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GRADUATE SCHOOL OF ARTS AND SCIENCES

Dissertation

THE TRANSLATING AND ADAPTING OF AL-FARABI'S *KITAB IHSA' AL-ʿULUM* IN SPAIN

by

MICHAEL CHESTER WEBER

B. A., Mount Union College, 1975
M. Div., Yale University, 1979
S.T.M., Yale University, 1980
M. A., Boston University, 1991

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Approved by

First Reader

Thomas F. Glick, Ph. D.
Professor of History

Second Reader

Herbert W. Mason, Ph. D.
University Professsor and Professor of History

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THE TRANSLATING AND ADAPTING OF AL-FARABI'S

KITAB IHSA' AL-ᶜULUM IN SPAIN

(Order No.)

MICHAEL CHESTER WEBER

Boston University, Graduate School of Arts and Sciences, 1996

Major Professor: Thomas F. Glick Professor of History

ABSTRACT

Since the last quarter of the nineteenth century, historians of medieval science and intellectual historians have been intrigued by the phenomenon of Arabic-Latin translation in twelfth-century Spain; these historians have characterized the efforts of the group of translators working in Spain as a "School". Because these historians utilized an unsuitable model, that of northern European Cathedral Schools, they have failed to find the institution they sought. While these same scholars have acknowledged the importance of the multi-ethnic character of medieval Toledo as the *sine qua non* of translating, few have displayed any nuanced understanding of the social structure that Amèrico Castro termed *Convivencia* and of how scholars actually related to one another across ethnic lines.

This dissertation reconsiders the question of the character of this "School" by examining the work of two of the most important Toledan translators, Dominicus Gundisalvus and Gerard of Cremona, in the two Latin translations they made of one Arabic text, al-Farabi's *Kitab Ihsa' al-ᶜulum* (*Book of the Enumeration of the Sciences*). This dissertation concludes that these two translators not only had unequal abilities but

that the conventional judgements of them are wrong and need to be reassessed to Gundisalvus' advantage. Extensive comparison of the work of these two further reveals an enormous amount of information about their milieu. These data are then compared with that for other translators working within the same time period and social setting and with Islamic educational practices for educating students in the "Ancient Sciences." The historical data indicate that there was a lively *Convivencia* among scholars and that the best model to explain Christian translating is not a formal school, but one of functional adaptations of polymorphous Islamic institutions and educational practices designed to create philosophers in the Peripatetic tradition, who "know with certainty."

This dissertation also demonstrates that Gundisalvus' adaptation of al-Farabi's text, the *De Scientiis*, was the Latin text most commonly used to provide curricular guidance for the expansion of the *quadrivium* in the following centuries, most notably in England. Given the importance of this text, the dissertation also presents the first English translation of it.

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A NOTE ON TRANSLITERATION

This dissertation is intended primarily for scholars of the Medieval West who, by and large, are unacquainted with Arabic. As there is no one universally agreed upon system of transliteration, I have decided to eliminate diacritical marks in transliterations. However, *hamza* and *ayin,* being full-fledged consonants without equivalents in the Latin based alphabet must be represented. So, in place of *hamza* I have placed an apostrophe (') and for *ayin*, a superscript c (^{c}). At the first use of any uncommon term I have supplied the actual Arabic word, without indicating the voweling, and the transliteration that I will use. In the course of the subsequent text, such words are most frequently referred to in transliteration. Due to the small number of Arabic words involved (and I do not believe that there are many homophonic pairs in the text that might occasion confusion) I do not believe this to be a serious difficulty; still, I regret any inconvenience it may cause.

Chapter One

The Historiography of the Translation Movement

A. The Current State of Research

Since the time of Valentin Rose and Moritz Steinschneider historians of medieval science and ideas have attempted to describe the intriguing phenomenon of Arabic-Latin translation in twelfth-century Spain;[1] these same historians have characterized the efforts of a group of translators working in Spain throughout the twelfth century as a "School". Yet, this has never been an entirely satisfactory explanation. By way of explanation, scholars such as Charles Homer Haskins had assumed that Toledo was the "natural" place for the transmission of Arabic culture and learning because of its many Mozarabs and Jews.[2] Since the tenth century, scholars like Gerbert of Aurillac and John of Gorz had gone to Spain and acquired some knowledge of the rich culture, especially the widespread learning based upon scientific, astronomical, and philosophical texts that the Latin West did not possess. In Gerbert's case, we know that long after his visit he wrote to friends in Catalonia seeking still more texts in translation that would expand the fund of knowledge in the North. Several scholars of this movement have attempted to see a continuity between Gerbert's search for new texts and that of the twelfth century translators. This model of northern Europeans always coming to the lands south of the Pyrenees seeking knowledge was believed to explain both the location of translating and the northern European origins of some of the twelfth century translators. Others saw a second model for a "School" residing in the Cathedral of Toledo in the characteristics of the royal school organized a century later under the patronage of Alfonso X "The Learned" (1252-1284),

a school whose purpose was vernacular translation of a wide range of texts.This model was believed to explain the prodigious volume of translation and the methodology of the translators working in pairs. It was assumed that the twelfth century "school" operated under the patronage of the Archbishop of Toledo, Don Raimundo at the Cathedral of Toledo.

Both models have certain inadequacies. The most glaring one is that they do not respect the particular social setting of the twelfth century and, as Robert I. Burns has cautioned, "Each juncture of time and place in Spanish mediaeval history was so unique that its measure of contact and conflict was qualitatively different from that of conditions a generation before or a province away."[3] With the first model the main problem is that not all translators came from outside Spain and the *earliest* certainly did not. Furthermore, it is clear that Archbishop Raymond was not responsible for much translating at all and most of that done at Toledo was done after his death. Still, this model has persisted because two of the most prolific translators, Dominicus Gundisalvus and Gerard of Cremona, were members of the Cathedral chapter and because the amorphous character of patronage appears to explain the great variation of the actual circumstances of translating that we know existed. Derived from the second model, the Alfonsine school, the methodology of translators working in pairs utilizing an intermediate Romance dialect has been assumed to have been the *modus operandi* of all translators in Christian Spain; certain manuscript dedicatory colophons can be read in such a way that they seem to support this. More importantly, the assumption of nearly every writer on this subject is that, like these latter translators, the twelfth century group also relied upon an intermediate Romance translation

as the vehicle for turning Arabic into Latin. Unfortunately, these borrowed models obscure as much as they explain and neither takes seriously the social circumstances which prevailed in the frontier areas of Christian Spain as the Christian conquest gathered momentum. Using inadequate models and assuming social contexts other than those which actually existed in Toledo and the other recently conquered cities of the frontier where translation did occur does not make for good history.

Part of the difficulty in creating a proper interpretation of this phenomenon lies in the material itself. A scholar must be conversant with two social worlds, the Islamic and Christian, and become familiar with the distinctive character that each of these civilizations developed in the Iberian Peninsula; one must be able to read both Arabic and Latin and be able to make use of manuscripts and archival data in order to make a significant contribution to the solution of this historical problem. In addition, the subject matter which must be consulted straddles the boundaries of several modern disciplines: History of Science, History of Philosophy, Church History, and the Histories of Islamic and Christian Spain. Moreover, the era of the movement was in itself a boundary period, far different from the centuries that had come before and that would come after it. In particular, the newly victorious forces of the Christian Kings of Castile-Leon were reconstructing a society over the foundation of and with elements derived from the defeated Islamic Party Kingdoms (the *Ta'ifa* states), particularly in Toledo and on the Eastern coast. Thus, there were few social institutions or customs that can be asserted with certainty to have existed during this period and many that do exist are distinct from their French and English counterparts. Furthermore, the institutions themselves were developing in a rapidly changed

social circumstance in which the former minority ethnic group had at last come to political power and cultural dominance. Thus, it is understandable that general histories have often presented generalized conclusions about this movement and the institution that supported it. However, the more closely one explores the problem of the twelfth century "school," the more questions such simplified conclusions raise. Perhaps this complexity is the reason that a thoroughly up-to-date reference work like the *Dictionary of the Middle Ages* does not have an adequate discussion of what one might call with justice one of the most important historical movements of the Latin Middle Ages; the ambiguity of the material probably explains the lack of a book length monograph on the subject in the modern era.

Instead of synthesis, the historiography of the translation movement has been written in short, specific essays. A very special treatment of Toledo has been created in an interesting little anthology, *Toledo, Siglos XII-XIII: Musulmanes, cristianos y judios: la sabaduria y la tolerancia.*[4] While it is not entirely satisfactory--and there are better sources for many of the subjects addressed in it--it is the only attempt to bring together the particularity of intellectual, cultural, and political history of that important city in one volume.[4] Generally, most of the research is published in anthologies devoted to a single topic,with each article written by specialists on every individual aspect of the problem: social historians, manuscript scholars, philosophers, historians of science and historians of education contribute what they can to make the subject more manageable.[5] While some authors have produced several different and insightful essays,[6] there is not at present a synthesis available, though we may be getting closer to one. It appears to me that some philosophical presuppositions may in fact be getting in the way of progress on this topic;

some scholars wish to deny any Islamic influences on the rest of Europe (for reasons that can only be inferred), especially the development of institutions of which the West is justly proud, like the universities. At this time, the best current scholarship must be mined from articles written by individual scholars from slightly different perspectives.

B. The History of the writing about the translation movement

To find a unified perspective from one scholar, one must go back to the work of Charles Homer Haskins in his two collections of essays, *The History of Science* (1924) and *The Renaissance of the Twelfth Century* (1927), many of which had been published earlier in *Harvard Studies in Classical Philology*. It was Haskins' genius to see the translation movement in both in its parts and as part of a wider "new spring of intellectual life."[7] One of his essays, "Translators from the Arabic in Spain," presented the state of research on the translation movement as of 1923 when it first was presented.[8] As far as I can determine, Haskins was the first writer in English to examine with care the manuscript evidence, particularly the dedicatory colophons of the works translated, to attempt a prosopographic description of the translators working in Spain. Here he was building upon the work of Rose, Steinschneider, and Amable Jourdain, whose conclusions he modified.[9] He diligently examined the manuscripts thought to be derived from individual translators, particularly Hermann of Carinthia and Hugh of Santalla, to sketch something of their lives.[10] He began by listing the repertoire of their translations and attempting to date their work. To our great benefit, he frequently reprinted long extracts of the dedications in a critical fashion. From these, a wider group of scholars was able to grasp something of the relations between the

translators and their patrons. Haskins was able to date Hugh accurately and to establish that his patron was the bishop Michael of Tarrazona. This careful exegesis placed Hugh's work *seven years before* the ascension of the renowned Raymond to the archbishopric of Toledo and in a very different milieu, namely Catalonia. This alone should have called into question facile assumptions about a "School", based in and spreading from Toledo. With these two studies in particular, he laid the groundwork for a broader discussion of the related issues of translation treated in the later book.

Indeed, Haskins saw the work of translation as one of the three defining characteristics of the twelfth century renaissance, along with the development of the Gothic in art and the rise of vernacular poetry.[11] He seems not to have appreciated fully the character of the Spanish society within which the movement occurred and could accept and reproduce the generalization that, "Toledo was the natural place of exchange for Christian and Mohammedan (sic) learning."[12] He could even speak of a "School of Raymond" but with the caveat, "whether or not it had any formal cathedral school."[13] At times, he seems not to have integrated his own studies: for example, in the chapter on "The Translators from Greek and Arabic" in *The Twelfth Century Renaissance* he does not present a careful chronology of the translators, a discussion of their interrelations, nor even a catalog of their works.[14] Haskins was keenly aware that the work of these men led directly to scholasticism and, for him, that was their principal importance. He deemed it important that, rather than being solely a Spanish phenomenon, this was a "European movement" in that many of the translators had come from across the Pyrenees. Yet, except for repeating Gerard of Cremona's students' explanation, that Gerard came to Spain in search of the *Almagest*,

Haskins did not speculate on the reasons why these men sought new learning; clearly he saw them as the vanguard by which "this spirit of devotion to science passed to the Latins;"[15] but how this devotion was related to the Seven Liberal Arts is not addressed. It is probably a mark of his careful documentary, descriptive approach to scholarship that he did not hazard guesses beyond his evidence. Haskins' legacy was certainly in evidence in the works of some of his friends, especially George Sarton whose *Introduction to the History of Science* passed on many of Haskins' conclusions to a generation of scholars in encyclopedic format.[16] Lynn Thorndike, too, displayed a similar, descriptive approach to prosopography, thoroughly grounded in manuscript study, as in his *History of Magic and Experimental Science* and especially in his article unraveling the identity of "John of Seville."[17]

A somewhat different point of view was held by Fr. Manuel M. Alonso, who was one of the most prolific Spanish scholars of the translation movement. Devoting himself almost exclusively to the translation movement, Alonso published many critical articles in the journal *Al-Andalus*, many of which later were gathered into a book, *Temas Filosóficos Medievales.*[18] His works run the gamut from studies of texts and their place in the history of ideas to prosopographic studies, but his most persistent interest was in the translator Dominicus Gundisalvus. Alonso attempted to come to grips with key figures like Ibn Daud, John of Spain, and John of Seville, as well as Gundisalvus. In his article, "Notas sobre los Traductores Toledanos Domingo Gundisalvo y Juan Hispano" he attempted to correct misperceptions about these translators and was the first to offer some new evidence about their lives, relying on the manuscript of the Toledo Cartulary.[19] He was able to date the Archdeacon Gundisalvus (and, by implication, those who worked with him) to the third

quarter of the twelfth century, a generation later than Raymond. He also could account for the presence in some of the archdeacon's works of knowledge of Peter Lombard's thought and that of Hugh of St. Victor, which would not have been available until after 1160.

In addition, Alonso could maddeningly draw conclusions based upon inferences and not evidence. For example, he concluded that "no era mozarabe Gundisalvo" and that only with time and study had he come to know Arabic.[20] The evidence he relied upon to make such a judgement is completely lacking; I assume it is because in Alonso's judgement the archdeacon did not have a superb command of Arabic. Similarly, in is work on "Traducciones del Arcediano Domingo Gundisalvo" he refers to Juan Hispano as "maestro" of Gundisalvus; though he does not say it, this must be derived from his reading of a manuscript colophon.[21] To his credit, he was aware of the differences between Juan Hispano and Juan Hispallensis, but like other scholars he repeated the conventional wisdom that thought the former to be a Jewish convert to Christianity sometimes called Ibn Daud, or John David of Toledo, who became Raymond's successor as archbishop of Toledo. To be fair to Alonso, some of this misidentification goes all the way back to a conflation of manuscript readings made by Jourdain and conjectures which assumed the character of established fact and that only later were corrected by Lynn Thorndike.[22] Alonso was a much better scholar when he worked with texts and studied the translating and adapting of Arabic works. Here his edition of the *De Scientiis* and his long article on the translations of Gundisalvus show him at his best.[23]

What Alonso was weakest at--namely his somewhat speculative approach to prosopography--was addressed by later scholars. One who benefitted from Alonso's work

was Juan F. Rivera Recio, whose article on "Nuevos datos sobre los traductores Gundisalvo y Juan Hispano" demonstrated the value of the archive of the Cathedral at Toledo for prosopography.[24] He found documents dating not only Gundisalvus and Juan but perhaps Gerard of Cremona. He showed that the archdiaconate of Cuéllar was the official designation of both Gundisalvus and Juan. Such work should have put to rest the far too facile identification of Juan with Juan of Seville or Ibn Daud but, unfortunately, it has not. In his larger book on the history of the Cathedral of Toledo, he devotes one chapter to all the ecclesiastical offices and another to the biographies of the translators[25]. Here he has done an invaluable service.

Regarding this important figure, Ibn Daud, we must note also the work of Richard Lemay and Marie Thérèse d'Alverny. Lemay tried to establish a chronological pattern of translating in order to explain the movement from the Augustinian medieval world view to the more "scientific" assessment "of man in his physical world."[26] In rejecting the "School of Raymond" hypothesis, he attempted to lay out a different social structure grounded in the relations between the translators. In particular, he focussed upon the centrality of a person he identified as "John of Seville-John David of Toledo." While he did not have the advantage of Rivera's research at hand--and thus misidentified this translator--he attempted to connect this central figure with an important historical figure of the time, namely the Mozarabic Count Sisnando Davidiz who had been the de facto ruler of Toledo immediately after the Christian conquest, arguing that Ibn Daud must have been a person of high social standing to have attracted the attention of nearly all the other translators and be known only by his patronymic. While he seems to have grasped at a straw here, Lemay was at least

trying to bring the translation movement into contact with the wider social history of twelfth century Toledo.

In this respect, d'Alverny was more successful. Once again taking the context of medieval Toledo seriously and reading the evidence of the manuscript colophons anew rather than relying upon the flawed readings of the past, she concluded that the only reasonable figure who could be called Ibn Daud was in fact the Jewish philosopher Abraham Ibn Daud, who was indeed a contemporary of Gundisalvus, and whose manuscript dedications relate him, like Gundisalvus, to the archbishop Juan.[27] She also provided important studies on the history of the translation of the *Qur'an.*[28] As Peter Dronke has observed, she was really the motivating force behind a good deal of the renewed interest in the translation movement in the latter half of the twentieth century and we are all in her debt.[29]

Paying careful attention to the social world in which the translators worked, José M. Millás Vallicrosa produced several important works. Two concern us: first is his justly famous *Assaig d'història de les idees fisiques i matemàtiques a la Catalunya medieval*, the first study stressing the transfer of Arabic science to the Latin West through the medium of the monastery of Ripoll.[30] The unique--and arguably most important--work of his was the massive *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo.*[31] Unlike any other work on this subject, it approaches the process of translation through the history of the manuscripts that the translators produced. It is, however, more than just a catalog and bristles with information useful to the historian. Also important is his small article on "Translations of Oriental Scientific Works" that briefly calls attention to the

social situation in Toledo.[32] He noted that the conflict between Mozarabs and Latin Christians was a strong force active in the city throughout this era. Moreover, he stressed the importance of Jews in the translation movement and acknowledged their contributions.

Building upon Millás are the works of Thomas F. Glick. His research began in the study of the adaptation of hydraulic technology accompanying the course of changes in social circumstances.[33] Later on, his abiding concerns became insightful discussion of ethnic relations among Jews, Christians (both Mozarabic and Latin), and Muslims which demonstrate the complexity of the social situation.[34] Because of the extent of the acculturation of the Mozarabs and Jews to the dominant culture (e.g., that Toledan Christians were almost entirely monolingual Arabic speakers in 1085 and that both Arabized Jews and Mozarabs held a kind of second class citizenship in Christian lands), they were subject to a type of status inconsistency. However, within that constraining circumstance, they still were able to function as cultural go-betweens who ought to have been more highly regarded, yet the Mozarabs in particular found themselves stigmatized by the Latin Christians as having been contaminated "by overexposure to infidel customs."[35] The members of the three religions did in fact live together or, as Glick has put it, "they were indeed integrated; and integration, a process of normalization of day-to-day interactions, provides the immediate social context for cultural exchange."[36] Thus we can appreciate the social situation of the so-called Jewish and Mozarabic "dragomen" who worked with Latin Christian scholars who, perhaps, derived some small degree of status from their ability to read Arabic. The hallmark of Glick's research is his interest in a realistic appraisal of the Islamic civilization within the Iberian peninsula and how its contributions were functionally

adapted by later Spanish society. In this regard, he is following in the historiographic footsteps of Américo Castro as well as Millás.

The most interesting work by any modern scholar writing on the translation movement has been done by Charles S. F. Burnett of the Warburg Institute at the University of London. In a series of articles and two books he has thoroughly and creatively examined the persons, techniques, and ideas of several translators and, because of his research, some long-held conclusions must be altered. In one provocative article he demonstrated that careful manuscript work can still yield new answers to what are the most important questions about the translation movement.[37] Burnett has gleaned what knowledge we can have from outside sources that establish the biography of translators and their sources of income. Moreover, he devoted one article to a careful study of the manuscript evidence on the relations between Hugh of Santalla and Herman of Carinthia.[38] On the basis of an extremely tedious study of a group of manuscript translations of works of astronomical judgements, he was able to conclude that Hugo (who prior to this research was thought to have worked alone) and Hermann must have worked together and, thus, along with Robert of Ketton and Hermann's pupil, Rudolf of Bruges, they form a northern "group of translators, whose approach to Arabic science, and programme of translation were quite distinct from those of their near contemporaries in Toledo."[39] His further writings on Hermann of Carinthia have created an understanding of this man who may have been one of the first to move toward the new metaphysics.[40] He has also addressed the question of how and where Adelard of Bath learned his Arabic and concluded that "there is no evidence that Adelard read Arabic!" Instead, Adelard claimed to have learned his ideas from

teachers, among whom Burnett conjectures was Petrus Alfonsi.[41] Burnett's further studies on the ideas and sources of Hermann and of Dominicus Gundisalvus have pointed clearly to the importance of the School of Chartres with its Neoplatonic orientation as an intellectual center that stimulated interest in the subject matter of the new science that eventually emerged along with the translations made in Spain.[42]

When Burnett turned to study the oft-cited prologue of Ibn Daud to the *De Anima*, upon which much of the theory of twelfth century intermediate vernacular translations is based, he provided an insight of rare genius:[43] if one understands what the prologue actually says in the normal sense of the words, Ibn Daud informs us that the text was read aloud by someone who could read Arabic (usually a Jew or Mudejar) and that this spoken Arabic was turned into Latin by the Christian scholar who understood spoken Arabic but could not read the text. Such a method had been attested long ago by Steinschneider and Rose; however, the dominant assumption of scholars reading this text equated "vulgariter" with vernacular Spanish Romance, precluding them from appreciating the full import of this passage. Burnett's further research demonstrated precisely that some mistakes of translation could only have arisen from mishearing some homophonic Arabic consonants.[44] Some texts, edited by Mozarabs who could read Arabic, have the corrections in Arabic in the margins though written in Latin letters. This insight should change the still dominant thinking on the role of the so-called "dragomen" of the twelfth century, which has always reflected anachronistic assumptions that correspond with the later formal school of Alfonso the Wise.

Some of the best work on the role of Mozarabs has been done by P. J. van Koningsveld. Here, like d'Alverny and Burnett, he has made careful use of manuscripts,

particularly the Arabic-Latin glossary preserved in Leiden University's Library, [45] and more recently by trying to understand just what kinds of texts Jews, Muslims, and Christians copied and read in Christian Spain.[46]

B. The Philosophical Milieu

That Chartrian Platonism paved the way for the reception of the new science has been believed for a long time. Richard Lemay emphasized that there was a progression of thought in the course of the twelfth century that moved from astronomy and cosmology to metaphysics ; he said, "This is a capital point of intellectual history which one should not be afraid of emphasizing when dealing with twelfth century latin thought."[47] This reflects his own keen insight into the central problem of the translation movement: Why did scholars--supposedly in search of the philosophy of Aristotle--spend what amounted to a generation of labor translating astronomical treatises? For them the study of the heavens was a bridge to the rest of natural science, especially as it was represented in the Arabic fusion of Aristotle and Plato. Lemay summarized this neatly:

> The ultimate source of this natural movement [of the heavens] according to Abu Ma'shar is to be found in God's will, but the . . . description showed this will to be scarcely different from the *primum movens* of Aristotle . . . Abu Ma'shar rejoices that his search in the realm of natural science for the principles of astrology has led him to the discovery of the Creator and of his essential attributes.[48]

In short, the translators understood with their sources like Abu Ma'shar, Avicenna, and al-Farabi that the search for God could be placed upon an objective (vis a vis a logical) footing. Many scholars and translators attest to this unitary conception of truth, not the least

of whom was Gundisalvus.

Such straightforward statements ought to be taken at face value. However, that has not always been the case. Tina Stiefel tried to present the argument that the translators along with twelfth century schoolmen from Chartres were somehow ahead of their time and were more like the more secular scholars of the later Italian Renaissance. Moreover, she believed that "the cosmologists firmly grasped the ideas of a theoretical scientific explanation."[49] She correctly noted the certain contempt that these men felt for those who did not see *ratio* in the physical world. However, she is on very uncertain ground in her attempt to provide a nearly secular rationale for their work; in the process she can quote Adelard as he tried to explain the ultimate correlation between the divine *ratio* and the *ratio* of nature and apparently not understand him at all![50] Her contention that all of the *physici* (her term for the new breed of followers of Arabic science) suffered opposition because they rejected authorities belies an ignorance of the very essence of the search for new science beyond the Pyrenees: it was a new search for very old authorities like Aristotle and, by extension, his Arabic commentators. It was only by assimilating these authorities that new conclusions were possible. Furthermore, I am not at all clear as to what this opposition consisted of. The recognized opposition that I know about comes from later Masters of Theology who are threatened by the growing popularity of the Arts when it has incorporated these new elements.[51] As Thorndike and Russel both showed half a century before Stiefel the whole idea of ecclesiastical opposition to Arabic science is nonsense whether we speak of England, France, or Christian Spain in the twelfth and early thirteenth centuries.[52]

Nearly all of the current generation of scholars writing on the transmission of Arabic

learning to the West have come to see this change in the medieval mindset as a result of the appropriation of new authorities. As Jean Jolivet has noted, the twelfth century saw a general rise in the appreciation for the thought of the Arabs.[53] In one sense, what was being translated and transmitted was a "theory of knowledge which far surpassed in breadth and power the traditional framework of the Liberal Arts. This latter point takes us to the frontiers, often difficult to trace exactly, which in fact join rather than divide the realms of science and philosophy."[54] Under such influences, change was inviting: Jolivet has noticed not only how the translators adapted Arabic schemes for the organization of knowledge (e.g., Al-Farabi's scheme in the *Kitab ihsa' al-ᶜulum*, the focal point of this study) but also how the works that they provided gave a legitimate place in higher education to the study of nature.

This is, in fact, the thesis of Tulio Gregory in "La Novelle idée du Nature au XIIᵉ Siécle."[55] Like Lemay and Stiefel, he noted the real change in attitudes toward nature which places a premium on observation of the physical world to discover "*legitima causa et ratio.*"[56] Astronomy was the primary science because, as Daniel of Morley wrote, "he who damns astronomy, of necessity destroys what is natural. For not easily can he cure, who ignores the causes of things. But astronomy forsees the causes."[57] Gregory pointed out that this attitude, rather than being novel, "belongs more directly to Arab science."[58] Far from being opposed to a religious point of view, such knowledge reinforced the idea of God in control of history; he noted that for Hermann of Carinthia

> It is possible to meet in the heavens the stages of sacred and profane history, the succession of empires . . . and the certainty of heavenly predictions, the precision of the horoscope of religions comprise the announcement of the

incarnation of Christ. [59]

Therefore, the new attitude of twelfth century students of science, which includes the translators, saw the world not as a symbolic representation of divine reality, but in the physical reality itself one saw, if not God, the working of the divine *ratio* that was profoundly revelatory.

We can, in addition, attribute this new attitude at least in part to the sources that were translated. Jolivet pointed out that Islamic Neoplatonism was well-suited to Christian adaptation. More specifically, Guy Beaujouan has said, "Having found its principle Arabic sources in Spain, medieval Western science obviously reflected, at the start, the choices of the Hispano-Muslim culture."[60] The preponderance of available texts were those which were agreeable to a revealed religion and which had survived the rather "oppressive domination of the Malikite fakihs."[61] All of the texts that were translated had, in one sense, already been approved by the doctrinal authorities of a strictly monotheistic religion that shared many beliefs about the natural world with Christianity. It ought then to occasion no wonder that such texts could be made to serve the purposes of Christian philosophers, particularly those with a Neoplatonic world view.

The social circumstance of the some of the translators reinforces the notion of the compatibility of Arabic learning with the Christian religion. At Toledo, Domincus Gundisalvus and Juan Hispano were archdeacons. Gerard may have been "dictus magister", whatever that may mean.[62] Deacons were supported by benefices and were important members of the Cathedral chapter. Hugh was the beneficiary of the efforts of Archbishop Michael and Robert of Ketton and Hermann of Carinthia were, at least for a time, in the

employ of the great Abbot Hugh of Cluny. Other twelfth century scholars, like Roger of Hereford, William of Conches, and Daniel of Morley were not translators but were supported by the church. Such widespread support for a translation movement was not accidental; nor would bishops and abbots have worked against their own interests. Thus it is clear that the efforts of the translators and the scholars had not only the imprimatur but the active support of the religious authorities. Of course, the classic case in point is that of Robert Grosseteste who was not only a scholar and translator but was a bishop himself.

It is clear that all of the scholars who were familiar with this new knowledge held it important enough to require change in what was an 600 year old educational tradition. Both Gerard of Cremona and Dominicus Gundisalvus felt it necessary to bring new schemas for the organization of knowledge out of their Arabic milieu because the new sciences would not fit well in the traditional *Quadrivium*. Very important was the change in attitude as to what an educated man needed to know: scholars who were well-schooled in the seven Liberal Arts were sorely lacking if they did not know the new Arabic astronomy. This knowledge they could not get from the old Latin books. Petrus Alfonsi wrote: "This art may only be understood firstly through practice, and similarly no one can master the art without practice."[64] Scholars who failed to take advantage of this new knowledge were passé: "Whether one listens to Adelard of Bath, Raymond of Marseille, or Daniel of Morley, the metaphor is the same: compared to the adepts of Arabic Science, the masters who have remained faithful to the traditional knowledge are nothing more than cattle."[64] As Haskins had discovered in the 1920's, by the end of the twelfth century at least one scholar could put together a list of necessary texts that included the *De Generation et Corruptione* and the *De*

Anima of Aristotle and Al-Farghani demonstrating the influence of the new sciences.[65] Such changes may seem incremental, but they reflect a new idea of education which the availability of the new knowledge of these translations brought about. As summarized in a provocative article by Richard McKeon, the thought world of scholars after the translation movement was radically different in both the attitude toward knowledge and the approach to it: previously it entailed the presentation of established "Sentences"--a term which refers to noncontroversial, settled propositions. After the arrival of the new materiels, it was more a matter of everything being called into question, "to which new answers could be established."[66]

That such a disruption of the traditional curriculum occurred is a matter of fact: the 1215 ban on the "new Aristotle" at the University of Paris attests to the perceived threat to old ways and an awareness of new differences in method and subject areas. Even more indicative of the effects of this new knowledge were the debates between the masters of theology and the masters of arts, about the fundamental problem of the organization of the curriculum. The center was not holding as the new texts and approaches pressed hard upon old structures; Masters in Theology felt particularly threatened by this movement.[67]

C. The Need for a New Appraisal

As in many other aspects of medieval history since the time of Haskins, the description of the translation movement in Spain has been altered radically on the basis of these very detailed, particular studies which I have summarized here. Of necessity, generalizations that were long accepted have been laid aside. Thanks to the efforts of these scholars we know more of the biography of the translators and the methods of translation;

we are able to get a clearer sense of their chronological and geographical distribution; we now can place their ideas and accomplishments in a broader frame of reference.

However, there still is much to be done. Studies like those of Burnett need to be replicated using other scholars and other manuscripts. We still do not have an adequate description of the role which the translators played within the church, much less within Spanish society. Here laborious work would have to be done with archival material in a research milieu that Peter Linehan has described as, at best, difficult.[68]

In terms of the translated texts we have a fairly clear picture of the history of the translations and of their general progression (i.e., from astrological and astronomical works toward truly philosophical metaphysical texts); however, comparison-contrast studies of the translations and adaptations of Arabic works need to be done on a wider group of texts. Actual studies of how competent the translators were have not been carried out on especially some of the most prolific translators. The original works of the translators themselves also need more attention like that Burnett has given to the *De Essentiis* of Hermann.

Arguably, the most glaring weakness of that portrait remains the near complete lack of modern studies placing this movement in the larger context of twelfth century Spanish society and within the main debate between Spanish historian regarding the importance and role of Castro's *Convivencia.* The translators are always cited as examples of *Convivencia* and Toledo is called the natural or logical place for such activity; but in Castro's formulation of that concept, how Convivencia influenced them has never been discussed to my knowledge. This term, "is loosely defined as 'coexistence,' but carries connotations of mutual interpenetration and creative influence even as it embraces the phenomena of mutual

friction, rivalry, and suspicion."[69] It is my contention that the experience of *Convivencia* played a major role in shaping the translation movement. Islamic models of education and patronage of scholars provided the proper backgrounds for the translation movement and can be discerned in the adopted and adapted institutions of the Christian Spain by a careful reading of the texts. Moreover, it is only on the basis of an appreciation of what Arabic culture had to offer and the experience of the *Convivencia* of Jews, Muslims, and Christians that any intellectual exchange in Spain can be understood in the first place. It is my contention that the choice of works to be translated--particularly this text of al-Farabi--was the result not of chance but of the Christian finding direction at the hands of a persons trained in Islamic circles in the "ancient Sciences", who must have "agreed" to direct him. Ironically, Castro himself has little to say about this phenomenon; in his discussion of the transfer of knowledge he is primarily engaged in an extended polemic against those historians who would term every philosopher from Seneca to Averroes a "Spaniard".[70] He does, however, overstate the parameters of the problem when he characterized Gundisalvus as the "sole outstanding figure in that group of inquisitive and curious Europeans who were able to perceive the possibilities of Greek thought brought to Europe by way of the Arabs."[71] The actual experience of *Convivencia* as it relates to translation even Don Amèrico has not discussed. Glick's work with Castro's notion of *Convivencia* in regard to Jewish translators is the best effort so far. Recent works by Josep Puig, Charles Burnett and P. J. van Koningsveld attempt to place the translations more in their particular social context.[72] However, in spite of the problems of access to source materials, the particularity of the historical situation of the emergence of these groups of translators still needs additional

careful study placing this movement within the frontier that had been conquered barely a generation before they began their work.

To that end, the following chapters will discuss the roles and accomplishments of two of the most prolific Toledan translators, Dominicus Gundisalvus and Gerard of Cremona, by focussing upon one of the texts that they both translated, al-Farabi's *Book of the Enumeration of the Sciences.* As d'Alverny has suggested, "there are three ways of proceding in one specific topic: by discovering new documents, by carefully studying the manuscript tradition, and by comparing the version or translation with the original text--when it is available--in order to evaluate the skill or inadequacy of the translator, his methods and peculiar traits, and his vocabulary."[73] In order to understand their interest in and adaptation of this curricular guide for the education of a philosopher, we must first come to some understanding of the specific Islamic models for translating and for higher education as they were practiced in Islamic Spain, particularly at Toledo; and we need to address the situation of the translators working in that frontier city and their role within the Church; and we must consider the adaptations of Arabic terminology and institutions in order to meet the ends that they desired. Second, by carefully reading their works we will come to know something of not only their abilities as translators but a good deal about the *Convivencia* within which they carried out their task. Third, after a careful exegesis and commentary upon the text, I will show how its reception helped shape people and curricula which changed as a result of the interest in the new Sciences. Finally, in the appendix I will provide the first English translation of the whole of Gundisalvus' translation, the *De Scientiis*, because that was the text through which the Latin West became aware of

"Alpharabius'" thoughts on what an educated man needed to know. Thus, of all the translated texts, the *Enumeration* is particularly interesting because it is, in one sense, the blueprint for the transition from the old curriculum to the new; if you will, it is the middle term between the old knowledge and new science and in a very real way, Gundisalvus and Gerard are the hinge men who brought it to the West.

NOTES TO CHAPTER ONE

[1] Rose, "Ptolemaeus und die Schule von Toledo," *Hermes* viii (1874) 327-349 and, among other works, Steinschneider, *Die hebraeischen Ubersetzungen des Mittelalters und die Juden als Dolmetscher* (Berlin, 1893).

[2] Haskins, *The Renaissance of the Twelfth Century* (Cambridge, 1927), 52.

[3] Robert I. Burns, "Muslim Christian Conflict and Contact," *Thought* 54 (1979): 244.

[4] *Toledo, siglos XII-XIII: Musulmanes, christianos y judios: La sabiduria y la tolerancia*, ed. Louis Cardaillac (Madrid, 1991). The article on translators was written by Danielle Jacquart and the discussion of the Cathedral chapter is by Franciso Hernandez; both of whom are well-respected scholars though here thy are writing general summary articles.

[5] Here, particularly, I am thinking of *Traduction et Traducteurs au Moyen Age*, (Paris, 1989); *The Cultural Context of Medieval Learning*, ed. Murdoch and Sylla (Dordrecht, 1975); *Renaissance and Renewal*, eds., Benson, Constable, and Latham (Cambridge, 1982); *A History of Twelfth Century Philosophy*, ed. Peter Dronke (Cambridge, 1988); *Rencontres de Cultures dans la Philosophie Médiévale*, eds. Jacqueline Hamesse and Marta Fattori (Louvain, 1990); *The Introduction of Arabic Philosphy into Europe*, eds. Butterworth and Kessel (Leiden, 1994); *The Legacy of Muslim Spain*, ed S. K. Jayusi (Leiden, 1992) and the work cited in note 4 above.

[6] The best of these is probably M. T. D'Alverny, "Translations and Translators" in *Renassance and Renewal in the Twelfth Century*, eds., Benson, Constable, and Latham (Cambridge, 1982) 421-462; D. C. Lindberg, "The Transmission of Greek and Arabic Learning" *Science in the Middle Ages*, ed. D. C. Lindberg (Chicago, 1978) 62-70 is a convenient summary; from a slightly different perspective G. F. Hourani, "The Medieval Translations from Arabic to Latin made in Spain," *Muslim World* 62 (1972) 97-114; T. F. Glick, "Science in Medieval Spain: the Jewish Contribution in the Context of Convivencia," *Convivencia*, eds. Glick, Mann, and Dodds (New York, 1992) 83-112 summarized the most up-to-date literature on the movement as a whole with a special emphasis upon Jewish translators..

[7] Haskins, *The Renaissance of the Twelfth Century* (Cambridge, 1927), 278.

[8] Haskins, *The History of Science* (Cambridge, 1924), 3-19.

[9] See the discussion in D'Alverny, "Translations and Translators": 444-445, particularly notes 97 and 99.

[10] Haskins, *History of Science*: for Hermann see pp. 38-51 and for Hugh, pp. 67-81.

[11] Haskins, *The Renaissance of the Twelfth Century* (Cambridge, 1927), 8.

[12] *Ibid.*, 52.

[13] *Ibid.*, 53.

[14] *Ibid.*, 278-302; see especially p. 286.

[15] *Ibid.*, 302.

[16] Sarton, *Introduction to the History of Science* (Washington, 1931).

[17]Thorndike, *The History of Magic and Experimental Science* (New York, 1929) and "John of Seville," *Speculum* 34 (1959): 20-38.

[18] Alonso, *Temas Filosóficos Medievales* (Comillas, 1959)

[19] *Ibid.*, 17-47.

[17] *Ibid.*, 24.

[20] Alsonso, "Traducciones del Arcediano Domingo Gundisalvo," *Al-Andalus XII* (1947): 295-336.

[21]*Ibid.*, 298.

[22] See M. T. D'Alverny detailing of this conjecture becoming fact in "Avendauth?" *Homenaje a Millas-Vallicrosa,* 2 vols. (Barcelona, 1954-56): I 19-43. She summarized the details of the in "Translations and Translators" on p. 444, n. 97, which discusses the history of this problem.

[23] Alonso, *De Scientiis* (Madrid, 1954).

[24] Rivera Recio, "Nuevos Datos sobre los traductores Gundisalvo y Juan Hispano," *Al-Andalus* XXXI (1966): 267-280.

[25] Rivera Recio, *Iglesia de Toledo* (Rome, 1966) 2 vols.

[26] Richard Lemay, "Dans l'Espagne du XIIe Siecle: Les Traductions de l'Arabe au

Latin," *Annales: ESC* 25 (1963) : 639-655, esp. 641.

[27] D'Alverny, "Avendauth?" *Homenaje a Millas-Vallicrosa,* I (Barcelona, 1954-56): 19-43.

[28] The two articles are, with George Vadja, "Marc de Tolédo, Traducteur d'Ibn Tumart" *Al-Andalus* 17 (1952):124-131 and "Deux traaductions latines du coran au Moyen Age" *Archives d'histoire doctrinale et littéraire du Moyen Age* 16 (1947-48):69-131.

[29] Dronke, *A History of Twelfth Century Philosophy*, 18.

[30] Millás Vallicrosa, *Assaig d'història de les idees fisiques i matemàtiques a la Catalunya medieval* (Barcelona, 1931).

[31] *Idem, Las Traducciones Orientales en los Manuscritos de la Biblioteca Catedral de Toledo* (Madrid, 1942).

[32] *Idem*, "Translations of Oriental Scientific Works" in Guy S. Metraux and Francois Crouzet, *Evolution of Science* (New York, 1963): 128-167.

[33] Thomas F. Glick, *Irrigation and Society in Medieval Valencia* (Cambridge, 1970)

[34] *Idem, Islamic and Christian Spain in the Early Middle Ages* (Princeton, 1979), 165-193, esp. 176-77. It should be noted that this chapter of Glick's book is the first synthesis in English of the work of Millás and his school. For a discussion of Millás role in the history of science, see Glick's obituary, "José M. Millás Vallicrosa (1897-1970) and the founding of the History of Science in Spain," *Isis* 68 (1977) 276-283.

[35] *Ibid.*, 193.

[36] "Convivencia: An Introductory Note", in *Convivencia:* 4.

[37] "Some comments on the Translating of Works from Arabic into Latin in the Mid-Twelfth Century," *Orientalische Kulture und Europaeisches Mittelalter* (Berlin, 1985): 162f.

[38] Burnett, "A Group of Arabic-Latin Translators working in Northern Spain in the Mid-Twelfth Century," *Journal of the Royal Asiatic Society* 1977: 62-108.

[39] *Ibid.*, p. 70.

[40] *Hermann of Carinthia De Essentiis*, ed. Burnett (Leiden, 1982) and "Hermann of Carinthia" in *A History of Twelfth Century Philosophy* (Cambridge, 1988): 386-404.

[41] Burnett, "Adelard and the Arabs." In *Recontres de Cultures dans la Philosophie Médiévale: Traductions et Traducteurs de l'Antiquite tardive au XIVe Siécle,* eds. Jacqueline Hamesse and Marta Fattori (Louvain, 1990): 105.

[42] Burnett, "A new source for Dominicus Gundisalinus's Account of the Science of the Stars," *Annals of Science* 47 (1990) 361-374 and "Scientific Speculations" in *A History of Twelfth Century Philosophy* 151-176.

[43] Burnett, "Some comments on the Translating of Works from Arabic intoLatin in the Mid-Twelfth Century," *Orientalische Kulture und Europaeisches Mittelalter* (Berlin, 1985): 166.

[44] *Ibid.*

[45] Van Koningsveld, *The Arabic-Latin Glossary* (Leiden, 1977)

[46] Van Koningsveld, "Andalusian-Arabic Manuscripts from Christian Spain," *Israel Oriental Studies* XII, ed. Joel Kraemer (Leiden, 1992) 75-110.

[47] Lemay, *Abu Ma'shar and Latin Aristotelianism* (Beruit, 1962) p. xxxi.

[48] *Ibid.*, 68.

[49] T. Stiefel, "The Heresy of Science: A Twelfth-Century Conceptual Revolution" *Isis* 68 (1977): 354.

[50] *Ibid.*, 352.

[51] Nancy Spatz, "The Inception Speech of Galdericus" in *Archives d'histoire doctrinale et littéraire du Moyen Age* 61 (1994): 134f.

[52] See here Thorndike, *History of Magic*, 179-180 on William of Conches and J. C. Russel, "Roger of Hereford: Bringer of Arabic Science to England" *Isis* 18 (1932): 14-25.

[53] Jolivet, "The Arabic Inheritance" *A History of Twelfth Century Philosophy*: 113-150.

[54] *Ibid.*, 117.

[55] Tulio Gregory "La Novelle idée du Nature au XII[e] Siécle" in *The Cultural Context of Medieval Learning*, eds. Murdoch and Sylla, (Dordrecht, 1975): 193-218.

[56]*Ibid.*, 192. The quote actually comes from Calcidius's Commentary on theTimaeus.

[57] *Ibid.*, 202, taken from the introduction to Abu Ma'shar: "*qui igitur astronomiam damnat, physicam necessario destruit. Non enim facile curat, qui causus rerum ignorat. Causum autem previderit astronomus.*"

[58] *Ibid.*, 203.

[59] *Ibid.*, 204: "pourra retrouver dans les cieux les etapes de l'histoire sacree et profane, la succession des empires . . . et la surete des predictions celestes, la precision de l'horoscope des religions comprenant l'annonce de l'incarnation du Christ."

[60] Beaujouan, "The Transformation of the Quadrivium," *Renaissance andRenewal*, eds. Benson, Constable and Latham (Cambridge, 1982): 465.

[61] *Ibid.*, p. 465. A similar point was made by Hourani who noted, "The ʿulama' of the prevailing Malikite school of law suppressed any form of intellectual expression that was not severly Islamic and practical." : 99.

[62] Rivera, "Nuevos datos": 273; I deal with one possible meaning for this term below in Chapter Two.

[63] "Letter to the Peripatetics of France," ed. Millás Vallicrosa, "La Apportación astronómica de Pedro Alfonso" *Sefared* 3 (1943): 65-105. The quote is from 99: "*Ars etenim ipsa non nisi per experimentus primus potuit comprehendi et magistrus artis similiter sine experimento nemo potest congoscere.*" More recently it has been reproduced by John Tolan, *Petrus Alfonsi and his Medieval Readers* (Gainesville, 1993) as an appendix with English translation; the translation given here is his, p. 175.

[64] Beaujouan, 481.

[65] "A List of Textbooks from the Close of the Twelfth Century," *History of Science*, 374-375.

[66] McKeon, "The Organization of the Sciences and the Relations of Cultures in the Twelfth and Thirteenth Centuries" in *The Cultural Context of Medieval Learning*, eds. Murdoch and Sylla, 182-183.

[67] So Nancy Spatz, "The Inception Speech," *passim.*

[68] So Linehan, see his preface in *The Spanish Church and the Papacy in theThirteenth Century* (Cambridge, 1971).

[69] Glick, "*Convivencia*: An Introductory Essay," *Convivencia*, 1.

[70] Castro, *The Spaniards*, 512-522.

[71] *Ibid.*, 520.

