. Hence the heavens will generate according to their substance a substantial form, because it is able to be present according to its power not mathematically but by mechanical contact.

In regard to this, what is mechanical? It is said to be that broken ray, because since this is able to correspond to a subject and in the same way any qualities existing there. Whence what is said to be broken

because, if it were a body having a disposition, such as lux has in a subject, according to the rays, then it could be broken, because it is being moved locally or because it recedes; but mechanically.

Again when it is argued, that what is not a species because lumen really denotes the medium, is also not the species. I say that because species indeed really denotes the medium, as the Commentator of the De Sensu et Sensato says, "because lumen passing from green plants causes a green species in the medium". Hence if there were a name imposed for the species then the real thing, which is lumen, would be able to denote that medium as the medium, because lux is a primary quality. Therefore, it has an imposed name for its species, which is lumen, and not the reality of lux. Thus it is said, that air is illuminated and not luminous. So, if it were the imposed name of a green species, by causation in the medium, it might denote the medium. Nor is this against the manner of this species.

And also, when it is being argued, that lumen is not a species because it excludes a substitute, I say, that there are two species of color able to be simultaneously in the medium, notwithstanding the fact that the species of these colors might be incompatible, as the species of solar light (lux) and the light (lux) of saturn. Yet both are able to be luminaries at the same time that their lights are incompatible. Nevertheless, neither lumen nor species is able to exclude its opposite through privation, namely darkness.

And in another way, it is said, that what is repugnant to species because it is something real having a real action; and if essential lumen were without lux by which it is generated, then it would not be able to generate accidental lumen.

Appendix D
ADDITIONES MAGNAE
BOOK II
DISTINCTION

13

Concerning distinction 13, I ask, whether lumen is the proper sensible species of lux. To this proposition, it is said first, that lux is not a substantial form because it is per se sensible as seen in Avicenna, Liber 6 Naturalium part 4 ch. 3. But it is doubtful in what way lux is able to be sensible per se, when for one sense there is only one object, which is the adequate object. Color is per se the object of sight, which is not contained under lux nor is lux contained under color.

I respond, that both are able to be through themselves sensible and however it is a single sense; because by how much more perfect any sense is, the more it is able to have several objects; but sight is the most perfect sense.

Both instances are demonstrated in the First Book of the Metaphysics, because many differences in things are shown by sight to us; not only because it shows many objects in many cases as in the case of the heavenly bodies and the bodies of the lower world but because it shows to us many sensible differentiae as color and light and not as hearing and touch. Touch senses only those things that are of one physical genus but sight senses light and color and they are not a single physical genus, as all neutral tastes are with extreme tastes, one physical type.

Then to argue that, if it is the first adequate object of sight that is being sought, I say, that it is necessary to allow something common to color and light and this is unnamed. As is the case in touch, which according to the Philosopher is of two contraries, which have something in common but this commonality is unnamed. Similarly, the *sensus communis*, which apprehends the opposites in the particular senses which are not able to have any one thing in common unless if the common thing is abstract. In another way, it is possible to say, that, when

there are plural objects of a given potency and among these there is an order there, there can only be one adequate object to which the remainder are reduced.

According to this, I say, that lux is the first object and through itself visible and not derived from color but that color in visibleness is derived from lux, because it is necessary for perceiving color to have lux cooperating either extrinsically or intrinsically, (if it is part of the composition of color.)¹

Q.II Whether lumen is the proper species of lux. About this second article, in what way lumen is given existence by Lux, one must know that there are two lumens, because you have essential lumen and accidental lumen. Essential lumen is said to be that species of lux through which the sense of vision is able to attain the vision of a luminous body. And this is in three ways, according to the three rays: the straight line ray, the broken ray, and the reflected ray.

The straight line ray is that which comes from a luminary to the earth through a transparent medium without any angle because nature acts as much as it is able and the shortest way it can, because a straight line is shorter than an angular line between the same points. So a solar ray always progresses in a straight line, if it is able, but, if a medium of another transparency occurs, like when the ray passes through air and comes to water which is not an entirely dense body, the ray is permitted to cross but not in a straight line unless it strikes it at the perpendicular. There that same density bends the ray away from the straight line when the ray strikes the surface of the water, which is a medium of a different transparency, as seen in the books of perspective. Also this bending of the ray from the straight line is called the breaking of the ray and the ray is called a broken ray.