[72] J. Puig, "The transmission and Reception of Arabic Philosophy in Christian Spain (Until 1200)" in *The Introduction of Arabic Philosophy into Europe*, eds. Butterworth and Kessel, (Leiden, 1994) 7-30; Burnett, "The Institutional Context of the School of Toledo", forthcoming, and "The Translating Activity in Medieval Spain," in *The Legacy of Muslim Spain*, ed. S. K. Jayyusi (Leiden, 1992) 1036-1054; and van Koningsveld, "Andalusian-Arabic Manuscripts".

[73] D'Alverny, "Translators and Translations": 427.

Chapter Two

Spain, Toledo and the Translators in the twelfth century as seen through the lens of Islamic educational practice

In this chapter I will discuss translating as it was practiced in the twelfth century, both its characteristic methods and its social organization. We need to concentrate as much on the demolition of old and worn out ideas as on the construction of new paradigms of learning. Translation was not mechanical, like some modern electronic translator or computer translation program. Still, too many presentations about this movement have relied upon imprecise concepts to explain this phenomenon that do not take into account the human factors, as if no choices were involved and no structures in place to facilitate that transfer of knowledge. In addition, since the the beginning of the study of this phenomenon all who have looked for a "school" have not found one; this is unsurprising since they were looking for the wrong kind of "School", one based on western, northern European models. Much has been overlooked because the particularity of the Toledan context is not taken seriously enough. It may very well be the case that information is scanty, but one can still put this movement in its proper context and arrive at better historical reasons than "nature" and better models than French cathedral schools to explain this movement. To establish that particular context, will be our task in this chapter.

A. The Socio-Political Context: *Convivencia*

As is commonly known, Spain in the eleventh and twelfth centuries was the primary place where Jews, Christians, and Muslims lived together and interacted with each other in extraordinary as well as common ways. Throughout this period there was also a unusual

kind of warfare being waged, the Christian conquest, which set Islamic state against Christian state as the broad backdrop to all social history within the peninsula. In our period, the eventual outcome was not quite visible: the Christians appeared to be headed for victory but there were significant signs of an Islamic resurgence. By 1150, Toledo, the focus of our interest, had been captured and held for nearly three generations, though it was never far from the frontier. It was in this city that the cultural phenomenon that Américo Castro termed *Convivencia* (meaning daily social interaction) was being put into practice in a particular manifestation involving not simply Muslims and Christians, but Muslims living under Christian rule (Mudejars), former Muslim converts to Christianity ("New Mozarabs"), Jews, Old Mozarabic Christians, Castilian Christians, and French Christians, all of whom were aware of the differences between themselves and the other groups.[1] Social contacts in such an environment were not simple. And, yet, on the basis of this contact, there spread from Spain a new fount of knowledge which transformed the intellectual life of Europe.

From 711-1492 CE, Spain was split into two spheres of political and cultural influence, one Islamic and one Christian, varying in size and slowly exchanging the roles of one being dominant, centralizing and extensive and the other being small, decentralized, resisting domination and under siege. Yet, whether one was in al-Andalus or Christian Spain the social structure inside each of these competing societies encompassed the people of the three Abrahamic religions, splitting along religious lines as the markers of ethnicity.[2] As Castro put it, in these centuries "the definitive structure of Spanish life was forged. It is not possible to break up this history into stagnant pools, or to divide it off into parallel, synchronous currents, because each of the three groups was a part of the circumstances

projected by the other two."[3] The particular character of these projected "circumstances" would vary greatly, depending upon the relative status of the three groups. In the main, there was always pressure toward assimilation and accommodation to the dominant group. After 1031, the circumstances of governance were changing quickly; places like Toledo and Saragossa had long been in the middle of such transformations, being on the frontier, and saw a series of swift transitions: first, the fall of the Caliphate at Cordoba led to the establishment of the kingdoms of the *Ta'ifas* and then the fall of the *Ta'ifas* led to Christian overlordship. This pattern was repeated in most of the cities of al-Andalus, though generally in a less compressed time-frame. During such changes, the ruled became the rulers (or the allies of the rulers) and they either adapted the previously existing institutions to their own use or abandoned them, to replace them later with more amenable institutions. In Toledo, like in Saragossa, Christians and Muslims had lived all mixed together inside the city walls. Toledo, a city of some 37,000 people, had six Mozarabic parish churches spread throughout the city [4] and it was also the principal site to which Jews from al-Andalus had migrated.[5] They lived in their own quarter of the city, called by Ibn Hayyan the *Madinat al-Yahud*, the city of the Jews, which was situated within the city walls.[6] While these three groups were "ethnically distinct," they all spoke Arabic as their first language.[7]

Toledo had been ruled in the Ta'ifa period by a Berber clan, the Dhi'l-Nun, who were the masters of the town sometime before 1031, but who had also been a strong presence in the area for at least two centuries before that. In a manner similar to Alfonso VI's later conquest, the city had fallen to Ishmael ibn Dhu'l-Nun "without serious resistance."[8] This ruling house had diplomatic relations with the kings of Castile

(recognizing the Castilians ' overlordship) from at least 1037.[9] As is well known, when the future Alfonso VI was defeated by his brother Sancho, he fled to Toledo for safety and remained until he had seen Sancho successfully deposed. While king of Castile and Leon, he maintained good relations with Yahya al-Ma'mun, the ruler of Toledo, until the latter's death in 1075.[10] In fact, the sixth wife of Alfonso VI was the princess Zaida, who was probably Yahya al-Ma'mun's daughter.[11] Yahya had successfully expanded the hegemony of Toledo (and, in so doing, increased its wealth) conquering Valencia and Cordoba, though the latter conquest was short lived.[12]

In terms of life in his city, Yahya was a patron of artists, particularly poets, and scholars were numerous. Additionally, al-Ma'mun loved poetry and had several poets as viziers. Of course, a good deal of that poetry is panegyric, but that in itself is revealing: panegyric is written for patrons, exalted panegyric for generous patrons. Al-Ma'mun's praises are lavish; he is called "benefactor of the lands of the East and the West, protector of the Servants of God . . . a king with a heart more valiant than a lion, while his fingers are more generous than the rain."[13] Sa'id al-Andalusi shows that the Toledan scholars were particularly adept in the "ancient sciences" and at least as accomplished as the city's poets. He lists Ibn al-Waqshi, "the leader in all fields of science," Amin ibn Damj (i.e., son of Dominicus, obviously a muwallad convert to Islam), and al-Quwaydis as the great teachers and six of their pupils, including al-Zarqallah, the constructor of the famous astronomical Tables.[14] Of course, we must include Sa'id himself, who served as qadi as well as being a tutor to some students. For our purposes, it is interesting to note that Sa'id recognized that, "None of the scientists of al-Andalus paid much attention to the study of natural science or

theology."[15] The study of the "ancient sciences" was possible in part because some of the books from al-Hakam II's great Cordoban library had been saved from the fire and the wells and had made their way to Toledo.[16] In short, the social world of the Ta'ifa state of Toledo before its conquest was rich, varied and inclined to the secular. It was intentionally so in contradistinction to the repressive religious intolerance of al-Mansur.

B. The Cultural Context: The Three Religions

At this point the question arises of the character of the Toledan *Convivencia* as it related to the translation movement. More to the point, we must ask about what Glick described as "the ability of persons of different ethnic groups to step out of their ethnically bound roles."[17] In Toledo, the main picture is one of minorities of significant numbers fulfilling the *dhimmi* contract under fairly tolerant rulers. It would be fair to expect that because Mozarabic Christians lived intermingled with Muslims, that they might have experienced greater assimilation to Islamic cultural norms than Jews had, because the Jews lived in their own Quarter. From the small amount of primary data that we have, we cannot make a definitive judgement. We know that Jews shared in the public life of Toledo, serving the government in particular. There is evidence of Muslim scribes working in Jewish bookshops. Sa'id also mentions Jewish pupils and Jewish scholars, but not any Christians. Christians did come to know the *Qur'an* and the methods of reasoning and commentary that Muslims employed. Despite living intermingled, it appears that the Mozarabs weremore confined by their ethnic boundaries than the Jews; however, there was a curious assimilation on a linguistic level, by which Islamic religious expressions in Arabic were used by Mozarabs as the functional equivalents of Latin Christian ones. It should be remembered

that the Christian assimilation did include the methods of Islamic religious sciences, even if those methods were put to different purposes.

Additionally, each of the three groups had its own educational institutions. In the Mozarabic community, these schools had existed throughout the *Ta'ifa* period and even continued to train clergy in a bilingual curriculum well after the Christian conquest.[18] Jews also maintained their own schools, teaching Hebrew, Torah, and Talmud; there is a tradition that a Jew from as far away as Germany had travelled to Toledo to see a very old copy of the Torah, such was the city's reputation for biblical study.[19] As we have seen, Toledo was not particularly renowned for the study of Islamic religious sciences, but that is not because there were no religious scholars there.[20] Islamic education, however, followed a different model because the dominant culture was Islamic and it reflected the social reality that Toledo was part of al-Andalus, an Islamic land, no matter how politically fragmented it might be. Andalusi education was carried on in a national context; hence, the student gained his primary education at home or in his village, went to a regional center like Toledo for some further instruction, but if he desired thorough religious instruction, he went to the capital, to Cordoba, with its great library and collection of scholars, many of whom had gained certificates of study with the greatest teachers of the Islamic East. In this way Islamic educational patterns reflected the social realities of dominance just as Jewish and Mozarabic patterns reflected minority status.

A further distinction between Jews and Mozarabs is this: Jewish communities of al-Andalus were always linked to other Jewish communities throughout the Mediterranean world; a young Jew who wished to study with a great Rabbi elsewhere could go, provided

he had the means, and accomplish his purposes. Mozarabic horizons were more limited. The only place to go was to the Christian north and many did; but in that process they entered into a far more different world than the Jew in France or the Muslim in Cordoba would have. That is to say that the Mozarabs were distanced socially also from other Christians, who shared neither their language, Bible nor liturgy. As such, the Mozarabs were in a unique position *vis a vis* the other two groups. The truth of this assertion easily can be seen when the Christians regained control of Toledo: even when their ethnic group became dominant, the Mozarabs were still treated like a minority and still had to fight to retain their cultural heritage against the Castilians and their Cluniac allies.

An essential element of *Convivencia* is the understanding which each ethnic group has of the other, which conditions its relations with that group. As Castro formulated the concept, this often has more to do with idealized perception and constructions of the other groups than with real social interaction.[21] In this case, we need to focus upon how much each group understood of the others religious practices and how they evaluated them. It is absolutely clear that the common people were aware of their differences: at a basic level the three groups have different Sabbaths, used different liturgical languages, different dietary restrictions, different calendars, and had different clergy as well as differing religious structures. Real awareness of the theological differences was probably limited to scholars and religious professionals. Arguably, it can be said that no one in al-Andalus or the Christian north was as well informed about the other two religions as the great Ibn Hazm; in his book, *al-Fisal*, he displays an encyclopaedic knowledge of the religions that Islam had encountered. However, as Arnaldez had pointed out, it is "not only the work of a historian:

it is that of a man inspired by a theological idea . . . Ibn Hazm does not attempt to understand them [the religions] in themselves; he is interested in them only in relation to dogmas or problems which enable him to compare them with Islam."[22] He uses what he knows to establish the supremacy of Islam and point out the foolishness --especially the irrationality--of the other two religions. Similarly, the great Maimonides displayed rather thorough knowledge of both Islamic and Christian theology and discussed it in a much less polemical way. In his *Guide for the Perplexed* he presents a discussion of the methods and philosophical underpinnings of some of the same doctrines that Ibn Hazm had considered, though without the attendant triumphalism. As he says in criticizing some Islamic and Christian doctrines which are philosophically indefensible to him, "It is not our object to criticize things which are peculiar to either creed, or books which were written exclusively in the interest of one community or the other. We merely maintain that the earlier Theologians, both of the Greek Christians and of the Mohammedans [sic], when they laid down their propositions, did not investigate the real properties of things;"[23] I do not know of a Christian approach to the subject of comparative religion in the whole of the Middle Ages that is not polemical or that was this broad minded; the main Christian tradition misunderstood Islam as a heresy and considered Judaism as necessary only as a part of the *heilsgeschichte* working out in history.[24] It is important to recognize, though, that there was more than casual contact between scholars of the three religions. Such contact could involve a kind of distanced, mutual respect. Moses ibn Ezra tells a story of one such encounter.

> In the days of my youth and in the house in which I was born,
> a wise *faqih*, who I was accustomed to and who was a

> person of confidence, asked me to recite the Ten Commandments in Arabic; I perceived his intention, to minimize its eloquence. So I asked him to recite the *Fatihah* of his *Qur'an* in Latin language since he spoke and comprehended it. And when he set out to translate it into that idiom he debased his pronounciation and disfigured it in its entirety. Comprehending,then, my intention he excused me from having to do that which he had asked me.[25]

This tale is revealing for it shows that each one was aware of one of the other's central religious text, of the equivalence in function of those texts, and of the tie between the religion and language it was expressed in. There is also the mutual knowlege of the language of the third ethnic group, and a devaluation of that idiom . Each of these scholars knew enough about the other's religion to be able--perhaps to want to--attack it in spite of being friends; that neither pursued the matter further is an excellent example of how *Convivencia* worked out among religious scholars.

There is also evidence of the interpenetration of Islamic religious formulas in Mozarabic Christian texts which suggests how thoroughly the Mozarabs were assimilated. In what is an extraordinary document, MS Arabic Escorial 1623, a collection of Church Canons originally written in Latin were translated by a Christian monk of 1049 into fairly flawless Arabic. In it, Christ is referred to not only as امر , "Lord", but repeatedly is called المشيح المسلم , "The Messiah of the Muslims", and the believers are called المسلم , "Muslims." "Mihrab" is used for "altar" and "sunni" for what is lawful. Even an Islamic term for heretic, "kharijite" is taken over.[26] As one would expect, when he found no adequate equivalent term, this translator resorted to transliteration.[27] This level of acculturation is surprising and

appears to me to indicate more than linguistic accommodation: for example, there were adequate Arabic terms for "Christian" and I wonder how much the Islamic notion of submitting one's self to the absolute will of God is functioning behind this adoption of terminology to the neglect of the wider implications of Christian faith, e.g. grace. Similarly, while an altar and a mihrab have one function in common in medieval religious buildings (i.e., to point the direction to the Holy City), there is no analog in Islam to the sacrifice of the Mass carried out upon that Christian altar. Is that element being downplayed? These questions remain unanswerable because we do not have a source describing practices and their corresponding beliefs out of this same milieu.

One set of later Mozarabic sources that we do have reveals some knowledge of Islam and Islamic religious texts and the practices of religious scholars. Thomas Burman has brought this material together and shown that Mozarabs had access to *Qur'an*, *tafsir*, the *Life of Muhammad* of Ibn Ishaq, and collections of *Hadith*. Moreover, they knew how to use these materials to argue in the fashion of the *mutakallimun*.[28] There remains some question of how broadly this knowledge extended. It is clear that it was available to Robert of Ketton as he translated the *Qur'an*.[29] Burman himself is cautious in his appraisal: "We must not surrender to the temptation to see in all this much more than there is."[30] But, what is there is significant: some Mozarabic Christians had access to the texts that Islamic religious scholars studied and passed on in the schools of higher education in the Islamic world and, *more importantly*, they were aware of the methods of argument of Islamic religious scholars. Given the normal methods for the transmission of texts and of instruction it seems to me necessary that these particular Mozarabs were exposed to Islamic education.

This need not mean that a Christian Mozarab went to an Islamic school; more likely a "new Mozarab" brought his previous training with him when he changed religions.[31] It is relatively certain that some of these Mozarabic works could only have been composed under Christian rule.

We do know that these later Mozarabs were so thoroughly assimilated on the linguistic level that they had need of guidance in Latin when they tried to approach the theological terminology of that language. Van Koningsveld had masterfully demonstrated this in his study of the *Arabic-Latin Glossary of the Leiden University Library.*[32] He shows that this Toledan text served to bring the vocabulary of Latin Christianity to Arabic speaking Christians so that they could improve their understanding.[33] Clearly, large numbers of Mozarabs did find a comfortable niche as an ethnic minority, able to adapt central ideas of their own religion to Islamic norms. After the fall of Toledo, they had to work to be assimilated to Latin Christian culture, which was in some measure more foreign to them. Another good example of continuity of the assimilation to Islamic norms is the famous memorial tablet in Toledo dating from 1156 for one Michael Semeno where the Latin inscription *in nomine domini Iesu Christi* is translated into Arabic as *Bismillah al-rahman al-rahim.*[34] Strictly speaking, this is not translation; it is functional adaptation or transposition, in Carne-Ross's phrase.[35] Such linguistic equivalents are common and even necessary; but it is important to remember that they depend, as Carne-Ross noted, upon a certain closeness "in cultural habits and so on." Monroe noticed that in the political arena, even as late as the end of the thirteenth century, "Alfonso VIII of Castille struck coins in Toledo with the inscriptions entirely in Arabic, though containing Christian counter-

propaganda."[36] He reports that one particular coin calls the Christian king, *Emir Catholicorum, Alfonso ibn Sancho* and quotes the *Basmallah,* just like Michael Semano's inscription, in the place where an Andalusi coin would normally have the *Shahada.*[37] This indicates just how pervasive linguistic assimilation had been and how tenacious it remained. Arabic was the *lingua franca* even a century after the fall of Toledo.

In summary, it is fair to say that, for the most part, there was in the twelfth century little actual familiarity within any one group for the foundational religious texts of the other two groups. Certainly, the texts were available; but, other than in the relatively isolated cases of persons who were in the intellectual elite of one of the groups, these texts were not read or preserved. Moreover, the interests and relations between the groups varied depending upon which group was dominant. For example, as Sa'id makes clear, when the Muslims were dominant they had wide ranging cultural interests: there were books of poetry, natural science, philosophy, and the religious sciences to be found everywhere. Among the Mozarabic minority, the predominant interests were in intramural affairs, like the adoptionist heresy controversy. While the Muslims produced many texts enriching the general culture, the only significant Mozarabic work was Beatus of Liébana's *Commentary on the Apocalypse*, whose main purpose was to combat adoptionism. For the most part, the Jewish minority contributed to the general culture with philosophical works , medical practice, and bureaucratic advising while preserving their unique heritage. When the Christians came to power, there was an interesting change in roles: then the Muslims were preoccupied with internal concerns while the Mozarabs expanded their interests.

Here the recent work of van Koningsveld is illuminating: he subjected the surviving

Andalusian-Arabic manuscripts of medieval Christian Spain to analysis regarding their origin and circulation and, by implication, their use.[38] His lists of manuscripts reveal that Muslims *in Christian Spain* continued to copy and study standard religious texts: *Qur'ans*, fiqh, hadith, juridical judgements, and the like; there are only two anti-Jewish polemical texts and one copy of the Gospels. Interestingly, there are no scientific and few philosophical manuscripts.[39] Among those philosophical works, al-Ghazali's *Tahafut* was the most predominant text, a work not sympathetic to philosophers. Manuscripts circulating among the Jews are predominantly medical, though there were some significant philosophical works, e.g., Ibn Sina's *Kitab al-Shifa*, and there was only one religious text.[40] When he turns to Christian texts, (few in number in this survey, it must be pointed out) we also find primarily medical texts along with a copy of the *Almagest*.[41] We must use these lists with caution, due to the accidental nature of preservation and identification of provenance of those which have survived. However, van Koningsveld was able to conclude that, "The Andalusian-Arabic MSS point to the historical role, indeed the *key-role*, played by Jews in the process of transmission of Arabic science to the West."[42]

C. The Cultural Context: Institutions of Education

Absent from the preceding discussion are precisely those questions about the study and students of philosophy. Throughout the history of Islamic Spain, the institutions that existed were the same ones as those found throughout the rest of the Islamic world. This is true of cultural institutions every bit as much as political institutions. Following a general pattern, though, always allowed for local variation. For the study of philosophy, and what

we might think of a higher education in the Liberal Arts, Islamic society never developed an institution, consistent across the Islamic world, devoted to that purpose. The study of classical philosophy and science was called the study of the "Ancient Sciences" or the "Foreign Sciences", terms designed to indicate the non-Islamic character of such study *vis-a-vis* the Islamic Sciences. Though the patterns of education were so similar that one could easily move from one part of that world to another and make continual progress in one's study, as the biographies of numerous scholars indicate, there was a difficulty involved in studying philosophy and no express locus for it. Nakosteen has presented a neat summary of the types of schools and patterns of education in the period before the rise of the endowed college for religious higher education, the *madrasa.* From age 5 or 6 to 14 a boy went to a school, known as a *maktab* or *kuttab* which was not located in a mosque and was more than an elementary school for reading and writing, though that is what the name implies. After learning the fundamentals of reading, writing, and reciting, a student of 15 to 18 could move on to the mosque-based school, called *masjid* school, where there were circles (called *halqa*) of scholars and pupils and learning progressed to religious sciences with some training in elementary logic and mathematics; finally, the student could move onto becoming a scholar at the less concretely defined institutions composed of libraries, bookshops, and literary salons, known variously as *bayt al-hikma, dar al-hikma, dar al-'ilm,* etc., or simply called *majlis.*[43] For a biographical description of this phenomenon it is easy to consult Ibn Sina's *Autobiography* where one can see this precocious student interested in philosophy studying and reading. As Dimitri Gutas has analyzed this text,[44] he shows Avicenna learned reading and writing at home where, at age six, his further education

continued under a tutor who taught him *Qur'an* and Arabic literature; he was also sent to a greengrocer to learn arithmetic. Next he studied Islamic law *(fiqh)* and began to study philosophy , somewhere between the ages of 10 and 16; being precocious, he completed his studies in philosophy without a teacher, but with the aid of texts like al-Farabi's *On the Purposes of the Metaphysics* to help him when he was stuck. His progress clearly implies that he had access to a library which had the standard Aristotelian corpus as well as Alexandrian and Arabic commentators (something which Gutas does not comment upon); finally, when he was eighteen, he gained access to the Royal Library of Nun ibn Mansur, where he was able to complete what Gutas has called his "Graduate Education." Even though his ability is exceptional, his case displays the ordinary patterns. He simply went beyond the point where most people had stopped their education, into that third degree of study, where, independently, he had use of a great library to study the "ancient sciences." The only significant variation from the ordinary pattern is that Ibn Sina's father brought tutors to his house rather than sending his son to a school; this is simply a result of his social class.

This general pattern accords well with Islamic education as it was practiced in Spain. Michael Lenker has devoted a doctoral dissertation to this subject and concludes that, with small variations, education in Spain was thoroughly Islamic.[45] The pattern he discerns by studying the lives of religious scholars in biographical dictionaries shows that elementary education was primarily at home or in the local village, followed by training in the mosque school in the leading regional city, and that Cordoba was the place to complete one's education in al-Andalus. Those who desired higher education in the Islamic sciences often

completed the "Grand Tour" of the educational centers of the eastern Islamic world, gaining certificates of competency in one or another of the Islamic sciences from noted teachers. He does not study the lives of secular scholars nor does he display any interest in the philosophical curriculum. However, he noticed that after the fall of the caliphate of Cordoba, this system contracted and began to break down: "After the completion of their hometown studies, it was not only to Cordoba that students automatically flocked. But now, teachers were scattered all around Spain, mostly in the capitals of the petty kingdoms into which Spain was divided."[46] Hence, in the period immediately before their conquest by the Christians cities like Toledo inherited not only the remains of the great libraries of Cordoba, [47] but also teachers from the educational system. Regarding this, Makdisi said that the *muluk at-tawa'if* were "vying for power and prestige by boosting the number of humanists at their courts."[48] We have seen how Toledo was particularly favored in this regard and that the scholars there possessed a definite aptitude for science and philosophy, i.e. the Islamic "ancient sciences."[49]

It is these scholars--what, how, and where they taught and learned--who are the key to an adequate understanding of the later translation movement: more specifically, within the social structureof *Convivencia* the movement devoted to Arabic-Latin translation of scientific and philosophical texts was a functional adaptation of specific aspects and institutions of Islamic higher education, especially of those institutions for the study of the "ancient sciences" as practiced in al-Andalus. The later Christian books, teachers, methods, and institutions for such study all bear signs of being adapted from Islamic models. The evidence for this conclusion is forthcoming in the remainder of this chapter; however, we

first need to take a closer, more specific look at how such higher education was practiced in al-Andalus for, in some measure, it was unlike the rest of the Islamic world.

In terms of institutions, the main one in medieval Islamic higher education, the *madrasa*, appeared too late in history to be influential in Spain in our period. The *madrasa* was an innovation which grew out of the earlier *masjid*, the mosque based school, and was created in Baghdad by the great vizier Nizam al-Mulk somewhere between 1064 and 1068.[50] This was based upon the earlier combination of a mosque based school with an inn for lodging students which was founded near the turn of the eleventh century. The *madrasa* became the premier institution for higher education in the Islamic world after its founding but *not in al-Andalus*. In fact, the first legal *madrasa* does not appear in Spain until 1349 in Granada,[51] though there may have been a late eleventh century one in Murcia.[52] The reason for the delay in implementing this form of higher education has to do with the dominance of the Malikite school of law in al-Andalus, which did not recognize the legal character of these institutions. However, the absence of this institution still allowed for the mosque schools and the houses of wisdom as the locations for higher education. These were different places with somewhat differing functions in the Islamic world.

The mosque school, the *masjid* school (مسجد), had been in existence as early as the eighth century and taught *Adab*, the literary curriculum, and the Islamic sciences.[53] In these schools, instruction in the literary sciences (grammar and poetry) preceded the study of the religious sciences (*Qur'an*, Hadith, and *fiqh* or law). Makdisi cites the example of the actual curricular progress of Abd al-Latif of Baghdad, one of the highly regarded scholars of the Islamic East (d. 1231) who, as an adolescent, studied grammar with a private tutor while

beginning his study of law and Hadith in just such a school.[54] He continued to study the specifically Islamic sciences later in his career in a *madrasa;* only later in his academic life was he introduced to al-Farabi and the "sciences of the ancients, " as the classical Greek philosophical tradition was called, in a study circle (*halqa*) in a Cairo mosque. Similarly, in eleventh-century al-Andalus, we know that in the great mosque of Cordoba Ibn Hazm studied grammar, "Arabic proverbs, and even jahiliyyah poetry "[55] The Islamic sciences were always taught in a mosque school, that is certain; but, the important point is that the sciences of grammar and literature were taught there as well. As Makdisi put it, "The arts and the sciences could flourish in Muslim Spain without the proliferation of madrasas because the mosques as well as other institutions and private homes, continued to perform, as they did in the East, instructional functions on the level of higher learning."[56] It is to these other two institutions of higher education that we must now turn.

The two which are relevant for our purposes are the *majlis* and the library complexes. The *majlis*, as defined by Dozy, was "a meeting place of scholars who discuss."[57] The library complexes go by a variety of names, composed of two terms, the first of which describes the place and the second, its content: variously, it is called *bayt al-Hikma, dar al-hikma, dar al-'ilm, khizana al-'ilm, khizana al-kutub,* meaning "house of wisdom" or "storehouse of knowledge" or something similar. It appears that there was no tight distinction between these terms and that any combination could describe similar institutions.[58] This was the most likely place where the sciences of the ancients would be found and not only in books. Peters observed that it was in this institution "where the connection with Greek learning is more pronounced than in the mosque based school." He

goes on to say, "there is little reason to think that they were schools in the ordinary sense of the world. It would be nearer to the truth to call them 'research centers' rather than academies."[59] The earliest and most famous of these, those created by the patronage of Harun al-Rashid and his son al-Ma'mum in the ninth century were the prototypical institutions for the translation of Greek philosophical and scientific works. However, they had within them a classroom, frequently called a *majlis*.[60] It is important to note that physically these houses of wisdom were often attached to mosques. They always had a patron, frequently the ruler or a high royal official. Even in fairly remote regions these libraries could be extensive, as Ibn Sina's *Autobiography* indicates.[61] In terms of staff, there was a librarian and, where translation occurred, there were translators; both could serve as teachers. In fact, the teachers of al-Farabi were some of the same Syrian Nestorian Christians who had been active in translating for more than a generation. It was not uncommon for groups of students to grow up around these teachers.[62] The most detailed study of these institutions was done by Youssef Eche, who believed that these were the premier institutions which had given rise to the *madrasas*.[63] While Makdisi has rejected this interpretation with sound reasoning, Eche's description of these "schools" remain our primary description of them. In summarizing them he noted that, 1) they were quasi-official institutions, administered as trusts; 2) they offered room and board (i. e., support) to students and teachers; 3) there were often burial places of important scholars; 4) the literary arts were taught there; 5) the library was central; 6) teaching was in the form of meetings, disputations, and discourses of the learned; 7) Eche sees in this teaching heterodox tendencies (in his opinion, Shi'ite) and finally, 8) what he calls the agency of the book.[64]

Makdisi's thorough critique of Eche clarifies the function of this institution even further: it is important to note that the support was not generally available, but assigned; the mausoleum was not necessary but accidental; and that the quasi-official status could include private as well as semi-public libraries.[65] While Makdisi's main concern is to show that the *bayt al-hikma* did not necessarily lead to the *madrasa*, that is not our concern; nevertheless, he reinforces and clarifies the key functions of the pre-madrasa institution. More importantly, Makdisi had shown earlier that part of the agenda of the founders of *madrasas* was, at best, to minimize the importance of the "foreign sciences" and, thus, institutions like the *bayt al-hikma* "inclusive of the foreign sciences began to fade away, becoming extinct by the sixth/twelfth century."[66] In other words, these institutions served as a kind of advanced way-station in which Islamic scholars could gain access to the classical classical philosophical and scientific tradition only until Islamic civilization was sufficiently developed that it could create with confidence its own institution of higher learning. The importance of this institution as a training ground for the transfer of desired but unavailable works should be kept in mind.

One of the additional meanings of *khizana* is bookstore and it is clear that these treasuries were one of the channels through which books of the ancient sciences passed even though copying for one's self or paying a scribe to copy for you were the usual methods. Van Koningsveld had noted the presence of at least three Jewish *khizanas* in early thirteenth century Toledo.[67] Curiously, one of these used Muslim scribes to copy medical texts and not only occasionally, for this same scribe is attested as working in that shop for at least two years.[68] As van Koningsveld presents this, these libraries raise as many

questions as they answer, primarily because of the high social standing of the owners, who were not mere artisans, but viziers and rabbis: he notes that "these three libraries are the only ones known to have existed in Toledo in this period."[69] It is easy to see these bookshops not as places of sale as much as private libraries in which the patrons arranged for the copying of important texts *in the ancient sciences* well into the period of Christian rule in Toledo. That is to say that this Muslim institution continued to function in Christian Spain as it would have in al-Andalus.

The final institution of higher education which concerns us is the *majlis*. This word has wide meaning.[70] It can refer to any gathering of wise people and is usually identified by its purpose: e. g., *majlis al-adab* for literary discussion, *majlis al-khassa* for associating with the ruler. It can refer to a scholarly discussion in a *bayt al-hikma*, as was noted above. In Spain, al-Qifti explains that educational circles were called *anda' al-adab* (اندا الأدب), a club or association for literary purposes.[71] These circles were multiform but often centered on the court, though they were known to be in bookstores as well as private homes. Those frequented by scholars had a kind of etiquette and discipline along with an awareness that not everyone could benefit from what went on in them. Al-Maqqari tells a story about the *majlis* of Ibn Bajja, in which he relates how a descendant of the Marwanid caliphs was present and Ibn Bajja's pupil, Ibn Judi, transgressed the norms of acceptable behavior; the shaykh reproached him severely, saying "How could you approach a man in my majlis whom you saw that I favored and honored and listen to his words, and proceed to ask him about himself? See that it does not become a habit." In the course of this majlis, there was a recital of poetry, which figured in the exchange between Ibn Judi and the marwanid. It is

important to know that Ibn Bajja's rebuke must have been effective, because Ibn Judi is recalled in one biographical dictionary as a "cultivated secretary" and as "one of those knowledgeable in the ancient Sciences."[72] Sa'id al-Andalusi also refers offhandedly to the *majlis* of Abu'l-Qasim Maslama ibn Ahmed (d. 1008) who formed "an excellent group of students, better than any group formed by any other scholar of al-Andalus."[73] As one might guess, this group was composed of students interested in the sciences but many of them knew religious sciences as well.

The *majlis*, like the *bayt al-hikma*, ought not be considered as exclusively Islamic institutions. Sa'id has numerous places where he mentions both Jews and Christians as students and masters of students alongside Muslims.[74] Even in the *majlis al-khassa* we find Jewish viziers and physicians contributing at the highest levels of society. What is significant about these institutions is that they did not have rigid boundaries nor set curricula. Furthermore, they were populated by the type of scholars Makdisi had termed "humanists." As he describes them, humanists were employed in learning the "foreign sciences" and were often physicians, astronomers, astrologers, and translators of classical works in the foreign sciences.[75] In the East, these men in the later period taught even in the *madrasas* and, he adds, "it is easy to see that the professors of humanistic studies outshown their colleagues, the appointees to the chairs of law . . . the success and reputation of the scholar-humanists reflected honor and prestige on the College, and the best candidates were sought for the teaching of humanistic studies."[76] This was an eleventh century phenomenon from which al-Andalus was not immune. Michael Lenker, whose whole thesis is devoted to proving the thoroughly Islamic character of Andalusi education, even has to admit that in the tenth

century the scholars who came to al-Andalus from the East were "above all the bearers of a general culture."[77] While religious scholars still came from the East, though in fewer numbers, the majority of these men were simply reflecting the reality of educational culture in Baghdad, which, "of course, was a model to be imitated in all possible respects."[78] As the Christian conquests gathered momentum both of the traditional schools of Islamic law in al-Andalus were on the wane, being too rigid to adapt to changing circumstances.[79] But the cardinal point is that the scholars who came to al-Andalus just before the fall of Toledo were the ones who were the channels for the "ancient sciences"--accustomed to teaching in their *majlis* what had previously been forbidden in the religious schools.[80]

If we are to explain the phenomenon of Arabic-Latin translation in Toledo within three generations of the Christian takeover of the city, we must consider the case for the functional adaptation of Islamic institutions of higher education, the mosque school and especially the library complex known as the *bayt al-hikma* and its attendant *majlis*. One reason for considering this model is that there really is not a previous analog in Christian history which can be seen as the precursor of this phenomenon. When one looks for the translation and preservation of ancient philosophical works in the Latin West, it is the provenance of individual scholars, men like Boethius or John the Scot, sometimes but not usually working with royal patronage. When one looks for models for the recovery of the traditions of the ancient world, one finds in the Carolingian or Ottonian renaissances royal patronage and the creation of libraries, but while there is some instruction in language and the establishing of critical texts, they are not characterized by translation. Moreover, the texts they were likely to desire were either religious or legal works. When one looks intently

at the efforts of Christian scholars of late Antiquity, like Augustine or Cassiodorus, who knew the heritage of antiquity was being threatened by social disruption and institutional collapse and who set up curricular guides to try and preserve the knowledge of what an educated man needed to know--or who even took steps to ensure that preservation, like Cassiodorus--these efforts are largely individual with little or no long lasting effect. What happened in Christian Spain (and later in Sicily) was different and there are no completely adequate models in the Latin West to account for the entire phenomenon; more importantly, the models that do exist are remote in time and there is not the slightest evidence that the men who worked in Spain were aware of them.

On the other hand, they were in contact with the Muslims for whom the institutions we have just described were ubiquitous; we know that Christians had even participated in some of these institutions, sometimes being welcomed across ethnic lines, sometimes bringing the knowledge of these institutions with them after their conversions. We know that the Christians took over the very buildings where the Muslims had carried on these same activities, that some institutions maintained their life right through the conquest (like the Jewish *khizanas* mentioned above) and were in their midst, and that Christians actively sought Islamic books, just as Muslim scholars had done in al-Andalus.[81] The most telling argument, though,comes from considering the whole course of the transfer of the methods of educational practice to the Latin West from the Arabic world, of which our translation movement and its texts, especially the one we will consider in Chapter Three,were just part. We know that the works translated by these scholars fed the thirst for learning among twelfth century autodidacts and the curricular needs of the soon-to-be-established

universities in the next century. Makdisi has shown in numerous publications that the heart of the organization of the western university depends upon Islamic models and his works provide the seemingly undeniable evidence of that.[82]

In the first place, he demonstrates the novelty of the legal structure of the college as an educational institution endowed for the support of students and compared it to the *khan*;[83] next he looked at the nature of the legal organization of the university as a corporation and compared and contrasted it with the *madrasa* which preceded it by at least a century and a half.[84] Secondly, he noticed that the language used to describe the functional roles of teachers and students and even the terminology for the essential product of education, the *licentia docendi*, were simply word-for-word translations of previously existing Islamic terminology. For example, the essential guild structure arranging classes of people in a university corresponds exactly to that found in Islamic higher education:[85]

Islamic Terminology	Latin Terminology
Mutafaqqih	Scholar
Sahib	Fellow
Mudarris	Magister

The *licentia docendi* was simply a translation of *ijazat at-tadris*.[86] As he says of the license, education in antiquity "did not produce the license to teach. Nor was the license produced by Eastern Byzantine education . . . nor was it produced by Western Christian Latin education."[87] It is clear to him that it came in with "all the knowledge that medieval Christendom was importing from Islam. It had come as part of the tools and methods that were part and parcel of that education."[88] Third, he also demonstrated the parallels between Islamic scholasticism and that of the West.[89] In all his work Makdisi is quite

careful to point out the differences between the institutions of Islam and those of the West. However different they were in detail, he has shown clearly that they carried on the same functions, often adapting terminology. It is obvious that the Western institutions arose in the late twelfth and early thirteenth centuries, later than the institutions of the Islamic world, and almost immediately after the West began to have far more contact with its neighboring Mediterranean civilization as a result of the Crusades in the Levant and the Christian conquest in Spain as well as the conquest of Sicily.

No one would seriously dispute the role of Spain and Sicily as the loci of the transmission of texts of science and philosophy that fed the changed curriculum of the new universities of the Latin West; Makdisi simply takes it as given. However, what is curious about his works is that while he clearly lays out the starting point of this cultural transmission and makes a serious case for its end result, he has very little to say about the process, the means, by which such transference occurred and where and when it happened. His only look at this problem merely concluded that there could not have been direct borrowing from Spain simply because the *madrasa* never took root there until after the rise of the university.[90]

I contend that these adaptions of Islamic models which fed the development of the universities must have passed through a Muslim-Christian frontier in the course of the twelfth century. The place where there was the most acculturation (i.e., the most likely exposure to these models) and where the very physical space used for these functions of Islamic education was taken over was in the towns of Christian Spain recently recovered from Muslim rule, especially in Toledo after 1085. It is not insignificant for my point that

we might think of a higher education in the Liberal Arts, Islamic society never developed an institution, consistent across the Islamic world, devoted to that purpose. The study of classical philosophy and science was called the study of the "Ancient Sciences" or the "Foreign Sciences", terms designed to indicate the non-Islamic character of such study *vis-a-vis* the Islamic Sciences. Though the patterns of education were so similar that one could easily move from one part of that world to another and make continual progress in one's study, as the biographies of numerous scholars indicate, there was a difficulty involved in studying philosophy and no express locus for it. Nakosteen has presented a neat summary of the types of schools and patterns of education in the period before the rise of the endowed college for religious higher education, the *madrasa*. From age 5 or 6 to 14 a boy went to a school, known as a *maktab* or *kuttab* which was not located in a mosque and was more than an elementary school for reading and writing, though that is what the name implies. After learning the fundamentals of reading, writing, and reciting, a student of 15 to 18 could move on to the mosque-based school, called *masjid* school, where there were circles (called *halqa*) of scholars and pupils and learning progressed to religious sciences with some training in elementary logic and mathematics; finally, the student could move onto becoming a scholar at the less concretely defined institutions composed of libraries, bookshops, and literary salons, known variously as *bayt al-hikma, dar al-hikma, dar al-'ilm,* etc., or simply called *majlis*.[43] For a biographical description of this phenomenon it is easy to consult Ibn Sina's *Autobiography* where one can see this precocious student interested in philosophy studying and reading. As Dimitri Gutas has analyzed this text,[44] he shows Avicenna learned reading and writing at home where, at age six, his further education

continued under a tutor who taught him *Qur'an* and Arabic literature; he was also sent to a greengrocer to learn arithmetic. Next he studied Islamic law *(fiqh)* and began to study philosophy , somewhere between the ages of 10 and 16; being precocious, he completed his studies in philosophy without a teacher, but with the aid of texts like al-Farabi's *On the Purposes of the Metaphysics* to help him when he was stuck. His progress clearly implies that he had access to a library which had the standard Aristotelian corpus as well as Alexandrian and Arabic commentators (something which Gutas does not comment upon); finally, when he was eighteen, he gained access to the Royal Library of Nun ibn Mansur, where he was able to complete what Gutas has called his "Graduate Education." Even though his ability is exceptional, his case displays the ordinary patterns. He simply went beyond the point where most people had stopped their education, into that third degree of study, where, independently, he had use of a great library to study the "ancient sciences." The only significant variation from the ordinary pattern is that Ibn Sina's father brought tutors to his house rather than sending his son to a school; this is simply a result of his social class.

This general pattern accords well with Islamic education as it was practiced in Spain. Michael Lenker has devoted a doctoral dissertation to this subject and concludes that, with small variations, education in Spain was thoroughly Islamic.[45] The pattern he discerns by studying the lives of religious scholars in biographical dictionaries shows that elementary education was primarily at home or in the local village, followed by training in the mosque school in the leading regional city, and that Cordoba was the place to complete one's education in al-Andalus. Those who desired higher education in the Islamic sciences often

completed the "Grand Tour" of the educational centers of the eastern Islamic world, gaining certificates of competency in one or another of the Islamic sciences from noted teachers. He does not study the lives of secular scholars nor does he display any interest in the philosophical curriculum. However, he noticed that after the fall of the caliphate of Cordoba, this system contracted and began to break down: "After the completion of their hometown studies, it was not only to Cordoba that students automatically flocked. But now, teachers were scattered all around Spain, mostly in the capitals of the petty kingdoms into which Spain was divided."[46] Hence, in the period immediately before their conquest by the Christians cities like Toledo inherited not only the remains of the great libraries of Cordoba, [47] but also teachers from the educational system. Regarding this, Makdisi said that the *muluk at-tawa'if* were "vying for power and prestige by boosting the number of humanists at their courts."[48] We have seen how Toledo was particularly favored in this regard and that the scholars there possessed a definite aptitude for science and philosophy, i.e. the Islamic "ancient sciences."[49]

It is these scholars--what, how, and where they taught and learned--who are the key to an adequate understanding of the later translation movement: more specifically, within the social structureof *Convivencia* the movement devoted to Arabic-Latin translation of scientific and philosophical texts was a functional adaptation of specific aspects and institutions of Islamic higher education, especially of those institutions for the study of the "ancient sciences" as practiced in al-Andalus. The later Christian books, teachers, methods, and institutions for such study all bear signs of being adapted from Islamic models. The evidence for this conclusion is forthcoming in the remainder of this chapter; however, we

first need to take a closer, more specific look at how such higher education was practiced in al-Andalus for, in some measure, it was unlike the rest of the Islamic world.

In terms of institutions, the main one in medieval Islamic higher education, the *madrasa*, appeared too late in history to be influential in Spain in our period. The *madrasa* was an innovation which grew out of the earlier *masjid*, the mosque based school, and was created in Baghdad by the great vizier Nizam al-Mulk somewhere between 1064 and 1068.[50] This was based upon the earlier combination of a mosque based school with an inn for lodging students which was founded near the turn of the eleventh century. The *madrasa* became the premier institution for higher education in the Islamic world after its founding but *not in al-Andalus*. In fact, the first legal *madrasa* does not appear in Spain until 1349 in Granada,[51] though there may have been a late eleventh century one in Murcia.[52] The reason for the delay in implementing this form of higher education has to do with the dominance of the Malikite school of law in al-Andalus, which did not recognize the legal character of these institutions. However, the absence of this institution still allowed for the mosque schools and the houses of wisdom as the locations for higher education. These were different places with somewhat differing functions in the Islamic world.

The mosque school, the *masjid* school (مسجد), had been in existence as early as the eighth century and taught *Adab*, the literary curriculum, and the Islamic sciences.[53] In these schools, instruction in the literary sciences (grammar and poetry) preceded the study of the religious sciences (*Qur'an*, Hadith, and *fiqh* or law). Makdisi cites the example of the actual curricular progress of Abd al-Latif of Baghdad, one of the highly regarded scholars of the Islamic East (d. 1231) who, as an adolescent, studied grammar with a private tutor while

beginning his study of law and Hadith in just such a school.[54] He continued to study the specifically Islamic sciences later in his career in a *madrasa;* only later in his academic life was he introduced to al-Farabi and the "sciences of the ancients, " as the classical Greek philosophical tradition was called, in a study circle (*halqa*) in a Cairo mosque. Similarly, in eleventh-century al-Andalus, we know that in the great mosque of Cordoba Ibn Hazm studied grammar, "Arabic proverbs, and even jahiliyyah poetry "[55] The Islamic sciences were always taught in a mosque school, that is certain; but, the important point is that the sciences of grammar and literature were taught there as well. As Makdisi put it, "The arts and the sciences could flourish in Muslim Spain without the proliferation of madrasas because the mosques as well as other institutions and private homes, continued to perform, as they did in the East, instructional functions on the level of higher learning."[56] It is to these other two institutions of higher education that we must now turn.

The two which are relevant for our purposes are the *majlis* and the library complexes. The *majlis*, as defined by Dozy, was "a meeting place of scholars who discuss."[57] The library complexes go by a variety of names, composed of two terms, the first of which describes the place and the second, its content: variously, it is called *bayt al-Hikma, dar al-hikma, dar al-'ilm, khizana al-'ilm, khizana al-kutub,* meaning "house of wisdom" or "storehouse of knowledge" or something similar. It appears that there was no tight distinction between these terms and that any combination could describe similar institutions.[58] This was the most likely place where the sciences of the ancients would be found and not only in books. Peters observed that it was in this institution "where the connection with Greek learning is more pronounced than in the mosque based school." He

goes on to say, "there is little reason to think that they were schools in the ordinary sense of the world. It would be nearer to the truth to call them 'research centers' rather than academies."[59] The earliest and most famous of these, those created by the patronage of Harun al-Rashid and his son al-Ma'mum in the ninth century were the prototypical institutions for the translation of Greek philosophical and scientific works. However, they had within them a classroom, frequently called a *majlis*.[60] It is important to note that physically these houses of wisdom were often attached to mosques. They always had a patron, frequently the ruler or a high royal official. Even in fairly remote regions these libraries could be extensive, as Ibn Sina's *Autobiography* indicates.[61] In terms of staff, there was a librarian and, where translation occurred, there were translators; both could serve as teachers. In fact, the teachers of al-Farabi were some of the same Syrian Nestorian Christians who had been active in translating for more than a generation. It was not uncommon for groups of students to grow up around these teachers.[62] The most detailed study of these institutions was done by Youssef Eche, who believed that these were the premier institutions which had given rise to the *madrasas*.[63] While Makdisi has rejected this interpretation with sound reasoning, Eche's description of these "schools" remain our primary description of them. In summarizing them he noted that, 1) they were quasi-official institutions, administered as trusts; 2) they offered room and board (i. e., support) to students and teachers; 3) there were often burial places of important scholars; 4) the literary arts were taught there; 5) the library was central; 6) teaching was in the form of meetings, disputations, and discourses of the learned; 7) Eche sees in this teaching heterodox tendencies (in his opinion, Shi'ite) and finally, 8) what he calls the agency of the book.[64]

Makdisi's thorough critique of Eche clarifies the function of this institution even further: it is important to note that the support was not generally available, but assigned; the mausoleum was not necessary but accidental; and that the quasi-official status could include private as well as semi-public libraries.[65] While Makdisi's main concern is to show that the *bayt al-hikma* did not necessarily lead to the *madrasa*, that is not our concern; nevertheless, he reinforces and clarifies the key functions of the pre-madrasa institution. More importantly, Makdisi had shown earlier that part of the agenda of the founders of *madrasas* was, at best, to minimize the importance of the "foreign sciences" and, thus, institutions like the *bayt al-hikma* "inclusive of the foreign sciences began to fade away, becoming extinct by the sixth/twelfth century."[66] In other words, these institutions served as a kind of advanced way-station in which Islamic scholars could gain access to the classical classical philosophical and scientific tradition only until Islamic civilization was sufficiently developed that it could create with confidence its own institution of higher learning. The importance of this institution as a training ground for the transfer of desired but unavailable works should be kept in mind.

One of the additional meanings of *khizana* is bookstore and it is clear that these treasuries were one of the channels through which books of the ancient sciences passed even though copying for one's self or paying a scribe to copy for you were the usual methods. Van Koningsveld had noted the presence of at least three Jewish *khizanas* in early thirteenth century Toledo.[67] Curiously, one of these used Muslim scribes to copy medical texts and not only occasionally, for this same scribe is attested as working in that shop for at least two years.[68] As van Koningsveld presents this, these libraries raise as many

questions as they answer, primarily because of the high social standing of the owners, who were not mere artisans, but viziers and rabbis: he notes that "these three libraries are the only ones known to have existed in Toledo in this period."[69] It is easy to see these bookshops not as places of sale as much as private libraries in which the patrons arranged for the copying of important texts *in the ancient sciences* well into the period of Christian rule in Toledo. That is to say that this Muslim institution continued to function in Christian Spain as it would have in al-Andalus.

The final institution of higher education which concerns us is the *majlis*. This word has wide meaning.[70] It can refer to any gathering of wise people and is usually identified by its purpose: e. g., *majlis al-adab* for literary discussion, *majlis al-khassa* for associating with the ruler. It can refer to a scholarly discussion in a *bayt al-hikma*, as was noted above. In Spain, al-Qifti explains that educational circles were called *anda' al-adab* (اندا الأدب), a club or association for literary purposes.[71] These circles were multiform but often centered on the court, though they were known to be in bookstores as well as private homes. Those frequented by scholars had a kind of etiquette and discipline along with an awareness that not everyone could benefit from what went on in them. Al-Maqqari tells a story about the *majlis* of Ibn Bajja, in which he relates how a descendant of the Marwanid caliphs was present and Ibn Bajja's pupil, Ibn Judi, transgressed the norms of acceptable behavior; the shaykh reproached him severely, saying "How could you approach a man in my majlis whom you saw that I favored and honored and listen to his words, and proceed to ask him about himself? See that it does not become a habit." In the course of this majlis, there was a recital of poetry, which figured in the exchange between Ibn Judi and the marwanid. It is

important to know that Ibn Bajja's rebuke must have been effective, because Ibn Judi is recalled in one biographical dictionary as a "cultivated secretary" and as "one of those knowledgeable in the ancient Sciences."[72] Sa'id al-Andalusi also refers offhandedly to the *majlis* of Abu'l-Qasim Maslama ibn Ahmed (d. 1008) who formed "an excellent group of students, better than any group formed by any other scholar of al-Andalus."[73] As one might guess, this group was composed of students interested in the sciences but many of them knew religious sciences as well.

The *majlis*, like the *bayt al-hikma*, ought not be considered as exclusively Islamic institutions. Sa'id has numerous places where he mentions both Jews and Christians as students and masters of students alongside Muslims.[74] Even in the *majlis al-khassa* we find Jewish viziers and physicians contributing at the highest levels of society. What is significant about these institutions is that they did not have rigid boundaries nor set curricula. Furthermore, they were populated by the type of scholars Makdisi had termed "humanists." As he describes them, humanists were employed in learning the "foreign sciences" and were often physician*s*, astronomers, astrologers, and translators of classical works in the foreign sciences.[75] In the East, these men in the later period taught even in the *madrasas* and, he adds, "it is easy to see that the professors of humanistic studies outshown their colleagues, the appointees to the chairs of law . . . the success and reputation of the scholar-humanists reflected honor and prestige on the College, and the best candidates were sought for the teaching of humanistic studies."[76] This was an eleventh century phenomenon from which al-Andalus was not immune. Michael Lenker, whose whole thesis is devoted to proving the thoroughly Islamic character of Andalusi education, even has to admit that in the tenth

century the scholars who came to al-Andalus from the East were "above all the bearers of a general culture."[77] While religious scholars still came from the East, though in fewer numbers, the majority of these men were simply reflecting the reality of educational culture in Baghdad, which, "of course, was a model to be imitated in all possible respects."[78] As the Christian conquests gathered momentum both of the traditional schools of Islamic law in al-Andalus were on the wane, being too rigid to adapt to changing circumstances.[79] But the cardinal point is that the scholars who came to al-Andalus just before the fall of Toledo were the ones who were the channels for the "ancient sciences"--accustomed to teaching in their *majlis* what had previously been forbidden in the religious schools.[80]

If we are to explain the phenomenon of Arabic-Latin translation in Toledo within three generations of the Christian takeover of the city, we must consider the case for the functional adaptation of Islamic institutions of higher education, the mosque school and especially the library complex known as the *bayt al-hikma* and its attendant *majlis*. One reason for considering this model is that there really is not a previous analog in Christian history which can be seen as the precursor of this phenomenon. When one looks for the translation and preservation of ancient philosophical works in the Latin West, it is the provenance of individual scholars, men like Boethius or John the Scot, sometimes but not usually working with royal patronage. When one looks for models for the recovery of the traditions of the ancient world, one finds in the Carolingian or Ottonian renaissances royal patronage and the creation of libraries, but while there is some instruction in language and the establishing of critical texts, they are not characterized by translation. Moreover, the texts they were likely to desire were either religious or legal works. When one looks intently

at the efforts of Christian scholars of late Antiquity, like Augustine or Cassiodorus, who knew the heritage of antiquity was being threatened by social disruption and institutional collapse and who set up curricular guides to try and preserve the knowledge of what an educated man needed to know--or who even took steps to ensure that preservation, like Cassiodorus--these efforts are largely individual with little or no long lasting effect. What happened in Christian Spain (and later in Sicily) was different and there are no completely adequate models in the Latin West to account for the entire phenomenon; more importantly, the models that do exist are remote in time and there is not the slightest evidence that the men who worked in Spain were aware of them.

On the other hand, they were in contact with the Muslims for whom the institutions we have just described were ubiquitous; we know that Christians had even participated in some of these institutions, sometimes being welcomed across ethnic lines, sometimes bringing the knowledge of these institutions with them after their conversions. We know that the Christians took over the very buildings where the Muslims had carried on these same activities, that some institutions maintained their life right through the conquest (like the Jewish *khizanas* mentioned above) and were in their midst, and that Christians actively sought Islamic books, just as Muslim scholars had done in al-Andalus.[81] The most telling argument, though,comes from considering the whole course of the transfer of the methods of educational practice to the Latin West from the Arabic world, of which our translation movement and its texts, especially the one we will consider in Chapter Three,were just part. We know that the works translated by these scholars fed the thirst for learning among twelfth century autodidacts and the curricular needs of the soon-to-be-established

universities in the next century. Makdisi has shown in numerous publications that the heart of the organization of the western university depends upon Islamic models and his works provide the seemingly undeniable evidence of that.[82]

In the first place, he demonstrates the novelty of the legal structure of the college as an educational institution endowed for the support of students and compared it to the *khan*;[83] next he looked at the nature of the legal organization of the university as a corporation and compared and contrasted it with the *madrasa* which preceded it by at least a century and a half.[84] Secondly, he noticed that the language used to describe the functional roles of teachers and students and even the terminology for the essential product of education, the *licentia docendi*, were simply word-for-word translations of previously existing Islamic terminology. For example, the essential guild structure arranging classes of people in a university corresponds exactly to that found in Islamic higher education:[85]

Islamic Terminology	Latin Terminology
Mutafaqqih	Scholar
Sahib	Fellow
Mudarris	Magister

The *licentia docendi* was simply a translation of *ijazat at-tadris*.[86] As he says of the license, education in antiquity "did not produce the license to teach. Nor was the license produced by Eastern Byzantine education . . . nor was it produced by Western Christian Latin education."[87] It is clear to him that it came in with "all the knowledge that medieval Christendom was importing from Islam. It had come as part of the tools and methods that were part and parcel of that education."[88] Third, he also demonstrated the parallels between Islamic scholasticism and that of the West.[89] In all his work Makdisi is quite

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No one would seriously dispute the role of Spain and Sicily as the loci of the transmission of texts of science and philosophy that fed the changed curriculum of the new universities of the Latin West; Makdisi simply takes it as given. However, what is curious about his works is that while he clearly lays out the starting point of this cultural transmission and makes a serious case for its end result, he has very little to say about the process, the means, by which such transference occurred and where and when it happened. His only look at this problem merely concluded that there could not have been direct borrowing from Spain simply because the *madrasa* never took root there until after the rise of the university.[90]

I contend that these adaptions of Islamic models which fed the development of the universities must have passed through a Muslim-Christian frontier in the course of the twelfth century. The place where there was the most acculturation (i.e., the most likely exposure to these models) and where the very physical space used for these functions of Islamic education was taken over was in the towns of Christian Spain recently recovered from Muslim rule, especially in Toledo after 1085. It is not insignificant for my point that

such adaptation is exactly what one ought to expect given the socio-political character of the Christian conquest, especially as practiced in the early stages by Alfonso VI. It is clear that the process was relatively peaceful, with no retribution nor "ethnic cleansing." The King's intent was to preserve as much of the city's cultural life as possible, changing little other than overlordship. The initial appointment of Sisnando Davidiz as governor, a Mozarab from al-Andalus originally, who instituted tolerant policies--too tolerant in the eyes of the French and some Castillians at the court--indicates the course he intended to take.[91] Even more significant was the employment of Abu'l Qasim ibn Khayyat, the converted Cadi, who wrote a number of charters for Alfonso, particularly to other Ta'ifa kings who had been closely related to the Toledan ta'ifa.[92] In similar circumstances at Saragossa, Alfonso "forbade his knights to harm Moorish villages and assured the people he would respect the Moslem laws and customs."[93] At Toledo, the treaty of surrender allowed, "for the remaining followers of Islam, those who wished to accept the rule of the Leonese monarch . . . to be allowed to stay in the realm, secure in their freedom, lives, the possession of their property, and the free exercise of their religion."[94] Only the *Jami'* Mosque was to remain to the Muslims, the others were to be given to the kings along with the personal property of al-Qadir. The head tax was to be the only serious burden of accepting his overlordship.[95] That the king expected a loyal citizenship continuing to live in *Convivencia* is further indicated by his adoption of the title "Emperor of the Two Religions."[96] Even Muslim historians, like Ibn Bassam, recognized the lenient approach of Alfonso--and especially of Sisnando--who, he says, "tried to make the Toledans' [i.e., the Muslims'] misfortunes bearable and render tolerable the vile condition into which they had been depressed."[97] The hallmark of this

careful treatment had included the preservation of the Jami' mosque in Muslim hands; how significant this concession was can be read in the intolerance of the French Queen and French Bishop, Bernard, who seized it and consecrated it to Christian use in Alfonso's absence. As Linehan has described the king's response,

> Alfonso VI was only deterred from his intention of burning the archbishop and the queen . . . by the pleas of the 'prudent' Arabs themselves who, as the story was told by Rodrigo of Toledo in the thirteenth century, were fearful of further reprisals.[98]

Archbishop Bernard was no friend to the Muslims and many fled the city by the end of 1086. It is clear that his purposes, and those of the contingent he represented, were at odds with the king's and that they slowly they reached a kind of reapproachment, for "from 1085 onward they [the Muslims] tended to remain in their ancestral homes."[93]

This was the climate when the *Jami'* Mosque became the Christian cathedral. With it would have come the very place where the *masjid* school had been and the place, if not the contents, of its library, if it had one.[99] Certainly al-Qadir had an extensive library and he has been characterized as "un grande bibliophile"[100] as his ancestors had been. The banu Dhu'l-Nun even resorted to stealing libraries![101] Not only places, but people "came over" to the Christian camp as well. Many of them would have brought the knowledge of Islamic educational practices with them. This tendency could even include high placed Muslim intellectuals like the aforementioned Abu'l-Qasim, a faqih of the Islamic city. His tale, including a poem of his, displays an exemplary attitude of *Convivencia* in the city at the moment of the conquest. In the following lines he responded to his friends who criticized his conversion:

> I change color like a chameleon,
> Who changes color at the right time,
> And who sees his world with wide open eyes.
> All adore the Compassionate
> And they pray in public out of what is in their souls.
> If the Christian religion could harm my Creator,
> I would never have accepted it.[102]

In short, there were formerly Islamic "collaborators" who were the product of the educational system who remained in Christian lands. Moreover, Burman has demonstrated that there were Mozarabic Christians who were aware of not only the texts of Islamic religious higher education but also of the methods of argument and persuasion which were carried out on the basis of those texts. He concluded that,

> In coming to grips intellectually with Islam, therefore, they did not hesitate to open and study extensively the Qur'an, the Hadith, Qur'anic commentaries, and other Islamic books. They they used information in these sources in much the same way earlier Oriental Arab Christians had, they nevertheless knew these firsthand and understood--at least in considerable measure--the particular scholarly and religious conventions and principles which informed them.[103]

In other words, these Mozarabic scholars had adapted the very Islamic sciences to their own educational and evangelical (i. e., polemical) purposes. The famous converso of this era, Petrus Alfonsi, who, while not being from Toledo must have spent some time there, adapted not only astronomical tables to advance science but wrote other works. In his more widely read works, The *Disciplina Clericalis* and the *Dialogi*, he brought to the Latin world two texts, the first of which was of a well-known Islamic *adab* genre while the second reflects techniques of Islamic educational argumentation. These were as greatly favored in Christian circles as they had been in Islamic ones.[104] That these were adaptations of Islamic models is

without question; Makdisi has claimed that the title, *Disciplina Clericalis*, is a word-for-word translation of the typical genre known as the *Adab al-Katib*, "The Secretary's Art."[105] If one considers each of these cases one clearly sees borrowing, but borrowing with subtle changes, adapting the character of a text or institution to fulfill a similar function in the new environment: the Cathedral is still a place of worship, a *tafsir* is still a commentary on the meaning of the *Qur'an*, a library still contains books and the instruments for their production and preservation; scholars like Petrus Alfonsi continued to teach--even to teach subjects well-known in his former world but relatively unknown in the new. While this evidence is circumstantial, it is univocal; consideration of other historical fields, though, shows a similar pattern. Glick has shown how Islamic irrigation systems were taken over by Christians and many of their functional characteristics preserved.[106] Others have shown the adaptation of particular legal institutions and, as was already mentioned, Alfonso VIII's usage of Arabic script and Islamic expressions, aping Andalusian coin styles. In summary, functional adaptation was a *modus vivendi* in reconquered lands and that is the root of *Convivencia*, as Castro said.[107]

D. The Translation Movement as a Christian *Bayt al-Hikma* and *Majlis*

In taking seriously this specific socio-cultural milieu, I wish to consider the translation movement as the functional adaptation of the more polymorphous Islamic institutions, the *masjid* school, the *bayt al-hikma* attached to the place of worship in a regional center, with the attendant *majlis*. Let us then consider the Islamic model.

To summarize briefly, teaching was done in a mosque or its attached library; in a

provincial center like Toledo, the *Jami'* mosque would serve this purpose. The *'ulama*, the scholar-teachers, derived their income from endowments and were authority figures but were not clergy in the sacerdotal sense. They gathered a circle of students around them, many of whom also derived their livelihood from the religious institution and often found similar employment for themselves. They enjoyed great reputations and students would come from afar to study with them and, more importantly, as their reputation grew the scholars would be invited to other religious schools or libraries seen as bringing glory upon the institution. They did not teach a whole curriculum--certainly not the basic, elementary curriculum, though that could be offered in the same setting. Each scholar specialized in one or more subjects, but taught by reading a text, sometimes writing a commentary on it, but always commenting upon it. After a student completed his period of study, he gained a certificate of his completion in that subject. In addition, the scholars and students often lived nearby in a lodging devoted to their maintenance.

The first question to be answered is, Where was the locus of translation? The answer, when not ambiguous as in the famous notice that Hugh of Cluny found Robert of Ketton and Herman of Carinthia "on the banks of the Ebro," is clear: it was in the cathedral chapters of the cities that had been regional centers of al-Andalus. We know that among the translators, Hugh of Santalla, a native Spaniard, worked for the archbishop Michael of Tarragona as a *Magister.*[108] As his patron, this archbishop secured access to the library of the Beni Hud of Saragossa sometime after 1118.[109] Tudela, an important center of Jewish intellectual life, had Robert of Ketton working as a canon in its cathedral,[110] and he is also known as an archdeacon of Pamplona.[111] Another figure, Hermann of Carinthia, worked

closely with Robert and was also acquainted with Hugo, as Burnett has shown.[112] Of course, at Toledo, Dominicus Gundisalvus was an archdeacon, and Gerard of Cremona was part of the Chapter. Another member of the chapter, John (Johannis Hispanis, presumably) was also *magister scholiarum*. In every case where we know the workplace of a translator it is a cathedral chapter.

The office of archdeacon appears to be much more important than that of the *magister*. This is curious, at first sight, because the obvious place to look for educational activity in a cathedral would have been in the cathedral school, especially if northern European models were operant. It is out of such schools that the nascent universities arose in France and England shortly after the main period of translation. However, remembering the fact that Spanish, and especially Mozarabic, Christianity was isolated from and resistant to many of the developments of the church in the eleventh and twelfth centuries, it is not unreasonable to suggest that it did not develop along the same lines.[113] Hence, if one looks to older models, models from the time of the Arabic conquest, one finds the archdeacon playing a significant educational role. In particular, the seventh century schools "do not describe a scholarly institution in the strict sense of the word . . . but speak of groups of young men gathered around a bishop or archdeacon."[114] Usually the archdeacon was the master of educational activity for the bishops, "adding the direction of young clergy to his other responsibilities."[115] This, in itself, proves nothing and unfortunately we have little in the way of records for the Mozarabic parishes throughout the period of Arabic dominance. This may represent a possible model, though, for the Mozarabic churches were actively trying to preserve much of seventh century custom and practice.

What is undoubtedly clear is that the cathedral chapter of Toledo was reconstituted at least twice in the first half of the twelfth century. Under Bernard it looked monastic and was composed mainly of French Cluniacs like the bishop himself. Later it had native Spaniards and was more extensive.[116] It also grew by leaps and bounds, from twenty members to ninety in the space of fifty years. It is also not clear how the residency of canons functioned and we do not know how much they had to stay in the chapter even though they derived their income from it.[117] At Toledo, the archdeacon had traditionally one of the most important roles and, in terms of prestige, archdeacons everywhere were of senior status in the chapter and many became bishops in the course of their careers. The archdeacons resident in the Toledo chapter were numerous and both Gundisalvus and John Hispanis were certainly translators. John was probably later the Bishop of Toledo. Burns, in studying the chapter at Valencia in the early thirteenth century concluded that, "At this moment in medieval history, the archdeacon's office had attained its ripeness of power. He loomed in the diocese."[118] He was not a priest, but he had more power. Linehan has noted that in roughly contemporary Vich, few canons were priests and some even actually refused ordination. He compares them to the "Bachelor Fellows" of English universities.[119] From Valencia, again, we know that the income could be substantial[120] and it is clear that the church of Toledo became richer and richer throughout the twelfth century.[121]

When these translators were working and were members of the chapter there were masters of the cathedral school. The Master of the Scholars does appear as early as 1162; just what this office was precisely, was not defined until later, and is unclear even in Rivera's detailed study of the church at Toledo;[122] after the Third Lateran Council of 1179,

Canon 18 "required every cathedral church to assign a benefice to a *magister* who was to instruct free of charge."[123] It is further clear that the function of this office was changing throughout Christendom in the course of the twelfth century. Most importantly, *just when* the *magister* began to teach more advanced students, this was the time when "un phénomène nouveau" arose that connected the magistracy to the passing of exams.[124] It is also clear that these early masters were generally archdeacons.[125] However, Olga Weijers concludes that the advanced school, the *studium generale*, was not a term of "signification précise" until the end of the thirteenth century.[126] While this does not cinch the case (simply because we don't know enough about Mozarabic practice), it does make it abundantly clear that the traditional office responsible for educational activity was the archdiaconate and that was the transitional office out of which the later university masters were created. Furthermore, it is clear that in all of northern Europe this office was in transition at precisely the same time that the newly acquired learning transferred from Spain was beginning to be studied. It is probable that one element of this new development was a Christian Spanish adaptation of Islamic educational office could be behind this transition.

There is no reference to a librarian in the Toledan chapter this early, even though we know books were being given and kept for use in the school. Perhaps this role was just a function of some member of the chapter and not deemed worthy of a title.

For the twelfth century translators who were archdeacons, it is easy to see the parallels in function to the *'ulama*. The translators were supported by the cathedral chapter's endowments. The only example we have of a translator working for money was when Herman and Robert worked for Peter the Venerable, Abbot of Cluny, making the

translation of the *Qur'an*. Herman is nowhere attested as a cleric of any sort and it may be that he was otherwise without means of support. Clearly, all these translators had libraries at their disposal, though that library may not have been within the cathedral but was in some way provided by the patron.

The most important set of questions for a comparison with the *'ulama* is, Did these men teach?, How did they teach?, What was the character of the teacher-student relationship? and Did such instruction lead to a recognition of competency? First, the only existing example of a witness to instruction is from Daniel of Morley, an Englishman who came to Spain after trying the school of Paris. He tells that he specifically went to Spain to find the "*doctrina Arabum,*" a term which, it should be noted, he uses in its strict sense to refer to the quadrivium.[127] In about 1180 he studied with Gerard of Cremona and, perhaps, from his Mozarabic companion, Gallipus, in Toledo; at the end of his resume of the content of that teaching, he recounts how it was done.[128] While Gerard presented the contents of the "Isagoge of Japhar"--Gallipus the Mozarab interpreting for him--the students listen to this reading. Then Daniel says he objected to the text, supporting his objection by citing a different authority; this is followed by a syllogistic presentation by Gerard, and a rejoinder by Daniel. To students of the later universities, this looks like scholastic *Quaestiones*; that it would look absolutely familiar to Muslim scholars has been overlooked. Important here is the question of what Gallipus is doing. In an earlier passage Daniel reports learning directly from Gallipus. Now, what exactly is his role? If we look to Islamic models, we find that the *ashab* of the master often taught beginning students until those students were up to par and could join the master's circle. In that circle the *sahib* often acted as a kind of public address

system for the teacher, repeating his words for the gathered students. Could this be the meaning of Gallipus' interpreting Gerard? Whatever the ultimate judgement on the historicity of Daniel's text as a whole (and Burnett has called that into question), it indicates teaching practices that are recognizably Islamic in the following ways: first, the focus upon a text. While not unlike later Latin education, the focus of presentation is upon a text being read or recited orally and written down by students. Second, the assistant who may be repeating what the lector is saying. Third, the questions of the student and the give-and-take encounter with the teacher, using a method not at all unlike Abelard's *Sic et Non.* Finally, there is the reaching of some conclusion satisfactory to all. This method which has analogies in all three western religions Makdisi has shown to be a particular hallmark of what was the contemporary Islamic legal higher education.[129]

Second, in terms of instructional methods there is similarity. As an example, Makdisi cites at length the biography of Abd al-Latif of Baghdad because his story is so typical of Islamic higher education. We read about teachers sitting in front of their classes within the mosque, assistants who repeat what the teacher says, disputation between students and teachers, and *quaestiones*.[130] The text being read in Arabic had to be interpreted orally because of the problems of reading without diacritics and vowels.[131] Questions led to interpretation, usually by citing other authorities in this *sic-et-non* style, for which there was a technical vocabulary "in full bloom" as early as the eleventh century.[132] In legal education, the point of reconciling disconcordant texts was to arrive at consensus, *ijma'*, the whole basis for Islamic law. Now these same methods were used--sometimes by the same teachers--to teach the humanistic subjects.

Third, in terms of relationships between teachers and students there are parallels of function and, more importantly, of terminology that shows evidence of having been translated from Arabic. Teachers were called *mudarris* and this corresponds to the Latin, *magister* (as was discussed above). In the Toledo Cartulary we find a "*G*[erardus] *dictus magister*": Gerard who is called Master/Teacher.[133] There is some question about exactly what this phrase means because it cannot refer to the *magister scholiarum* of the cathedral who taught elementary subjects (i.e., reading, writing, and the beginnings of the *trivium*). This *magister* is attested in the documents as early as 1162 and there was a John who held this office at the same time Gerard was "called Master." The meaning of this term appears to be connected to the ambiguity of Gerard's role: Gerard is something like a *magister* but not in the traditional, formal sense of the title. Remember, that as Weijers pointed out (see page 64 above), in the twelfth century, this title was in flux and did not have definite denotations. As Daniel of Morley shows, Gerard was a teacher, but just not of the usual subjects that the *magister scholiarum* taught. What could be responsible for the terminological difficulty? Consider the other half of the teacher-pupil relationship: we know that Gerard's students called themselves *socii*; as Burnett notes, "*Socii* normally means associates;"[134] however, I do not think that is the meaning here. Gerard had translated a work of the geometer al-Nayrizi in which the students of a teacher of the *quadrivium* are referred to as *sahibuna*, our fellows.[135] In Nayrizi's case, as in all Islamic higher education, this refered to a distinct class of students, graduate students kept on for advanced study with their master. These were not ordinary students, but were the better ones, moving from being mere learners to becoming disciples on their way to becoming masters and the term

reflects this higher status. The foremost distinction of this group of students is that they transmit the knowledge they had gained from their master on his authority and, thus, gain their own authority. Now Gerard translated this term as *socius noster*, our fellows, making the Latin term the equivalent of the Arabic one for this Islamic practice. It is possible that Gerard was the first In the Latin West to use the term in this sense.[136] That his students use this term for themselves probably indicates that he used it as well. The question is, does this terminological equivalence indicate a functional adaptation? I believe that it does. The term for teacher that would be translated as the counterpart to *socius* is *magister*. However, the Islamic *magister* in higher education institutions teaches very different subjects that those taught by the *magistri* in the Latin West. In other words, the term *magister* could stand for two different functional offices in Toledo in 1180: the established, traditional Latin *magistri* of the Cathedral school teaching elementary subjects, and Gerard teaching his expanded *quadrivium*, who is not one of them; his is not yet an established office like theirs, thus he is "called Master" to indicate his distinct function. It is possible that he is the only person they are aware of who has ever performed such a function in Christian circles. Because he is a teacher, he must be a *magister*; but somehow his distinctivenss must be connoted. Note, too, that his students are not *scholares* (as the cathedral school *magister* would have taught) but *socii*.

In this light, it is interesting to look at the so-called biographical notice composed by these *socii* in light of the commonplace Islamic biobibliographical literature called *Tabaqat*; the stock entry in this genre tells when a scholar lived and where the man came from, from whom he transmitted knowledge; sometimes there is an anecdote that tries to encapsulate his

character; generally, there is a listing of his works and a listing of his pupils. Gerard's biobibliography certainly shares many elements of that traditional genre--a genre that simply never existed in the Latin West. Moreover, it is also possible to hear echoes of Islamic scholastic terminology in the *dictus* as well; due to the relative frequency of Islamic scholars having the same name, when a scholar is referred to, after his full name, there is usually the phrase "he was called" (كنوه) followed by an epithet; this latter name became the standard way of referring to the scholar and it usually reflected an outstanding attribute.[137] Thus, within this tradition it would have been normal for Gerard of Cremona, the most prolific translator of scientific works in the the twelfth century who taught the same subjects in Toledo, to have been known as "Gerard, The One Called Teacher." Without appreciating the particular significance of this terminology, Lemay asks "What can these associates have been doing?" He then proceeds to trot out Ibn Abdun's over used and well-worn dictum to explain that they were seeking Arabic books for the master to translate.[138] It seems far more probable to me that those who adopted the designation of *socii* were doing what *socii nostri-sahibuna* had always done: trying to learn the lore, the *Doctrina Arabum*, for which Toledo and Gerard in particular were famous so that they could pass it on.

These students in this particular role raise the fourth issue of comparison, that of competency established by the completion of study with a *magister*. That Christian scholars reared in the Islamic milieu sought such students was clear early on. In the first quarter of the twelfth century Petrus Alfonsi sent a letter to the "Peripatetics of France," usually a calque for the Arabic *Faranji*, "Franks," meaning all northern Europeans.[139] Petrus announces a *lectio*, a lecture course whose object is that the students who go through it (i.e.,

beginning together and hearing the entire *lectio*) will attain to a *magisterium* in this art. While there is no mention of a certificate, the function of this course is to equip the students who will really know their subject based upon the latest authorities (all translated from Arabic by the way) and not the old Latin texts, who will then be competent to teach. In reading this text, we need to be attuned to the educational assumptions behind it:[140] Petrus Alfonsi is a master who can bring others to his level of competence; as the second half of the letter shows (a kind of advertising "teaser" attached to this piece of self promotion) he would be using his own text; he expected to find his students within the confines of the Holy Mother Church, but he also expected them to be ready for a graduate education, ready to move beyond the arts of the *trivium,* which he acknowledged they had mastered; finally, he perceives that they, too, having completed study with him, will move on to being masters themselves. Thinking in terms of Latin Christian models, this is surprising: before the advent of the *licentia docendi* Alfonsi expects to be treated as though he had it (i.e., he is competent to teach anywhere with authority) and he can bequeath the same status (something an individual Christian magister could never do because the authority could only be conferred by the Church, usually in the person of an official, the Chancellor, who was not a teacher). Considered in light of Islamic models, it is unremarkable. That he did gain pupils under such conditions is clear, for Walcher of Malvern calls him "my teacher," though perhaps at second hand.[141] Moreover, Alfonsi hoped to gain a certain fame from this. Here he resembles those Islamic humanists whom Makdisi has called "self-made men, whose fortunes varied from rags to riches, and back again."[142] These humanists were frequenters in the courts of rulers (*majlis al-khassas*) throughout the Islamic world and to

this general pattern Alfonsi is no exception, for he was clearly in the service of Henry I of England and, probably, of Alfonso VI of Castille as well.[143]

Easy confirmation of this thesis of adaptation would be had if there were evidence that Muslims or Mudejars recognized what the Christians were doing as equivalent to their own educational activity. As far as I know, there is only one late reference by an Islamic writer which calls a Christian educational institution by an Islamic title: a school for language study ("and the other arts they wished to learn") founded by Alfonso X in 1266 in Murcia is called a *madrasa* by Ibn al-Khatib, even though he knew its character as a place of language and liberal arts instruction and translation.[144] Interestingly, this school had at least one Muslim as an instructor and Christians as students. While this use of terminology is clearly imprecise by Islamic standards and may be anachronistic, it it nonetheless clear that Ibn al-Khatib expected his reader to understand and accept the standard terminology for an Islamic school in reference to a non-Islamic institution.

E. Translation as Oral Transmission of Texts

Perhaps the most significant consideration for the study of translation proper is the pervasive orality of Islamic education and textual transmission. As Makdisi encapsulated this phenomenon he said,

> The characteristics of the Arabic language *required* dictation, rather than merely writing by copying the written word. The language required that the word be *heard* from an authoritative speaker, rather than merely seen in writing. For the written word is lifeless: only the consonants are written. The speaker breathes life into the inert consonants, resurrecting them by *vocalizing as he speaks.*[145]

This points up one of the cardinal problems of transmitting and translating an Arabic

text: one must know how to place the vowels and even how to distinguish between certain homomorphic consonants, whose only distinction may be a superscribed dot. Furthermore, the indicator for the doubling of consonants--which can change the meaning of a word completely--also only was indicated by a diacritical mark which was often omitted. The one who *knew* the text was the one who could read it. Hence, there was a strong emphasis upon memorization which was the rule for literary texts, including the *Qur'an.* The presentation of a text to students (auditors) was accomplished by *dictation* rather than by reading.[146] In al-Andalus, this had been the custom. Al-Qali, who had come to al-Andalus in 942, related this oral character of the transmission of his own book: "I dictated this book from memory on Thursdays in Cordoba in the mosque of the Shining City."[147] The place referred to was the mosque of the new palace complex of Abd al-Rahman III, *Madinat al-Zahra,* outside of Cordoba. This oral presentation was characteristic of Jews as well. There is an account of Abu'l-Fida from 1330 which related how he "brought the two books of Judges and Kings to a man who knows Hebrew and Arabic and have let him read them . . . and have written down what I thought to be true and have rendered the names as accurately as I could, *letters and vowels."*[148] This oral transmission also crossed the ethnic boundaries; Abraham ibn Daud (a Toledan who may have been one of the celebrated translators) reports that "R. Joseph b. Issac b. Shatnash surnamed Ibn Abitur . . . interpreted the whole of the Talmud in Arabic for the Muslim king al-Hakam."[149] We are not specifically told here that he read the text aloud, but the general meaning of "interpret" is to read with the correct voweling. This is what Gallipus the Mozarab did for Gerard of Cremona when the latter undertook to translate the *Almagest;* as Makdisi pointed out, without the interpreter the text

is lifeless (not to mention subject to misreading). We also know that Christian works crossed over to Jewish scholars, the most famous example being Gundisalvus' *De Anima*, and there are clear signs that this Latin-Hebrew transfer also went through oral channels, perhaps using Romance.[150] Hence, in the Islamic world, the normal mode of proceeding in all scholarly activity related to the transmission of authoritative texts was oral; in al-Andalus, both Jews and Christians shared that manner of proceeding. This Islamic model is the one that would logically be expected to be adapted by Christian translators.

For the most part, there is general agreement that the process of translating was accomplished orally. However, there has arisen the notion that the intermediate language used in translation was Romance. It is undeniable that there is evidence of some romance vernacular words, both Castillian and Catalan, appearing in translations.[151] However, that such was the rule or that complete written intermediate Romance translations were produced ought to be abandoned. This error arises from the assumption that Romance was the vernacular and, hence, the *lingua franca*. The few Romance words that do leave vestiges are the results of mishearing not misreading.[152] The problem of mishearing in Islamic scholastic circles was well known. Abu Ubaida was aware of just this problem in a fellow *sahib*: "he hears with us from the scholars other than what we hear; he writes on his slate other than what he hears; he transcribes in his notebook other than what was written on the slate."[153] Errors could result from mishearing or unclear articulation; they could be due to distraction or due to ignorance. Such a process was bound to induce error and being aware of this, students had to read their transcriptions back to their teachers, subject to his correction, before they could receive their certificate. It is clear from some Christian

manuscripts that were in Mozarabic hands that some kind of correction process also occurred.[154] Clearly, the translating process was oral. The old view was imaginatively expressed by Gabriel Thery:

> The Translation began. Ibn Daud, a converted Jew, born in Muslim lands . . . evidently knew Arabic and Romance. A Jew spoke the language of the land that he lived in. Ibn Daud read the Arabic text, he translated mentally into Romance, and Gundisalvus began with the Romance and turned it into Latin. [155]

Now this reconstruction like most of the descriptions of the Romance intermediary translation theory are based upon reading a single dedicatory preface from Ibn Daud and Gundisalvus' translation of Avicenna's *De Anima*. The text simply says, "*singula verba vulgariter proferente, et Dominico Archidiacon singula in latinum convertente, ex arabico translatum.*" [156] Burnett has argued that *vulgariter* should not be taken as referring to Romance (the vulgar language of the Christian North) but to "the spoken Arabic of the Toledan Muslims and Mozarabs." This is reasonable not only because van Riet could not find any evidence of Romance in this particular work but also because Burnett has found that his more sensible reading of that colophon explained numerous problems in the text itself which could *not* be explained by an intermediate Romance translation.[157] In addition, the early annotators of some scientific and philosophical translations clearly spoke Arabic even if they could not write it. Some resorted to writing Arabic corrections in the margins of these Latin texts, spelled phonetically in Latin script, which indicates that they could not write Arabic even though they knew it. As van Koningsveld summarized their situation, they "used Arabic when they wanted to know the meaning of a Latin word, a Latin passage, etc. for themselves, *pro memori.*"[158] These transliterations also indicates that mishearing

was a problem particularly because *sin* and *sad* (س, ص), *kaf* and *qaf* (ك,ق) and *ta* and velarized *ta* (ت,ط) were pronounced the same. We even find such unintended slips as *el-* prefixed to a Latin noun, as when Gerard in the *De Scientiis* translated ال جزء as *el pars;*[159] Burnett has found *el-* prefixed to a Latin adjective in *idafa* construction.[160] As Burnett noted, mistakes in translation can easily be accounted for if homophonic consonants are switched in the hearers mind. This would have been unlikely if an intermediate Romance were used, for it is well-nigh impossible that a pair of Arabic words with homophonic consonants in the same position would be translated by a pair of Romance words with homophonic consonants in the same positions. But the fact that errors of this type exist indicates *at a minimum* that Thery's reconstruction (above) was not the only method of translation, if it were used at all. In comparing the two translations of the *Enumeration of the Sciences* below, I have found no passages that can be explained by errors of hearing Romance but many resulting from mishearing or misreading Arabic. A typical form of error is mentioned by Burnett: in one case the reader pronounced *al-mankus* (المنكوس), "inverted" or "reversed," but the hearer, in this case Adelard of Bath, misheard *al-manqus* (المنقوص), "reduced" or "decreased," and wrote the Latin equivalent of the latter term. Looking at the words, it is easy to see the differences; in the Romance equivalents their meanings are not even close; however, when a *qaf* and a *kaf* are pronounced aloud, it is frequently impossible to tell them apart by ear.[162] This problem grew out of the particular difficulties of the Spanish cultural situation, that had large groups of people who could understand spoken

Arabic but could not read it. Even when they could, there is some question of their command of the language.

Even though Mozarabs were acculturated very early in the Islamic era, as were many Jews, however, as Ibn Sa'id observed, "it cannot *but* be said that the common speech among *the higher and lower classes* had considerably deviated from the rules of Arabic grammar."[163] It was this variant, vulgar Arabic which had become the primary language of the Mozarabs. Bilingualism was widespread among Jews but, as Glick noted, even though "the Mozarabs adopted the language at a slower pace [than the Jews] by the time Toledo was conquered in 1085 the indigenous Christian population was composed wholly of monolingual Arabic speakers."[164] That this had indeed been the case is attested to by the Arabic-Latin glossary that van Koningsveld has studied. Written near the end of the eleventh century by a Mozarabic cleric, "most probably a member of the *clerus* who lived in Toledo," it was copied and used near the end of the twelfth century.[165] This was just at the time that Mozarabs were beginning to come to prominence in the Cathedral chapter, including the first native archbishop in more than a century.[166] The purpose of the Glossary was "to enable the Christian readers who had a working knowledge of Arabic to read and understand certain Latin texts by giving them a list of basic Latin words in alphabetical order and an explanation or explanations in Arabic."[167] Note well that we are not talking about people with Alvaro's famous polished Arabic style here, but people who could use the language everyday but who were unaware of its more technical vocabulary and nuanced meanings, something they were still learning. Having said this, we need to remember that their Arabic was better than their Latin. Thus, when we find descriptions of Mozarabs "as

familiar with Latin, Arabic, and Romance" we need to qualify what their familiarity with each language might have been.[168] Most likely, they knew spoken, everyday Arabic. Yet as any Arabist knows, this language has an enormous vocabulary and one can be said to know it and still not be literate in technical areas with specialized vocabularies. Furthermore, as in most of the Islamic world today, one can speak the language and not know how to read it.

Thus, following Burnett's lead, I believe the following adequately represents the true process of translation: Upon procuring a text, either :1) the scholar proceeds to work by himself by reading the Arabic text and writing a Latin equivalent; or, more likely, 2) with the aid of a Jewish or an advanced Mozarabic helper who is literate in Arabic (in the strict sense) and who can read an unpointed text but who may have limited facility with the meaning of terminology in science or philosophy, who reads the text aloud, in common Spanish Arabic pronunciation, while the Christian scholar hears the Arabic, selects the proper Latin equivalent, and writes it down; in most cases, this proceeded word-by-word.

In this process, the importance of Jewish intermediaries should not be overlooked. Arabic and Hebrew are Semitic languages with similarities in vocabulary and structure; Jews also were more likely to be fluent in Arabic because they had been more fully acculturated into the higher levels of Islamic civilization in al-Andalus The closeness of Jewish and Christian scholars has not always been recognized; but Teicher has shown that many scientific and philosophical texts made their way into Hebrew through the intermediary of Latin translations. It is clear that by the twelfth century, many formerly Arabic texts were no longer directly accessible and, in at least one case, the Hebrew translator found the Latin

of Gundisalvus' *De Anima* far easier to understand than Aristotle's original.[169] Consequently, it did happen that Hebrew translations of classical texts could be even one step further removed from the original, being translations of Latin translations or Arabic translations of Greek originals. This outstanding fact ought to be considered when one tries to identify Ibn Daud, who worked with Gundisalvus. By his name, there is no reason to assume he is anything other than Jewish and not a *converso* or hypothetical misnamed Mozarab. And if Ibn Daud is of the great Jewish family of Toledo, that would mean that the foremost Jewish philosopher of the city was working with the foremost Christian philosopher in the city to bring the peripatetic tradition to their respective communities. Someone had to be the channel by which Latin manuscripts of ancient works recently translated and recently written texts came into Jewish hands. That Jewish scholars who sought philosophical knowledge were aware of a Christian scholars's text--in fact, Gundisalvus' text--recently written at Toledo, points strongly to the interconnectedness of these two groups. Like the Christians, at times, these Jewish translators displayed little understanding of technical terminology when they began a text; but Teicher concludes, they improved as they progressed through the document, generally translating more *ad sensum* than *ad litteram*.[170]

In conclusion, I have shown that viewing the translators and the translation movement as a kind of *majlis*, a less structured institution connected to the primary religious institution of a regional political center, where scholars supported by that institution were gathered around a patron in a spirit of shared exploration of "ancient sciences", working in much the same ways as Islamic scholars always had in similar pursuits, is an adequate model

to explain this novel phenomenon. While it is not identical with the Islamic institution in form, it shares more characteristics with the Islamic culture of learning, than it does with educational models from north of the Pyrennees. In particular,the overwhelmingly oral character of this pursuit distinguished it from previous Latin Christian models of translation and education. This also explains why scholars in our era, looking for the contours of a school like a *studium generale* based upon models from northern Europe, do not find what they were seeking. As we have seen, the Islamic model was multiform, especially when devoted to the "foreign" or "ancient Sciences." Scholars whose regular duties included teaching in a religious establishment also taught philosophy, science, and medicine in a variety of settings, but not necessarily in a classroom of the mosque. Frequently, they simply provided their students with texts which helped them to learn on their own and supplemented that autodidactic instruction by discussions in libraries and schools. All this is to say that while teaching in the *quadrivium* was always associated with scholars, it is not so easy to associate it with a "school" *per se*. If this model stood behind the activity at Toledo, then there would have been no formal school for us to discover.

As I said earlier, this interpretation of the "School of Toledo" also regards this particular adaptation as something of a dead end: it was an adaptation for a specific purpose, the transmission of previously unknown knowledge, and when that purpose was accomplished, the social organization that produced it passed out of existence. Here, its fate was not unlike that of the *masjid* school and the *bayt al-hikma* in Islamic society. They, too, were superseded by the *madrasa* as the institution of higher education just as this institution passed out of existence with the coming of a university, which took over its instructional

function. It is important to recognize this functional distinction in both the Islamic and Christian world: the *masjid* school and the *bayt al-hikma,* like the school of Toledo, were institutions of the developmental period within their societies. Their purpose was to acquire knowledge, to find new authoritative texts from the classical tradition, and to make them available to serve the needs of the developing society. In these two worlds, those needs were different, but often the same texts could serve them. The *madrasa* and the university had a different function: they were the institutions of a developed society, defining and transmitting the traditions settled upon within the culture. Every society needs different cultural institutions in different phases of its life. One can see this most clearly in the case of a library: it exists in all phases of a society, but in the developmental phase it is a place of discovery and acquisition, while in the developed phase it becomes a storehouse, an archive documenting that cultural development. In the thirteenth century, Europe entered fully into a new phase and the universities and the schoolmen met its needs. Even in Spain, where the tradition of cultural integration lingered, the later royal schools of translators tried to bring what had already been preserved in Arabic or Latin into the vernacular, which was now Castilian Romance and to create codified collections of knowledge in an encyclopedic tradition, as Glick has noted.[171] The twelfth century movement at Toledo and other cities was simply no longer necessary.