A reflected ray is, when the straight line ray comes to a bodily obstacle of sufficient density, so as not to permit the ray to pass through the medium, but because the nature of the bodily luminary is not capable of multiplying the species of lux through the medium of this body, it does what it is able by multiplying it in the equally contiguous medium to the obstructing body. And this type of multiplied lumen is called reflection. Reflection takes place according to the equality of the angles of incidence and reflection, as seen in Alhazen, Euclid and others.

Accidental lumen is said to be that which is able to lead to the knowledge of a luminary, as lumen in a room in a house where a solar ray reaches, and that accidental lumen comes from a principal ray falling through a window and this is caused directly (but essential lumen which is distinguished by the three rays is caused directly)² by a bodily luminary and not by a directness of effect but by a directness of cause. Which can be proved. First, concerning the straight line ray: all natural agents equally disposed multiply themselves always in the same manner; therefore part of the medium that is in the window, in like manner will multiply itself in the room of the house in any part, since the medium is equally disposed. The contrary of this appears to the senses. Therefore the sun directly acts in some part of the medium to which it is not present mathematically but only virtually present and not by bodily contact, as seen in the Liber 6 Naturalium.

So, if lumen gives rise in any part of the medium to something else, this is not in a point but in a divisible part. Therefore it acts directly in a distant part and, as a consequence of an agent of greater power, it is able to act directly over a greater distance and so lux

which is first and is more perfect can act over the total extent of the medium. I say, however, that, if God preserved the terminated ray at the window in being without the sun, the window being open, this ray would multiply itself to the opposite side of the window as the sun does now. However, in this case the multiplication does not take place by the power of the ray, but by the power of the sun directly, because when two agents are present which are able to produce the same effect, the stronger agent prevents the weaker one from producing the same effect.

Concerning the reflected ray the same is demonstrated, because as in other cases, a ray directly reflected by a mirror by which the thing is seen, is caused directly by the thing of which it is the species multiplied to the mirror and reflected to the eye. It is obvious, because this ray will be moved as the thing moves, because one cannot imagine in the mirror an image or species by which the ray could be caused. For that which appears in the mirror is nothing except an image or species of the thing itself. This is seen clearly according to the authors of perspective, particularly Alhazen in Book 7 and Euclid in the Liber De Speculis. For they prove that in a plane mirror the thing appears beyond the mirror at a distance equal to that distance of the thing in reality from the mirror. But it is evident that the species of the thing does not cross through the greater density of the mirror (de calibe).³ Therefore no species is the cause of this visual ray reflected from the mirror but the ray has only the thing itself for an efficient cause, in the same way that the sun directly causes the reflected ray as a ray.

Concerning the broken ray, it is proved that a stick in water causes the breaking of the rays or their species when entering a medium of a more subtle transparency, because they bend away from the straight ahead

path in a manner which has been described and it is not caused by another species, because then the stick would not appear broken. So in reality there is no species in the place where it appears broken, as the authors of perspective know well, who describe the cause of this apparition. Therefore this cause of breaking is not by any agent other than the thing itself directly; and it is the same in the case of the solar ray broken in water or another medium.

And these three rays are said to be essential lumen, because they lead to an understanding of a luminous body, and because the eye placed in any one of these rays can see the sun through the straight line ray.

It is not to be doubted that through the reflected ray the sun would appear in the mirror and also with the broken ray it would be seen through instruments. (In some bodies the species are not reflected as qualities impressed subjectively, for this reason, that they are not seen on the surface of the polished body but appear beyond that body and also appear in a mirror in which the species of a face appears beyond the mirror, which would not occur, if the species were really there, as an impressed quality of the surface.)⁴

Footnotes

1. This addition is regarded as a gloss; see Additiones Magnae above on p. 55.
2. Ibid., see Additiones Magnae above on p. 56.
3. It was not possible to render this word in translation.
4. This final addition is regarded as a gloss; see Additiones Magnae above on p. 57.

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