F. The Translators

In what is the most surprising contrast with the Islamic world, we possess little in the way of biography for any twelfth century translator. While the libraries of medieval Islam

bristled with biographical and biobibliographical works, the genre never developed in the Latin West. More disappointing than this, though, is the fact that the raw materials for writing biography do not exist in any abundance either. In terms of these materials one must either comb through dedicatory colophons or, in the case of writers like Adelard and Alfonsi, creatively read their dialogs for self-revelatory comments. When a scholar worked in a religious setting, the archives can be helpful but they were written to preserve knowledge of important legal transactions, not as witnesses to social or personal history. To my knowledge, only Gerard of Cremona has anything like an attempt at biobibliography written about him. For the two scholars who will be the focus of the remainder of this work, Gerard and Gundisalvus, we have only two sets of sources beyond the text about Gerard: the archive of the Cathedral of Toledo and the manuscript colophons. These have been thoroughly studied. First, neither man worked in the notorious "School of Raymond," because neither man is attested in the chapter until after Raymond's death. In May of 1157 there is a "*Gondisalvus archidiacones*" attested, though this may not refer to our translator who is generally called "*Colarensis archidiaconis*", i.e., of Cuéllar.[172] This latter individual is without doubt mentioned in 1162 for the first time and signing the document after him is one "*Giraldus*" who is a mere deacon and probably not Gerard of Cremona.[173] In 1174, in a highly significant document know as the "*Constitutiones de Cerebruno*" both Gundisalvus and "*G*[erard] *dictus magister*" sign as they do again in a document from 1176.[174] By 1193 there is a new archdeacon of Cuéllar, who is one Juan, whom Rivera believes to be John of Spain (Johannis Hispanis) who worked with Gundisalvus on at least one occasion and later became archbishop of Toledo.[175] In his book, Rivera has speculated about Gundisalvus

origins in Cuéllar, a small town some 31 kilometers southwest of Toledo. Part of the village was given by Alfonso VII in 1140 to Juan, archdeacon of Segovia. In 1166, Juan became bishop of Osma and he give his portion to his niece, Palencia, and her husband, Gonzalo Petri. If they had a son, his patronymic would have been Gonzalez, Gundisalvus in Latin. Nearly contemporary with this, Domingo Gonzalez is archdeacon of Cuéllar, residing in the chapter of Toledo, Gundisalvus the translator and author.[176] If these connections are real, then Gundisalvus would have come from a highly placed family from the frontier with royal connections; this would explain his level of education and his entre into the world of the church.

Gerard's life can be read only from his biobibliography and those two brief notices from the chapter archive already mentioned. We are told that he left his native Italy in search of the *Almagest.* He is said to have been somewhat precocious and well-trained in philosophy before his setting out.[177] In the list of his translations attributed to the *socii* he is credited with 71 translations. Lemay follows Sarton in identifying 17 more.[178] Lemay also lists a couple of original works, all dating from the late twelfth century, though the attribution is uncertain.[179] Of Gundisalvus, we know that beyond translating he eagerly composed his own works, though composed is a bit too generous a term for his cut and paste method. Alonso lists 11 translation[180] and Rivera counts four original works.[181] From our sources, that is all we can glean. However, as Charles Burnett has suggested, we can derive additional data about the translators from their work: "What was their competence in the languages they were using? What methodology did they follow? . . . What can the physical aspects of the manuscripts tell us about the composition of the Latin texts?"[182] This

needs to be done for, as Lemay remarked, no one can adequately discuss Gerard's competence in Arabic because the Latin of his translations has never been compared to the Arabic originals.[183] Alonso, who tried to discuss the two in comparison is as likely to mislead as to enlighten because of his *a priori* judgements about the chronological relations of the translations.[184]

In the chapter which follows, I have made my own contribution to the study of translating, comparing the translation of Gerard and the translation and adaptation of Gundisalvus, letting the evidence speak for itself in answer to some of the technical questions of translating. It is clear that the milieu that was outlined above explains some of the peculiarities in the translations, perhaps even their relationship to each other. It is significant that each man approached the same text with similar linguistic skills and similar amounts of philosophical knowledge and yet produced two different documents.

To me, the most important indicator of the functional adaptation of the Islamic model is the very choice of the text to be translated: it is simply inconceivable that this text, the *Ihsa' al-ᶜulum*, *The Enumeration of the Sciences*, was an accidental choice. This particular text was one of the most trusted texts in the Islamic world, particularly favored by Muslim humanists who recommended it to their students who desired to learn classical philosophy but who did not have a school for such learning. Furthermore, the text is more than just the curricular "laundry list" which it appears to be at first sight. It represents a program of study for the development of a true philosopher; this is never said explicitly in the *Enumeration*, but al-Farabi and the subsequent scholars who recommended the text knew exactly what he was doing. Moreover, the text in which al-Farabi explained the

philosophical underpinnings of his scheme, *Tanbih 'ala sabil al-sa'ada, The Exhortation to the Way of Happiness,* was also translated by Gundisalvus. In other words, Gundisalvus was sufficiently imbued with the spirit of Islamic humanists to know that he must translate not only the text expressing the particulars of philosophical texts to be read, but also the text expressing the reasons behind those choices. He must have been guided into this knowledge in the same way Islamic scholars working without a school would have proceeded. It is inconceivable that Gundisalvus and Gerard would have known these texts even existed, much less how much they fit Gundisalvus expressed purpose, without the guidance of someone trained in the Islamic tradition; that is to say, without the experience of *Convivencia* they would never have known the value of such texts. It is to that text we and its particular function that must now turn.

NOTES TO CHAPTER TWO

[1] Mikel de Epalza, "The New Mozarabs: An Emblematic Christian Minority in Islamic al-Andalus," in *The Legacy of Muslim Spain*, ed. Jayusi, (Leiden, 1994): 151.

[2] Glick, *Islamic and Christian Spain*, 166.

[3] Castro, *The Structure of Spanish History* (Princeton, 1954), 167.

[4] L. Torres Balbas, "Chrónica Arqueológica de la España musulmana," *Al-Andalus* XIX (1954): 178.

[5] *Ibid.*, 189.

[6] *Ibid.*, 193

[7] Glick, *Islamic and Christian Spain*, 177, argues that the Mozarabs and Muslims were monolingual Arabic speakers, while the Jews were bilingual. Mozarabic clergy may have known some Latin as well, but not too much, as van Koningsveld has demonstrated: *The Arabic-Latin Glossary* (Leiden, 1977), 61-62.

[8] D. M. Dunlop, "The Dhununids of Toledo," *Journal of the Royal Asiatic Society* 2 (1942): 83.

[9] *Ibid.*, p. 85.

[10] Joseph O'Callaghan, *A History of Medieval Spain*, 205.

[11] Maria Jesús Rubiera Mata, "Los primeros moros conversos, o el origen de la tolerancia," in Louis Cardaillac, ed., *Toledo, siglos XII-XIII* (Madrid, 1991): 112.

[12] *Ibid.*, p. 205; Dunlop, 88-89, for the details.

[13] Taken from Henri Pérès' French translation of an Arabic poem by Ibn Arfa Ra'sahu; quoted in Teres, p. 82. The translation into English is mine.

[14] Sa'id al-Andalusi, *Science in the Medieval World*, tr. Salem and Kumar, (Austin, 1991): 68-70.

[15] *Ibid.*, p. 71.

[16] So concludes Teres,"Le Dévelopment de la Civilization arabe à Tolèdo," *Cahiers de Tunisie* 18 (1980): 79.

[17] Glick, "Convivencia: An Introductory Essay" in *Convivencia*, 4.

[18] Klaus Reinhardt, 'Bibel und Kultur in Toledo zur Zeit der Reconquista," *Ars et Ecclesia,* H. Stork, ed., (Trier,1989): 298

[19] *Ibid.* 307.

[20] Michael K. Lenker, has shown that there were such scholars: "The Importance of the *Rihla* for the Islamization of Spain" (Ph. D. diss., University of Pennsylvania, 1982): 143.

[21] See Glick's criticism of this in "Convivencia: An Introductory Essay," p. 4.

[22] Roger Arnaldez, "Ibn Hazm" *Encyclopaedia of Islam* 2nd. Edition, V. 3, 796.

[23] *Guide For the Perplexed,* 2nd edition, Ed. and tr. by M. Friedlander (New York, 1956), 109.

[24] On this the best work is Normal Daniel, *Islam and the West* (Edinburgh, 1960).

[25] Quoted in Victoria Abumalham Montserrat, "Edicion, traduccion y estudio del Kitab al-Muhadara wa'l-Mudakara de Mose ibn Ezra" 2 vols. (Ph.D. Diss.: Complutense Univ., Madrid, 1982) II, 49. There is a slightly different Spanish translation in Alejandro Díez Macho, *Mose ibn Ezra como poeta y preceptista* (Madrid, 1953). The translation into English is mine.

[26]Jareer Abu-Haidar, "A Document of Cultural Symbiosis: Arabic Ms. 1623 of the Escorial Library," *Journal of the Royal Asiatic Society* (1987): 227-228.

[27]*Ibid.*, 229

[28] Thomas Burman, *Religious Polemic and the Intellectual History of the Mozarabs* (Leiden, 1994), 198.

[29] *Ibid.*, 141-142.

[30] *Ibid.*, 197.

[31]"New Mozarab" is Mikel de Epalza's term for Muslim converts living in Christian Spain. See his "Mozarabs: An Emblematic Christian Minority in Islamic al-Andalus": 151.

[32]*The Arabic-Latin Glossary*. The Glossary itself is published as, C. F. Seybold, *Glossarium Latino-Arabicum* (Weimar, 1899) and later editions.

[33]*Ibid.*, 64-65.

.[34]Among others, Burman quotes the text at the beginning of his book, 13.

[35]Donald Carne-Ross, "Translation and Transposition," in W. Arrowsmith, ed., *The Craft and Context of Translation*, (Austin, 1961). As Carne-Ross describes it, "Transposition, in the sense I choose to give it, occurs when the language of the matter to be translated stands close enough to the language of the translator--in age, idiom, cultural habits, and so on--for him to be able to follow the letter with a fair hope of keeping fiath with the spirit.", 3.

[36]Monroe, *Islam and the Arabs in Spanish Scholarship* (Leiden, 1979) 138.

[37] *Ibid.*

[38] "Andalusian-Arabic Manuscripts from Christian Spain," in Joel Kraemer, ed., *Israel Oriental Studies* XII, (Leiden, 1992) 75-110.

[39] *Ibid.*, 95-100. N.b., we must use this information with caution because of the preponderance of fourteenth century texts which may not accurately reflect twelfth century attitudes or customs.

[40]*Ibid.*, 100-103.

[41]*Ibid.*, 103-104.

[42] *Ibid.*, 94.

[43] Mehdi Nakosteen, *History of Islamic Origins of Western Education* (Boulder, 1964); see the chart on p. 45 but use the rest of this text only in conjuction with Makdisi's far more detailed studies.

[44] Dimitri Gutas, *Avicenna and the Aristotelian Tradition* (Leiden, 1988), 152f.

[45]Lenker, see pp. 140-156 *passim*, but especially 143-144.

[46] *Ibid.*, 151-152.

[47] Elias Teres claims that, "A Tolède, au milieu des troubles de la 'fitna' apparurent des restes é pars de la bibliothéque d'al-Hakam II,":79.

[48] Makdisi, *The Rise of Humanism in Classical Islam and the Christian West* (Edinburgh, 1990), 236-37, hereinafter cited as Makdisi, *Humanism* .

[49] H. S. Otero, "Transmision de Saberes Entre Las Minorias Etnicas de Toledo en la Epoca de la Reconquista," *Estudios Sobre Alfonso VI y La Reconquista de Toledo: Actas del II Congreso Internacional de Estudios Mozárabes (Toledo, 20-26 Mayo 1985)* (Toledo, 1989): 222.

[50] Makdisi, "On the Origin and Development of the College in Islam and the West," in Kalil Seemans, ed., *Islam and the Medieval West*, (Albany, 1980): 36, hereinafter cited as Makdisi, "Origin". Compare his treatment in *Humanism*, 40.

[51] Makdisi, "The Madrasa in Spain," *Revue de l'Occident Musulman et de la Méditerranée* 15-16 (1973): 153; hereinafter Makdisi, "Madrasa".

[52] *Ibid.*, 154 where he discusses this possibility.

[53] Makdisi, *Humanism*, 48-50.

[54] *Ibid.*, 86.

[55] R. Hillenbrand, "Medieval Cordoba as a cultural Center," in *Legacy of Muslim Spain*: 127. Compare R. Arnaldez, "Ibn Hazm" *Encyclopedia of Islam* 2nd. Ed., V. 6 791, who cites the specific chapters of Ibn Hazm's works which reveal this.

[56] Makdisi, "The Madrasa": 158.

[57] As quoted by Makdisi, *The Rise of the College: Institutions of Learning in Islam and the West* (Edinburgh, 1981), 11.

[58] Makdisi, *Humanism*, provides a chart similiar to this (p. 54):

dar			'ilm
bayt	}	al {	hikma
khizana			kutub

Any one of the left column terms could be paired with any one of the right column terms and still describe the same institution.

[59] Peters, *Aristotle and the Arabs* (New York, 1968), 73-74.

[60] Makdisi, *Humanism*, 60.

[61] See on this Dimitri Gutas, *Avicenna*, 157.

[62] Makdisi, *Humanism*, 48f.

[63] Eche, *Les Bibliothèques Arabes publiques et semi publiques en Mesopotamie, en Syrie, et en Egypte au Moyen âge* (Damascus, 1967).

[64] I am following Makdisi's summary of Echehere because of its precision and clarity, *Rise of the College*, 306-308.

[65] *Ibid.*

[66] *The Rise of the College*, 9-10.

[67] "Andalusian-Arabic Manuscripts," 89-90.

[68] *Ibid.*, 90.

[69] *Ibid.*

[70] See the *Encyclopedia of Islam*, 2nd. Ed., v. 5, p. 1031, for the range of institutions defined by this term.

[71] Makdisi, *Humanism*, 61. The form اندا appears to be Andalusian for انديه .

[72] D. M. Dunlop, "Philosophical Predecessors and Contemporaries of Ibn Bajja," *Islamic Quarterly* II (1955): 112-113.

[73] *Science in the Medieval World*, 64.

[74] Here, for example, see his discussion of Abu Fadl Hasday ibn Yusef ibn Hasday, of a distinguished Jewish family of Saragossa, who studied with Sa'id himself as far as his cosmological studies were concerned. Sa'id commends him and writes as though he expects great things from the boy; *Ibid.*, 81-82. In fact, he went on to be a vizier of al-Muqtadir and al-Mu'tamid of Saragossa. There is some confusion about his Jewishness; in Ibn Bassam (*al-Dhahira*, 494) there is a report that this Abu Fadl converted to Islam because of the love of a young woman. This is all covered in Juan Vernet, *El Islam en España* (Madrid, 1993),120f. However, Eliyahu Ashtor, *Jews of Muslim Spain* 3 vols. (Philadelphia, 1984) 3:217 argues that the conversion story was a fable arising because Abu Fadl disturbed the Muslim intellectuals' conscience by having too much power as a non-Muslim so the retaliation was to make him a Muslim, though one who converts for base

reasons. Ashtor notes that medieval Jews already knew the story and that it was a fabrication.

[75] Makdisi, *Humanism*, 232.

[76] *Ibid.*, 57.

[77] Lenker, 94. See his footnote 24 for the distinction to previous scholars.

[78] *Ibid.*

[79] Makdisi, *Humanism*, 42.

[80] *Ibid.*, 92.

[81] Lenker reports that new books brought from the East "seems to have been particularly appreciated by the Spaniard [sic]" by which he means the Andalusis. This ought to be compared to Ibn Abdun's overworked prohibition about selling books to Christians, which can be supplemented by other sources who report the same thing: see van Koningsveld "Andalusian-Arabic Manuscripts": 78

[82] The list of his works is long, but most of the earlier work was incorporated into his two books, *The Rise of the College* and *The Rise of Humanism in Classical Islam and the Christian West.*

[83] *The Rise of the College.*

[84] Makdisi, "The Madrasa as a Charitable Trust and the University as a Corporation in the Middle Ages" in *Actes du Ve Congrès International d'Arabisants et d'Islamistes* (Brussels, 1970): 329-337.

[85] Makdisi, *Humanism*, 22; I am simply replicating his chart.

[86] *Ibid.*, 27.

[87] *The Rise of the College*, 272.

[88] Makdisi, *Humanism*, 34-35.

[89] Here see "The Scholastic Method in Medieval Education: An Inquiry into its Origins," *Speculum* 49 (1974) 640-661; "Law and Traditionalism in the Instiutions of Learning in Medieval Islam" in G. von Grunebaum, ed., *Theology and Law in Islam,* (Wiesbaden, 1971), esp., 76-77.

[90] This is the conclusion contained in "The Madrasa in Spain".

[91] O'Callaghan, *History of Medieval Spain*, has a very readable account of this period, 204-207.

[92] Mata, 111.

[93] Ramon Menèndez Pidal, *The Cid and his Spain*, tr. H. Sutherland (London, 1934) 205.

[94] Bernard Reilly, *The Kingdom of Leon-Castille Under King Alfonso VI, 1065-1109* (Princeton, 1988) 1171.

[95] *Ibid.*

[95] There is a detailed discussion of this title and its sources in Muhammad Benaboud and Agnus MacKay, "Alfonso VI of Leon and Castille, al-Imbratur dhu-l-Millatayn," *Bulletin of Hispanic Studies* 56 (1979) 95-102, esp. p. 97.

[97] *Ibid.*, 99. The quote is from *Al-Dhakira* Pt. IV, i (Cairo, 1945) 130-131.

[98] O'Callaghan, 205.

[99] Our sources are unfourtunately silent on the Mosque of Toledo; that it had a library or a formal school can be inferred from the evidence of educational institutions throughout al-Andalus; however, we have no specific records. Curiously, we also don't have any records of the Cathedral Library until much later, even though there must have been one.

[100] Elias Teres, 83.

[101] Julian Ribera *Disertacions y Opúsculos* (Madrid, 1928) v.1, 211-212.

[102] Quoted in Elias Teres, p. 84; the translation is my own from the French therein.

[103] Burman, 195-196.

[104] John Tolan, *Petrus Alfonsi and his Medieval Readers* (Gainesville, 1993); pay particular attention to Part II where the reception of these texts is discussed.

[105] Makdisi, *Humanism*, 342.

[106] This is most easily accessible in his survey article "Hydralic technology in

Al-Andalus," in *Legacy of Muslim Spain*: 974-996 and the full details can be consulted in *Irrigation and Society in Medieval Valencia* (Cambridge, 1970).

[107] Castro, *The Spaniards*, 504.

[108] Charles Burnett, "Some Notes," 164.

[109] Charles Burnett, "Translating Activity in Medieval Spain" in *Legacy of Muslim Spain*: 1041.

[110] *Ibid.*, 1044.

[111] Charles Burnett, "A Group of Arabic-Latin Translators working in Northern Spain in the mid-12th Century," *Journal of the Royal Asiatic Society* (1977): 63.

[112] *Ibid*, 68-70.

[113] Peter Linehan makes this absolutely clear in *The Spanish Church and the Papacy in the Thirteenth Century* (Cambridge, 1971) and in *History and Historians of Medieval Spain* (Oxford, 1993).

[114] Pierre Riché *Education and Culture in the Barbarian West,* tr. John Contreni (Columbia, S. C., 1976) 282.

[115] *Ibid.*, 286.

[116] J. F. Rivera Recio, *La Iglesia de Toledo,* 2 vols. (Rome, 1966) 2: 20f.

[117] *Ibid.*, 2: 29.

[118] Robert I. Burns, S. J., "The Organization of a Medieval Cathedral Community: the Chapter of Valencia (1238-1280)," *Church History* 31 (1962): 18.

[119] Peter Linehan, *Spanish Church and Society, 1150-1300* (Brookfield, VT, 1983) 47-48.

[120] Burns, 21.

[121]Reyna Pastor de Togneri, *Del Islam al Christianismo: En las fronteras de dos formaciones económico-sociales: Toledo, siglos XI-XIII,* 2nd ed. (Barcelona, 1985), 104-110.

[122] J. F. Rivera Recio, *La Iglesia de Toledo,* 2: 34-40.

[123] *Dictionary of the Middle Ages* 3: 636.

[124] Olga Weijers; *Terminologie des Universités au XIII^e Siècle* (Rome, 1987), 140.

[125] *Ibid.*, 194.

[126] *Ibid.*, 38.

[127] Daniel's text is in Karl Sudhoff, ed., *Archiv für des Geschichte der Naturwissenschaften und der Technik*, V. 8 (Leipzig, 1918): 1-41.

[128] This passage has been translated by Burnett in "The Institutional Context of Arabic-Latin translations in the Middle Ages," p. 218. Burnett has kindly provided me with the page proofs of this article. The Latin is on p. 40-41 of Sudhoff.

[129] See his "The Scholastic Method."

[130] *Rise of the College*, 84f.

[131] Makdisi, "Scholasticism and Humanism,": 180.

[132] Makdisi, "The Scholastic Method," 651-652.

[133] See the documents of the Toledo Cartulary in *Cartularios de Toledo, ed.* F. J. Hernández (Madrid, 1985), documents 164 and 173.

[134] Burnett, "The Institutional Context": 223.

[125] A. I. Sabra, "Al-Nayrizi" *Dictionary of Scientific Biography* X :5-6.

[136] I have checked Latham and the *OLD* and neither attests to the word as referring to students this early.

[137]Examples of this are so numerous that it barely deserves mention; see Sa'id al-Andalusi, *Science in the Medieval World*, where nearly all the Andalusi scholars are so referred. I am grateful to Merlin Swartz for this insight.

[138] Richard Lemay, "Gerard of Cremona," *Dictionary of Scientific Biography* Suppl. :175.

[139] The text with translation is in Tolan, 165f.

[140] Here I am following Burnett's reading, "Institutional Context," 215-216.

[141] See Tolan, 10-11.

[142] Makdisi, *Humanism*, 92.

[143] Tolan, 5-11; he may have served Alfono the Battler as well.

[144] van Koningsveld, "Andalusian-Arabic Manuscripts," 81-82.

[145] Makdisi, *Humanism*, 324.

[146] *Ibid.*, 235-326.

[147] *Ibid.*, 326.

[148]Hava Lazarus-Yafeh, *Intertwined Worlds* (Princeton, 1993), 126-127. Empahsis is mine.

[149] Ibn Daud, *Sefer ha-Qabbalah*, G. Cohen, ed., (Philadelphia, 1967) 66.

[150] Jacob Teicher, "The Latin-Hebrew School of Translators," *Homenaje á Millàs-Vallicrosa,* 2 vols. (Barcelona, 1956) 2: 409.

[151] *Ibid.*, 409; D'Alverny, *Avicenna Latinus* 28 (Leiden, 1961) 285.

[152] So S. Van Reit, *Avicenna Latinus*: *Liber De Anima* (Leiden, 1972) see the introduction.

[153] Makdisi, *Humanism*, 213f.

[154] See Burnett, "The Translating of Works," 166; van Koningsveld, *Glossary*, 29f.

[155] Gabriel Thery, *Tolède, Grande Ville de la Renaissance Médiéval* (Oran, 1944), 44: "La traduction commence. Ibn Dauod, juif converti, ayant vécu en terre musulmane, . . . connaît évidemment l'arabe et l'espagnol. Un juif parle la langue du pays qu'il habite. Ibn Dauod lit donc le texte arabe, le traduit mentalement en romance, et Gundisalvi, a partir du romance, le traduit en latin."

[156] Reproduced in Van Riet, 4.

[157] Burnett, "The Translating of Works," 166.

[158] van Koningsveld, *Glossary*, 3.

[159] See Chapter Three below; the original is in González Palencia, p. 127.

[160] Burnett, "The Translating of Works," 167.

[161] *Ibid.*, 166.

[162] *Ibid.*, 166

[163] Roger Collins, *Early Medieval Spain* (New York, 1983), 213.

[164] Glick, *Islamic and Christian Spain*, 177.

[165] van Koningsveld, *Glossary*, 4; the colophon for dating the copy is reproduced on p. 39 with a translation.

[166] So Linehan, *History and Historians*, 214.

[167] van Koningsveld, *Glossary*, 1. In his text this entire quote is emphasized by his italics.

[168] This quote is from O'Callghan, p. 285, but it could have been taken from nearly any modern history that attempts to explain the phenomenon of translation and the seemingly key role of Mozarabs. It is clear that Jews were more acquainted with written Arabic and used it more frequently than Mozarabs, if we can judge from surviving documents.

[169] See Jacob Teicher, "Hebrew-Latin School," 406f.

[170] *Ibid.*,407.

[171] Glick, "Science in Medieval Spain: The Jewish Contribution," 110.

[172] All these references come from *Cartularios de Toledo, ed.* F. J. Hernández (Madrid, 1985) herinafter *CT*, and will be refered to by document numbers. This reference is to Doc. 119. For a summary of the nomenclature for Gundisalvus see Rivera, "Nuevos Datos sobre los traductores Gundisalvo y Juan Hispano" *Al-Andalus* XXXI (1966) 267-280.

[173] *CT*, Doc. 134.

[174] *CT*, Doc. 165 and Doc. 174, respectively.

[175] Rivera,"Nuevos datos," 274f.

[176] Rivera, *La Iglesia*, 298-299.

[177] The text is available in translation in E. Grant, ed., *A sourcebook in Medieval Science*, tr. Michael McVaugh (Cambridge, 1974), 35-38.

[178] Lemay, *DSB Suppl:* 187-188.

[179] *Ibid.*, 188.

[180] M. Alonso, "Traducciones del Arcediano Domingo Gundisalvo," *Al-Andalus* XII (1947): 295-338.

[181] Rivera, *La Iglesia*, 300-301.

[182] Burnett, "Some Comments," 162.

[183] Lemay, *DSB Suppl.*: 189-190. This is no longer true for Paul Kunitzsch has compared his work on the *Almagest;* this is summarized in "Gerard's translations of Astronomical texts, especially the *Almagest*" in Pierluigi Pixzzamiglio, ed., *Gerardo da Cremona* (Cremona, 1992): 71-84.

[184] Here I refer to the introuctory chapter of his *De Scientiis* which is thoroughly grounded is his belief that Gundisalvus must have come first and Gerard somehow depended upon him. The improbability of this argument is addressed case by case in the following chapter.

Chapter Three

I. The Character of Al-Farabi's Book

Al-Farabi's *Book of the Enumeration of the Sciences* (كتاب احصا العلوم)[1] is primarily an education text. In it he says that he is describing the parts of all the "well-known sciences" of his day so that anyone can pick up the book and put it to good use. Today it is seldom put to any use at all; in sum, I have found only three doctoral dissertations and two brief articles devoted to it. While it is often mentioned--and nearly as often confused with a similar text, the *De Ortu Scientiarum*[2]--its purpose and contexts are not at all well known. Yet in the twelfth century it was felt to be the key to the science of the Arabs, was twice translated into Latin, and may have provided a guide to the ancient philosophical works for which scholars in the Latin West felt an acute need. In the following pages I intend to discuss al-Farabi's work, the curious need which it filled in Islamic intellectual circles, the contents of the book as he wrote it along with the translations and adaptations made of it by two different Christians in twelfth century Toledo. Given the relatively high status that the work enjoyed in medieval Islamic philosophical circles and its importance in the overall transfer of philosophical knowledge and concepts to the Latin West, it is only fitting that we come to some understanding of this limnal text.

The *Enumeration* gained a measure of distinction in Andalusi intellectual circles when Sa'id al-Andalusi said of it, "there had never been a book like it and no one has tried to imitate it. The students of any of the sciences cannot do without it or proceed without its guidance."[3] Sa'id does not go on to say exactly what there is in this text that makes it indispensable; as the overall discussion of al-Farabi makes clear, however, Sa'id regarded

him as the premier philosopher among those who had studied science in the East. In his discussion of another two of al-Farabi's works, Sa'id emphasizes that al-Farabi provided exceptionally clear descriptions of the individual parts of whatever he wrote about. Perhaps that is why Sa'id regarded this work as so valuable. Surely he was not alone in that opinion. In reference to a different book, Maimonides wrote "do not busy yourself with books on the art of logic except for what was composed by the wise man Abu Nasr al-Farabi. For, in general, everything that he composed--and particularly his book on the *Principles of Beings*--is finer than fine flour. His arguments enable one to understand and comprehend, for he was very great in wisdom."[4] In celebrating the millenary of his death, Emil Fackenheim provided a summary assessment of al-Farabi's place in originating medieval Islamic philosophy on the basis of Plato and Aristotle: "Though preceded by al-Kindi, undoubtedly al-Farabi (870-950) is the real founder of medieval Islamic philosophy; what is more, he is perhaps its greatest representative. Not without reason is he called the 'second teacher,' Aristotle himself being the first."[5] He goes on to relate the opinions of medieval Jews, Christians, and Muslims in their high regard for al-Farabi's works. George Makdisi has pointed out that Ibn Abi Usaibi'a termed this particular book so important that a student seeking to learn philosophy could not do without it.[6] In part, the value of the book comes from its contents: it is, as Sa'id remarked, a straightforward description of what makes up each individual field of knowledge. However, one should not think of it as a textbook, as these remarks might seem to imply. Rather is it more like a syllabus or curriculum, describing what one would need to know in the broadest contours: al-Farabi tells the reader what all the subjects are that make up the "well-known sciences"; then he presents the topics

within those subjects that one will need to study in order to know a given subject. For example, he does not discuss each grammatical point as a teaching grammar would. Unlike a modern course syllabus, he does not indicate *all* the books he would recommend in order to study each subject in his classification; instead, reference is usually made to the known books of Aristotle (some of which we now know to be written by someone other than the Stagirite) or another ancient authority, like Euclid. The result is a curriculum which, if it is followed, will introduce the student to all the parts of classical philosophy. To the modern reader this book might appear to be unique but not terribly useful. Two points need to be made in this regard. First, while al-Farabi's work was unique, it belonged to a genre of Muslim educational texts which ultimately trace their origins back to Hellenistic Greek *pinax* (πιναξ) literature.[7] Other philosophers in the Muslim world produced similar texts; in particular, Al-Kindi and Al-Ghazzali and Ibn Khaldun[8] and in al-Andalus the noted controversial scholar, Ibn Hazm.[9] However, it had been al-Farabi's genius to mold and formulate "the various branches of knowledge into a complete and permanent form within Islamic civilization,"[10] and with the exception of al-Kindi, all these others owe him a certain debt. In al-Andalus there was interest in the classification of the sciences; in fact, the eleventh century saw three different classifications emerge, that of Ibn Hazm, Ibn 'Abd al-Barr, and Sa'id al-Andalusi.[11] Each of them noted the differences between the sciences that religious scholars favored and those preferred by philosophers. While Sa'id might be viewed as favoring the philosophers and Ibn 'Abd al-Barr the religious scholars, Ibn Hazm sought to avoid extremes.[12] In addition, Jewish scholars were also interested in and influenced by al-Farabi; both Abraham ibn Ezra and Bayha ibn Paquda adapted the

Farabian curricular scheme to their own purposes as did Judah ha-Levi and Maimonides.[13] Hence, there was in al-Andalus a developing interest in the organization of the sciences of the ancients at the same time new texts were becoming available.

Second, each of these texts grew out of a curious problem of Islamic higher education which needed philosophical study but did not have an institutional place for it. Education as it was practiced had a religious function. This was in some measure accidental; the pre-Islamic Arabs did not have clearly defined educational institutions.[14] With the advent of Islam, its unifying of culture and religion required training: Islam was a religion of the Book. In order to understand the Book a certain amount of education was necessary. The mosque as the cultural center of the community was a logical place for such education. The teachers often were religious functionaries, leaders of prayer or judges in Islamic law, as well as educators and the main subjects studied were the *Qur'an*, the subjects that led to its interpretation and those related to the codification of religious law. It was in the contact with the Roman Empire that the phenomenon of education outside of religious subjects was encountered by the Muslims. The usefulness of classical education was obvious to thinkers like al-Kindi and al-Farabi; however, the tensions between the rationalist tendency of Greek philosophy and revealed religion (already a problem in both Byzantine and Roman Christianity) also manifested itself in Islam.[15] While some attempts at reapproachment were tried in the Muslim East, in the main more "secular" educational institutions failed to gain hold and education in other than the "Islamic Sciences" became the provenance of private instruction by individual scholars. Hence, to find this kind of education --necessary though it was--was difficult.

In the eleventh century it was recognized in the Islamic East and West that there were three basic divisions of knowledge: the "Islamic Sciences," the "Ancient" or "Foreign Sciences" (natural and philosophical sciences), and what were known as the literary arts or *Adab* (ادب).[16] For a young man wishing a higher education, it was relatively easy to get trained in the "Islamic Sciences": the reading of the *Qur'an,* learning the Hadith, coming to grips with the legal opinions of a particular school of jurisprudence. There were institutions, established curricula, and means for the support of such study.[17] What was much harder, and relatively a private educational endeavor, was to become educated in the "Ancient Sciences," which consisted at base of the study classical philosophy. For complex reasons growing out of the history of the *Mu'tazilite* controversy, the student was left on his own if he wished to pursue these studies. This quandry grew out of the belief among the orthodox that such study, particularly Aristotelian metaphysics, led to heresy.[18] As education was a religious obligation enjoined by the *Qur'an,* there could be no support for an educational system that appeared likely to create heretics. Ironically, though, Islamic religious sciences as they came to develop had need of precisely the kind of logical training that the "Ancient Sciences" offered; in spite of official disapproval, many of the scholars who taught Islamic sciences and who recognized the need for philosophy, were "discreet in their teaching of the philosophical fields, giving autodidacts a bibliography with which to work on their own."[19] These guides could be created for any branch of higher education in Islamic society and with any desired emphasis; al-Farabi "wrote particularly for those who would learn the philosophical sciences."[20]

In al-Andalus the situation of even orthodox educational institutions was somewhat

peculiar by Islamic standards. In Islamic Spain, the Malikite school of law or *madhab* (مذهب)[21] had dominated Andalusi jurisprudence from the beginning and it continued to do so until the end of the period we are considering in this study: "Andalusian Islam is marked by characteristics of uniformity, correctness, and staidness. It was completely Sunni and the only legal *madhab* to enjoy official recognition throughout the Taifa period was that of Malik."[22] This school of legal theory was not particularly interested in developing institutions of Muslim higher education and, particularly, seldom created *madrasat* (مدرسة), the mosque-based schools for higher education commonly found in the Islamic world. Among the other three schools of law, the *madrasa* became the norm for instruction in the religious sciences. However, the Malikites tended to rely upon the mosque schools called *masjid* schools (مسجد) and private tutors for all education.[23] It should not be inferred that the Malikis were against higher education; rather, their resistance was to the institution of the *madrasa.* This stems from a peculiarity of their legal opinions regarding *waqf,* the law of trusts, which was the main vehicle in establishing the legal basis for such institutions.[24] We must note also that *for religious scholars* the educational system of al-Andalus was thoroughly Islamic to the point of including the "Grand Tour" of the lands of the eastern caliphate to collect diplomas certifying study in the Islamic sciences, as one of Makdisi's students has shown.[25] Even though the focus of religious scholars was on the "Islamic Sciences," there was still a recognized need for instruction in philosophy. The Andalusi scholar Ibn Hazm (and the teacher of Sa'id) recognized that need but also said that there was a place for the use of reason within the confines of conservative Islamic jurisprudence. In his *Letter on the*

Excellence of al-Andalus (*Risala fi fadl al-Andalus*)[26], his primary concern is to establish that Muslim Spain has had her share of great men of letters. In the course of that description, it is necessary that he survey all the subject areas in which such great men had written in both the religious and profane sciences: poetry, history, medicine, philosophy, mathematics, and theology (*kalam*) defined as the application of reason to religious study.[27] As he turns to discuss theology, in a departure from his usual practice of simply listing authors and commenting upon their works, he notes that al-Andalus has been spared some of the rancor associated with the application of reason to theology in spite of having *mu'tazilites* and rationalist theologians there. He refers to a work that "we have composed according to the canons or our school which we have chosen from among the sunnite doctrines, a work on this question" which is based upon solid reasoning and proofs and the "l'authentication immédiate de la raison".[28]

This may in fact represent the social reality that scholars in al-Andalus appear to have had a greater predilection for exposure to the "Ancient Sciences" than those in other Islamic lands. While the oft-cited work of Henri Pérès which presumed to find evidence for a different educational structure in al-Andalus has been disproved, it is clear that the leading scholars of the land were often masters of the "Ancient Sciences" and the Divisions of the Sciences.[29] Often the great Cordoban library of al-Hakam II al-Mustansir has been cited as evidence of wide ranging andalusi intellectual interests: it was reported to contain over 400,000 volumes and needed forty-four volumes just for its catalog.[30] However, in the period of the eleventh and twelfth centuries, the period immediately after Ibn Hazm, there appears to be far more interest in the "Ancient Sciences." This interest corresponds with the

arrival of the works of Muslim Neoplatonists like al-Farabi in Spain; prior to this, as both Sa'id and Ibn Juljul show, the Malikite jurists, the *fuqaha'*, were able to repress scholars interested in *philosophy (falsafa),*[31] though they never were successful at completely silencing the philosophers (*falasifa).* They were, however, able to purge the great library in Cordoba of its objectionable texts, though many books appear to have made their way to other cities of al-Andalus. As the period of the Ta'ifa kings and their city-states developed, the Malikite *faqihs* lost a good deal of their power and "the religious class had little influence at the courts of the petty rulers and the overall religious activity in Islamic Spain seems less comprehensive."[32] A great many of the illustrious men of Muslim Spain (i.e., those well-regarded enough to gain entries in biographical dictionaries called *Tabaqat*) were skilled in classical philosophy. In a listing of the actual education and competencies of eight scholars from throughout the Islamic world, Makdisi himself has shown that the two Andalusis, Ibn al-Waqshi of Toledo (d. 1096 CE) and al-Luraqi of Andalusia (fl. 1221 CE) are both noted for their mastery of the "Ancient Sciences."[33] Dunlop showed much the same for the early twelfth century scholars, particularly those connected to Saragossa in the time of the Ta'ifa kings, the beni Hud. Among others, his listing adds to these two Malik Ibn Wuhaid of Seville and Ibn Bajja. In a bit of hyperbole, Ibn Bajja's friend, Ibn al-Imam, says that in penetrating the philosophical books, Ibn Bajja was the "wonder of his age and the portent in the sky of his time."[34] Ibn Bashkuwal called Malik, "one of the men of perfection and distinction in the knowledge of the different divisions and kinds of the sciences." He goes on to drop this telltale hint: "Knowing predominated with him over transmitting."[35] Their biographical notices are not at all unlike those of the scholars reported by Sa'id al-Andalusi

in the chapter on "Science in al-Andalus"[36] or those in Ibn Hazm's *Risala.*

Evidence that al-Farabi was considered trustworthy by even the orthodox comes from an example from the heart of the Abbasid Caliphate. The resume of the education of 'Abd al-Latif, as reported by his biographer Ibn Abi Usaibi'a, tells that the great man of eastern letters was introduced to the "Ancient Sciences" and al-Farabi at the same time. 'Abd al-Latif did not respect all the philosophers who had tried to make room for Greek science in the *Dar al-Islam*; but he found place for al-Farabi and Alexander Themisthius.[37] Thus, putting this witness from the very highest circles of orthodox Islamic education in the East alongside of Sa'id's testimony regarding the situation in al-Andalus, we can see that al-Farabi was most likely the Muslim philosopher acquainted with the Ancient Sciences to whom intellectuals turned for guidance in this subject area; he was, as Sa'id termed him, "truly the philosopher of the Muslims."[38] This kindly disposition in all probability was not only the result of al-Farabi having preserved a place for "Divine Science" in his scheme of education and his belief that the philosophers and religious thinkers were seeking the same ends, but that he ultimately derives all knowledge from God. As Lomba Fuentes has noted, given al-Farabi's premises about the relative roles of religion and philosophy, "it was not possible to have a contradiction between faith and philosophy."[39] As Al-Farabi concludes his discussion of Metaphysics in the *Enumeration,* he said that metaphysics ends at "a Perfect (*Kamil)* whom none can surpass in perfection."[40] Any religious scholar who read this text understood that al-Farabi was not interested in knowledge *per se;* it not only served a higher purpose but there was literally no way to avoid the divine, for God was the source of all that could be known. While this is made even clearer in another work, *The Book of*

the Letters[41], it is in the *Enumeration* that al-Farabi provided the curricular guidance about those Ancient Sciences and Divine Science so that future readers would "be able with this book to judge between the sciences so that he will know which of them is best and which is more useful and which is more perfect and which is firmer and which is stronger as well as which is weaker and more feeble."[42]

Considering the educational situation of Christian Spain within western Europe, it is not surprising that a text such as this would be attractive. Throughout Europe higher learning had become a rare commodity after the seventh century and in the increasingly complex societies of the eleventh its lack was beginning to be felt. The new vitality of the cathedral schools was evident in the twelfth century; however, the curriculum was stuck, as it were, in the same texts that scholars had studied in late Roman Empire: the Bible, Donatus and Priscian on Grammar, Capella on the Liberal Arts, Aristotle known through Boethius' translations and commentaries on Dialectic; on the whole, from its very beginnings, medieval education was always based on authorities.[43] Many scholars were aware that this old system was collapsing and tried to introduced new pedagogic methods or new texts; in particular, Peter Abelard and Thierry of Chartres come to mind. Even a determinedly orthodox thinker like Hugh of St. Victor saw the need to enunciate a new curriculum in the first half of the twelfth century.[44]

Since Visigothic times education among the Christians in Spain had been acquainted with a somewhat wider classical heritage than the rest of Europe; the education in that tradition has been characterized as Isidorean: "Isidore's work [*Tres libri Sententiarum*] remained a model for all such works done to the turn of the eleventh to the twelfth

centuries."[45] In this tradition there was an admiration as well as caution for the use of ancient texts; but unlike the rest of Europe, Spain had this Isidorean "monastic culture of learning" tied to the cathedral churches in the great cities of what became al-Andalus: Toledo, Seville, Mérida, and Saragossa.[46] However, even here there does not appear to have been a set curriculum; the only text which hints at educational content, the so-called Isidorean *Institutionum Disciplinae*, is really a brief notice on primarily education and appears to be too late to have been written by Isidore himself.[47] While there was no florescence of great Christian thinkers reared in this tradition, there still had been an accommodating attitude towards classical studies among learned clerics in Spain; in the twelfth century there was not an established Christian curricular alternative to what was learned in the remainder of western Europe. What was different, though, was the social situation in Spain where Christian scholars were aware of the Islamic scholars. As Otero has said, "It is clear that it is not possible to establish a parallel between the cultural institutions of the Spain and the cultural institutiones of the rest of Europe throughout the eleventh century; certainly the political and religious conditions were completely distinct."[48] Christian scholars in either al-Andalus or the North had as much need as other Europeans for assistance in becoming better *philosophi;* but they had a resource in the aid that Muslim *falasifa* could provide which their Christian brethren lacked.

It is important to note at this point exactly what was meant by *philosophus* in Latin or *failasuf* (plr. *falasifa* in Arabic) and philosophy in general. In Islam, the seeking of wisdom was enjoined by the Hadith that knowledge was to be sought as far away as China.[49] For the *falasifa,* Greece was as far as one had to go. There they found the love

of wisdom: as Rescher noted, "Arabic philosophy has nothing to do with 'oriental Wisdom'--it is Greek philosophy carried forward in an Arabic language setting."[50] In distinction to theology, van Steenburgen notes that *philosophia* came to represent that "savoir scientifique rationnel."[51] Marenbon has defined the perspective of twelfth century scholars: "*Philosophia* is what men can discover by reason and observation starting from the self-evident principle of each human discipline without the aid of revelation. . . . In the writings of Aristotle and his Greek and Arabic commentators medieval thinkers could find *philosophia.*"[52] Adelard of Bath, aware of the educational climate in northern Europe, expressed it thus: "Reason . . . is not to be found in the Western world, but among the Arabs."[53] Hence, the *philosophus* is that man whose search for wisdom is governed by reason and what could be discovered about God and the world by the aid of reason. Of necessity he needed the knowledge of the Arabs. The Arabs, as we have seen, often turned to al-Farabi.

So, what guidance does al-Farabi offer to these nascent *philosophi*? The subjects that he believed a Muslim seeking after knowledge needed: first, knowledge of language; second, what the Latin West knew as Dialectic, that he simply called Logic; next come the mathematical sciences which, like the Latin *quadrivium*, include music, astronomy and astrology, but also optics, statics, and the science of the making of mechanical devices (a kind of engineering) added to the base of arithmetic and geometry; fourth are the sciences of physics and metaphyics, understood in Aristotelian terms; finally, in what must be termed the most Islamic chapter, one finds the discussion of law, politics, and theology, especially the use of reason in defense of belief. He envisioned three uses for his book. The reader

would come to know what is truly in each branch of knowledge, know what the utility of each branch is and which to utilize and how to discriminate between the branches, and it would help him to distinguish the truly learned man from the phony imitator.

At first sight, one can see the usefulness of this schematization of all knowledge *for anyone seeking to become a philosopher*. Given that all young men, whether Christian or Muslim, were educated primarily in a religious milieu, this syllabus meets both their needs and the needs of the cultural organization supplying their training. In particular, al-Farabi's final use for the *Enumeration* is revealing: it is primarily a religious problem to distinguish the true adept from the heretic. There could be counterfeit scholars in any field of knowledge, but detecting and countermanding them was most important to religious authorities. To be a scholar in the Middle Ages, one needed the mind trained in all the branches of science to be able to defend the faith. This is an even more important task in a border area, like the Toledo after the Christian conquest, where intellectual contacts between the devotees of the three religions caused a certain amount of discomfort.

The *Enumeration* also had the potential to become a replacement for the older curricular texts like Capella and Donatus because not only was it respectful of revealed religion (being the product of a scholar reared within that tradition) but it need not be shorn of its classical paganism to be useful. Most importantly, it was not an old book, a guide from the past. Surely Donatus and Priscian and Capella were useful, but they were the products of an era very different than the twelfth century--an era when classical libraries and schoolmasters had thrived. They had been accurate guides for their day. But al-Farabi's book was new; it was the product of a civilization which existed and it was being

currently used in al-Andalus as a guide to the various books of Aristotle and others mentioned in the text. Most important, it contained new and interesting "sciences" like those for inventions and politics. Moreover, it was currently being used by members of that competing civilization in the other major cities of al-Andalus and they found it a secure and even indispensable text. Scholars like Ibn Tumlus depended heavily upon it even fifty years later than Gerard and Dominicus.[54]

Most encouraging was the fact that Al-Farabi's theology, like Ibn Hazm's, had a place reserved for the application of reason to religion, particularly the philosophy of Aristotle, which could be useful to scholars trying to understand how the world itself revealed the God of scripture. These scholars were predisposed to believe the Platonic ideal that truth was unitary . And yet with the new Aristotle they were encouraged to observe the world around them. How did one relate the physical world to the world of scripture? Was there an inherent unity in all creation? How did one reconcile Aristotle and Plato? This they wished to find out and here the Muslim Neoplatonists were far ahead on the road to understanding. Competencies and texts the Christian scholars simply knew they lacked in order to become *philosophi*, the Muslims were exploring and improving; here, Gundisalvus' preface to his translation of the *Enumeration* is illuminating:

> Some time ago, when there were many philosophers, nevertheless, he alone used to be called simply "a wise man" who was thought to comprehend all the knowledge of things with certainty. Now, however, with the world having grown old, I do not call anyone "a wise man," but something less, for no one deserves to be called "philosopher," because whoever wishes to seek wisdom in this field scarcely discovers anything. For this reason, we believe ourselves to be satisfied with the crumbs, when we are not able to taste everything; but, at least we can taste something of one kind or

another.[55]

The organization and philosophical underpinnings of al-Farabi's work have been subject to varying interpretations. Muhsin Mahdi has analyzed the *Enumeration* in a careful and thorough cataloging of its parts.[56] He noticed that in spite of there being five major divisions, there are actually eight sciences discussed in the text and these eight are divided into thirty-nine parts and the whole arrangement is idiosyncratic.[57] One of the curious aspects of the uniqueness of al-Farabi's organizational scheme is that he neither relied entirely upon the previous Islamic organizations of the sciences nor the ancient Greek ones, i.e., the Aristotelian; instead, he produces something of a blended scheme. In this way he presents certain peculiarly Islamic ideas about the divisions of the sciences and yet, within those divisions, he further divides each science into theoretical and practical like an Aristotelian. Put slightly differently, he really is attempting to produce a universal organization of the sciences *based upon logical analysis within the context of his own Neoplatonic beliefs about how one knows and what is knowable.*[58] This is clear from his inclusion of certain sciences that no one else before had grouped together: "his 'generally accepted' sciences encompass more than the philosophic sciences. They include the sciences of language, and the science of jurisprudence, and the science of theology , which no one before had classified as philosophic sciences."[59] But there appears to have been an agenda behind this inclusion of unusual sciences, as has been noted explicitly by Osman Baker, "It would be more appropriate to say that al-Farabi had composed the classification to make logic and the philosophical sciences better known and more generally accepted among Muslims. The classification constitutes an ingenious attempt at projecting a superior image

of the philosophical sciences in relation to the religious sciences."[60] These scholars are correct in seeing that al-Farabi's organizational scheme demonstrates clearly the preeminence of logic and, within the science of logic, the preeminent place held by demonstration (برهان) which leads to certainty. Such demonstration, as the application of the principles learned in the *Posterior Analytics,* is "the art that employs demonstrative statements which produce 'certain science'."[61] The use of this science enables the student of philosophy to find certainty about all human knowledge, i. e., the sciences that are discussed the the remaining chapters of the *Enumeration.*

It is further clear that the most emphatic use of demonstration in the book is in the section dealing with theology. Hence, in his own milieu, al-Farabi was presenting a challenge to those theologians who sought the truth only in the Hadith or *Qur'an* and rejected the sciences of the ancients. If we may posit for al-Farabi an intentionality similar to that demonstrated by Avicenna in providing a pedagogic system to shape peripatetic *falaisuf,* as Dimitri Gutas has argued, then there was an absolute need for a particular curriculum.[62] Thus, for students seeking philosophical understanding (i.e., certain knowledge based upon logic) in a revealed religion's culture, al-Farabi has provided a valuable tool even if it is not entirely logically consistent throughout. As Abed has summarized al-Farabi's motivation, his task "as he sees it, is . . . to make the Aristotelian principles comprehensible to Arab students of logic."[63]

The *Enumeration* was translated by two of the most prolific of the twelfth century translators (as has been noted in Chapter Two above); however, the relationship between the two translations has never been clearly explained. For example, Fr. Manuel Alonso

believed that there were incidences in the text which indicated that Gerard of Cremona had to be translating later than Dominicus Gundisalvus. As can be seen clearly in his introduction to the *De Scientiis* (which is discussed at the end of this chapter), all that he really proves is that the two translations were out of the same milieu, struggling with the same material:[64] but when Fr. Alonso was writing it was generally believed that Gundisalvus worked twenty-five to fifty years before Gerard. As we have already shown, they were in fact contemporaries as has been known since Rivera Recio's studies which came approximately a decade after Alonso's own work.[65] With accurate knowledge of the overlapping careers of these two men--and awareness of the character of twelfth century Toledo--it would be amazing if they had *not* had contact with each other. It is my belief that, in all probability, Gerard translated first, making the literal word-for-word translation under the overall patronage of Gundisalvus, who himself later adapted Gerard's work on the basis of both his somewhat better knowledge of Arabic and of Latin philosophical terminology and with a didactic purpose in mind. If this is so, it would fit the general pattern that Juan Vernet has discussed as "la técnica de las traducción."[66]

Moreover, the differences in their styles of translating and adapting of this particular work is revealing. We have ample witness from manuscripts that word-for-word translation was, in one sense, the norm in Spain. In a very early prologue to a translation of the Pseudo-Aristotelian *Sirr al-asrar* (*The Secret of Secrets*), John of Spain tells his patron that while he does not always translate literally--and, in fact, no one could always do so--nevertheless, his goal is to do so, so that he does not depart too far from the truth.[67] John's translations were frequently made for Raymond, Archbishop of Toledo in the period

immediately before Gerard and Gundisalvus were active and may represent the then prevailing norm for scientific translators. However, that norm may only be a particular manifestation of the overall practice in medieval Spain. Up to the end of the thirteenth century Jewish philosophical translators also preferred *'ot be-'ot* translating and Maimonides had to encourage ibn Tibbon to translate more artistically, "so that the subject be perfectly intelligible in the language into which he translates."[68] This may have been the goal of the better translators but it did run afoul of the problem John of Spain highlights: fidelity to the original. On this point Sebastian Brock has shown that the practice of a *fidus interpres*, though scorned by men of letters in antiquity, became the norm in Christian translation from the time of Jerome. Brock also notes that the Syriac Christian translators had also used this plodding method. Part of the reason for it, he asserts, is the "overriding prestige" of the source language and the desire to bring the reader to the text, not *vice versa.*[69] One hallmark of such translating is the preservation of the word order of the source language in the destination language.[70]

Of the two translators under consideration here, Gerard is patiently literal in his rendering of the Arabic while Gundisalvus often simply presents the essence of the subject under discussion. Gerard with one exception does not add to the text; nor does he leave parts out. Gundisalvus adds knowledge everyplace that he has different sources or texts or terminology. More importantly, he consistently simplifies Gerard's syntax, making it more latinate; in particular,he leaves out Latin terms for Arabic particles that Gerard supplied but which ought to be untranslated , for example leaving out *vero* when it stand for the ﻭ which introduces a clause. Where the text is quite tightly tied to Islamo-Arabic culture,

Gundisalvus' changes are more pronounced. This can be particularly seen in the chapter on grammar, the opening chapter, which presents unique difficulties because al-Farabi wrote with the Arabic language in mind and made reference to several elements of that language which have no analog in Latin. When Gerard couldn't translate these terms he simply transliterated them. This so troubled one later reader that he took the pains to write marginal notes explaining that these strange grammatical terms refer to customs *apud arabum* and he tries to give textbook style definitions.[71] Clearly Gerard had a clear purpose for his work: his attempt was to be as faithful as possible to the original in order to open access to the knowledge of the sciences that the Arabs had. However, as the glossator proves, his text was not useful without interpretation. It appears to me that Gundisalvus recognized the original function of al-Farabi's work and intended a similar goal for his own adaptation. Whether studying philosophy in either Latin or Arabic, the introductory student needed a clear guide to a field of knowledge that he was unprepared to confront, without the burden of extraneous material which could be confusing; all the passages either carefully massaged or rejected by Gundisalvus would only serve to confuse the beginning Latin student had they been left as Gerard had left them. For his purpose, these sections simply were not relevant.

In the following pages I will work through the text, highlighting its contents, noting the differences between the translations, and elucidating any terms or titles that may be unfamiliar. It will be necessary from time to time to engage in debate with previous scholars before we can move on to the next section of the work. On the basis of this careful comparison, at the end I will be able to draw more focussed conclusions about these two

men, about their relative abilities as translators and philosophers, about their contacts with the Islamic society they encountered, and about the state of science in the Latin West.

II.. A Comparative Commentary on the Two Translations

[In the following commentary I will refer to the translations usually by the name of the translators and will follow the Arabic of the Escorial text as González Palencia presented it because it is clear that Gerard followed an Escorial-type of text. The *De Divisione Philosophiae* will frequently be consulted and referred to as *De Divisione* (*DDP* in the notes). All references to page numbers will be to the respective editions; manuscripts will be referred to by standard nomenclature.]

A. The Prologue of Gundisalvus:

This is wholly Gundisalvus' creation; Gerard dives right into translating. There is a dual purpose to this prologue and it gives us some insight into the writer and his world. In the prologue are echoes both of the general situation of twelfth century intellectuals and of Gundisalvus' own hermeneutical approach to text. In the first place, he speaks about how, with the world grown old, there simply are not *philosophi* to be found and knowledge is hard to come by. This is a uniquely Christian attitude in Spain for, as we have mentioned, the Muslim writers were filled with pride at the intellectual place of al-Andalus and of the number of her scholars. However, among Europeans it was not only a Spanish sentiment: Hugh of St. Victor says something similar at the start of Book 3, Chapter 3 of his *Didascalion*[72] and Petrus Alfonsi uses a similar metaphor for sharing "philosophical nectar" which he perceives that the Latins in a kind of imperious ignorance do not know.[73] In both these cases, the references are to northern European students and scholars. Hence, this relative lack of sophistication they mention is an expression of the same sense of place as

found in Bernard of Chartres famous metaphor about his generation of scholars standing on the shoulders of giants: medieval Latin scholars who had glimpsed the authoritative past knew how much they didn't possess of what the ancients had known. Such an awareness was even more pronounced for people like Gundisalvus who did know both what the ancients had known and that the Arabs had held to and advanced beyond the knowledge of the ancients. Furthermore, in his expansion of this theme in the *De Divisione Philosophiae*, he notes that there was a happier time when wisdom enlightened the world. Presently, the cares of the world have overtaken the zeal for wisdom and study languishes. It is his purpose, he says, in bringing out his book that "*saltem in summa sapienciam degustent, quam mundana vanitate ebrii miserabiliter abhorrent, et sapore magnam esse ex gustu partis approbant.*"[74] Secondly, the conclusion of both prologues refers to the act of learning with this metaphor of tasting; for Gundisalvus this implies understanding and not dilettantism. At the end of his *De Divisione Philosophiae* there is an essay on interpretation of texts of the philosophers and there, too, he resorts to this metaphor of tasting, saying that the reader "who does not come to understand the author's intent is like a hungry man who gnaws the bark while leaving the soft marrow intact."[75] As he expresses it slightly differently in this latter passage, to understand philosophy we have to become philosophers, making their thoughts, our thoughts. This principle of imitation may be said (and often is said uncharitably) to underlie all of Gundisalvus' work..

Al-Farabi's book also begins with a prologue which discusses the uses of the book. He says that his intent is to discuss the well-known sciences and the contents of each. Then he lists a table of contents showing the five major divisions. However, the bulk of his

prologue is devoted to the uses to which this little book can be put. Alongside the autodidactic purpose (i.e., knowing what the sciences and their parts are) there is the curious use of discovering whether or not someone claiming to know the sciences actually does. The real point of this usage is to lead the student to truth, not to "blindness and gullibility."[76] It must be said at this point that the *Enumeration* does not represent the whole of al-Farabi's educational program for students. As al-Rabe pointed out in his study of Islamic classifications of the sciences, al-Farabi intended this work to be "only an enumeration of the sciences without expressing his philosophical and methodological reasons behind this classification."[77] Those reasons are only implicit in the *Enumeration* but it appears that the order in which the sciences are presented is basically the order in which they ought to be studied. Baker has noted "that the most important philosophical idea which al-Farabi applied to his classification is the hierarchy of the sciences"[78] and Hammond has quoted al-Farabi's own description of how that hierarchy ought to be put into practice:

> No youth should start the study of philosophy before he is acquainted with the natural sciences. For human nature requires a gradual rise from the imperfect to the perfect. Mathematics is a very important subject in training the mind of the young philosopher because it helps him pass easily from the sensible to the intelligible and because it familiarizes the mind with exact demonstration.[79]

Now this curriculum must be preceded by the study of grammar and logic, which are more tools than sciences proper. Thus, following the presentation of the sciences in the *Enumeration,* the student will train his mind so that he can rise through the progressive study of the individual sciences to become a philosopher.

B. Chapter One: The Science of Language

The first chapter of the *Enumeration* is devoted to the science of language, understood as being composed of two parts: "The first of them is the preservation of significant expressions among any people and the knowledge of what each of these signify and the second is the knowledge of the rules for these expressions."[80] The first of these is self-evident; it describes the basic function of language. However, the second part needs elucidation because it is not immediately clear how the "rules" (قوانين in Arabic, *canones* in Gerard and *regulae* in Gundisalvus) of expressions function. This section begins what Mahdi has characterized as the first of al-Farabi's excurses which neither enumerate the parts of a science nor discuss its contents;[81] this one defines what al-Farabi means by "rule" and explains to what rules pertain and gives common examples from the various arts, so that the function of a rule is that of "a few things describing many things."[82] This is precisely the function of rules among the ancients. Now at the end of this digression al-Farabi knows that he has strayed from his enumeration and so noted the need to return to the subject at hand.

As noted above, in this discussion we find the first significant difference between Gundisalvus' adaptation and Gerard's translation. Gundisalvus prefers the term *regula* throughout the whole work where Gerard usually has *canon*. It is clear to me that this is intentional. In the original and Gerard's translation there is an aetiological explanation of the term "rule" which notes that the ancients used the term in more than one sense; but the underlying purpose of all of them was, as was noted above, that "things few in number

described many things."[83] Gerard's choice of word may have been effected by the Latin tradition for Capella had defined *canon* as *"regula grammatica."*[84] Gundisalvus not only prefers *regula* but he also leaves out this whole discussion of the origin of the term because the confusion does not arise from his choice of term, as the standard dictionaries show. All that he indicates by *regula* is self-evident and, for this reason, is a better choice of equivalent term.

In this section a somewhat interesting sidelight also can be cast upon the extremely literal nature of Gerard's effort. In describing the extent of rules, al-Farabi had written:

حتىٰ تاتىٰ علىٰ جميع الاشياء التىٰ هو موضوعة للصناعة

which Gerard had rendered as *donec veniat super omnes res que sunt illi arti supposite.* Now González Palencia preferred the marginal variant, *comprehendant,* to *veniat* because it makes more sense as the idiomatic rendering of the Arabic expression.[85] Yet I believe that he mistook Gerard's literal rendering, for the literal meaning of تاتىٰ is "to come to."[86] Here we see Gerard translating according to root meaning of the word which does obscure the sense of the passage but which is also a common technique of his.

In each translation, though, the central idea emerges of what rules of grammar are and why they are necessary. It is worthwhile to note here that rules do apply to each branch of the sciences and al-Farabi defined and discussed them here only because this is the first instance of their usage. The remainder of the chapter is devoted to a straightforward presentation of the parts of the science of language. Al-Farabi begins by noting that all

languages express meanings using both simple and compound expressions. These expressions, identified as "the noun, the verb, and the instruments" are not distinguished philosophically; only examples of the basic types are provided. This appears to be the standard way in which al-Farabi presented this material and one can compare the treatment of these expressions in the fifth part of the the *Introductory Sections on Logic.*[87] In this essay, he gives more detail of his meaning of the terms in question, defining the noun or name (اسم) as "a meaning which can be understood alone and by itself without signifying by its essence, structure, and form the time of the meaning in question."[88] He then gives examples of simple and proper nouns as simple expressions, like "animal, man, . . . whiteness, blackness" and examples of compound expressions, "man is an animal." In the *Introductory Sections* he went into far more detail about how expressions signify and what they stand for. In the *Enumeration*, simply listing them is enough.

Throughout this section, and reflecting al-Farabi's overall philosophical stance, the idea of the universality of these concepts emerges.. Rules and expressions and vocalizations are all created among *all* peoples. This is a foundational concept:

> Al-Farabi's assumptions that all languages correspond to a fixed logical or conceptual structure that mirrors reality in a natural way was bound to lead him to the conclusion that all languages correspond to each other . . . This is because, according to al-Farabi, all languages express no more and no less than fixed structures (namely thought), which in turn reflect reality.[89]

This idea might not stand on modern examination, but it was a central building block of al-Farabi's system. It would seem that this universalism appealed greatly to twelfth century

scholars like Gundisalvus, who sought to develop a unitary and universal conception of truth. While agreeing that language, a subject studied in far more detail among Muslims than among Christians, was the vehicle for thought, in a curious insertion in this paragraph Gundisalvus could not resist noting that "these divisions of speech are not the same for all peoples; but in whatever manner they are made, there is an appropriateness to them all."[90] Perhaps this is an unconscious marker of the changes he was about to introduce into the text, for the remainder of al-Farabi's text quite specifically depends upon the Arabic language. This is a very good place to observe the differences in translating methodology.

That difference in method is clear in the succeeding sections discussing language. For example, in presenting the third part of the science of language, al-Farabi got quite involved in the particulars of Arabic, presenting the problems posed by having the nominal forms derived from the verbs, discussing verbal nouns, reduplication of consonants, and the imperative. Here, Gerard reproduces the Arabic word-for-word, resorting to transliterating specific terms like *masdar*, *nein, elif* and *lam* and *adenuiet.* This had been standard practice in nearly all Arabic-Latin translation, and may have been practiced when the Syriac translators of the ninth century had brought Greek terms into Arabic.[91] However, this is a hallmark of Gerard's translating. Paul Kunitzsch, the only other person who has studied Gerard's translating in detailed comparison with the Arabic, has categorized Gerard's translating method as one of, "extreme literalness, to the extent that one could say that it is some sort of Arabic in Latin words."[92] These transliterated terms were virtually meaningless to the reader who did not know Arabic, as can be seen clearly in the marginal corrections and comments of a later reader of Gerard's text who knew both Latin and

Arabic. This individual not only gave Latin equivalents for the Arabic terms but also went to the trouble of describing the Arabic vocalization of the *Tanwin* and *Gezma*.[93] To the Latin reader without Arabic, the very specificity of the references in this section render the text useless: these rules in no way help the reader to know what he needs to know about language.[94]

The contrast with Gundisalvus could not be more pronounced. Where Gerard has long, involved paragraphs reflecting the Arabic syntax, he has mere sentences; he covers the whole description of the parts of speech in approximately one page, while Gerard needs five or more. More importantly, Gundisalvus has based his exposition on the Latin language, including the normal Latin technical terms (like *orthography* for the science of correct writing). In the discussion of correct reading (for which there is no analogical problem in Latin to the need for knowing and supplying diacritics) he turns to discuss accent instead. In this section, some have believed that the fact that Gundisalvus used the terminology for the three Greek accents is evidence that he knew Greek. There is no other evidence of any awareness of the grammar of the Greek language within the *De Scientiis* and a larger comparison demonstrates unfamiliarity with Greek words (as can be seen in the second chapter on logic) and should have negated any such conclusion. In all of this grammatical material, Gerard presented the text of al-Farabi as literally as possible while Gundisalvus found equivalents for terms that were very specific to the Arabic language and which could result in confusion rather than clarity for his readers.

Gundisalvus' concern with clarity is even more apparent in his comprehensive description of the sciences in his *De Divisione Philosophiae*. This work follows a different

organizational scheme than that of the *De Scientiis* from which most of its contents have been lifted; it is based upon Gundisalvus' own translation of al-Ghazzali's *Maqasid*,[95] and also utilizes an *accessus authoritas* which appears to be borrowed from Thierry of Chartres,[96] while representing much of al-Farabi's discussion. More specifically, while he has adopted Ghazzali's description of how the philosophers divided the sciences in the main and utilized a newly developed pre-scholastic teaching tool, he is clearly indebted to al-Farabi for the functional description of Grammar and most of the other sciences and for the enumeration of the parts of each. Here grammar is presented as the first of the practical sciences defined as *"disponendi conversacionem suam omnibus hominibus"* which includes Grammar, Rhetoric, and Poetics.[97] Grammar proper is defined as "*sciencia gnara recte loquendi, recte scribendi;*"[98] furthermore, it is the primary practical science:

> That it is naturally the first of all the sciences, being divided into two parts: namely, the science of preserving and of observing what every word signifies to the people who use that language and the science of observing the rules for their words. [99]

In this discussion there are no traces of the Arabic language like those preserved by Gerard; in fact, Gundisalvus uses examples of Latin to illustrate errors, solecisms, and barbarisms which the proper knowledge of grammar can correct. Still he preserves the idea that he gained from al-Farabi, that language functions in the same way for all people, but with this proviso: "*illa variatur apud onmes secundum diversitatem linguarum, hec pene eadem est apud omnes secundum similitudinem regularum.*"[100] This is his own distinction, based upon his own observation and is not derived from another source. It appears to me

that this comparison of Gundisalvus' more mature *De Divisione* and the *De Scientiis* shows that when he alters a passage it is not because he doesn't understand it, but rather because it appears to him to need further clarification, to be in error, or to lack an analog in the world of his readers.

C. Chapter Two: On Logic

The second chapter of al-Farabi's work begins much as one might expect, much as the book itself began, with an introduction reiterating the contents of the chapter and the order of their explication. This paragraph Gerard has reproduced literally. Gundisalvus, on the other hand, skips over it entirely and follows neither al-Farabi's definition nor wording while still preserving the essence of his argument. Al-Farabi said that logic has the express purpose of providing the rules for correct thought and defends against errors that "might be committed in dealing with the intelligibles."[101] Here Gerard misses the meaning of this term entirely; in Arabic the word is معقولات which should be defined as the"mental counterparts we acquire from encounters with the external world."[102] Gerard translates this, as he always does, by the Latin *ratio* or *rationata*; Gundisalvus uses *intellectus,* which is more representative of the nuanced Arabic meaning: that which is intellected, the perceptible.[103] In al-Farabi's system there is a relation between language and logic: linguistic expressions, لفظ in Arabic, are merely the particular constructs which convey thoughts.[104] Among the Muslim Neoplatonists al-Farabi was the one thinker who had carefully worked through the problem of the relation between language and logic. There were fairly complicated arguments within Islamic circles about the basic philosophical problem; al-Farabi was the

thinker *par excellence* who believed that "thoughts are natural and depend upon things as they are, whereas language is based upon human consensus. It is in this sense that Alfarabi and the other Arabic logicians defended their thesis concerning the superiority of logic over language."[105] Thus there are close ties between these first two chapters, but in al-Farabi's thought, logic was definitely the more important subject.

This accorded well with the desires of medieval thinkers. Many were trying to understand the relationship between reality, the impressions of reality on the human mind, and the expression of that reality in language. Here they did have the aid of the Aristotelian tradition, especially as presented in Boethius' commentaries. In this tradition the *De Anima* and the *Peri Hermenias* were the foundational texts in which Aristotle was thought to have come to some straightforward understanding of the problem. In Boethius' presentation of the *Peri Hermenias* the bipartite nature of the problem was laid out:

> What are spoken [ex quae sunt in voce] are symbols [notae] of the affections in the soul, and what are written of those that are spoken. And just as there are not the same written letters for everyone, so there are not the same spoken sounds [voces]. But the primary things of which these are the signs--the affections of the soul--are the same for all; and those of which they [the affections] are likenesses [similitudines]--things [res]--are also the same.[106]

It is precisely the problem of this correspondence which al-Farabi set out to solve *vis-a-vis* the Arabic language and which also played so great a part in the discussions of the schoolmen of northern Europe. When one is after the "Truth" it is the fundamental epistemological question.

Now given this distinction between the thought process and the expressions of that process, it is inconceivable that Gundisalvus did not have thoughts about these matters. In

fact he has a careful and involved discussion of how the reality of the world is represented in the soul in his *De Anima* which is a very Platonic discussion grounded in Avicenna's doctrine of the internal senses.[107] There is reason to believe that Gundisalvus did not agree entirely with al-Farabi's presentation and definition. First of all, he radically rewrites this section. Instead of reproducing the original definition, he gives the opening description of the second section of the chapter, "On the Use of Logic," as an alternative definition--and he even alters this: where Gerard (following al-Farabi) has the intent of logic "the verification of all which we seek", Gundisalvus has that intent as giving the rules "by which we perceive the truth of expressions." Here he could be following Ghazzali's presentation--at least in terms of his outline--for after a proemium on the difference between belief and knowledge, Ghazzali introduced logic as the solution to the problems posed by incertitude. It is this discrimination between true and false that begins with the *significatione dictionum* but proceeds to a discussion of how those words represent the *intellectibus.*[108] This appears to be the order in which Gundisalvus treats the material. If we turn for help to his *De Divisione* we find that logic is defined as "*racio disserendi diligens, i.e., sciencia disputandi integra.*"[109] Here, too, it appears that logic is limited to the realm of discourse; however, as he proceeded to discuss the genus and material of logic, he clearly showed himself understanding the function of logic in Farabian terms for the material of logic is *universalitas que accidit rebus intellectis* and the genus is said to be the *instrumentum et pars* of philosophy which treats the things sensed and intellected.

Interestingly, he simply skipped over better than five pages of literal translation wherein al-Farabi relates the correspondences of grammar and logic. This is all the more

curious an excision because a large section of it is an argument for the need to know logic in order to be in possession of *certain knowledge of things,* something Gundisalvus seems to be advocating as a legitimate function of philosophy. Like the excisions in the first chapter, though, this one is also best explained by Gundisalvus' reluctance to particularize the point under discussion with excessive reference to the Arabic language. When he returns to following al-Farabi's text it is at a place which seeks to explain on the basis of the *antiqui* what the differences between mental images and their expression is. It is clear here that he does not share al-Farabi's concern with the particular nature of the relation between Arabic grammatical expression and universal logical expression, even though there was an analogous problem among contemporary schoolmen, a problem in which it is inconceivable that Gundisalvus would not have been interested.[110] However, it appears once again that a straightforward, simplified presentation is his goal.

After this, Gundisalvus follows al-Farabi in the discussion of the problem of internal *versus* external logic. In one of his characteristic additions, he also informs the reader that *logos* is the Greek term for *ratio.* Needless to say, al-Farabi and Gerard lack this etymology.[111]

This is, in one sense, the most traditional portion of the whole chapter. Here al-Farabi was arguing that logic inheres in humans and that there is a continuity between the world as it is perceived by the human mind and how the mind expresses that perception and that this vital, developing sense is able to distinguish between good and evil.. It is the organizing principle behind all knowledge--whether of perceptions, expressions, or ethics--being the very thing that distinguishes Man from the animals. The roots of this idea are very

old, going back to Aristotle himself. In the *Peri Hermenias* Aristotle had said,

> Spoken words are the symbols of mental experiences and written worlds are the symbols of spoken words. Just as all men do not have the same writing, so all men do not have the same speech sounds, but the mental experiences which these directly symbolize are the same for all.[112]

Aristotle then refers his reader to his *De Anima*, where this was discussed in more detail. The Latin West had been exposed to this idea not directly, but by Boethius who coined the Latin terminology saying that: "words signify not things but thoughts [intellectus] . . . Truth and falsehood belong to thoughts and not to images as Aristotle says in the *De Anima* (432a11)."[113] Boethius had also preserved and passed on the distinction between "thoughts which are the same for all people and words which vary between nations."[114] It is fair to say that for al-Farabi and Boethius logic was the *scientia scientiarum*, the path to universal Truth or, at least, as close to that Truth as humans could get. Thus in the realm of nature reasoning was the highest of human virtues, even more highly regarded than ethical values because it was the basis of ethical behavior. Scholars in the monotheistic religious traditions might believe that revelation had a role here as well, but in this tradition the emphasis was entirely on intellections.

With logic being of such importance, a grounding in it was necessary for anyone seeking to truly know and that required the presentation of the parts that needed to be studied in order to master this science. Here, al-Farabi follows the list of the eight traditional parts of logic, going back to Aristotle. In the Islamic East, this tradition went directly to Aristotle through the Syrian translators and included nearly all of the *Organon*; in the West, the line ran through Boethius and was not as complete. The so-called *logica*

vetus of the eleventh and early twelfth centuries knew only the *Categories*, the *Peri Hermenias*, and the *Isagoge* of Porphry and Boethius' commentaries on these along with his treatises on topical reasoning and the syllogism even though he had translated and commentated on nearly all of Aristotle. These other works were not generally available to medieval scholars: his translations of the Topics,, the *Sophistical Refutations,* and the two books of the *Analytics* and his commentaries on these along with Cicero's *Topics*, and his own works on differentia and syllogisms.[115] Hence, Islamic philosophers had more of Aristotle himself to work with than their western, Christian counterparts had.

However, the tradition in which al-Farabi was trained had been colored by the prejudices of monotheistic religion. In particular, this tradition only read the *Organon* as far as "up to the end of the assertoric [i.e., the non-modal] figures and that there would be no instruction in what comes after that."[116] Due to this peculiarity, a kind of a technical term had arisen which called this part of the *Organon* after *Prior Analytics* I.7 "the part that is not read."[117] It appears that al-Farabi and his teacher Yuhanna ibn Hailan may have been the first to break the barrier in Baghdad; moreover, his main teacher, Abu Bishr Matta ibn Yunus was the translator of the *Posterior Analytics.* This may explain the peculiarity of what Mahdi has termed the fourth digression of the *Enumeration*, which comes at the end of this section on logic.[118] This digression praises the fourth part of logic, demonstration, as taught in the *Posterior Analytics*, as being more sublime and of a greater dignity than the other parts of logic, which are expressly said to be used in the service of demonstration. The thrust of al-Farabi's argument is that the true knowledge of the world is only possible on the basis of demonstration, just as Aristotle himself had argued.[119] It is interesting that

Gundisalvus--who was not heir to a tradition that put such value on the *Posterior Analytics*--reproduced almost all of this fourth digression but adds his own obvious conclusion as to the valued purpose of demonstration: *sciat quibus regulis hoc fieri valeat, discernat inter artes, quibus fit certitudo et quibus fides vel opino."*[120] He informs his reader that certainty can be arrived at on the basis of the five types of verification which can be determined on the basis of each of the traditional parts of logic.[121] In this way the value of this *new* logic is stressed.

It is not an exaggeration to say that this distinction between knowledge *per se* and opinion is the foundation of all of Aristotle's logical works; both Muslim and Christian medieval philosophers wanted to be able to know the truth by relying upon more than mere belief, no matter how reasonable such belief might be. This seems to have been what separated the scholars from the other major figures in these two religions: the scholars needed to know for sure! Aristotle's systematic methods--with their seeming universality and value-free character--appeared to be the ideal tools for discovering the truth. Moreover, the variety of methods could be used for solving just about any philosophical problem. However, Islamic scholars before al-Farabi and Latin Christians before the adaptation of his *Enumeration* both had serious lacunae in their knowledge base in regard to formal logic. What al-Farabi presented in this section was the formal, traditional, and complete approach to the Greek logical tradition. While the *Enumeration* sometimes seems trite in its observations to those of us who know the whole Aristotelian tradition, we must keep its *Sitz im Leben* in mind to recognize its value to medieval scholars who did not have that tradition available.

The way to certain knowledge was through the uses of the specific syllogistic arts; al-Farabi presented them in a somewhat Aristotelian fashion by reciting the types of syllogism: demonstrative, topical, sophistical, rhetorical, and poetic; and the types of syllogism are described in terms of their uses and the kinds of knowledge that they lead to. In this listing of methods we do discover another clue about the knowledge fount of our translators. For reasons that are unclear, al-Farabi gives a spook etymology for the Greek word *sophistos*, apparently working backwards from the correct meaning of the term, saying that it was composes of two terms, *sophos* and *istos*.[122] Of course, this is manifestly not the case for *sophistos* is simply "the noun of agent derived from the verb."[123] Not surprisingly both Gerard and Gundisalvus follow al-Farabi in this derivation; curiously, though, each of them has a different transliteration for the second root: while Gundisalvus has *istos* following al-Farabi exactly, Gerard has *estos* or *exestos*. If the latter is the original reading of Gerard, it could indicate (in rather uncharacteristic fashion) that he was trying to find the proper Greek root, e.g., εξιστημι, *existeimi,* which can mean "to alter, change." I have checked both the Graz and Bruges manuscripts of Gerard. Graz reads *ex sophia qui est sapiam et xestes qui est deceptio* while Bruges reads *ex sophia qui est sapiam et estos qui est deceptio.*[124] Given that Gerard is unlikely to have altered the text, coupled with the reading from the Bruges manuscript, this leads me to believe that this is simply a copyist's error where he has produced a parallelism between the two halves of the expression by reproducing the preposition *ex* before *estos* and,thus, the inaccurate etymology remains.

Even more curious, al-Farabi reports a tradition that described the sophists as a *madhab* whose name was derived from an eponomous founder. Al-Farabi knew this

tradition to be false and said so, remarking that the name comes from the methods employed, not the founder of a sect. In Guthrie's classic work on the sophists he sees Protagoras as the first noteworthy sophist--certainly the first to take fees for his work, the characteristic hallmark of a sophist--even though the (perhaps) mythical Corax and Tisias were the first to argue extensively from probability instead of facts.[125] No matter which of them was first, there is no connection between any of these names and *sophistos*. Once again, Gundisalvus does not reproduce this errant material.

On rhetoric, al-Farabi's interest seems to be to compare rhetorical to topical reasoning, contrasting the probable with the persuasive. It appears to me that Gerard literally mistranslated while preserving the overall sense of the passage. Al-Farabi had said that rhetoric sought to persuade people and to reassure their minds. Gerard seems to have preferred reading the Arabic إقناع in its root sense of "be satisfied, be content;" in so doing he missed the whole sense and purpose that al-Farabi proposed for rhetoric and he appears not to have recognized the derived meaning of "persuasions," which Gundisalvus did. Here we can see the relative independence of the two translators once again for there is absolutely no way that Gundisalvus' *cum sermonibus suis persuasibilibus* could be derived from Gerard's *sufficientia hominibus in qualiter sententiae.*

Poetics was understood by al-Farabi as the kind of reasoning that appealed to the imaginative faculty, the *imaginatio* of the Latin translators. This faculty was the mental storehouse for the forms perceived by the senses.[126] As al-Farabi understood human knowing, humans perceive in the "potential intellect" (عقل بالفعال).[127] This Aristotelian

concept was defined by the First Teacher as, "that in virtue of which an image arises for us" and it is "exactly the same as what one in the strictest sense perceives."[128] It is this power resident in the mind which the poetic expressions are able to stimulate. This appears to be good and effective because it can stimulate humans to actions which they otherwise might not be so inclined to perform.

At this point, the discussion of the types of the syllogism is brought to a close by a summary of the names of the types. Here the two translators have slightly different terminology: what Gerard calls *opinativa* Gundisalvus terms *putative* and what the latter had termed *persuasibilitas* in the discussion of rhetoric he now changes and accommodates himself to Gerard's *sufficiens*. This list is followed again by a discussion of the problem of internal reasoning and external expression and how the simple and the compound forms of each correspond, a discussion which appears to me to be both redundant and superfluous. It is only at this point that al-Farabi finally ends this long excursus and begins the enumeration of the eight parts of logic which Gerard dutifully follows.

This discussion presents both the parts of logic and the texts that correspond to them. It is only at this point that he then undertakes an enumeration of the parts of logic, including a curricular sketch and listing of the titles of the texts which ought to be studied. This is in interesting contrast to the chapter on grammar; there, al-Farabi had not presented anything like a syllabus and had listed no texts. Here, he includes both the Greek and Latin titles of the works he thinks students should read.

As valuable as this section was for Islamic autodidacts, Gerard's slavishly reproduced list of mainly transliterated titles would have been of nearly no value; Gerard must have

known this and this implies quite strongly that the work wasn't intended for the same kind of Latin audience as the original had been; as it stands, the text would not be useful to the Latin student of philosophy who knew no Arabic. There is simply too much Arabic which would have to be interpreted to be useful. This seems to me to be a major point: Gerard's text could serve quite well as the basis for either, a) another adaptation which would be geared to Latin students; or b) as a guide to looking for the works of Aristotle under their Arabic titles. It may have played both roles, for it is clear that Gundisalvus adapted it for just such a purpose and Burnett has shown how the texts referenced in it came to be translated *seriatum* by several generations of scholars as if part of some program.[129] In striking contrast, Gundisalvus rewrites this entire section with a very clear eye cast toward the reader seeking an introduction to the subject. We can see Gundisalvus here as something of a master teacher, not simply the compiler and plagiarist that he is often characterized as being. For while Gerard goes point-by-point following al-Farabi's explication of the purpose, content, and bibliography for each of these eight branches of logic, Gundisalvus relates the eight in an interesting and inverted order. Instead of beginning with the smallest building blocks of logic, the Categories, with their defining of the intelligibles and their expressions, Gundisalvus began with the "big picture," with what al-Farabi himself considered the most important component of dialectic, demonstration:

> But because certain knowledge of the truth cannot be had, except on the basis of demonstration, it was necessary that a book be composed which teaches how and out of what demonstration can be made. And on this basis the book which is called *Posterior Analytics* or the *Book of Demonstrations* was composed. But, since demonstration cannot exist except on the basis of the syllogism, which actually consists of propositions, thus a book was necessary in

> which it is taught how many and of what kind are the propositions and how, according to modes and figures of speech, syllogism are to be woven. On this account the *Prior Analytics* was made. But since . . .[130]

And so on it runs, down to the smallest building blocks of logic. By beginning with demonstration Gundisalvus makes clear that he actually has grasped what al-Farabi rather clumsily makes clear in the final excursus of the chapter, the superiority of demonstration as the capstone of the logical sciences. In this presentation of the eight parts of logic as a descending curriculum, the hierarchical relationships of each branch of logic depending upon the following part, clearly shows the process by which philosophers seek after certain truth and illustrates the connection between the most basic form of description and the Truth. In one involved and tightly connected paragraph, Gundisalvus accomplished a complete description of the curriculum of the *Organon* and its internal relations. It is a stroke of genius.[131] It makes one complete unit out of the enumeration of the parts of logic and the excursus on the value of demonstration. While al-Farabi is content to summarize the discussion of the primacy of demonstration in terms of the testing of expressions and the discovery of errors and the manner of their making, Gundisalvus again cuts right to the heart of the matter; a man can "discern between the arts, knowing with which there may be certainty and with which only faith and opinion."[132]

Thus, at the end of the two chapters which present what has been termed the propadeutics to the actual sciences, we can see that al-Farabi and Gundisalvus, while having slightly different emphases, are seeking the same thing. Al-Farabi has consistently wanted his readers to come to realize that both language and logical studies lead to discovering

errors and avoiding their consequences and that there was an intrinsic connection between the two. Gundisalvus is primarily after the Truth, and while that involves avoiding errors, it as a somewhat broader concern, not as involved with the details as al-Farabi is, because whole new fields are opening to study. It is this emphasis which Tulio Gregory has seen as comprising the new knowledge that twelfth century men were seeking: "the juxtaposition of new authorities with the ancient ones and the prevalence of themes drawn from Arab Neoplatonism, in particular from Avicenna, indicate the new cultural horizon which was opening up for the Latin West."[133] This new cultural horizon included an aversion in general to those who taught or studied only on the basis of opinions or beliefs or old authorities. What set apart those who translated and discussed the knowledge of the Arabs was having new knowledge which led to certainty, not ignorance. This situation was very much like that of the early Muslim philosophers, like al-Kindi and al-Farabi; they stood apart from their coreligionists and even from the intellectuals of their day. In other words, the similarities of their social settings made both al-Farabi and his Latin translators feel the need to be advocates for the study of logic; the differences of those social settings is responsible for the differing emphases which we can see when we compare them to one another.

D. Chapter Three: On the Sciences of Instruction

In this chapter al-Farabi turned to what were traditionally called the mathematical sciences: arithmetic, geometry, optics, the science of the stars, music, statics, and the science of mechanical devices that his translators called *ingenium,* علم الحيل in Arabic.[134] The first

question we confront is the title for this group of studies: the sciences of instruction, *Sciencia doctrinarum* or *Sciencia doctrinali* which translates the Arabic, علم التعاليم. In the Roman Empire, Varro had produced a text on the quadrivium entitled *Disciplinarum Libri IX*, which "appears to have been the fountainhead of much subsequent Latin scientific literature.[135] In fact, this title was so influential that Capella's own title for his work that we know as the *Marriage of Philology and Mercury* was probably the *Disciplinae.*[136] This became the standard technical term in Latin for these sciences, *Scientia disciplinaria* which was equivalent to *mathematica.*[137] In a clear and carefully referenced article, M.-D. Chenu traced the senses in which the terms *disciplina-doctrina* came to be used in both Varro's broad sense and in "le sens le plus spècialisé de discipline ou de methode mathématiques," which appears in Latin for the first time in Boethius *De Trinitate*, a work with which Gundisalvus was quite familiar.[138] *Doctrina* was a clear synonym for *disciplina*, even in the ancient world and means simply "subjects, instruction, or erudition."[139] It is clear that in both the Arabic and Latin texts it has this meaning and is evidence of how Greek technical terms came into both languages by the method of translating according to roots. The reason why the mathematical sciences (as well as this expanded group presented by al-Farabi) should continue to be so named is also derived from their methodology and is given by Gundisalvus in his *De Divisione*: *"pro eo quod, qui in precedentibus scienciis* [i.e., the practical sciences of grammar, ethics, economics] *per diversas opiniones vagatur, in mathematica quasi sub disciplina restringitur."* He goes on to say that among the Arabs this science is called *domatrices* [from *domator*, "she who tames"] because "in these ways

the heart tames arrogance."[140] This reflects that possible the meaning of the Arabic term as "direction" or "formation."[141] This traditional meaning is thus shared by the Muslim and Christian philosophic thinkers in the Middle Ages.[142]

It should be noted at this point that in this chapter and the next on Natural and Divine Science there is very little deviation between the two translations. Gundisalvus' characteristic additions continue, adding references to books that are not referred to by either al-Farabi or Gerard.

Gundisalvus begins his chapter by enumerating the seven parts of the *Sciencia Doctrinali* while Gerard follows al-Farabi in merely reporting that the science has seven great parts which were previously catalogued at the beginning of the work; thus he plunges right into the description of the first part, arithmetic. In this chapter particularly, al-Farabi has taken to dividing his discussion of the parts of the sciences into theoretical and practical. In their translations Gundisalvus and Gerard consistently prefer different terminology for these, with Gundisalvus preferring *practica* and *theorica* while Gerard uses *activa* and *speculativa*. This is in no way a significant distinction for as Hugh of St. Victor had noted, "The theoretical may also be called the speculative; the practical may be called the active."[143] When Gundisalvus finished his initial discussion of the differences between the practical and theoretical, he tells the reader that everything about arithmetic can be easily learned from the *Arithmetica* of Nichomachus (of Gerasa). This was a well-known text, *The Introduction to Arithmetic*, which had been translated into Latin in the Roman Empire, recommended by Cassiodorus, and adapted by Boethius in his *De Institutione Arithmetica*.[144] It is a work which Julio Samsó has characterized as a book "one would expect to be known in

al-Andalus in the second half of the fourth/tenth century [A. H.]"[145] The Andalusi tradition preserved in Sa'id numbers Nichomachus of Gerasa as one of the fine men who deserve to be called "philosophers of Greece," even though Sa'id misidentifies him as the father of Aristotle.[146] Thus, it is possible that this addition could be explained as being derived from either the Boethian or Andalusi traditions. I would suggest it is the latter for the reasons enumerated below.

As the discussion of mathematics continues in the *De Scientiis* there is a rather unwieldy seam. Gundisalvus has told his reader that he can discover all about mathematics in the book of Nichomacus. The very next sentence, as Alonso noted, was not in the Arabic,[146] and does not make consecutive sense: it reads, "Each of *these* has parts." This cannot refer back to the book of Nicomachus; it must refer to practical arithmetic and does not relate to the preceding discussion of theoretical math. It appears to have been taken from some other source and inserted at the point, Gundisalvus' usual practice. Moreover, this source must have been Arabic, for the whole point of this inclusion is to get to the discussion of the commercial uses of math, known in Arabic as the *al-hisab wal-mu'amalat* (الحساب المعاملات), the arithmetic of commerce. Here Alonso was seriously in error when he said, "Sería absurdo que al-Farabi u otro esritor àrabe puises tal explicación."[148] In fact, such works were not only common in al-Andalus but earlier in the twelfth century John of Seville had translated one of these into Latin. In it, Ibn al-Samh (d. 1035) actually quoted al-Khwarizmi as well as Nicomachus and Euclid. As Samsò describes its contents, it "ends with a long collection of practical problems which might be of interest to a merchant."[149] As

this section is a unit and Gundisalvus describes a *Kitab al-mu'amalat* nearly exactly as such books are known to have been in al-Andalus, I am forced to conclude that he is following an Arabic source that was unknown to Alonso.

Turning to the science of geometry, curiously, none of the three provide a textbook-style definition of geometry, although Gundisalvus knew one and provided it in his *De Division;* however, there was little that he might have turned to as an alternative to the Arabic tradition on this subject. Here the older Latin tradition could not be of much help. Capella's chapter on geometry is mostly geography and, as Stahl has pointed out, "All quadrivium studies languished in the Latin world [of late antiquity] and geometry was the most neglected subject of the four."[150] For the most part, Gundisalvus follows al-Farabi and Gerard, but he has reworked this section extensively, with some topics being treated in more detail, others in less, but always with an eye for including some kind of Latin terminology.

The question of other sources for this section is not simply answered. It is manifest that both Gundisalvus and Gerard were aware of Euclid's *Elements*, which is mentioned as the "course book" at the end of the section. But, they were also aware of other geometry texts in Arabic, particularly Anaritus' (al-Nayrizi, fl. 897-922) *Commentary of Euclid* which Gerard translated and Gundisalvus made use of in the *De Divisione.*[151] It is not clear when Gerard translated this text, but because of the choice of certain terms (primarily *surdus*) used in this chapter, I believe that both knew this text at the time when each was translating.

Of course, the main divisions of geometry, like nearly all the mathematical sciences, is between theoretical and practical. Both translators begin with the discussion of the practical. For some reason that is not clear, al-Farabi has begun his discussion with a

consideration of the function of lines, planes, and solids as they appear in various materials (wood, iron, walls, land) as made by various artisans (carpenter, smiths, masons, surveyors). Before going into this discussion, Gundisalvus wanted to introduce the Latin terminology and tells his reader that practical geometry is known under three modes, "*Altimetria, planimetria, et profundimetria*" depending upon what one wishes to measure. This terminology *appears* to be derived from Hugh of St. Victor's *Didascalion*, where the first two terms definitely appear with *cosmimetria* as the third term.[152] It is also Hugh's trio that appears in the *De Divisione*, with a recognition that there were these two terms, *cosmimetria* and *profundimetria*, and that they really meant the same thing: Gundisalvus says that, *cosmimetria* is the science that considers "*qua vero in profundum, dicitur cosmimetria quasi sciencia de mensura solidi.*"[153] When he explains what each type of measurement measures, Gundisalvus relates each type of measurement to one of the three constituent subjects of geometry: height measure measures lines, plane measure measures surfaces, and *cosmimetria* measures solids. But this is *not* what he says in the *De Scientiis*! While Baur did not recognize any other source for this section of the *De Divisione* than the *De Scientiis*, he believed that other portions of the chapter depended upon Anaritus' *Commentary*. Interestingly, Anaritus wrote another work entitled, *On the Knowledge of Instruments by means of which we may know the distances of objects raised up in the air or set up on the ground and the depths of valleys and wells and the width of rivers.*[154] The contents of such a work would correspond fairly exactly with the three types of measurement described in the *De Scientiis*, height, depth, and breadth, and seems to be a closer correspondence to what Gundisalvus wrote than Hugh's text. This must await further

investigation. What is clear from the examination of both of Gundisalvus' texts is that this terminology was in no way standardized and that Gundisalvus, at least in the *De Divisione*, was trying to correlate this non-standard terminology with the standard types of geometric measure derived from the classical tradition.[155] A quick glance at Baur's apparatus shows eleven variants for these three terms, ranging from simple misspellings to exchanging one term for another. Thus, from some source, perhaps Anaritus, Gundisalvus wished to introduce terminology that he thought would be helpful. Later on, when he wrote his larger work, he tried to reconcile the Latin terminology with the Arabic, somewhat unsuccessfully, I would judge. Having completed this helpful insertion, he then proceeds to al-Farabi's discussion of the uses of geometry in the mechanical arts and finally moves to consider it in its theoretical dimensions.

Concerning theoretical geometry, the discussion is straightforward, noting that this subject treats lines, planes, figures, and solids, absolutely, i.e., regardless of their embodied material. Gerard has some difficulty translating this section, not recognizing some elementary terminology. For example, in explaining the subject matter of this section al-Farabi had written:

ويتصور في نفسه الخطوط بالوجه الاعم

[Lines are considered on their own in the common manner.][156] Gerard renders في نفسه as *in anima sua.* While this might be a possible rendering--*anima* could mean "essence"--it is stretching the meaning of *anima* beyond its bearing and that is not implied by the Arabic for

the نفسه is merely reflexive. However, Gerard knew that the primary sense of the word also meant "soul" and somehow here he must be using *anima* in that way even though it is nonsensical. This is a translating error that he makes several times in this same paragraph.

Similarly, his choice of the verb *curo, curare* to translate the third form of the Arabic بلي in the next sentence which reads, "which does not take into consideration within which body they exist," is barely adequate. While *curo* can mean "pay attention to" I don't think that is what Gerard has in mind. Instead, the Arabic verb has as one of its meaning, "to care for or be concerned about," though here it must mean "take into consideration," for al-Farabi's whole point is that in whatever matter a geometrical form is found, that material does not effect the study of the form. As Gerard presents it, one is nearly led to think that al-Farabi believed that geometrical forms are sensate, having souls and caring what kind of material they are embodied in! While not exactly nonsense--and the careful Latin reader could make a certain amount of sense of this--the meaning is certainly obscured. Surely this is why Gundisalvus simply summarizes the whole discussion by simply saying that speculative geometry only considers the various forms "*absolute quidem absque omni materia.*" In fact, in his discussion of the subject matter of this science, Gundisalvus presents only the essence, using a mere twelve lines of printed text while Gerard has nearly twice that much. It is impossible to explain why, but Gundisalvus leaves out a reference to points and angles as two of the building blocks of geometry, something we would consider essential.

In this section there are two difficult terms, neither of which is easily understood. First, in discussing the correspondences and equivalences of geometric figures, we find the

term *surdus*. Surds are, technically, "a sum with one or more irrational indicated roots as addends. Sometimes used for an irrational number."[157] It is in this latter sense that our translators uses the term. Second, in a list of three dimensional figures we find "*cubas, pyramides, speras, columnas, serratila, pinealia.*"[158] All of these are clear except for *serratilia*. Clearly this must mean something like, "little saw" from its root. It is not in any Latin dictionary but it stands for the Arabic term منشورات which means prism.[159] Once again, the Latin term reflects a translation according to root. Ironically, the Arabic word probably also reflects the same translation method used to move from Greek to Arabic, for πρισμα is derived from the verb πρῖω, to saw, and means something sawn. منشورات is its grammatical equivalent. However, the standard Latin term was the transliteration, *prisma*, which was used by Capella. Fortunately, we have another twelfth century text concerned with rhythomachy which also uses this term;[160] while it doesn't include a definition, the text makes it clear that *serratilia* stands for the three dimensional object associated with a triangle. Charles Burnett, who has been studying this text, believes that the term was probably coined in Spain and means a triangular base pyramid because there are drawings of just such objects in other manuscripts and , "it would be natural for Spanish translators to use a word for the equivalent Latin root, especially since *serra* meant a mountain range, which has precisely the shape of an elongated prism."[161] It seems likely to me that Gerard or Gundisalvus probably coined the term. Certainly, it must have come from someone who rendered Arabic into Latin in a literal fashion and did not have exposure to enough geometry to recognize the Arabic as the equivalent of prism. Of our two authors, Gerard is

the best candidate for being the originator.

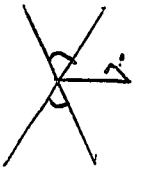
At the end of this section, the reader is referred to Euclid's *Elements* as the text book. Gundisalvus goes on following Gerard and al-Farabi into what Mahdi has characterized as the fifth digression, on the different methods used by the ancients for finding the roots of numbers, including the enigmatic reference that says that Euclid was distinguished from the other ancients by using only the "method of synthesis" to find such roots.

Turning to the science of optics, there is little difference in the two translations. Other than Gundisalvus citing Euclid as an authority in the discussion of the relations of geometry to optics, he make no other additions to al-Farabi and only leaves out small sections which probably appeared to be redundant. Of all the chapters in these texts, this one is the most similar in the two translations. This may be because this was the only text Gundisalvus knew on Optics and had no material to add. Even the usually expanded text of the *De Divisione* reproduces this section word-for-word, including the figures, with only two insignificant changes.

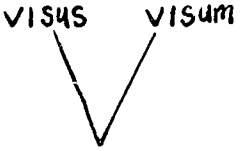
Al-Farabi's optics are derived from the Greco-Arabic tradition and represent the purest Aristotelian tradition; his teachers and contemporaries adopted other sources, most notably Galen, but al-Farabi and al-Razi were followed by Avicenna in preserving the Peripatetic tradition.[162] All theories of vision in antiquity and the Middle Ages believed in some form of contact between the eye and what it sees. "Aristotle's theory of vision might be called (in the absence of a better term) 'mediumistic,' for contact between object and observer is established through the medium."[163] This is the tradition both translators

preserve.

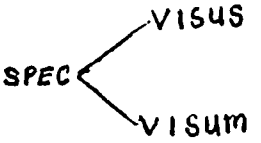
The figures themselves are curious. Al-Farabi has described four types of rays:the straight, the turned, the reflected, and the diffracted. What the first and third are is obvious; but there are explanatory diagrams as well as well as text to explain the other two. The turned are represented in the Arabic manuscripts like this:



In Gerard and Gundisalvus there is a similar diagram, though it only has half of the Arabic along with indications of where the perceiver and the perceived are, like this:

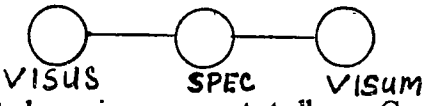


When we turn to the drawing for the diffracted rays, Gerard simply rotates the first figure 90° and indicates the mirror. This is not even close to the Arabic figure or its accompanying text, which looks like this:



Now it is clear that both figures were adapted by Gerard and that they are significantly different than the original figures; interestingly, Gundisalvus preserves Gerard's figures, which would seem to indicate that he was following Gerard's work rather than working entirely independently. His text, too, is nearly identical to Gerard's and in each of them it is hard to understand the difference between the second and fourth class of rays. It seems to me that they really did not understand this subject very well.

In this, they were not alone. In the Latin manuscript tradition the adaptation of the figures continued. In particular, the illustrator of the Bruges manuscript of Gerard changed the figure for the reflected rays to this:



This appears to me to be no improvement at all over Gerard's diagram, but, at some point, someone thought it clearer. In sum, the diagrams reflect almost no prior knowledge of optics and show no evidence of awareness of the differences between the rays that al-Farabi intended to explain.

Like nearly every other subfield among the sciences of instruction, the science of the stars, as al-Farabi taught it, had two parts: the science of the knowledge of astrological judgements and knowledge about the stars. There is nothing novel about this presentation, encompassing what we would call astrology and astronomy. In this section occurs Gundisalvus' well-known counter assignment of the names of the two fields. This was, again, one of Gundisalvus' own additions to al-Farabi's description. Once again, his specific interest was to introduce Latin terminology to his readers in place of al-Farabi's rather cumbersome Arabic descriptive titles.

His source for this apparent change is not clear. It is certainly not Hugh of St. Victor, who not only has the correct correspondence of title and content, but he also knows the correct etymology of the Greek names. Charles Burnett has suggested that there might be a source "influenced by, if not originating from, the School of Chartres."[164] He offers evidence which shows that, in all probability for his *De Divisione*, Gundisalvus had borrowed the accessus scheme from a work called *Artem artium*. In this text, astronomy is

described as being the science of the *cursus planetarum contemplativa* useful for knowing the past, present, and future. When Gundisalvus found the same basic description in al-Farabi, he applied the titles as he had received them in this (Chartrian?) tradition. It is further clear that he was not making a mistake or subject to confusion between the two terms; in the *De Divisione* astronomy was definitely grouped with the other augeral sciences: geomancy, hydromancy, aeromancy, pirromancy, and ciromancy. As in al-Farabi, the *Artem artium* described astronomy as having two parts: one concerned with motion (the theoretical) and the other (the practical) concerned with the *operibus sigillorum et imaginum per horas et momenta.* He correctly recognized the distinctions between al-Farabi's two sciences and applied the title *astronomia* to that science which al-Farabi had described as the one in which "the stars furnish proof of what will be in the future, much of what is now seen, and much of what has been."

That there was a kind of equivalence between the two terms is also manifest in the Leningrad manuscript of the *artem artium.* It reports that. "*Nomen compositum est ab 'astro' et 'norma' quod est regula, inde dicitur astrologus qui agit lege astrorum.*"[165]

The confusion of these two terms did not end with Gundisalvus. Vincent of Beauvais, in his *Speculum Doctrinale*, reproduces much of Gundisalvus' translation, though he attributes it to al-Farabi. In section XVIII.46 he presents the science of the stars, preserving Gundisalvus' nomenclature, still having astronomy refer to what should be called astrology and vice versa. More significantly, St. Thomas Aquinas, who certainly was not unacquainted with the Aristotelian scientific traditions of antiquity, also reproduces this terminology. In a general listing of the liberal arts in his *Commentary on the de Trinitate of*

Boethius, written between 1255 and 1259, he also uses the term *astrologia* as the general term for astronomy.[166] The editor and translator of this text notes that this is St. Thomas usual terminology for that science "whose subject is the heavens and the celestial bodies."[167] In St. Thomas' case, he certainly was widely read and could have derived the proper terminology from many sources, but he used this oft derided error of Gundisalvus as his standard. Perhaps the great Doctor respects the Toledan's nomenclature because of the reputation of Spain--and Toledo particularly--as the place where these "black arts" were well-known.

In his *De Divisione*, Gundisalvus also adds to his usual *accessus* scheme a discussion of when astronomy ought to be read in the curriculum. He says that it should come after geometry, but not straightaway; he tells his reader that it is a difficult subject and encourages him to read simple book, like Meleus, Theodosius, and Ascalonita before tackling the *Almagest*,[168] that famous book which supposedly lured Gerard to Spain in the first place.

In regard to al-Farabi's chapter on music, there is no need to comment here. The field has been amply covered by Henry George Farmer and I can only refer to his works.[169]

The texts of Gundisalvus and Gerard are nearly identical, but the small differences there reflect the overall preferences in translating that we have seen before. Suffice it to say that the operant divisions of theoretical and practical were in place and represent the science behind the composition of music and the performance of it. This is entirely unlike the Boethian tradition, which had been digested in Hugh's *Didascalion* and which pays almost no attention to the issues which dominate this chapter of the *Enumeration*.[170]

With the exception of optics, up to this point the mathematical sciences were those taught in the classical tradition. The final two of al-Farabi's branches of the sciences of instruction were *new* sciences, like optics. They were also to be the sciences of the future. A scant paragraph in the original is devoted to the science of statics while that of making mechanical devices is treated more fully. The discussion of statics is nearly identical in both translators, with only the slightest differences in terminological preference. In this chapter, though, are two of the rudiments of modern physical science: the knowledge of accurate measurement and the instrumental use of the principle of gravity to make practical use of the lever, the simplest machine. It is this kind of applied mathematics which is the stock-in-trade of engineering and which is given a fuller treatment in the final chapter on mechanical devices.

As to its proper name, at least as defined by Gundisalvus, *sciencia ingenium* is that science that teaches "how anything can be made to be put together."[171] This is nearly exactly the translation of one of the premier books on this subject written in Arabic, whose title was "The Compendium of [That which combines]Theory and Useful Practice in the Mechanical Arts."[172] In the description of this science, it becomes clear that the subject is dependent upon the mathematics of proportions. As the text sums up, it is in this science that those other mathematical sciences (arithmetic, geometry, optics,astronomy) find a practical application in the hands of craftsmen. Such an art was understood to stand squarely in the Peripatetic tradition: it is the bringing into reality what was merely potential.[173] If al-Farabi has any distinction from his predecessors it is in calling this subject *ʿilm* rather than *sina'at,* knowledge rather than art. However, throughout this book he does

not employ any consistency in the use of these terms so I doubt this to be significant. Prior to the translation of this text, there was no broad category to describe this practical art. The other Latin summaries, like Hugh's, rely upon the old distinction going back to Capella that simply distinguishes the mechanical (or servile) arts and the arts that make one free. But this bifurcation is not the same as al-Farabi's distinction, for few of the mechanical arts rely on the application of the principles of the quadrivium.[174] It is exactly this practical application to physical reality of mathematical principles that is what we now call engineering.

E. Natural and Divine Science

In the fourth chapter of the *Enumeration* al-Farabi set out to explain the two sciences which we would term physics and metaphysics. The first has eight parts and the second three so that there are eleven major sections. The whole discussion is determined by the Aristotelian tradition and all the references are to texts of Aristotle: for the first part, the references to texts are to parts of the *Physics* and the other physical tracts and one reference is to the *De Anima* while in the second section the solitary referenced text is the *Metaphysics* (but only referred to by Gerard). The uniformity of the two translations in this chapter is the most pronounced of the whole text.

As Mahdi noticed, none of the parts of natural science is called by al-Farabi a science; nothing is proved by them and they simply inquire into natural phenomena.[175] It is clear from the translations that the Gerard did not reveal any awareness of other sources for natural science and merely reproduces al-Farabi word-for-word, with one possible exception. Al-Farabi's influence on Gundisalvus in this science is pronounced. As I

mentioned, his text is nearly pure Farabi. If one looks beyond Gundisalvus' translation, to his larger *De Divisione*, where natural science, mathematics, and divine science are treated first (because they are al-Ghazzali's three theoretical sciences, Gundisalvus' source for the organization of this text; see above), it is clear that he knows other sources; but other than four brief citations in definitions and the like, he still prefers to reproduce al-Farabi's detailed presentation of the contents of natural science. More telling is his statement that even though natural science stands at the head of the curriculum here, it ought not be read first, but rather should be learned after logic for natural science makes use of the syllogism learned in logic,"[176] a Farabian idea. Furthermore, in the *De Scientiis* itself, while he rewrites very little of this chapter, he makes only one addition, referring his reader to Aristotle's *Meteorologica*, in what is a perplexing reference.[177] But that is not the only curiosity.

Even more interesting is his omission, at the start of the section on divine science, of the reference to Aristotle's *Metaphysics*. Usually he would be quick to reference a work of the Stagirite; given that his work is intended as a guide for those students who, as we are told in every description of Arabic science in Spain, were seeking the knowledge they did not currently have--and the *Metaphysics* is certainly an important part of that knowledge--the omission is thoroughly puzzling. Still, he leaves it out! The reference is in all of the manuscripts of the Arabic text, without question. If we look to the *De Divisione* for a clue, we find that, once again, as he follows al-Farabi he doesn't mention Aristotle's book. In fact, his explanation of the derivation of the term *metaphysics* has occasioned some derision, for he says that the name is derived from the fact that metaphysics ought to be studied "after

physics," implying that he did not understand the science at all; this is surely an overstatement, for he understood metaphysics well enough to make significant alterations in the Aristotelian tradition in order to try to harmonize it with Christian thought. All this demonstrates is that he had no command of Greek.[178] He read and translated a great many metaphysical texts; but in both of his curricular guides he does not recommend the *Metaphysics.*

I suggest that there is a perfectly reasonable explanation for this and that it is absolutely consistent with most medieval thinkers. Both Muslim and Christian thinkers who actually encountered the *Metaphysics* found it a puzzling and nearly incomprehensible book. Even the great Ibn Sina (Avicenna) reported that he had read the text more than "forty times and had memorized it" without understanding it until he came across al-Farabi's commentary, which made everything clear.[179] Similarly, for Latin medieval philosophers, Marenbon has noted that commentary was required in order to make sense of the *Metaphysics* at all and that it "was admired more than read."[180] In keeping with my overall thesis regarding Gundisalvus' translating, and adapting method, he, as a nascent *philosophus,* has at every point tried to make the material of the *Enumeration* clearer for his students. If he were aware of the difficulties of the *Metaphysics*--and it is hard to believe that he wasn't given his scant understanding of metaphysics--he may not have wished to encourage his students to read it.

Moreover, the reference may not have been understood if he had included it. It has been argued that Gerard's translation is the first time in Latin that the exact title *De Metaphysicis* is used for a work of Artistotle by Pérez Fernández.[181] He shows that

Gerard's rendering is not a word-for-word translation of the Arabic, فيما بعد الطبيعي , as the Arabic had been for the Greek, το μετα την φυσιν, but is idiomatic. He also believed that Gerard must have known Greek, "sin embargo."[182] I am not entirely convinced of this; rather, this can be readily explained by the fact that, as Paul Kunitzsch observed, "he must have possessed a rather good education in classical Western traditions for very often--though not always--he inserts the correct names of Greek authorities or other Greek names, and sometimes technical terms, which appeared in the Arabic sources in more or less corrupt transliteration."[183] He could have learned the names of scholars and texts without knowing any Greek at all. This is perhaps all that can be concluded until a specific study is done on Gerard's command of Greek. However, Pérez goes on to argue that Gundisalvus' later use of the term *Metaphysica* in the *De Divisione* as the name for the science is unprecedented in the Latin West. In his text, Gundisalvus says he took the term from Boethius, but it is not in the latter. Pérez concludes that this was the "birth" of the term in the medieval West. This may be technically correct, but I believe that it pushes the point too far. Certainly, medieval thinkers knew that Aristotle had produced a book on this subject and it's title had to be some form or other of *Metaphysica*. To press for such precision seems to me to be anachronistic.[184] For our purposes, the importance of Pérez' conclusions is that Gundisalvus probably derived his name for this science from Gerard, certainly not from al-Farabi who terms it "Divine Science," a name which he doesn't use in his chapter heading, but does use in the text.

In terms of content, all of the references in this chapter are to the works of Aristotle according to their usual Latin names; there is little that is uniquely Muslim here, except for

the most important point, and that is the adaptation of Aristotelianism to revealed religion. As al-Farabi had noted, The One who stands at the head of the chain of being "ought to be believed to be God, the most high."[185] It has been argued that Gundisalvus was an "Augustinizing-Avicennan" in his own writings, particularly, in his *De Anima.*[186] That may be so; but in this work, he is quite content to replicate al-Farabi's conclusion. More importantly, as Mahdi showed, this is "the most demonstrative" section of all of the *Enumeration:* this eleventh part of the chapter "begins and ends with demonstrations; it is the most demonstrative of all the sciences; indeed, it contains more demonstrations than all the sciences in the book."[187]. Note carefully what this means: that by the science of reason, unaided by revelation, one can come to the knowledge of God, the God of revelation. Moreover, as the discussion of Demonstration in Chapter Two showed, demonstration leads to *certainty* not opinion or belief. Thus, Gundisalvus affirms al-Farabi's contention that the philosophers who wish to know God by reason alone can achieve that end via metaphysics, but not necessarily using Aristotle's book on the subject. Considering this to be Gundisalvus' purpose would imply that he valued other sources on this subject. This calls for additional study.

F. On the Science of Civics (and its parts), Jurisprudence, and Theology

With the exception of Farmer's short translation of the section on music and Saliba's translation of the section on Mechanical Devices in Chapter Three, this final chapter of the *Enumeration* is the only portion of it to have been translated into English previously.[188] In this chapter, al-Farabi turns to one of his favorite themes; he wrote two full length books

devoted to political science, usually called (in English) *The Political Regime* and *The Perfect State.*[189] In one sense, al-Farabi was the supreme political thinker of the Middle Ages; even this chapter had a wide history of dissemination for in addition to our texts, it was translated into Hebrew twice and appeared in numerous Arabic compendia.[190] It had a limited usefulness, however, because the second and third sections are simply too tied to medieval Islamic social structures: the roles of scholars in religious law and theologians did not quite have an analog in either the Jewish communities or the Latin West. In fact, I would conjecture that the reason why Gundisalvus leaves this third section out of his translation is because he can make so little sense of it. Gerard, while including this material, doesn't understand the central terminology for what were common Islamic practices. Neither of them had the slightest idea that the third section was devoted to theology, translating the title as "On Eloquence." Gundisalvus' title, "On the Science of Civics and its parts, the Science of Jurisprudence, and the Science of Eloquence" appears to translate no known Arabic manuscript family. However, it appears to be lifted from the description in the Arabic text's proemium of the contents of the chapter. As previously noted, both translators mistranslate *kalam* as either the science of *eloquendi* or *elocutionis*. By not understanding the idiomatic meaning of this term, their difficulties in translating can scarcely be imagined: expecting a discussion of public speaking of some sort they got a discussion of the methods of debate among theological sects. Still, in the first third of this chapter there was valuable material.

In the first section, al-Farabi notes that there are basically two modes of ruling and living in society: either one is working toward what truly leads to happiness or one follows what is thought to lead to happiness but really doesn't. This can be learned in one of two

ways: one can learn the general rules or one can learn from experience. This, al-Farabi tells us, is like the craft of a medical doctor, who knows not only the general rules about bodies but also knows the specific powers of illnesses and their remedies by practice.

The second part of the discussion is devoted to *fiqh* (فقه), Islamic law, and the third to *kalam* (كلام), theology. Al-Farabi defines *fiqh* as the "art that enables man to infer the determination of whatever was not explicitly specified by the Lawgiver."[191] The clear supposition is that this is a religious law, not civil law. He describes both law and theology as being concerned with actions and opinions. How one determines the correct actions and opinions is the business of lawyers and theologians. He discusses with sagacity the differing approaches that theologians take toward divergent opinions and the relations of reason to revelation. One of the most curious things in the whole of the *Enumeration* is that here in the two most specifically Islamic sections of the book, just like in Grammar, al-Farabi has no texts to which he refers his readers. Clearly, he must have known the texts, so his silence must be otherwise explained and that explanation is simple: these subjects were treated in institutional Islamic education and books and teachers were easily found in either the *masjid* or *madrasa.*

For our translators, this chapter was full of pitfalls. As was mentioned above, Gundisalvus didn't even bother to translate the section on *kalam* even though he reproduced al-Farabi's title which had it. Gerard muddled through the second and third sections displaying absolutely no understanding of what he was translating. It is clear to me that he had no concept of the role of law and theologians in Islamic society. The fact the he again

resorts to transliteration and translating by roots indicates something of his weakness here. Throughout this section Gerard's syntax becomes nearly impossible to untangle. Importantly, it must be said in no uncertain terms that *Gerard could not have been dependent upon Gundisalvus* for he alone translated the bulk of the chapter.

In the translations, right away we discover Gerard's difficulties. As we mentioned, he rendered the reference to *kalam* in the title as *elocutio.* Where al-Farabi had listed the "positive dispositions, morals, inclinations, and states of character" that lead to a voluntary action or way of life," Gerard has "actions, customs, practices, habits, and *segea."* This last term is simply a transliteration of سجايا, which means "character." He simply doesn't know the word. It could be that, given his penchant for translating by root, he had difficulty identifying the root for it is weak in the third position, سجو ; his corrector recognized the term and noted the approximate meaning in the margin.[192] Gundisalvus, on the other hand, simply produces it as "customs and behaviors," again not dependent upon Gerard nor can Gerard be dependent upon him. Unlike the transliterations of Chapter One on grammar and of the sections to follow on law and theology, this is a general term, one in common usage, whose only difficulty is that its meaning is in no way apparent from its root verb.

The problem of translating *kalam* mentioned before is more like the problem of the chapter on grammar for this is a technical term, whose meaning is completely denotative. The differing but similar translations of this term demonstrates once again that the two translations are relatively independent. However, they also call into question the whole idea of an intermediary Romance translation for the following reasons. As the proponents of

Romance translation agree, the first translator would read in Arabic and then produce Romance, which the second translator would put into Latin. Here, that first translator, presumably fluent in Arabic, either would not have known that *kalam* referred to theology or would not have known a Romance equivalent and thus would have chosen the Romance equivalent of *eloquentia*.. It is inconceivable that an educated Muslim or Mozarab or Jew (i.e., someone sophisticated enough to have known that "on what is after the nature" (literally) meant Aristotle's *Metaphysics*) would not have known the meaning of *kalam*. If such a person knew the meaning, then it is inconceivable that s/he would have rendered it by the Romance equivalent of "eloquence". If said person were a relatively uneducated Mozarab, it is possible that s/he might not have known the meaning of *kalam* and would have translated according to the root meaning; but once again, this would have been the same person who knew fairly sophisticated metaphysical terminology. It is extremely doubtful that such a person would have been a Jew for Jewish writers from Maimonides to Ibn Ezra all used both *kalam* and *mutakallimun* in their proper, technical senses.[193] This renders the whole dragoman theory at best improbable. However, assuming this person to be Mozarabic, it is inconceivable that s/he did not know an equivalent for *segea* just a few lines above. As Gundisalvus and Gerard's corrector both demonstrate, it was not a difficult or unusual word. Thus, it seems clear to me that Gerard did *not* have the aid of someone fluent in Arabic and was left to his own knowledge of the language. Gundisalvus either had that aid or was a better Arabist. It appears to me that his corresponds fairly well with what we know of how the two men translated: Gundisalvus often used a Mozarabic or Jewish helper while Gerard worked alone most of the time; the one aid they both employed, Galib,

was a Mozarab who conceivably might not have known Islamic and Arabic technical terminology. I believe that we can say, without fear of contradiction, that for these texts, neither man had the aid of an educated Muslim. In my opinion, Gerard was working by himself from some kind of vocabulary organized by root verbs. His Arabic was limited and may in fact have been learned in the environs of Toledo for it shows certain evidence of Spanish-Arabic pronunciation.[194]

To further secure this point, in the section on law, Gerard displays no awareness of the legal technical terms *fiqh, shari'a, ray, usul,* and *mutakallimun* as used throughout the chapter.[195] In discussing religious law, al-Farabi also had included the obligatory *tasbih*, the epithets of praise for God, immediately following the mention of his name. In the first occurrence, al-Farabi wrote, "God, praise be to him" (سبحانه) and slightly later, "God, the mighty and majestic" (عز و جل); Gerard had rendered the first epithet as "God, whose fame is sublime" and he leaves the second one out entirely. Gundisalvus repeated the second one in even more garbled form, though he has severely reworked this section so that it becomes one short paragraph.[196] Thus, it is clear that no Muslim, Neo-Mozarab, or Jew helped Gerard in this section.

In essence, al-Farabi had described the way law functions in Islamic society. As Coulson has summarized the case for al-Farabi's era and the rest of the Islamic Middle Ages, "law can only be the pre-ordained system of God's commands or *Shari'a*, jurisprudence is the science or *fiqh*, or 'understanding' and ascertaining that law."[197] While Gerard reproduces the text, he has no understanding of the technical world which it represents.

When al-Farabi turned in the third section to discuss the relations between law and theology, Gerard is able to understand that he is discussing two distinct roles and he gets that of the lawyer right; when when he tries to understand that other actor, the theologian, he simply doesn't have any idea what the term means and he calls this person, *loquax*, a talkative person. If we were to stretch the Latin as far as possible, apologetically we might convince ourselves to see here Gerard striving to use a term for advocate.[198] But, as he did not understand that the name of this science, *kalam*, meant theology, we can barely expect him to have grasped that the name of its practitioners, *mutakallimun*, meant theologians, even though he knew enough Arabic to know that the latter term is derived from the former. Once Gerard moves beyond the description of social roles and function, to where al-Farabi discussed the ways various groups tried to defend their religions, he is on firmer ground.

I do find it curious that Gundisalvus leaves out this whole third section, especially as he was something of a theologian and one who was interested in defending his religion. It is in this part that al-Farabi describes those who are not yet perfected in this life as being like children, objecting to things (theological ideas) not really objectionable. He calls his readers to see the rational ways by which religion can be defended. This could have been extremely useful to anyone on the quest to becoming a *philosophus*. Yet he never used this material. My conjecture is that he failed to see past the particularity and that, like elsewhere, where he saw no direct analog to the Latin West, he refrained from introducing that material to his readers. Furthermore, as the *De Divisione* shows, he had access to a very thorough selection of conventional sources on the science of "perfecta eloquencia."[199]

G. Summary

In the preceding pages we have seen the consistent and distinct work of two different minds, with different abilities and different agendas. Gerard was a translator and Gundisalvus was, for lack of a better term, a redactor. This is not, however, to call him a mere editor or compiler. When one considers his changes to al-Farabi's text in detail, we can discern a pattern, evidence of a purpose. Gerard presents the whole of al-Farabi's text; Gundisalvus always seems to have an every for the usefulness and the potential for instruction in the text; those parts he takes. He appears to have been interested particularly in what had universal value and did not bother himself with representing traditional Islamic or Arabic material. Gerard, on the other hand, wanted all of the knowledge he could amass. Gundisalvus was free to translate idiomatically, to summarize, to add, to leave out what did not appear germane, and to make terminological clarifications because he was after useful knowledge. As we have seen, neither man was completely at home in Arabic but both were competent translators of a relatively simple text.

The dominant question of scholarship on the relationship between the two we can now explore basing our comments upon the translations themselves. Alonso had concluded that Gundisalvus translated before Gerard and that Gerard made use of his text.[200] The reasons for this conclusion were slight but real. As he showed, Gerard depended upon Gundisalvus in just one case in the Fourth Chapter where there is a reference added by Gundisalvus that is lacking in al-Farabi which Gerard also added.[201] We have found no others and neither did he! Now when one considers all the pages of text--including Gundisalvus' many additions--it seems odd that Gerard has chosen only this one to

reproduce. Alonso's conclusion seems untenable. Moreover, because Gundisalvus did not translate large sections of the work, Gerard simply could not be following him in those sections and those show no marked difference in quality from the remainder of Gerard's translation.

On the other hand, Gundisalvus could have been using Gerard and still have produced the text he did. As I mentioned in the commentary, there are a great many places where Gerard's text could only be useful to someone with a knowledge of Arabic; and Gundisalvus had that. As the more "mature" text, Gundisalvus' work is more polished and could be read by someone only familiar with Latin. He has avoided Gerard's difficulties in syntax and is more careful in his choice of terms. As Alonso also showed, Gundisalvus' Arabic was much better than Gerard's.[202] If one tries to take the circumstances of the two translators into account, it is fair to say the Gerard was influenced by Gundisalvus--but that is only to say what we already know: as the Archdeacon of the Cathedral, Gundisalvus was responsible for the educational functions and archdeacons were patrons of translators as well as translators themselves. If, as I have suggested, the chapter at Toledo functioned as a Christian school with its *majlis* or *Bayt al-hikma*, then Gundisalvus would have been responsible for its direction and Gerard would have depended upon him for guidance as well as support. In the following chapter I will consider the influence of this text on Gerard's own program of translating and that of translators who came after him. Considering all of the evidence, I would have to say that the two translations were probably made independently, though it is possible, as Charles Burnett suggested[203] that Gundisalvus used Gerard's text as a sort of "rough draft" for his own work but corrected its mistakes and

confusions and added to it from his own fount of knowledge.

That Gundisalvus' text was indeed more useful is clear from the history of the manuscripts and the transmission of the texts. There are twice as many surviving manuscripts of the *De Scientiis* than there are of the *Liber alfarabi de scientiis* and that is without counting the transmission of Gundisalvus' text within Vincent of Beauvais or the dissemination of the *De Divisione Philosophiae.* Thus, of these two it is Gundisalvus who, in the words of David Knowles, "acted as a kind of harbinger or sponsor of Arabian and Jewish thought, and helped make its introduction to the West a simple and natural process."[204] It is just possible that is precisely what he intended.

NOTES TO CHAPTER THREE

[1]Now there is no English translation of the text available; the most accessible edition is that of Angel González Palencia, *Catalogo de las Ciencias* (Madrid, 1953) which contains the Arabic text based upon the Escorial manuscript, a Spanish translation, Gerard of Cremona's Latin translation, and Dominicus Gundisalvus' version according to its first published edition. The two Latin translations are *not* critical editions. For a "critical" reconstructed edition of Gundisalvus, see M. M. Alonso, *De Scientiis* (Madrid, 1954) which also includes as an appendix the passages reproduced by Vincent of Beauvais in his *Speculum Doctrinale*; in the following pages I have noted the significant variations in the three manuscripts of Gerard's translation. I hope to bring out an English translation of al-Farabi in the near future.

[2]There is a critical edition of this text in Clemens Bäumker, *Alfarabi Über den Ursprung der Wissenschaften,*in *Beiträge zur Geschichte des Philosophie des Mittelalters* XIX (1916), 1f.

[3] Sa'id, *Science in the Medieval World : Book of the Categories of Nations*, tr. by Sema'an I. Salem and Alok Kumar, (Austin, 1991), 50.

[4] Quoted by Lerner and Mahdi in *Medieval Political Philosophy* (Cornell, 1978) 31.

[5] Fackenheim, "Al-Farabi: His Life, Times and Thought," *Middle Eastern Affairs* II (1951): 55.

[6]Makdisi, *Humanism,* 217.

[7]Here see F. E. Peters, *Aristotle and the Arabs,* (New York, 1968) 84, n. 54.

[8]The works of these two along with Ibn Khaldun and al-Farabi have been carefully compared by Ahmad Abdulla Al-Rabe, "Muslim Philosophers' Classifications of the Sciences: Al-Kindi, Al-Farabi, Al-Ghazali, Ibn Khaldun" (Ph. D. diss., Harvard University, 1984).

[9]The only study of Ibn Hazm's text is A. G. Chejne, *Ibn Hazm* (Chicago, 1982) which provides both the Arabic text and an English translation as well as some biography and commentary.

[10] Seyd Hussein Nasr, *Three Muslim Sages* (Cambridge, 1964), 134.

[11]There is a fine summary of the three in Anwar Chejne, *Ibn Hazm* (Chicago, 1982) pp. 89f. This is perhaps the only place to encounter a description of Ibn ᶜAbd al-Barr's

classification.

[12]This is Chejne's take on the three systems. All three were thoroughly Islamic, though, and one should not take their works as evidence of any kind of anti-Islamic tendencies.

[13]Thomas F. Glick, "Science in Medieval Spain: The Jewish Contribution in the Context of *Convivencia*" : 83-112.

[14] So Kalil Seemans, "Education in Islam," *Muslim World* 56 (1966); see especially p 190-91, where he argues that there were Arabs, Jews, and Christians teaching in the Jahiliyyah period.

[15]This was clear from al-Farabi's own logical training at the hand of Christians who only read Aristotle's *Organon* up to the assertoric figures and there could be no instruction in what came after that. In fact it came to be called, "The part that is not read." Al-Farabi seems to have been one of the first philosophers among those recovering Ancient Sciences to read this part. See N. Rescher, "Al-Farabi on the Logical Tradition," *Journal of the History of Ideas* 24 (1963): 129.

[16]This scheme is according to Ibn Butlan (d. 1068 CE) as recalled by George Makdisi, *The Rise of the Colleges,* 75.

[17]*Ibid.,* 79.

[18] See in this regard, Ignaz Goldziher, "The Attitude of Orthodox Islam Toward the 'Ancient Sciences'," *Studies in Islam,* ed. and tr. Merlin Swartz (Oxford, 1990): especially 189-192.

[19] Makdisi, *Rise of the Colleges,* 225. There appears to be some disagreement on whether or not such study could be carried out in the religious schools. Makdisi notes that even in conservative Baghdad of the Eleventh Century some of the subjects of the ancient sciences were taught in the *madrasa* (*Rise of the Colleges,* 217); cf. Nasr, "The Meaning and Role of 'philosophy' in Islam," *Actas del V Congreso Internacional de Filosofia Medieval* 2 vols. (Madrid, 1972), I.59-76, says that philosophy as such was banned in the *madrasa* but taught in the *Bayt al-Hikma*--which was frequently attached to the mosque (73). It appears to me that theory and practice may not have correspended completely and this could be responsible for the disagreement between these two eminent Islamists. Whatever the case, in al-Andalus philosophy was taught in the *masjid* as Ibn Hazm makes clear.

[20] Makdisi, *Humanism,* 217.

[21] School is the traditional term for these ideological divisions of religious scholars; it translates the Arabic مذهب which comes from a root meaning to follow a way, to conduct ones self, to hold an opinion; among its definitions are "adopted procedure, ideology, movement." so Hans Wehr, *Dictionary of Modern Written Arabic*, ed. by J. Milton Cowan (Ithaca, NY; 1994).

[22] David Wasserstein, *The Rise and Fall of the Party Kings* (Princeton, 1985) 174.

[23] See here Makdisi's thorough discussions in both *The Rise of the Colleges* and *The Rise of Humanism.*

[24] Makdisi, *Rise of the Colleges*, 238.

[25] Michael K. Lenker, "The Importance of the *Rihla* for the Islamization of Spain" (Ph. D. diss., University of Pennsylvania, 1982).

[26] Ch. Pellat, "Ibn Hazm, Bibliographie et Apologiste de L'Espagne Musulmane," *Al-Andalus* XIX (1954): 53-102. This contains a French translation of the text and a brief introduction along with a useful list of scholars and books named in the text (ironically, in Arabic).

[27] *Ibid.*, 90-91.

[28] *Ibid.:* "nous avons composé d'apres les règles de l'école que nous avons choisie parmi les doctrines sunnites; un ouvrage sur cette question."

[29] Henri Pérès, *La Poesie Andalouse en Arabe Classique,* (Paris, 1953). See the introductory sections of Lenker's dissertation, where he carries on the argument; however, carefully compare Lenker's sources with the material in this paragraph and its sources; to my knowledge, he never cites Sa'id or Ibn Hazm. In short, using Tabaqat of religious scholars he find that religious scholars were trained in the religious sciences and not the "Ancient Sciences." I believe the whole subject needs a thorough, more balanced presentation, which considers these witnesses.

[30] Roger Collins, *Early Medieval Spain* (New York, 1983), 173.

[31] So argues George Hourani, "The Early Growth of the Secular Sciences in Andalusia," *Studia Islamica* XXXII (1970): 143-156. See especially p. 144-150; he is followed by Joseph Puig, "The Transmission and reception of Arabic Philosophy in Christian Spain (until 1200)," in *The Introduction of Arabic Philosophy into Europe*, ed. Butterworth and Kessel (Leiden, 1994): 7-30; see here p. 8.

[32] Lenker, 77.

[33] Makdisi, *The Rise of the Colleges*, 82-84.

[34] Translated and reported in D. M. Dunlop, "Philosophical Predecessors and contemporaries of Ibn Bajjah," *Islamic Quarterly* II (1955): 100.

[35] *Ibid.*, 101.

[36] *Categories of the Nations*, Ch. 13, p 58-78.

[37] Makdisi, *Rise of the Colleges*, 87.

[38] Sa'id al-Andalusi, 49.

[39] Joaquín Lomba Fuentes, "Sentido y alcance del Catálogo de las Ciencias de Al-Farabi," *Arts Liberaux et philosophie au Moyen Age: Actes du quartiéme Congrès Internationale du Philosophie Medievale* (Montreal, 1967): 515: "no puede haber contradicción entre fe y filosofia."

[40] *Enumeration*, 89. The translation is Ian R. Netton's, *Al-Farabi and his School* (London, 1992), 41.

[41] As Netton demonstrates, 45-46, where he presents al-Farabi's epistemology in a thumbnail sketch.

[42] From the احصاء العلوم ed. González Palencia, ص. ٨ my translation. Note: The Arabic appears at the back of the book with its own pagination.

[43] John Marenbon, *Later Medieval Philosophy* (London, 1991); in the opening of this survey Marenbon paints a very clear picture of what scholars studied and how they studied it.

[44] See Taylor's introduction to his translation of the *Didascalion*, 4.

[45] Makdisi, *The Rise of the Colleges*, 246.

[46] Pierre Riché, *Education and Culture in the Barbarian West*, tr. John J. Contreni (Columbia, S. C., 1978) 288. See the section from 288-295 on monastic culture.

[47] The text of this work is given in Paul Pascal, "The *Institutionum Disciplinae* of Isidore of Seville," *Traditio* 13 (1957): 425-431. A discussion is in Pierre Riché, "L'Education a L'Epoche Wisigothique: Les *Institutionum Disciplinae*," *Anales Toledanos*

III (1971): 170-180.

[48] Horacio Santiago Otero, "Transmision de saberes entre las minorias etnicas de Toledo en la epoca de la Reconquista," *Estudios Sobre Alfonso VI y La Reconquista de Toledo: Actas del II Congreso Internacional de Estudios Mozárabes (Toledo, 20-26 Mayo 1985)* (Toledo, 1989): 219: "Está claro que no puede establecerse un paralelismo entre las instituciones culturales de España y las instituciones culturales del resto de Europa durante el siglo XI, ya que las condiciones político-religiosas eran completamente distintas."

[49] Quoted by Netton, 31.

[50] Rescher,"The Impact of Arabic Philosophy on the West," *Islamic Quarterly* 10 (1966): 4. Cf. here Dimitri Gutas' corrective of Nasr (among others) in his *Avicenna and the Aristotelian Tradition*, "Introduction."

[51] Ferdinand van Steenbergen, "La conception de la philosophie au moyen âge," *Actas del V Congresso Internacional de Filosofia Medieval* 2 vols. (Madrid, 1972), I: 43.

[52] Marenbon, *Later Medieval Philosophy*, 66.

[53] Quoted from the *Questiones Naturales* by Jean Jolivet, "The Arabic Inheritance," in Peter Dronke, ed., *A History of Twelfth Century Philosophy* (Cambridge, 1988): 134.

[54] He copied major portions of al-Farabi's *Enumeration* wholesale into his book, *Introduction to the art of Logic.* For a text and Spanish translation see Miguel Asín Palacios, *Introducción al arte de la lógica* (Madrid, 1916).

[55] *De Scientiis,* 55-56. All translations from the original sources are my own unless otherwise noted.

[56] Mahdi, "Science, Philosophy, and Religion in Alfarabi's *Enumeration of the Sciences,*" in Murdoch and Sylla, eds., *The Cultural Context of Medieval Learning* (Dordrect, 1975): 113-147.

[57] *Ibid.*, 115.

[58] Here Ian Netton's work is indispensible; see Netton, 46-54..

[59] Mahdi, 117.

[60] Osman Baker,"The Classification of the Sciences in Islamic Intellectual History: A Study in Islamic Philosophy of Science" (Ph. D. diss., Temple University, 1989) 199-200.

[61] Mahdi, 123.

[62] Gutas, *Avicenna and the Aristotelian Tradition,* 149-175.

[63] Shukri B. Abed, *Aristotelian Logic and the Arabic Language in Al-Farabi* (Albany, 1991), xix.

[64] *De Scientiis*, 17-24 where he displays parallel text; see the end of the commentary below for my assessment of this conclusion.

[65] Rivera Recio,"Nuevos datos sobre los traductòres Gundisalvo y Juan Hispano," establishes Gundisalvus' date range while Gerard is firmly attested in the Toledan Cartullary alongside of Dominucus. See Francisco J. Hernández, *Los Cartularios de Toledo* (Madrid, 1985) document 165 from March of 1174, for example.

[66] Juan Vernet, *La cultura hispanoárabe en Oriente et Occidente* (Barcelona, 1978) 93.

[67] Lynn Thorndike, "John of Seville," *Speculum* 34 (1959) 20-38, 26, who quotes the Latin and offers emendations.

[68] So Glick reports in "Science in Medieval Spain: The Jewish Contribution in the Context of Convivencia,"107, quoting Stitskin, ed., *Letters of Maimonides* (New York, 1977): 133.

[69] Sebastian Brock, "Aspects of Translation Technique in Antiquity," *Greek, Roman, and Byzantine Studies* 20 (1979): 74.

[70] *Ibid.*, 81.

[71] This corrector's work appears in the margins of the Paris, Bibiliotheque Nationale MS Latin 3557, noted carefully in González Palencia's *apparatus criticus*. Unfortunately, I have been unable to identify nor date this corrector. The knowledge of Arabic displayed is quite good and the corrections are mainly terminological and not merely grammatical, which may mean that the corrector did not have the Arabic text at hand. The manuscript catalogs have nothing to say about this hand either.

[72] P. 87 in Taylor's edition.

[73] Translated in John Tolan, *Petrus Alfonsi and his Medieval Readers* (Gainsville, 1993) as Appendix I, 172-180.

[74] *DDP*, 1.

[75]*Ibid.*, 140, ln 18f. Baur list no source for this metaphor. If it is Gundisalvus' own, it is his finest piece of creativity in my opinion.

[76] This prologue is on ٧,٨,٩ .ص of the *Catalogo.*

[77] Muhammad al-Rabe, "Muslim Philosophers Classifications of the Sciences: Al-Kindi, al-Farabi, al-Ghazali, and Ibn Khaldun," (Ph. D. Diss., Harvard Univ., 1984) 78. He says that the reasons for the sytemn have to be sought in the *Tanbih* of Farabi. Interestinly, Alonso claims that Gundisalvus also tranlated that work.

[78] Baker, 6.

[79] Robert Hammond, *The Philosophy of al-Farabi and its Influence on Medieval Thought* (New York, 1947) xiv, quoting al-Farabi, *What must precede the Study of Philosophy* (Cairo, 1901) in Arabic, 61.

[80] *Catalogo,* 121, my translation of Gerard's Latin which corresponds with the Arabic.

[81] Mahdi, 117.

[82]*Catalogo,* ١٣ .ص .

[83] *Ibid.*, 122.

[84] *Martianus Capella de Nuptiis philologiae et mercurii* (Tuebner, 1983) III.309 which uses *canones* for *regulae.* There is practically no difference in the dictionary definitions and each work is often given as a synonym for the other: see Du Cange v. 3 *Canon,* v.7, *Regula;* Neirmeyer, *ad loci.* This difficulty goes all the way back to the Greek term κανων which stands behind both the Arabic and the Latin with the same ambiguities.

[85]*Catalogo,* 121.

[86] Wehr, *s.v.* .اقيَ

[87] Tr. by D. M. Dunlop in "Alfarabi's Introductory Sections on Logic," *Islamic Quarterly* 2 (1955): 264-282.

[88] *Ibid.*, 269 for the Arabic and 278 for Dunlop's English translation.

[89] Shukri B. Abed, *Aristotelian Logic and the Arabic Language in Al-Farabi,* 133.

[90] *De Scientiis*, 61-61.

[91] See Janet Latham, "Arabic into Medieval Latin," *Journal of Semitic Studies* 17 (1972): 30-67.

[92] Kunitzsch, "Gerard's Translations of astronomical texts, especially the *Almagest*," in *Gerardo Da Cremona*, ed. Pierluigi Pizzamiglio, (Cremona, 1992): 75.

[93] Unfortunately, González Palencia has nothing at all to say about this editor, even indicating his era from his hand; the main catalogs of the BN also do not refer to him. I am still waiting on a copy of the manuscript to try to make at least a preliminary judgement about his provenance and date.

[94] One important note on the scholarship of translation: in this section Gerard translates the Arabic نطق, to articulate, as *profero*, thus lending some small measure of support to Burnett's hypothesis that the word as it appears in Gundisalvus' prologue to Avicenna's *Liber De Anima* means to read out loud; see his "Some Comments on the Translating of Works from Arabic into Latin in the mid-twelfth Century," *Orientalishe Kultur und Europäisches Mittelalter* (Berlin, 1985): 165-66.

[95] All of the *De Divisione* follows the older, Artistotelian organizational scheme as found in al-Ghazali's *Maqasid*, dividing knowledge into theoretical and practical. Grammar is considered by Ghazali as the first part of this first third of the practical (or active) sciences. This scheme is given in the opening section of the *Maqasid*. The text is accessible in two Latin editions: that of Muckle, *Algazel's Metaphysics* (Toronto, 1933) which only includes the parts on metaphysics and physics and that of Lohr, "Logica Algazelis: Introduction and Critical Text" *Traditio* 21 (1965): 223-290, which includes the sections on logic. It also does not include the preface, which Gundisalvus had not translated. This had to be intentional; but its result was that many in the medieval West thought of Ghazali as just another of the Muslim aristotelians and were unaware of his rejection of philosophy. All of this is neatly summarized in Duncan Black MacDonald, "The Meanings of the Philosphers by al-Ghazzali," *Isis* 25 (1936): 9-15 who also gives a translation of the (missing) prologue.

[96] See K. M Fredborg, *The Latin Rhetorical Commentaries by Thierry of Chartres* (Toronto, 1988):14-20.

[97] Muckle, *Algazel's Metaphysics*, 2; *DDP*, 16.

[98] *DDP*, 47.

[99] *DDP*, 45: *que omnium scienciarum naturaliter prima est, primum in duo dividitur, scilicet in scienciam considerandi et observandi quid unaqueque dictio significet*

apud genem illiam cuius lingua est et in scienciam observandi regulas illarum dictionum..

[100]*DDP*, 46.

[101] Fuad Haddad's translation of this passage (from ص٢١. in González Palencia) in "Al-Farabi on Logic and its Relation to Grammar," *Islamic Quarterly* 13 (1969): 194.

[102] Shukri B. Abed, *Aristotelian Logic and the Arabic Language*, xvii.

[103] Alonso has pointed out this consistent distinction between the two translators of this important term. However, use much of what he says about the priority of the translations with care. See the "Traducciones del Arcediano Domingo Gundisalvo" *Al-Andalus* 12 (1947): 309f. and the introduction to the *De Scientiis* which reproduces the argument, 29-31. Afnan, *Philosophical Terminology in Arabic and Persian* (Leiden, 1964) 112, shows that the term is regularly the translation of the Greek τό νοητά, "the perceptible."

[104]See Abed, xix.

[105] *Ibid.*, xviii.

[106] 16a 3-9 which is 5:4-9 in Boethius commentary. Quoted and translated by John Marenbon, *Later Medieval Philosophy* (London, 1991) 99.

[107] J. T. Muckle, ed., "The treatise *De Anima* of Dominicus Gundissalinus," with an introductory essay by Etienne Gilson, in *Mediaeval Studies* 2 (1940): 71 ff. Notice in Gilson's essay that he appears to be overly critical of the Avicennan influence.

[108] See Lohr, 243 f. for the discussion of the parts and purpose of logic according to Ghazzali's summary.

[109] *DDP*, 69.

[110] On this point see Marenbon's discussion in *Early Medieval Philosophy*, 106-108.

[111] In this section Gerard has changed his usage of terms for قوانين to *regula*. It is seriously unlikely that he is following Gundisalvus here, for the latter has altered the text too severly and Gerard shows no evidence of those alterations. This is best explained as *regula* having the wider, more general meaning of rule while *canon* had a more narrow, grammatical meaning.

[112]*Peri Hermenias* 16a5.

[113] Quoted by Marenbon, *Early Medieval Philosphy*, 32. The translation is his.

[114] *Second Commentary on the Peri Hermenias* 38:3 ff. Again quoted in Marenbon's translation, 32.

[115] On this western tradition see Marenbon, *Later Medieval Philosophy*, 28, 35-36.

[116] Nicholas Rescher, "Al Farabi on the Logical Tradition," *Journal of the History of Ideas* 24 (1963) 127-132, 129.

[117] *Ibid.*, 131.

[118] Mahdi, 117.

[119] See *Posterior Analytics* 71b15.

[120] *De Scientiis*, 83.

[121] This listing may in fact go back to Aristotle, there is a similar list of the four kinds of argument--in dialogue form--in *Sophistical Refutations* I 165b1.

[122] *Catalogo*, ص. ٤٠.

[123] W. K. C. Gutherie, *The Sophists* (Cambridge, 1971) 28.

[124] Graz, Universitätsbibliothek MS.482, f224v and Bruges, Openbare Bibliotheek, MS 486 f. 95v. I am still waiting to consult the Paris MS on which Gonzalez Palencia's printed text is based.

[125] Guthrie, 178 on Corax and Tisias and 263 on Protagoras. After rereading Guthrie I have also checked George Kennedy, *The Art of Persuasion in Greece* (Princeton, 1963) and I cannot find any Greek tradition for this accound of the sophists. Perhaps it is Syriac, though I have no idea how the Muslims derived it.

[126] Marenbon, *Later Medieval Philosophy*, 105 discusses this idea in Avicenna and his adaptors.

[127] On this point see Osman Baker, 85.

[128] *De Anima* 428a1 and 428b1.

[129] Read carefully his forthcoming article (in another Brepols' anthology; Burnett has provided me with the final page proofs for which I am grateful) on "The institutional context

of the Arabic-Latin Translations of the Middle Ages: A Reassessment of the 'School of Toledo," 214-235 esp. 216 f. where he stresses the teacher-pupil relationships; also his "Translating Activity in Medieval Spain," in *Legacy of Muslim Spain,* 1041-1045, paying particular attention to what was translated and the order of such translations.

[130]*De Scientiis,* 77-79.

[131] It appears that this listing in Gundisalvus' own composition; when it is reproduced in his *DDP* Baur's extremely thorough footnotes have no other reference for a source. Cf. *DDP,* 74-75.

[132] *De Scientiis,* 83.

[133] Gregory, "The Arabic Inheritance," 77. .

[134] See George Saliba, "The Function of Mechanical Devices in Medieval Islamic Science," *Annals of the New York Academy of Sciences* 441 (1985): 141-151.

[135] William H. Stahl, *Martianus Capella and the Seven Liberal Arts* (New York, 1971), 5.

[136]*Ibid.,* 21, n. 2.

[137] So DuCange, v. 3, *s. v.. disciplina.*

[138] Chenu, "De lexicographiephilosophique médiévale: Disciplina" *Revue de sciences philosophiques et théologiques* 25 (1936): 687.

[139] Lewis and Short, *A Latin Dictionary, s.v. doctrinalis,* which could mean "theoretical," a meaning still possible in the Middle Ages (See Latham, *Revised Medieval Latin Word List*) but that meaning is not possible here. Ultimately this term is derived from the Greek, μαθησις, from the verb μανθανω, which stands behind all the terms for mathematics; it has the basic meaning of "to learn by inquiry, to ascertain," cf. Liddell and Scott, *Greek English Lexicon, ad loc.*

[140] *DDP,* 15 and 35.

[141] Netton, 39.

[142] Chenu has shown this by quotation from other Latin philosophers, p. 688-692.

[143]*Didascalion,* Book 2.1, 62 in Taylor's edition.

[144] Cf. *Oxford Classical Dictionary*, 733-34.

[145] Samsó, "The Exact Sciences in al-Andalus," in *The Legacy of Muslim Spain*: 953.

[146]*Science in the Medieval World*, 21. *N. b.*, that in the translation of Salem and Kumar they have used "Nicomack" as the form of the name, a maddening characteristic of this translation of the *Tabaqat*; see in this regard, C. Burnett's review in *Historia Scientiarum* 3.2 (1993): 157-158.

[147]*De Scientiis*, 87, footnote.

[148]*Ibid.*, 22.

[149] Samsó, "The Exact Sciences," 953; he refers the interested reader to J. Sesiano "Le Liber mahamaleth, un traité mathématique latin composé au XII[e] siècle en Espagne;" *Actes du premier colloque internqtionqle d'Alger sur l'histoire des mathématiaues arabes* (Algiers, 1988): 69-98.

[150] William Stahl, *Martianus Capella*, 127.

[151] On this see, Paul M. J. E. Tummers, "Some Notes on the Geometry chapter of Dominicus Gundisalvus," *Archives Internationales D'Histoire des Sciences* 34 (1984): 19-24. He is convinced that Gundisalvus did not depend upon Gerard's translation of this commentary, but worked directly from the Arabic text.

[152] The relevant passage is Book 2, Ch. 13, 78 in Taylor's translation. Hugh calls the third type of measure *cosmometria*, the term preserved in the *DDP* where Gundisalvus changed to that term while he copied most of his own translation of this chapter of the *De Scientiis*. There are a couple of possible explanations for the alteration: it is not likely that it is a variant on any work of Hugh's, for even in his earlier geometry text, *Geometrica Practica* he uses the same triad. See Roger Baron, "Notes sur les Variations au XII[e] siècle de la triad Géométrique Altimetria, Planimetria, Cosmimetria," *Isis* 48 (1957):31; it could be taken from an Arabic source that they both had consulted. That there was such an Arabic text (so far unidentified) is clear from the work of William of Conches; see Taylor, notes 52 and 53 to Chapter 2 of the *Didascalion*, 203.

[153]*DDP*, 108.

[154] Referred to by A. I. Sabra, *Dictionary of Scientific Biography*, X, p 5-6. He does not give the Arabic title and this work has not been available to me.

[155] Baron, 32.

[156]*Catalogo*, ص٥٧. .

[157] *Mathematics Dictionary,* ed., James and Beckenbock (New York, 1968) *ad loc.* 353. Tummers noted that Gerard is probably responsible for the introduction of this term into the Latin scientific vocabulary in the latter sense. Characteristically, this is a literal rendering of the Arabic صم which means in its root "to be silent, be deaf" just like the Latin *surdus*; the proper term is اصو جدر , the plural of which is صم ; the origin of this term is not to be found in the Greek.

[158] *De Scientiis*; p. 91; *Catalogo* (Gerard) 147, (al-Farabi) ص. ٨٥ .

[159] Both Hans Wehr and J. G. Hava, *Al-Fara'id: Arabic-English Dictionary* 5th ed. (Beruit, 1982) have this meaning. Curiously, in Kazimirski's *Dictionaire Arabe-Francais* (Paris, n.d.), v.2 1260, he notes the Latin equivalent *cauterium serratum.* I am indebted to Herbert Mason for this reference.

[160] Cambridge, Trinity College MS R. 15.16, ff. 61v-62r. Burnett is publishing it with a commentary in a forthcoming number of *Viator.* Again, he has kindly provided me with his accepted manuscript.

[161] Personal correspondence with me, 2 and 3 March 1995.

[162] David C. Lindberg, "The Science of Optics," *Science in the Middle Ages*, ed. David C. Lindberg (Chicago, 1978), 342.

[163] *Ibid.*, 340.

[164] "A New Source for Dominicus Gundisalvus' Account of the Science of theStars," *Annals of Science* 47 (1990): 371.

[165] *Ibid.*, 369.

[166] *The Divisions and Methods of the Sciences,* ed. and trans., A. Maurer, (Toronto, 1986) 44.

[167] *Ibid.*, 44 n. 24, quoting another work of St. Thomas *In III Metaphysica* lect.7, n. 41.

[168] *DDP,* 118; the only one of these I have been able to identify is Theodosius of Bithynia (ca. 150-70 BCE). The book referred to is probably his Περι οικήσεων, a group of astronomical tables.

[169] His major work was called *Historical Facts for the Arabian Musical Influence* (London, 1930) and a series of journal articles on al-Farabi's musical writing in the *Journal of the Royal Asiatic Society* including sections of this text in 1932, 570f. and sections of the *De Ortu Scientiarum* on music in 1933, 307f. The Bibliography has full citations.

[170] See Book 2.12, "Concerning Music," p 69-70 in Taylor's edition.

[171] *De Scientiis,* 108.

[172] Saliba, 142.

[173] *Ibid.*, 143-146.

[174] See the *Didascalion* II.20, 74-75 for a typical summary.

[175] Mahdi, 127.

[176] *DDP,* 27.

[177] The reference seems out of place--even to the wrong text--for the discussion is of the relations of artificial bodies to the intent of the maker. The only passage in the *Meteorology* which appears to be moderately related to this is Book IV, Ch. 5, where Aristotle is reminding his reader to consider all the causes of phenomena, not just material one.

[178] *DDP,* 38. Clearly this passage reveals that Gundisalvus knew no Greek for if he had, he would have known the double meaning of the preposition μετα and applied the non-temporal meaning here. What this does demonstrate, though, is that he got his metaphysics from the Arabs who used the same terminology; more on this below. As to his abilities as a metaphysican, compare Copleston, *A History of Philosophy* (New York, 1962) 2:219 with Marenbon, *Later Medieval Philosphy,* 54.

[179] See *The Life of Ibn Sina,* ed. W. E. Gohlman (Albany, 1974), 16-42 and also Dimitri Gutas, *Avicenna and the Aristotelian Tradition,* 22-30, esp. 28, who presents a slightly different, more critically accurate text.

[180] Marenbon, *Later Medieval Philosophy,* 55.

[181] Pérez Fernández, "Influjo del Arabe in el nacimiento del término Latino-medieval *metaphysica,*" *Actas del V Congreso Internacional de Filosofia Medieval I* (Madrid, 1979): 1100.

[182] *Ibid.*

[183] Kunitzsch, "Gerard's Translations of astronomical texts," 77.

[184] Pérez offers no evidence of what term James of Venice used for metaphysics, even though his translation antedated Gerard's. Nor does he say what the terms were that scholars like Abelard used who knew such books existed but didn't have them. It is true that Hugh does not use the term, but I have not explored this problem further, except to note that all Latham's examples are post-1250 (though that is limited to English sources).

[185] *Catalogo*, ٩٠ ص. *De Scientiis*, 30. Cf. Ian Netton's wider reading in al-Farabi's texts to confirm this basic conception, 49-54.

[186] There is a fine summary of the debate in Etienne Gilson's introduction to Muckle's text of the *De Anima*. While I do not wish to enter into this fray over terminology, the significant matter is that (abstracted from his sources) it appears that he substitutes Augustine's (might we say a Platonic) God for the Avicenna's (dare we say Aristotelian) active intellect; it is clear that al-Farabi also created a mixed scheme of intellection, mixing Platonic and Aristotelian schemes (see Netton, 54). Does this make Gundisalvus a member of the "School of al-Farabi?" Rather than endless debate over the dominant influence, it appears to me to be significant that al-Farabi in particular provided a mostly Aristotelian metaphysics which was amenable to revealed religion and that after encountering al-Farabi (among others) Gundisalvus wrote a metaphysical tract trying to do the same thing.

[187] Mahdi, 129.

[188] By Fauzi M. Najjar in Lerner and Mahdi, eds, *Medieval Political Philosophy* (Cornell, 1978) 22-30. In this section, all translated quotations from al-Farabi will be taken from this text.The other translated tex portions are in Farmer (see note 169) and Saliba (see note 162).

[189] *Al-Farabi on the Perfect State*, tr. and ed. Richard Walzer (Oxford, 1985); *The Political Regime* is still not available in English; see *Die Staatsleitung vom al-Farabi* (Leiden, 1904).

[190] Lerner and Mahdi, 23.

[191] *Catalogo*, ٩٩ص.

[192] *Catalogo*, ٩١ص; 167.

[193] See Maimonides, *Guide*, 108, where he discusses *kalam* and the *mutakallimun* whom he calls "our Andalusis." Other Jews, like Moses ibn Ezra, called Ibn Daud *mutakallim;* see Glick, "Science in Medieval Spain," 108.

[194] Paul Kunitzsch, 74.

[195] For those unfamiliar with this terminology, there is a useful glossary in N. J. Coulson, *A History of Islamic Law* (Edinburgh, 1964) 235f.

[196] *Catalogo* ١٠٠ .ص ; 172.

[197] Coulson, p, 75.

[198] Cf. Latham, *ad loc. locutio.*

[199] *DDP*, 64.

[200] *De Scientiis*, 14.

[201] *Ibid.*, 24.

[202] *De Scientiis*, 27.

[203] Burnett, "The Translating Activity in Medieval Spain": 1045, and the attached footnote 61, 1053 where he lists all the translations of Gerard that Gundisalvus "adapted."

[204] Knowles, *The Evolution of Medieval Thought* (Longmans, 1963), 204-205.

Chapter Four

The Influence of the *Enumeration of the Sciences* in the Latin West

Earlier in this century, C. H. Haskins stated flat out, "In this process of translation and transmission accident and convenience played a large part. No general survey of the material was made, and the early translators groped somewhat blindly in the mass of works suddenly disclosed to them."[1] How he knew this, he did not say; it appears to be an inference from the data itself. However, it appears to me to be a false conclusion, reflecting Haskins' unawareness of the Islamic tradition about what comprised a philosophical education. The Christian tradition--which Haskins knew well--saw Boethius' summary in the *De Trinitate* as the classic expression of the totality of philosophy.[2] The Islamic tradition, though, was much fuller in terms of content areas and much richer in texts within those subject areas. Because of the breadth of this philosophical curriculum, a guide was needed as was shown in Chapter Two. Furthermore, Christians who wished to appropriate this tradition had even more need of a guide, for they stood outside the circles of Islamic educators who led their own students in such study; as we have seen in Chapter Three, Gundisalvus appears to have adapted al-Farabi to make him useful to Christians in an analogical way. Hence, while convenience might be responsible, it is unlikely in the extreme that the translation of al-Farabi's book was accidental. It is inconceivable that Gerard or Gundisalvus would have stumbled upon it in an old Islamic library or while leafing through the volumes of a *khizana* in Toledo.

What seems far more probable is that Gundisalvus had a teacher who knew the world of Islamic philosophy and that teacher told him where to look. The best candidate for

this would be Abraham Ibn Daud; while this cannot be conclusively proven, in one manuscript Ibn Daud calls Gundisalvus his *socius*.[3] In keeping with our interpretation of this term in Chapter Two, this would imply that Gundisalvus was a younger, advanced student of Ibn Daud. This accords well with other evidence which indicates the influence of Ibn Daud's ideas on Gundisalvus.[4] If Ibn Daud were his teacher, then Ibn Daud, trained in al-Andalus in Islamic philosophy, would have been the one who led him to the very text to which every Muslim student of the ancient sciences would have been led. That Gundisalvus sought such knowledge is clear from his other activities. He also translated the *Maqasid* of al-Ghazali but without its preface, thus providing the Christian student with another account of the divisions of the sciences that was even closer to the old Boethian tradition. If what survives indicates the range of his translating, we can say that fully twenty percent of Gundisalvus translating was devoted to the organization and division of the sciences. Gerard was not so strongly inclined to devote his energy to a preparatory field. I see this as indicating a difference in the attitude of these two contemporaries: Gerard was after knowledge itself and the texts that contained it while Gundisalvus appears to be far more concerned with epistemology and how one knows (e.g., the subject matter of the *De Anima*) and what one ought to know (the subject matter of the *Ihsa'* and the *Maqasid*). We should also number his translation of al-Farabi's *Tanbih* among this latter group, for it is the text which explains the importance of the quadrivial sciences as being "the ladder to material sciences."[5] In al-Farabi's understanding of the progression of knowledge presented in the *Tanbih*, one passes next from the physical sciences to the metaphysical. Gundisalvus absorbed this idea completely, as he wrote in the *De Divisione Philosophae*:

> To know the way in which the Most High God rules the world, to know the orders of spiritual angels, to know the laws according to which the heavenly spheres are ordered; this knowledge can only be attained if one knows astronomy and none can acquire the science of astronomy without a knowledge of arithmetic and geometry.[6]

Jolivet has characterized the acceptance of the Farabian epistemology as allowing the nascent Christian philosophers "to envisage in a new way the relations between religious knowledge and secular learning."[7] It is this new visage which is easiest to trace when one looks for the influence of the translation of al-Farabi's *Enumeration*; however, the specific curricular changes which it inspired and for which it advocated have a history as well, to which we must now turn.

A. The Direct Textual Influence of the *Enumeration of the Sciences*: Manuscripts, Copies, Epitomes.

For the two translations discussed in Chapter Three there are only eleven surviving manuscripts. For Gerard's less useful version there are only three, one each in Paris, Graz, and Brugge. All are thirteenth and fourteenth century manuscripts.[8] For Gundisalvus' *De Scientiis* there are eight manuscripts and one printed edition. They, too, are mostly thirteenth and fourteenth century copies and two are in Vienna, a very interesting one in Worchester Cathedral, England, London, Oxford, Erfurt, and Lisbon.[9] The text was published in 1638 by a Scotsman, William Chambers in Paris. González Palencia reproduced his text and Alonso discusses it in his edition of the *De Scientiis*.[10] There are also six manuscripts of the *De Divisione Philosophae* extant, but they are generally late except for one at the Vatican and one in Paris. The provenance of all these manuscripts is

difficult to determine. We do know that some were associated with great thirteenth century centers of learning: for example, Paris MS BN Lat. 14700, which De Lisle believed to be a thirteenth century manuscript once resided at the monastery of St. Victor in Paris. The Brugge manuscripts were from a Cistercian monastery of Ter Duinen in Flanders.[11] The Worchester Cathedral manuscript either was always there or came from the nearby Great Malvern Abbey, which was an important scientific learning center before the rise of Oxford. Of course, Merton College was an early center of scientific study as well. Such a distribution is what we might expect: where there were early gatherings of scholars, there went the text of the *De Scientiis*. Interestingly, in many to these same manuscripts the translation of the *Maqasid* was also present.[12] This indicates without a shadow of doubt that these early centers were indeed interested in the problem of the divisions of the sciences.

B. Influence Upon Medieval Translators and Compilers

Having established this direct, textual influence (which, by the way, always recognized this book as being from the pen of al-Farabi, even when it had been severly altered) we must turn to the question of influence. This falls under two headings: first, the immediate influence in the circles of translators in Spain and, second, its influence on other writers concerned with the problems of establishing curricular texts for scholars seeking to become philosophers, men like Daniel of Morley and the addressees of Petrus Alfonsi's letter.

If one looks carefully at the Peripatetic curriculum contained in the *De Scientiis*, one

notices that few of the works recommended in it were available in the Latin West at the time it was translated. However, in the course of the latter twelfth and thirteenth centuries, that lack was rectified by the availability of new translations of the missing texts. As Burnett has observed, the *Enumeration* "provided a template for Gerard on which to pattern the programme of his own translations."[13] For example, if we follow just the *philosophical* curriculum, the *De Scientiis* recommends that the *Categories, De Interpretatione, Analytical Prior* and *Posterior* be read. Now the *Categories* and the *De Interpretatione* were available in the Boethian tradition. Remembering the special weight al-Farabi puts on "Demonstration" (and Gundisalvus in his rewriting of that passage seems to even increase that emphasis), we should not be surprised to find that Gerard, probably under Gundisalvus' patronage, translated both the *Posterior Analytics* and Themistius' commentary upon it. When we turn to consider mathematics and geometry, al-Farabi had recommended Euclid's *Elements* and books the Latins called *al-muchabala,* properly *al-muʿamalat* in Arabic, or practical mathematics, and Nichomachus' *Arithmetic*; Gerard translated the first two.[14] In natural science, the text recommends the *Meteorology, De auditu naturalis* (part of the *Physics), De caelo et de mundi, De generatione et corruptione, De impressionis superibus, De Vegetalia (De Plantis), De Animalia, De Anima,* and the *Physics.* Gerard translated the *Physics, De Caelo, De Generatione,* and the *Meteorology.* Now the *De Scientiis*, in the section on Divine Science also had recommended the reading of the *Metaphysics* and the *De Anima.* What is really interesting is what comes after this: around 1200, after Gerard's death, Michael Scot not only copies extensive portions of the *De Divisione Philosophae* and the *De Scientiis* in his own work, but he also translated the *Liber animalium, De Caelo,*

parts of the *De Anima*, *De Generatione*, the *parva naturalia,* and portions of the *Metaphysics*. He was also a significant figure in the discussions later about the banning of the "New Books of Aristotle" in the early thirteenth century. His near contemporary, Alfred of Sarashel, translated the *Meteorology* and the *De Plantis*[15] In short, there seems to have been a program of translating at work bringing not all of the Aristotelian corpus to Latin but those parts mentioned in the *De Scientiis*. Later, other scholars would translate the remainder of Aristotle's works. That a good many of this firrst group of translators worked at or near Toledo indicates a concentrated effort that we might term a "school" in the loosest sense of the term. It appears clear to me that the *De Scientiis* certainly played a role in helping select what to translate: texts it recommends were translated earlier than other texts of Aristotle. It is equally important to compare this list with what was being translated prior to the availability of the *Enumeration* (and here Gerard's own motivation in coming to Spain to find astronomical texts is but one example); translators were primarily interested in astronomical and astrological texts, in discovering secrets and the secret science. Hugh, John of Seville, Herman of Carinthia, Robert of Ketton and Petrus Alfonsi all were primarily interested in these subjects. It is only after Gundisalvus and Gerard put the philosophical curriculum before the scholars that an interest in pure philosophy is awakened. Of course some other factor could be responsible for this; however, I find the sequence and the geographical tie to Toledo to be very strong evidence. The strength of this influence spread quickly beyond Christian Spain.

One very early curricular list that Haskins believed to have been made by Alexander Neckam (1157-1217), a friend of Alfred of Sarashel, contained many of the new books of

Aristotle. Neckam studied and taught in England and Paris between 1180 and his death and was one of the first scholars to be influenced by the new translations. He also antedates the boundary fixing and division of the curriculum which was characteristic of the new universities when they developed in the early thirteenth century for he taught "not only the Liberal Arts but also theology, medicine, and canon law."[16] The range of readings he suggests combines the older Latin traditions (including the use of epitomes like the *Disticha Catonis*) with the new philosophy and science. He knows not only the new books of Aristotle (*Posterior* and *Prior Analytics*, and the *Topics*) but also the scientific books of the *Metaphysics, De Generatione,* and the *De Anima.* In the quadrivium he recommends Euclid on Arithmetic, Boethius on Music, Euclid again on Geometry, and the Ptolemaic Tables along with al-Farghani for astronomy. When he turns to medicine, he recommends many of the newly translated texts. Thus, while he is aware of the new texts, he does not seem to have been influenced yet by questions of the divisions of knowledge and show no actual acquaintance with the *De Scientiis*, unless his use of the term "metaphysics" reflects Gerard's coining of that term in his translation, as was discussed above in Chapter Three.

However, a second level of direct influence is found in a group of texts which copied whole passages from the *De Scientiis*, sometimes without attribution, and which, ironically, had a wider circulation. The earliest of these was made by Michael Scot around 1228 in his *Liber Introductorius.* Scot, who had a long and distinguished career serving the powerful of the thirteenth century, was in turn copied by the most prolific accumulator of scientific traditions of the thirteenth century, Vincent of Beauvais, in the latter's *Speculum Doctrinale.* Michael in particular advocated the new divisions of knowledge following

Gundisalvus.[17]

It is more important to consider the influence of Gundisalvus' works on divisions of the sciences in Vincent and Robert Kilwardby. Nearly all of the *De Scientiis* was reproduced by Vincent in his *Speculum Doctrinale*, the educational component of his *Speculum Maius*.[18] In Alonso's edition of the *De Scientiis* there are forty-three full pages of nearly word-for-word quotation, all attributed to al-Farabi rather than Gundisalvus, even though the quotes are always from Gundisalvus's adapted translation. This represents nearly half of the text. In particular, he reproduces nearly all of the portion on the quadrivium, including the treatment of the new sciences.[19] Vincent moved in the highest circles of the French court of Louis IX, who commissioned the finishing of the *Speculum,* which probably was completed by 1260 at the latest. This text survives in numerous exempla and

> The influence and popularity of the *Speculum maius* can be ascertained from the numerous extant manuscripts, excerpts, epitomes, and summaries, and from the fact that the whole or parts of it were translated into French, Catalan, Spanish, Dutch, and German. It was well known to the humanist scholars of the Italian Renaissance and was printed four times in the fifteenth century, once in the sixteenth, and once in the seventeenth.[20]

Publication would not have been achieved so many times if there had not been a desire to have this compendium of all knowledge available. Like Gundisalvus's text, publication for the most part represents the end of the manuscript tradition and explains the lack of any later copies.

The other major work influenced by Gundisalvus, though to a lesser extent, was Robert Kilwardby's *De Ortu Scientiarum*, which owes nothing to the Latin translation of an

Arabic opusculum of the same name. This text, written in 1247-1248, has been called the "greatest example of the genre" of divisions of the sciences and is credited with bringing the production of such texts to a halt.[21] Interestingly, the very first quotation--which is the very first sentence--is a precis of Gundisalvus' prologue to the *De Divisione Philosophae*, which in turn is loosely modelled upon his own prologue of the *De Scientiis*. This quotation even preserves the exemplum Gundisalvus had used, though it doesn't acknowledge him as the source.[22] This indicates to me that Kilwardby had Gundisalvus text in front of him as he began his own work. At several points in his text, Kilwardby quotes Gundisalvus' definitions or distinction in the purposes or boundaries of the sciences. These citations run the gamut, but are particularly used for the sciences of the Quadrivium (Music, Geometry and Astronomy in particular) but also for the Aristotelian sciences of grammar, topics, poetics, and rhetoric. Kilwardby often approved of Gundisalvus' definition in distinction to the other authorities he had utilized. Thus, by the time Kilwardby was writing, when the whole Aristotelian corpus is available and Aristotle's "new" texts had already been banned and reinstated at the University of Paris, Gundisalvus was still an authority on the organization and definitions of the sciences, perhaps the first authority a scholar would turn to.

C. The Influence Upon the Curriculum of the Universities

That the new division of the sciences and the study of those new sciences themselves evoked a response among scholars and churchmen is well-known. As muddled as the case may be, the bans upon the study of the "new books" of Aristotle at the University of Paris

in 1210, 1215, and 1231 indicate at a minimum that there was a problem integrating this new knowledge into the received tradition.[23] One result of this controversy was the stronger fixing of the boundaries between arts masters and theology masters. This is even more striking if one considers this development in light of the earlier cathedral schools that the universities had grown out of. As Klinkenberg has summarized this change:

> The twelfth century brought the transformation of the liberal arts school to the university. This was not an extension of the previous divisions of knowledge, although within them they contained both the liberal arts schema (the arts faculty) as well as the Platonic-Aristotelian divisions of knowledge. The faculty structurewas something new. It demonstrated a universal framework, within which disciplines and discipline groupings consolidated themselves and others could subdivide at that time as they also recently had done. This framework had, however, very solid and thick boundaries. It contained only what one regarded as knowledge established on the basis of and through observation and that already was so reckoned.[24]

Awareness of these boundaries behind the disciplines lies behind Gregory IX's distinction between what theology masters and arts masters may teach. This reflects an awareness of the threat posed to theological knowledge by the thoroughgoing peripatetic pedagogic techniques that guided the new sciences. At base, Aristotle's system depends upon observation of the natural world and its phenomena. The traditional interpretations of those phenomena (i.e., *auctores*) are subject to revision, correction, rejection, or replacement if they do not conform to observed reality and reason. Hence, here reason rules. For the theologians, there was always a primary emphasis upon old authorities, the older the better. It was often considered dangerous to the faith to question authorities (who derived some of their authority not from their reason but from their great spiritual insight) solely on the basis

of reason. Because the subject matter of religion (God and the spiritual realities) are nonsubstantial, observation and categorization were of less usefulness to theologians than to arts masters. But, to the nascent philosophers, this is simply shoddy reasoning, for The Philosopher himself showed that these topics can be approached, but admittedly at the price of some doctrines, the two most significant being the doctrine of creation and the immortality of the individual soul. Therefore, one result of the arrival of the new disciplines with their new teaching methods was a reorganization of the curriculum, including the books which arts masters needed to read and those required of arts students. Just as in the Islamic world, though separated from philosophers by an equally firm boundary, theologians needed the resources of logic and reasoning to do their own scholarly work. Hence, they had no desire to see the philosophical curriculum disappear; rather, they wished it to remain in its subservient place. This order seems to have been upset by the mid-thirteenth century when more students chose to become masters of arts as opposed to masters of theology. The handmaid has supplanted the Queen.

The exact history of these changes is uncertain even though the trajectories are clear. As Weisheipl noted, "It is not easy to obtain a full picture of the normal course of studies in the medieval university. Our information is particularly meagre concerning the faculty of arts."[25] In general, at least as early as 1309, the arts faculty of Toulouse had a set curriculum which put the study of the *libri logicales* prior to the *libri naturales* which in turn preceded the Metaphysics. To be graduated from Oxford a student had to have read not only the old canon, but also the *logica novus*, the *Peri hermenias*, Aristotle's *Politics*, *De Animalibus*, the *Metheorica* and the other *libri naturalis*, *Ethica*, the six books of

Euclid's *Elements*, the Algorismus (i.e. al-Khwarizmi), the *Computus*, and the *De Sphaera* of Sacrobosco, which was derived from Arabic texts. These were considered as accepted standards in 1268. For our purposes, though, the expanded arts of the quadrivium--optics, statics, tracts on quadrants and the astrolabe, and the Alfonsine Tables were represented at Oxford as an important part of the quadrivium that everyone needed to be a master.[26] When one turns to consider these new branches of the quadrivium--the truly new elements of the curriculum without roots in the Latin West--the readings called for are as if they were read straight out of the *De Scientiis*: the Physics, the *De Caelo*, the *De Generatione*, the *Metheorica*, the De *mineralibus*, the *De Anima*, the *De Animalibus*, and the *De Plantis*. Certainly the subdivisions of the "mathematical sciences" are being followed here thoroughly.

This, too, should occasion no surprise for as the foregoing discussion has indicated a number of important early scientists were Englishmen and Englishmen who were influenced by the circles of Toledo. Were we to construct an Islamic-style chain of transmitters (*Isnad*), it would run from Daniel of Morley and Alfred of Sarashel to Alexander Neckam and Roger of Hereford to John of Blund at Oxford and finally to Grosseteste.[27] Such a chain was discerned by Southern connecting Oxford to the fringe monastic cathedrals like Worchester.[28] What is most curious about these connections is the places where they are established: the important sites are not in established, urban England, but in the West, generally in the Welsh marches. As we noted above, one of the important early manuscripts of the *De Scientiis* which also contains the *Maqasid* is Worchester Cathedral MS Q 81, a kind of scholastic miscellany dating from 1230-1240. The manuscript may have been

connected with the abbey of Great Malvern (a few miles to the south) where Walcher had been abbot, a man who considered himself a disciple of Petrus Alfonsi, and who was known for his interest in astronomy and the explanation of astronomical phenomena. Very near also is Hereford, site of the famous Mappi Mundi, but also the site of a cathedral school teaching the new science. Roger of Hereford (fl. 1170-1190) presented a curriculum including the new sciences and emphasizing that after studying grammar, dialectic, and rhetoric one needs to proceed to the natural sciences and astronomy for "all things exist in number, weight, and measure, so that of these three sciences one is led to the investigation of the things in nature, both the higher and the lower."[29] Roger must have been one of that earliest generation who acquired the texts of the new science and, while they did not make systematic use of them, still saw the importance of the new physical sciences. Roger had a school which taught scientific subjects and seems to have declined in importance only as Oxford was on the rise; clearly, by 1210 John of Blund was lecturing on the *libri naturali* at Oxford.[30] Later in the thirteenth century, under the patronage of Robert Grosseteste as bishop of Lincoln, scientific study at Oxford was always more secure than it was in the schools of Paris, dominated as they were by theologians.[31]

Even Paris was not immune to this new learning: Peters has called the effect of the new Islamic Aristotelianism "electric."[32] Ironically, even after Robert Kilwardby supposedly had written the definitive text on divisions of the sciences, the problem of philosophical pedagogy simply did not go away. There must have still been some serious debate between the theologians and the arts masters for beginning around 1230 and continuing until the end of the century theology masters began to denigrate the study of the arts, and the divisions of

the sciences in particular. Their ostensible purpose was to show the superiority of theology to the other fields of study. Their vehicle for this disparagement was the inception speech for new masters, an "intramural" activity, which can be safely assumed to represent the dominant view of the faculty and students, for it was a new masters first formal presentation to his colleagues, demonstrating his identity with them and their intellectual world. In 1230, Odo of Châteauroux delivered an inception speech in which he denigrated the arts and the masters of arts. He says in an elaborate allegory comparing the four main types of biblical exegesis with the types of horses which can pull a chariot (presumably the exegete) and the ends toward which said horses pull. The horses of "the discovery and explanation of natural science, the complexity of mathematics, the abstraction of arts, and the skill and certitude of experience" can only lead to error and never to real knowledge, but only to worldly slavery.[33] Later in 1256, the first of the Cistercian masters of theology, Guy of Aumone, again denigrated the arts using the metaphor of combat, because the learning that they advocate is pagan. The "gentile philosophers . . . offer attractive weapons and fortification but, nonetheless, fail, because they are not chosen by the Lord."[34]

More directly impinging upon the divisions of the sciences as a bone of contention, two later masters specifically challenged the divisions of the sciences as the root of the problem between the arts and theology. Galdericus, a Cluniac Master of Theology who incepted in 1258, expressly contrasts sacred science with the new science and finds the former superior and the latter wanting. He even goes so far as to claim that sacred science is super to demonstrative logic, "for sacred science's middle term is the mediator of God and man, the Man Jesus Christ."[35] Galdericus sees the sciences of the arts curriculum as only

the *ancillae theologiae*. A little later yet in 1286, Stephen of Besançon, a Dominican, again delivered an inception speech critical of the divisions of the sciences. Again he relied upon the "certain middle term" of Jesus Christ. Then, he goes even further to the heart of the disagreement between the methods and authorities of the arts masters and their contemporaries in theology: for the theologian, scripture is the source of all truth and the arts are merely rivulets draining off from it.[36] Stephen calls upon his own authorities for support and puts Seneca as well as St. Paul up again Averroes, much to the latter's disadvantage.

Spatz rightly concludes that views such as these would have been representative of the theology faculty as a whole, for the inception functioned as a gateway event: it was the final exam in one sense for a bachelor wishing to stay on and teach, and it was the first real disputation that the student delivered as a master, on his own authority. She says, "based upon these speeches it would seem that the relations and respect between arts and theology deteriorated during the thirteenth century."[37] That is undeniably true. It is also true that, as she observes, this led to the condemnations of 1277 at Paris.[38] What Spatz doesn't ask in her short paper is, Why was this the case? What brought about this animosity, even if it was only professional and not personal?

Here, I believe the answer lies in the usefulness and relative importance of the new disciplines. As many scholars of medieval science, Richard McKeon among them, have noted, the transition in education from the twelfth to the thirteenth century represented a move from the manageable to the unknowable: "The Latin Christian culture of the twelfth century was a culture of Sentences and of methods for the concordance of their

disconcordances. The translation of works of science and philosophy which resulted from the contact with Arabic culture made the culture of the thirteenth century in the West a culture of disputed questions and quodlibetal questions--questions to which new answers could be established and questions about anything whatsoever."[39] Put slightly differently by Richard Southern, the old education, including scientific education, had as it characteristic weakness "its dependence upon *auctoritates et sententiae*. . . they also defined the limits beyond which the system could not develop."[40] In theology in particular there was no influx of new materials from the East like there was in the arts. Theology was stuck; the arts were flourishing. In fact, students flocked to the arts masters from the mid-twelfth century on because they had the exciting knowledge, the new knowledge. Even with the bans on the "new" books, teaching in the arts continued to go on and every single ban was a dead letter within a few years of its issuance.

In one sense, this is ironic. In the Islamic world, the same enmity between the "ancient sciences" and the theologians had followed the same patterns centuries earlier: theologians banned texts seen as a threat to revealed religion but, at the same time, needed the specialized training in logic and philosophical demonstration that only the philosophical curriculum could provide. What each side realized was that the very meaning of important terms like knowledge and truth were being defined on very different, seemingly incompatible bases. As Gutas has summarized Avicenna's understanding of the relationship between a philosophical curriculum and ordinary Islamic education, the peripatetic classification of the sciences "represents not only the work of Aristotle or the philosophical sciences alone, but *Knowledge* itself, *al-ʿilm*."[41] The implication is clear: only philosophical

science is real knowledge; everything else is pretence.

Seen in this light, the theologians of the Latin West were retaliating against what they perceived to be an attack by the arts masters on their truth, their knowledge. Unlike our knowledge of the Mu'tazilite controversy in Islam, we have no record of the philosophers actually trying to attack and destroy the theologians and deprive them of their livelihood. Just the same, there is no question about the attitudes of the philosophers: from Petrus Alfonsi's *Letter* and Adelard's *Questiones* the education of the cathedral schools was called into question precisely on the question of whether or not they "really knew." Following al-Farabi, in our text Gundisalvus (who, we might add, was something of a theologian) specifically contrasts those who know with certainty through demonstrative logic with those who merely hold opinions and beliefs.

We must be careful here not to become anachronistic, and see this as some modern science versus religion debate. This was a debate between two worldviews, but it was not modern in the sense that the two sides were seen as irrevocably opposed. Nor were the two sides after a different goal. In the thirteenth century to know the world was of no value in and of itself: the world was, as the *Qur'an* says, the book of God. The debate was between those who wished to know God as revealed in the world, the God who gave knowledge through intellections and emanations of his own ideas, and those who merely wished to know God through his revealed Word, the real image of God in the world, Jesus the Christ.

These are not the contours of the modern debate no matter how superficially similar they might appear at first glance. They were serving the same ends in the minds of the philosophers, no matter how the theologians might misinterpret the data. Here Gundisalvus

is quite specific. As the man who had translated Avicenna's *De Anima* along with Ibn Daud and who later wrote his own work on the subject, he gave a glimpse into his intentions in the prologue to that work which addresses this faith-reason dilemma and it is worth quoting in full:

> I have carefully collected all the rational propositions about the soul that I have found in the works of the philosophers. Thus, at any rate, a work hitherto unknown to Latin readers, since it was hidden in Greek and Arabic libraries, has now, by the grace of God and at the cost of immense labor, been made available to the Latin world so that the faithful, who toil assiduously for the good of their souls, may know what to think about it, no longer through faith alone but also through reason.[42]

As Jolivet summarizes this argument, "In short, the philosophers guarantee the truth set forth in the Bible."[43] For the theologian, the Bible is its own guarantee and is in no need of defenders. But is is precisely this attitude that the new philosphers would not accept because it did not recognize the authority of God-given reason. Thus, while it was decidedly not the modern debate, it contained the seeds of it.

In this study we have endeavored to show how the development of this attitude of respect for reason and for philosophical knowledge was not a happenstance occurence nor accidental. Nor was it the result of scholars testing ideas beyond their understanding. It was, instead, a conscious and directed borrowing of Islamic developments made upon the basis of the classical philosophical tradition. These elements certainly included the texts of Aristotle, but also texts which explained the expanded Quadrivium, like mercantile mathematics, statics, optics, and astronomy as a sort of "secular learning." It also included borrowing certain institutional practices, like the *bayt al-hikma*, to accomplish the transfer of

the philosophical tradition. It probably included adapting the functions and terminology of Islamic scholasticism--and imitating their institutions--for similar purposes which made the education in the peripatetic tradition possible. If we have found any "School" at Toledo, it is one that has more in common with one found in a mosque than a cathedral. Perhaps, we have found that twelfth century translators, whether consciously or not, paved the way for a curricular change in the Western Latin Universities that could barely have been conceived in the eleventh century. These are not small accomplishments; nor ought they to be devalued because they are not "original." Instead, they seem to me to be completely in keeping with both the Christian and Latin traditions which they sought to serve. Rightly understood, we are still in their debt.

NOTES TO CHAPTER FOUR

[1]Haskins, *History of Medieval Science*, 18.

[2] See here, James Weisheipl, "The Nature, Scope, and Classification of the Sciences" in Lindberg, ed., *Science in the Middle Ages* (Chicago, 1978): 470-471, especially his Chart 3.

[3] See M. T. D'Alverny, "Avendauth": 20.

[4] M. M. Alonso, "Las Fuentes literarias de Domingo Gundisalvo" *Al-Andalus* XI (1946) 159f.

[5] Al-Rabe, "Muslim Philosophers' Classifications of the Sciences": 92-93. This can also be compared to al-Farabi's *Tahsil*, p. 21 where he deliniates the movement of understanding from mathematics to metaphysics.

[6] *De Divisione*, 39. The translation is Jolivet's, "The Arabic Inheritance" in P. Dronke, ed., *A History of Twelfth Century Philosopy*, 137-138.

[7] *Ibid.*, 137.

[8] Paris, Bibliotheque Nationale MS Latin 9335; Graz, Universitäts Bibliothek MS II 482; and Brugge, Openbare Bibliotheek, MS 486For the dating of Paris manuscripts, Leopold DeLisle, *Inventaire de MSS Latin* (Paris, 1871) and for Brugge, *Catologue des MSS de la Bibliotheque Publique de Bruge* (Brugge, 1859). I have not consulted a catalog on Graz but the manuscript appears to be late thirteenth or early fourteenth century.

[9] Vienna, Dominikanerklauster MS 121; Vienna, Bibliothek National MS 2473; Worchester, Library of the Cathedral MS Q 81; London, British Library, MS Cotton Vespasian B-X; Oxford, Merton College MS 230; Erfurt, Wissenschaftlich Allegemein Bibliothek Erfurt, MS Amplonia F32; *Idem*, MS Amplonia, Q 295; and Lisbon, Fondo Generale, MS 2299. I derived the list from Alonso's introduction to the *de Scientiis*.

[10] SeeAlonso's introduction, 11 and González Palencia, 87f.

[11] I derived this provenance from A. Judy's introduction to Robert Kilwardby, *De Ortu Scientiarum* ed. Albert Judy (London, 1976), xx. The important manuscripts of the *De Divisione Philosophiae* are: Rome, Vatican Library, MS Lat 2186, which is of thirteenth century origin, Oxford, Bodleian Library, MS Digby 76 and Paris, Bibliotheque Nationale, MS Lat. 14700, which deLisle also thought to be thirteenth century.

[12] See Charles Lohr's listing on 232-235; for our purposes Worchester Cathedral Q 81, Merton College 285, Graz 482, and Paris BN 6443 and 14700 also include al-Ghazali's text in Gundisalvus' translation.

[13] Burnett, "Translating Activity", *The Legacy of Muslim Spain*, 1045.

[14] See Richard Lemay's expanded list of Gerard's translations in *DSB* XVI, 176-190.

[15] There are lists in G. Hourani, "The Medieval Translations from Arabic to Latin made in Spain," *Muslim World* 62 (1972), 110-113 and David Lindberg, "The Transmission of Greek and Arabic Learning to the West," in his *Science in the Middle Ages*, 65-67.

[16]Haskins, "A List of Text Books from the close of the Twelfth Century," in *History of Medieval Science*, 360.

[17] Recently Burnett has been studying this problem rather closely and has an article in press on the relations between the texts of Vincent, Michael, and Gundisalvus.

[18] On Vincent see Gregory Guzman, *s.v.* "Vincent of Beauvais," *Dictionary of the Middle Ages*, v. 7.

[19] See Alonso, *De Scientiis*, Appendix I, 143f.

[20] Guzman.

[21] Nancy Spatz, "Divisions of the Sciences in University Master's Inception Speeches," unpublished paper delivered at the American Historical Association Annual Meeting, January 1994, San Francisco, 2. I wish to thank her for provideing me with a copy of the paper.

[22] See Kilwardby, *De Ortu Scientiarum*, 9.

[23]The best clarification that I have discovered was in "Reconsidering the Intent and Effect of Pope Gregory's Decrees of 1231 Concerning the study of Aristotle's *libri naturales* at the University of Paris," a paper presented by Stephen Williams of the University of New Mexico also delivered at the 1994 AHA meeting which still remains unpublished. Williams has looked carefully into the personalities involved in the 1231 bans and at the papal correspondence as well as the charters of the university. What he sees is not a universal ban but rather as a question of academic boundaries and propriety. Pope Gregory IX created a committee to study the troublesome books and the commission seems to have done its work: the verdict appears to have been that the books on natural science could be studied by even theology masters "who can study and use natural philosophy but

must not become natural philosophers themselves." This appears to have left the arts masters free to use the *libri naturalis* and to teach and think like natural philosphers. Certainly the books were back in use at Paris by 1240.

[24] Hans Martin Klinkenberg, "Divisio Philosophiae," *Sciencia und ars im Hoch- und Spätmittelalter*, 2. Vols. (Berlin, 1994): I, 5.

[25] Weisheipl, "Curriculum of the faculty of Arts at Oxford in the Early fourteenth century" *Mediaeval Studies* 26 (1961): 145.

[26] *Ibid.* 168-176, provides an extensive listing of subjects and the texts derived from the Ancient Statutes of the University of Oxford. He does not say what text of al-Khwarizmi was being referred to.

[27] Burnett makes it clear that Alfred used Gerards's version of the *de Scientiis* in his article, "The Introduction of Arabic Learning into British Schools" eds., Butterworth and Kessel, *The Introduction of Arabic Philosophy into Europe* (Leiden, 1994): 49-53. Thorndike makes it clear that Daniel's list of the 8 branches of learning is "the same one that Gundissalinus repeated from al-Farabi" *DSB* V. 15 *s.v.*"Daniel of Morley,": 174; F.E. Peters makes the same points about John of Blund and the road to Oxford of this new divisions of the sciences.

[28] See his *Medieval Humanism* pp.162-171.

[29] J. C. Russel, "Roger of Hereford: Bringer of Arabic Science to England" *Isis* 18 (1932): 21: "*sicut cuncta numero, pondere et mensura consistunt ita horum trium scientiis ad rerum naturam investigandum, et superiorum et inferiorum pervexit.*"

[30] F. E. Peters, *Aristotle and the Arabs*, 221.

[31] David Knowles, *The Evolution of Medieval Thought*, 279.

[32] Peters, *Aristotle*, 222.

[33]Here I am quoting the translation of Odo's speech from Nancy Spatz's paper delivered at the 1994 AHA Annual Meeting (see footnote 19 above), 4.

[34] *Ibid.*, 6.

[35] *Ibid.*, 8. See also her "The Inception Speech of Galdericus" in *AHDLMA* 61 (1994) 134f. This same quote occurs on 142-143.

[36] *Ibid.*, 10.

[37] *Ibid.*, 12.

[38] *Ibid.*

[39] McKeon, "The Organization of the Sciences and the Relations of Cultures in the Twelfth and Thirteenth Centuries," in Murdoch and Sylla, eds., *The Cultural Context of Medieval Learning* (Dordrecht, 1975): 182-183.

[40] Southern, *Medieval Humanism,* 59.

[41] Gutas, *Avicenna*, 158.

[42] Quoted and translated by Jean Jolivet, "The Arabic Inheritance": 142.

[43] *Ibid.*

APPENDIX

A Translation of Gundisalvus' *De Scientiis,* which is itself a translation of al-Farabi's *Kitab Ihsa' al-ᶜulum*

A NOTE ABOUT THIS TRANSLATION

As anyone who has ever undertaken a translation knows, it is as much art as science. The Art involves the large, preliminary questions: Should this text be translated literally or idiomatically? Should the English reflect the character of the original language? Which style is appropriate for this particular text? The Science comes in knowing how to technically represent the content in English; to do this one must know the subject matter at hand, the ideas it expresses as well as those that stand behind it, and something of the intent of the author in presenting the material in its expressed form. The mix of the answers to these two sets of questions sets the parameters of translation.

For this text, the problem is complicated in that this is a translation of a translation. I have decided to treat it as Alonso did in his critical edition, i.e., as Gundisalvus' own work. For my reader, this means that this should not be taken as al-Farabi's work. As Chapter Three (above) has consistently shown, Gundisalvus worked by omission, contraction, consolidation, and , ironically, by addition. Unlike the literal translation of Gerard of Cremona, he was only generally faithful to al-Farabi's text. At times, this text stands as a complete rewriting of al-Farabi; in their respective critical editions Gundisalvus' work is only one-third the length of al-Farabi's.

In general, I have endeavored to produces a rather literal translation, but one that can be read easily. This has involved smoothing out some difficulties of the Latin; in particular, the Latin expression is often elliptical, particularly in the use of pronouns, of which there is an overabundance. This reflects the Arabic text which stands behind it, as does the incessant uses of introductory particles (usually *quidem* or *vero*). Most of these simply have to be left untranslated to produce good, readable English. In addition, there are places where the meaning of the text is not clear; to translate those passages I have resorted to comparison with both Gerard's literal text and Gundisalvus own later work, *De Divisione Philosophiae*, which frequently has more polished expression and often includes comparative material from other philosophers so that the point under consideration can be more easily established. Of course, I have consulted the Arabic original as well, though for the reasons already stated, it is not always helpful. Where I have added an interpretive word or phrase, I have simply included it in the text to avoid the intrusion of brackets and other devices that interfere with reading. Such inclusions are few in number anyway.

The value of this text is tied to the fact that medieval western European scholars *believed* it to be the work of al-Farabi and, as such, for many it was their first introduction to the Islamic philosophers' Peripatetic curriculum. For those wishing to gain the "wisdom of the Arabs" this text, along with translations of Avicenna's *Shifa'* and al-Ghazzali's *Maqasid*, was the introduction to the divisions and contents of the sciences beyond the *trivium*. Thus, it was written for and read by people either interested in philosophy already

or who wished to become familiar with it. Their concern was with content *not* style. For its translator, the repetitive sameness of this text and its laundry-list like character is impossible to overcome; however, the interest of modern historians of science and intellectual historians also lies precisely in the contents contained in these successive lists. That content I have endeavored to bring faithfully to the reader lacking competence in medieval Latin.

DE SCIENTIIS

GUNDISALVUS' PROLOGUE:

Some time ago, when there were many philosophers, nevertheless, he alone used to be called simply "a wise man" who was thought to comprehend all the knowledge of things with certainty. Now, however, with the world having grown old, I do not call anyone "a wise man," but something less, for no one deserves to be called "philosopher," because whoever wishes to seek wisdom in this field scarcely discovers anything. For this reason, we believe ourselves to be satisfied with the crumbs, when we are not able to taste everything; but, at least we can taste something of one kind or another.

AL-FARABI'S PROLOGUE:

Hence, in this book our intent is to touch briefly upon the well-known sciences and what is taught in every one of them and how the parts of each of them are designated. We propose to investigate this in five chapters: the first of these is about the Science of Language and its parts; second is about the Science of Logic and its parts; third are the Mathematical Sciences, which are Arithmetic, Geometry, the science of Optics, the science of the teaching about the stars, the science of Statics, and the science of the Making of Mechanical Devices; the fourth is about the Natural Science and its parts and also about Divine Science; the fifth is about the Science of Civics and its parts , including both the science of Jurisprudence and the science of Eloquence.

Many uses can be discovered for this little book. When anyone wishes to learn some additional science, on the basis of this text he shall know which of the sciences is considered preferable and toward which he ought to direct his effort, and which of them is useful. After reading this book and having made comparisons between the sciences, he will not be deceived in distinguishing the liberal arts from the other arts; he shall know clearly which of them is better or which is more useful, which is more certain and which is stronger.

Consequently, on the basis of his reading of this book, it will be easy for him to be able to convict of lying the person who misrepresents himself as knowing some science. For when he is asked what the parts of that science might be and what its contents are, he will not know how to respond. But, the one who keeps this book close at hand will appear skilled in all the sciences. For truly he cannot be considered to be an expert in some science who appears to be ignorant of what that science studies and of how many parts it has and of its contents.

CHAPTER ONE
On the Science of Language

Naturally, of all the sciences, the science of language is first. This first science is divided into two parts, namely, the science of reflecting upon and observing what each word signifies to the people who use that language and the science of observing the rules of expressions for that language. For in every art, whether it be practical or theoretical, one of the liberal arts or one of the mechanical ones,all things, or at least many things, are determined by rules to be of one kind. On the basis of these rules each art treats its subject matter. Indeed, things are discovered in this manner so that by these rules all that ought to be considered belonging to this art is known and so that accidentally what doesn't belong to it might not be considered in might it nor reject what properly belongs to it; and that by these rules we can test whether by chance we might be erring in some way. By these rules we may comprehend and observe easily what is in any art.

One singular thing is not made an art unless, when it is comprehended by a rule and apprehended in the human mind, it is found to be of some known order. Not only are expression perceived to be true in this way, but also all the instruments of all the sciences. When in some art there used to be an error by chance, the ancients used to call upon a rule, just as in the mechanical arts, where there is the straight ruler, the compass, and many other guides for other circumstances.

Regarding expressions of signification in every language, some are simple, such as "man" or "animal", and others are compound, such as "man is an animal." Some of the

simple expressions are proper, like "Socrates" or "Plato"; others are common, such as "man" or "animal." In regard to the common expressions, some are nouns, some are verbs, and some are prepositions. But these divisions are not the same for all peoples. In every manner in which they are made, there happens to be an appropriateness to them all: for nouns there is the masculine and the feminine, the singular and the plural and certain other things. For verbs there are moods, tenses, and certain other things.

Now in every nation the science of language is divided into seven parts; namely, they are the knowledge of simple expressions, the knowledge of public speaking, the knowledge of the rules for simple expressions, the knowledge of compound expressions, the knowledge of the rules for correct writing, the knowledge of rules for correct reading, and the knowledge of the rules for writing verse.

The knowledge of simple expressions teaches what every single word signifies, whether it is a genus, a species, or of some other mode.

The knowledge of compound expressions is about speaking, which orators or poets or wise men or the eloquent utilize among their own people.

The knowledge of the rules of simple expressions inquires into the utterance of letters and the number of them, about whether they are voiced or unvoiced, about the letters that can be joined together in syllables, about syllables which can be joined together into words, and about words and the occurrences of each of them.

Truly, the knowledge of the rules about compound expressions teaches what is appointed for a speech and with what words it is done.

The knowledge of the rules of correct writing teaches what the letters are and with

what strokes they ought to be written and which ought not to be used. This is called Orthography.

Truly, the knowledge of correct reading teaches divisions, subdivisions, and medial divisions and accents: grave, acute and circumflex.

The knowledge of the rules for making poetry teaches in the first place which syllables are long and which are short; then, what are the feet and caesura; next, it teaches about the various types of meters. But the variety of meters make numerous and diverse feet and they are called either by the name of the foot or by the name of the inventor.

CHAPTER TWO
The Science of Logic

However, the science of logic intends to give rules by which we perceive the truth of discourses either for ourselves or for others; or they perceive the truth for us or for someone else. Nevertheless, we need the rules of logic for verifying all discourses. Among those things which we utilize in reasoning there are some statements that do not need proof; for example, "The whole is greater than its parts" and "Every three is an odd number." There are others that do need to be proved because someone could be deceived by them.

Clearly, the things by which proof can be made are of two kinds: I mean words and thoughts. Words belong to the voice and thoughts to the mind. Explanation can be made with both of them. For an explanation that is a word is an external, expressed reason. On the other hand, the reason with which anyone can verify his own thoughts for himself is the *logos* fixed in the mind; certainly that reason by which he can verify these thoughts for yet another is the exterior, expressed *logos*. Truly the *logos* by which thoughts are verified the ancients called "the syllogism," whether it was fixed in the soul or was expressed in words.

Although Grammar and Logic agree in this, that both give the rules for words; nevertheless, they are different in that Grammar gives the rules for words of only one people while Logic gives the rules for words suitable to all peoples. It is fitting that in many ways peoples agree about the rules of the grammatical arts; namely, that some words are short while others are long; and that some are simple while others are compound; and that among the simple, some are nouns, some verbs, and some prepositions. Still, the science of grammar in every language concerns itself with what is appropriate to its own tongue. It

does not care if it conforms to other peoples' languages or not. Logic, though, does not give rules for words except in as much as the words of all peoples conform to those rules .

The interpretation of logic is understood from the substance of its intent. For logic is said to be derived from *logos* according to three intentions: *logos* in Greek is translated into Latin as *ratio.* But *ratio* in another sense is the external expression whereby language interprets what is in the mind. In yet another sense it is the *ratio* fixed in the soul, which is called a mental conception, that the words signify. Thereby the first of these two is what does the signifying and the second is what is signified. Third is that characteristic created in humans which discriminates between good and evil and which apprehends the sciences and the arts. This is in all people, but in certain adults and infants it is undeveloped, not being strong enough that it can perform its own actions, just as the feet of infants make for unsteady walking or as a small fire is unable to burn a great log, of just such a nature is this characteristic in demoniacs and drunks.

Therefore, because this science gives the rules of the expressed *logos* and of the internal *logos* whereby it demonstrates in both of these that third *logos*--the one residing in humans from creation--and, because it directs them in comprehending what is right, on that account it is named Logic, from a name derived from *logos* on the basis of these three modes. However much the many sciences that give the rules of the external *logos*, like the science of grammar, are called by the name "logic", still this science, that directs them in what is necessary in all modes of logic, is most worthy of this name.

These methods by which knowledge is verified are five: namely, Demonstration, Topics, Sophistics, Rhetoric, and Poetics.

It is the property of Demonstration to give certain knowledge about propositions in question, whether for one's self or others, whose contradiction should be impossible and within which no deceit can exist.

It also is the property of Topics to establish confidence about matters doubtful of rational proof either by truth or probability.

The property of Sophistics is to simulate or dissemble, both to make one believe to be true that which is not true and its converse. Sophistic is the name for the power by which a man has the knowledge for deceiving others and leading them into error, while he, in himself, might be good. In Greek, Sophistic is composed of "*sophos*," namely wisdom, and "*istos*," namely, deception. Sophistics is, therefore, the wisdom of deception and the sophist, the wise deceiver. Each person in whom a power of this type for deceiving and leading into error inheres, when that person utilizes his own art well, rightly is he to be called a Sophist; and his works, proceeding from that power, are works of Sophistics.

The property of the art of Rhetoric is by its persuasive words to move the soul of the hearer and incline him to what the speaker wishes, so that what he says might be believed and produce in the hearer knowledge that is close to certitude.

The property of Poetics is by its own words to make in the imagination something beautiful or foul, that does not actually exist, so that the hearer believes it and either abhors or desires something. For however much we might be certain that such a thing is not in fact true, nevertheless the image is aroused in our soul either to its horror or delight as we imagine. For sometimes imagination is more effective in humans than knowledge or thought. Often human knowledge or thought are opposite to the imagination; at that point,

a person is affected by what he imagines rather than by what he knows or thinks.

These, therefore, are the types of syllogism and the syllogistic arts and the types of proof which humans use to certify something in all matters. But these five can also be called by these names: the Certain, the Probable, the Erroneous, the Sufficient, and the Imaginative. Every one of these has elements particular to it and common elements which each shares with the others.

Expressions are called syllogistic whether they are fixed in the soul or are external and expressed by the voice. But those have been fixed in the soul by the many ordered and connected intellections, enabling them to verify other things. Truly, those external, voiced expressions are composed of many words, joined, ordered, and signifying the corresponding intellections. The expressions come forth from the intellections so that what is brought forth helps to verify something for the hearer. Now among these extrinsic expressions, the minor ones are composed of two words; similarly, among those fixed in the soul, the minor ones are composed of two simple intellections. Those minor, compound syllogistic expressions consist of two simple expressions. Those composed of many expressions are indefinite.

Now, certain knowledge of the truth is not to be had except through demonstration; therefore, it was necessary for a book to be composed which teaches how and by what means demonstrations are made. On this basis the book which is called *Posterior Analytics* or the *Book of Demonstrations* was composed; but, since demonstration cannot exist except on the basis of syllogism, syllogism which actually consists of propositions, a book was, therefore, necessary in which is taught how many and of what kind are the propositions and how, according to what modes and figures of speech syllogisms are to be woven. On

this account the *Prior Analytics* was made. But, since the propositions of syllogisms cannot be composed unless they first are assembled from their own terms, it was, therefore, necessary that there be a book which teaches of what and of how many terms a proposition consists. Truly, that is easily taught in a book which is called *The Book on Interpretation.* But, since propositions are never well-composed of terms unless first the significance of those terms is known, therefore the *Book of Categories* was instituted for teaching how many types of terms there are and what the significance might be of each of them.

Thus, there are eight parts to logic: Categories, Interpretation, Prior Analytics, Posterior Analytics, Topics, Sophistics, Rhetoric, and Poetics. The names of the books are produced from the names of the sciences which are contained in them; and for their parts, each of them has appropriate matters which it treats and which it intends and modes by which it treats them, and a usefulness which proceeds from it.

However, because the fourth part is of a stronger nature, it excels all the other parts in dignity and sublimity; in the whole of logic, one is not directed primarily except by the fourth part. The other parts were not invented except on account of the fourth. For while three parts are antecedent to it in order of teaching, they are nothing but preparations and introductions to it. Those that come after it were invented for two causes: one is that, because each is like a tool of the fourth part, perfection is upheld and aided by some means or other; for example, that by probability or persuasion people become accustomed to being moved gradually who, inevitably, do not know how to turn in necessity to demonstration; as is appropriate, certain kinds of aid can be great, others are small.

The second cause is on the basis of caution. For if these parts are not distinguished

by the appropriate names and by the proper rules and intentions. Surely it happens that when a man desires by proof to comprehend the truth and have certainty about some matter, if he does not know whether to utilize Topics or Rhetoric or Sophistics or something else, then he instead it is more likely that he will make an error and nothing will be made certain; instead, he ends up with what is believed or imagined, and being so deceived, he thinks himself most perceptive of certainty: having sought the truth, he instead becomes involved with error and doubtfulness.

Consequently, the four parts following Demonstration were invented for this purpose: that the properties of their rules and intentions might be distinct, so that when anyone wished to make a topical argument--or a sophistical one or one of the other types--he knew by which rules this could effectively be done, and he could discern between the arts of logic, knowing by which certainty could be attained and by which only faith or opinion.

CHAPTER THREE
On the Mathematical Sciences

Truly the mathematical sciences are divided into these parts, which are Arithmetic, Geometry, the knowledge of Optics, the science of the Stars, Music, the science of Statics, and the science of the making of Mechanical Devices.

Arithmetic is the science of number. Number may be considered under two headings: in itself and in things. The first arithmetic is practical, the other theoretical. It is the practical which inquires about number, of what quantity something is, in what manner it may be used in commerce or public business. The theoretical inquires about number when it is stripped of all sensible matter and imperceptible matter; that is, according to what the mind perceives absolutely, without any consideration of matter and without any motion and abstracted from anything that is able to be numbered by it. The latter consider what happens to their essences in themselves; for this reason they may be mutually compared, for example that some are even and some are odd, some are in excess and others are diminished, and all the other things that are easily able to be discovered in the *Arithmetic of Nichomachus.*

Everyone of these has parts. The parts of practical arithmetic are two: the science of combining numbers and the science of separating them. What teaches the combining of numbers is either the science of adding or of doubling or of multiplying. That which teaches to separate is either the science of subtraction or of averaging or of dividing. The science of discovering roots is contained in both divisions and the roots are discovered by both dividing and multiplying .

For these there are types of many practical uses: one is the knowledge of selling and compensation; another is that of currency and lending, another is of employment and leasing; another of spending and saving; and yet another is knowledge of depth and height of a discovered space. Of all these many types, one may comprehend them most easily in a book which the Arabs call *Mahamalech* [Arabic=al-mu^{c}amallat].

Similarly, in Geometry some of it is practical and some passive or theoretical. Active geometry considers lines, planes, and solids in three modes: when involving height, it is called the science of height measure, when within the plane, it is called plane measure, and when about depth, it is called depth measure. Each of these sciences has appropriate instruments and appropriate artisans, who are the surveyors or workmen. Surveyors are the ones who measure the surface of the Earth wherever you wish; their instruments are the hand, the foot, the cubit, the stadium, and the pole and the mile and many other things. The workmen are the ones who among engineers or workmen dressing the material down, like carpenters in wood or blacksmiths in iron or potters in clay or stone; thus, similarly all artisans of the mechanical arts work according to practical geometry. For out of these same materials these workmen shape lines, surfaces, squares, and circular shapes in the body of the material that is subject to their art. Of the many types of manufactures that exist, they are named according to the diverse materials from which they are crafted; and their instruments are diverse, such as the rule, the ladle, the square and many others.

However, theoretical Geometry considers lines, surfaces, squares, and circles, *etc.*, according to the common manner by which all lines or all surfaces or all solids are encountered in every material. This science inquires about lines, surfaces, bodies, and

figures and their quantities, equalities, inequalities, types of construction and order and what might correspond to one but not another, what would be reasonable for one, but weak or irrational in another; and all other matters which pertain to this.

Of this science there are two parts: one considers only lines and surfaces, the other, bodies. But the one that considers bodies is divided according to the number of types of solids, whether in cubes, pyramids, spheres, columns, prisms, or cones. For all of these, the consideration proceeds in two modes: in one, each type is considered for its own sake as, for example, lines as lines, planes as planes, cubes as cubes, and so forth about the others. In the other mode, each of these is compared with one of the others according to what happens in it. These are compared within their own types, either being considered equal or unequal, or something is compared to one of its accidents, or it considers how one thing is arranged in another: like how lines are in planes or planes in solids, or planes in planes, and solids in solids.

It is fitting to know what Geometry and Arithmetic have as their elements, by which many things are made clear. Even though the elements are finite, what can be made clear in using them is infinite. Hence, the book of Euclid, in which are the elements of geometry and arithmetic, is called *The Book of the Elements*. This book considers using one of two modes: one is of resolution, the other of synthesis. The ancient commentators made use of both these two modes in their books. But in his book Euclid only follows the way of synthesis.

The science of Optics inquires about the same objects as geometry; for example, about figures, sizes, places, order, equality or inequality, and other matters, but in this

science they are considered absolutely, as they occur in lines, planes, and solids. Thus the speculation of geometry is more common than the speculation of this science. But although what is under consideration in this science is bound up with what is treated in geometry, nevertheless, it is not superfluous but necessary, because the things that Euclid necessarily proved to be quadratic, when looked upon from another perspective, appear to be round or planar; those that are equidistant appear to run together, and equals appear to be unequal and *vice versa*; and of those situated in a plane, certain ones appear lower, some others higher; some appear closer while others seem farther away and the converse. For all these reasons this science is necessary, to discern between what appears to be different than what it really is and that which appears just as it is.

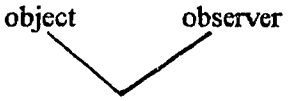
For this science teaches by which of the causes these illusions occur and it does this with the necessary demonstrations. Hence, it teaches in what ways sight is able to make errors so that it might not err but perceive all things that it looks upon as they are.

It teaches how to obtain the height of trees and walls and the breadth of streams and their depths and heights of mountains looking over their boundaries. Next it teaches the protraction of heavenly bodies and their quantities, all that is able to be acquired to do this from the reflection of their appearances. Some of them require the use of instruments and some do not.

It also teaches that anything that is seen is not seen except by rays penetrating the air, each one falling upon a thing, and by this means we see it. The rays penetrate passable bodies all the way to what we see: some are straight, some are reflected, some are turned around, and some are diffracted.

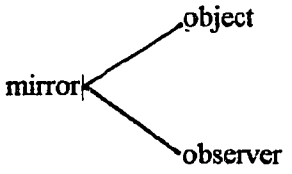
The straight are those that come forth from the seen object, carrying its own image and proceeding following a straight line as it penetrates the eye.

The reflected are those which begin to proceed from the seen object but before they can pass through, a mirror turns them and they are reflected obliquely toward the side parts of the mirror until at last they are extended to the side toward which they were turned, coming to that which appears to be within reach, like this:



Those that are turned around are the ones that return from a mirror following the same path by which they first passed, to the body from which that image it had exited. Thus, a man who is looking sees his own image with the same rays.

The bent are those which return from the mirror to the object, from which the image had exited, having been twisted from that path to one of its sides and falls upon what is behind the observer, or to the right or to its left or above him. Whereby a man sees what is behind him or at one of his sides according to the following figure:



And the medium between the object seen and observer or the mirror are always pervious bodies like air, or water or transparent solids.

Hence, the science of Optics inquires about all things that are seen and about all things that are seen with these four rays in any mirror and about all that happens to what is

seen. Therefore, it is divided into two parts: one of them is the inquiry into what is seen with straight rays and the second is the inquiry into what is seen with rays that are other than straight. This latter science is properly called the science of reflection.

The science of the stars follows. The sciences of the stars are two.

One is the science of the significance of the stars, what the stars signify as to what is about to be and as to many things that are in the present and as to many things that have already happened; this is called astronomy.

The other science of the stars is found in the teaching that considers the heavenly bodies and the Earth under three headings. Among these, the first is about the number of those bodies and their shape and their quantities and about their places. It also considers their mutual proportions and the number of protractions these same bodies have in common, from that which is not the result of the motion of a place nor in a place nor from a place in the whole of the earth.

The second is about the motion of the heavenly bodies, their number and the fact that the motion of them all is spherical, and finally, what they have in common with all the stars. Next it teaches about the motion that is proper to each of the stars and how many types of motion there are for each of them and the parts of the heavens to which they are moved, according to what pattern this same motion of each of them advances. It also teaches the way of comprehending the place for each star among the parts of the signs in every hour with all these types of motion. It also inquires further about all that happens to heavenly bodies and about the motion which is proper to each of them in the signs and what happens to them, comparing them together, in conjunctions and separations and in diverse

places; finally, it teaches everything that happens to them on the basis of their motion from comparisons with the earth, such as during an eclipse of the sun. It also teaches one more time about everything that happens to them on account of the place in which they live on the Earth in distinction with those who are in some other place in the world, like the eclipse of the moon. It also demonstrates for these occurrences, how many they are, of what disposition they are, in what hour they happen, and at what time they might be rising or setting, and other such things.

Third, it inquires about the Earth, about what parts of it are inhabited. It also shows how much of it is inhabited and what are its main parts, what are its climates. It describes the habitations that are to be found in each of them and their order in the world. It also inquires about that which necessarily follows, such as what happens in each climate and habitation from the common revolution of the whole world; and that things like the particular turning of day and night is on account of the position of a place on Earth, in which the risings and settings occur, and this explains the length or brevity of the days and nights, and things that are similar.

This, therefore is the content which this science describes. It also is called Astrology. It is reckoned among both the sciences and the doctrines. In another way, though, it is considered among the powers and potentialities by which a man is able to judge about thing which will be, like the power of interpreting dreams, and like the power of augury of birds and of sneezing and of other methods of divination.

The science of music describes as its contents the recognition of the types of harmonies and from what they are composed and how they are composed and of which

modes it is right for them to be, with each one making its own effect in penetrability and its ultimate effect.

Music, surely, is both theoretical and practical. In practical music it is its proper activity to discover the types of perceptible harmonies made by instruments, for which either nature or art has prepared them. Thus, the natural instruments are the epiglottis and the uvula and what are around them; next is the nose. But the artificial are those like the pipe, the string, the tube, and other things. Workmen in practical music cannot shape the air and the harmonies and their other accidents, except according to the compositions of what is customary for the instruments.

Theoretical music, though, gives the knowledge of all of these and the reasons and all of their causes on the basis of which harmonies are composed, not according to what is in the material, but absolutely and according to what is free from all instruments and materials, and it composes these according to what is commonly heard from every possible instrument or from everything that possibly can happen in a body.

The theoretical is divided into five great parts: the first of them is about the elements and the principles, whose property is that they might assist in the reception of what is in this science, and in what way the scales for these elements are arranged and by what this art may be discovered, and of what and how many things it is composed, and how one ought to inquire about what is in it.

Truly, the second part is the teaching about the arrangement in this art, namely, discovering the notes and knowing the number of them, how many and how many types of them there are, and making clear the correspondences of certain ones of these to the others,

and the demonstrations of all of them. It also teaches the types of order and the placing of these notes so that the composer might get from these notes what he wants and can thereby compose harmonies from them.

Third is the teaching about the bringing together of the elements with words and in the demonstrations on types of artificial instruments, for which they have been prepared. It also teaches about the composition of all of these things in this science and their place in it according to the measure and order which is assigned initially.

Fourth, is the teaching about the types of natural cases, which effects the quantities of notes.

Fifth is the doctrine about the composition of complete harmonies, namely, about those things which are set down in metrical expressions, composed according to the order, arrangement, and rank of this art following from every possible intention for harmonies. It also teaches by what means the ultimate penetration may be made, namely, in the final intention for which they were made.

The Science of Statics considers weights in two modes: either it considers what can be measured or what may be measured with weights, and this inquiry is about the principles of the teaching on statics; or it considers the basis upon which something is moved or those means by which something is moved, and this inquiry is about the principles of the instruments, by which heavy things can be elevated and while raised can be changed from place to place.

And the Science of the making of Mechanical Devices truly is the science of

thinking about, as anything can be assembled, all things whose manner of construction can be made clear and shown by instruction to be assembled in their reception into natural bodies and thus placed into reality. For all the other sciences do not consider lines, planes, solids, numbers, and other things except according to what is known of such things in separation from natural bodies. But because we have need to use such things, we want to sense before they are present in reality in natural bodies both with the perception of master craftsman and the genius of someone who prepared the composition of these things.

Thus the science of making devices teaches the modes of thinking thoroughly and discovering how for a purpose a number of natural bodies are fit together by some craftsman, so that the use which we seek emerges from them. Of such a kind is the knowledge of numbers that is called *Algebra* or *Mucabala*, and other such subjects, although this science shares some things with those of Arithmetic and Geometry. This science certainly comprehends the modes of discernment in discovering numbers, about such things as rationals and irrationals, which Euclid gives the principles of in his tenth book called *On the Elements*. For since the proportions (or rationals and irrationals) are common, just like the proportion of numbers to numbers, all numbers are compared with some magnitude of ratio or surd and those magnitudes are discovered in another manner; on this basis, certain things are able to be supposed about rational numbers, so that they can be compared in the magnitudes of their ratios; also certain things about the numbers of irrationals may be supposed, so that they might be compared with the magnitudes of surds.

From these, then, are many geometrical discoveries, among which are the arts of masonry and from this science are the geometrical devices for the measurement of bodies;

and from this is the invention of the instruments for the art of elevating, and the instruments of music, and the many instruments of the practical arts, like the bow and armor. Also, from this science come those instruments of perspective according to the art which directs sight in comprehending the truth of remote things when we look at them; and about the art of the mirror, how rays return, so that they can be reflected or turned around or bent. Through this science is known that place where the rays of the sun return to other bodies. Next the art of the mirrors demonstrates the setting of fires. From this science is the discovery of the arts of statics, of ratios and the making of instruments for many other arts.

Therefore, these are the causes and knowledge of the making of devices, which are the first principles of the arts of civil practices, that are directed in bodies and figures and order and places and measures, like the arts of manufacturing and of masonry and of carpentry and even many other things. These are the teachings and the types of them.

CHAPTER FOUR
On Natural Science

The science of nature considers the natural bodies and the accidents which do not exist except in those bodies. It also teaches the conditions from which and for which and on whose basis these bodies exist.

Some bodies are natural and some are created. The artificial ones, for example, are glass and cloth and a bed and, in the end, anything which has a body that has been made and whose existence is the result of human art and will. Natural bodies, though, are those whose existence is not the result of human will or art, like the heavens or the earth, and what is within them, like plants and animals.

Surely the arrangement of natural bodies and created ones are similar in this; that, just as a thing is invented in an artificial body that does not have being except in that created body, and the condition can be discovered from what and through what and for their being exists, so, too, is the case in natural bodies. However, all these conditions appear to a greater degree in artificial bodies than in natural ones. For those that do not have existence except through artificial bodies are like the weave of a cloth and the shining of a sword and the translucence of glass and sculpting of a bed.

Truly the reasons for which artificial bodies exist are their ends and intentions, just as cloth has been made so that it covers and a sword so that it may strike and a bed so that we may be suspended above the ground. The reason on account of which artificial bodies are made are, for example, for glass, that things might be placed in it that it is feared will dry out. The ends and intentions for which created things are made,that only exist in created bodies, are like the weaving of cloth so as to make it more beautiful; and like the shining of

a sword, so that by it enemies might be terrorized; and like the sculpting of a bed, so that is appears more beautiful; and like the translucence of glass, so that what is placed inside it appears to the outside.

Surely the agent by which artificial bodies are made are the authors and procurer of those things, for example, carpenters from whom a bed comes or a polisher from whom a sword derives.

Truly the conditions necessary for created bodies to exist are twofold for all bodies: namely, the material and the form. The form is like sharpness in a sword, because sharpness is the disposition and the form of a sword, by which it makes its effect. Surely the material is, as in the case of the sword, iron for the material must uphold the form and its disposition. Truly the existence of cloth is similarly from these two: namely, the material, which is threads and the form, which is weaving; so, too, a bed exists of material, wood, and a form, four-sided. And in all other things it is the same, because out of the joining of these two comes the being and the actuality and the perfection. Every single body does not lead something nor make it nor arrange it, nor arise from some other thing to enjoy life, unless it comes as a form in material.

It is similar for the natural bodies, for everyone of them does not exist except in relation to some intention or end; as is in book four of the *Meteorology*. Similarly, all accidents have to be in natural bodies; in the same way also, the existence of every natural body is of material and of form. Nevertheless, in artificial bodies these are more clear and subject to being seen, while in natural bodies these are not usually apparent, for their make-up is not now perceived by the senses. Consider wine: for the body of wine is created but

its power, that it can inebriate, is not perceived nor can its essence be known except through its working. That power is in the form of the wine and in its constitution, the comparison of this to wine is just like the comparison of sharpness of a sword to the sword. It is similar also in the composition of medicines, which do not work in bodies except through the powers arising from them on the basis of their composition; such powers as are sensed only in their operation. At any rate, just the same all medicines are composed of two things: of the material, namely the types of which it is composed, and the form, that is, the power by which its action operates. Should that power be destroyed, then there would not be a medicine, just as if the sharpness of a sword is destroyed, there would no longer be a sword.

Now the material and the form of bodies and their action and their ends on the basis of which they exist are called the principles of bodies, and if these are among the accidents of bodies, then they are called the principles of the accidents which are in bodies.

Natural science causes natural bodies to be known according to two modes: either according to what is sensible about them, or in testing what is intelligible about them. It also teaches the material and the form of these, the author and end of this body. Similarly, it teaches about the accidents which exist and from what they are made and the ends on account of which they are made. Therefore, this science gives the principles of natural bodies and their accidents.

Surely, among natural bodies some are simple and others are complex. The simple are those which are not made of other bodies; of such a kind are the celestial bodies. The complex are those whose existence is from other bodies, like plants and animals.

Likewise, natural science is divided into eight great parts.

The first of these is the inquiry about what all natural bodies share, whether simple or compound; namely, about principles and accidents and the consequences of those principles. This is taught in the book *On the Natural Sense of Hearing.*

The second part is the inquiry about simple bodies, whether they might be and, if they are, what are their bodies, and how many is the number of them. This consideration is about the world: what it is, what and how many are its parts, and whether in total they are three or five. This consideration is also about the heavens and about their difference with remaining parts of the world, and that its material is one. And this is taught in the first part of the first book of that called *The Book of Heaven and Earth.*

Next follows the inquiry about the elements of compound bodies, whether they might be of simple things, whose existence can be demonstrated, or whether they might be of some other kind of bodies. And if they are in bodies, it is not possible that they exist outside them; then it considers whether all of them or only parts of them exist; and if parts of them exist, then what may belong to them. And this inquiry is thus at the end of the first part of the first book of that work called *The Book of Heaven and Earth.*

Next follows a consideration of what all simple bodies share, of which some things are elements and principles of compound bodies and others are not of these elements. And this is taught at the beginning of the second part of this book called *The Book of Heaven and Earth.*

Next follows the consideration of what is appropriate to each of those that are elements, and of those that are not elements both as to principles and as to their concomitant accidents. This also is taught in the last part of the second and third and fourth book of this

same work.

The third part is the inquiry about the confusion and ordinary corruption of natural bodies and about these elements from which they are composed and about the quality of the generation and corruption of the elements, and how some things are generated out of others, and how from this process compound bodies are generated completely. It also teaches the principles of all of these things; all this is taught in the book which is called *On generation and corruption.*

The fourth part is the inquiry into the principles of accidents and their effects, what are the proper elements of such things and their make-up. This,too, is contained in the first three parts of the book that is called *On the Impressions of the Upper World.*

The fifth part is the consideration of bodies composed of elements and about those that are of similar or dissimilar parts. For those that have similar parts it teaches what those parts are; it also teaches about those that are composed of diverse parts, like flesh and bone, and from those that in no way are a part of a natural body of diverse parts, like salt or gold or silver. Next follows the consideration about what all bodies made of simple parts share, whether these parts are of bodies composed of diverse parts or not. And this is contained in the fourth book of that work called *On the Impression of the Upper World.*

The sixth part is the consideration about those things compound bodies made of similar parts share that are not parts assembled out of diverse parts; and these are bodies of minerals and the types of mineral matter. It also considers what is fitting for each of these types. This is taught in the book which is entitled *On Minerals.*

Seventh is the consideration about those things which the types of vegetables share,

and about what is proper to each of them; that is one of two theoretical parts about the bodies composed of diverse parts. And this is contained in the book *On Vegetables*.

Eighth is the consideration of those things which the types of animals share and what is appropriate to each of them. This, then, is the second part of speculation about composed of diverse parts. But this is taught in a book which is entitled *On the animals* and in the book *On the Soul* and in the books which are at the end of *On Nature*.

Therefore, natural science is about all types of bodies and it gives their principles and the accidents which accompany those principles. This, therefore, is the content of natural science and of its parts and the content of what is in everyone of its parts.

Divine Science is divided into three parts.

The first part inquires about essences and about the matters that are its accidents; after this, it inquires into what the essences are.

The second part inquires about the principles of demonstration in a particular theoretical science. Hence, it inquires about the principles of the science of dialectic and about the principles of the teaching of this science, and the principles of natural science. It also inquires about their verification and their properties and substances. It also destroys errors which the ancients held about the principles of this science, like the error of those who thought a point and number and lines and surfaces to be separate substances.

The third part inquires about essences, both those that are not bodies and are not in bodies. In the first place, it inquires as to whether they might be essences or not; it also proves by demonstration are essences. Then it inquires about these, whether they are multiple or not; it also shows that they are multiple. Next it inquires as to whether they are

finite in number or infinite; it also shows that they are finite. Next it inquires whether their ranks of perfection are equal or unequal; it also demonstrates that they are unequal. Next it proves that as this one increases, according to its own multitude, from the lesser to the more perfect and to perfection, until it comes to the limit of perfection, at which point nothing is able to be more perfect; nor is it possible that there be something similar to it in essence, nor equal to it, nor contrary to it, but coming right up as far as the first being, to whom nothing is able to be prior, and to whom nothing is able to take precedence. As regards its essence, it is impossible for it to acquire that essence from another thing. Finally, it proves that this essence is one absolute, surpassing all and is the first.

It also shows that the remaining things are ranked after this one in being and that this first Essence for its own sake is the one that confers being on all things that exist ; and that this first Unity is the one that confers unity upon all for its own sake; and that this first Truth confers truth upon all things that have truth in them of its own accord; and it shows how it confers it; and what does not exist to some other mode of being, in this one exists in a multitude; on the other hand, this one above all things is what is more worthy of the name and all that is signified by Unity and Being and Truth and the First. Next it shows that this, such as is of its own nature, ought to be believed to be God, whose glory is sublime.

After this it teaches how the essences came forth from God and how essence is fitted to being by God. Next it inquires about the order of the essences, and how they come to these ranks, and by what means each being merits the order in which it finds itself; and it makes clear what are the types of their mutual connections, and by what these connections

are made.

Next it proceeds to comprehending the other works of God in the essences, each one complementing all the others. Since it shows that in none of them is there a defect or discord, neither bad order nor bad composition, neither scarcity nor abundance. Afterward, it refutes the errors regarding God and about his work of certain men who held the opinion that there was too much or too little in him and in his works and in the essences that He created.

CHAPTER FIVE

On the Science of Civics and its parts and the Science of Judging and on the Science of Eloquence

The science of civil affairs inquires about the types of actions and the customs of free acts of the will; and it inquires about habits and customs and behaviors which proceed from the said actions and customary duties; and it inquires about the ends for which they are done. It also teaches how these ought to be performed among people and by what mode they can be described and arranged, following from what they have kept and preserved of this past.

On the basis of the ends for which they are done, actions which are useful are distinguished and it makes clear which of these actions are truly happy and which are thought to be happy but in reality are not. It also teaches that true happiness is not able to be found in the present, but must be sought in the future. What is thought to be happiness and is not are such things as victory and glory and pleasure.

This science also sets out the ends toward which they tend. It discerns between the actions and customs by which true happiness can be acquired and those for which this is merely thought to be true.

It also shows which actions ought to be used among one's fellow citizens, which among the whole of the people;furthermore, it makes clear which actions rulers should use toward their subjects and which subjects should use toward their rulers, since it shows what produces good behavior in subjects under the just domination of rulers. Of course, actions by which one lives based upon these virtues are called ethics.

It also teaches that ruling or reigning are of two types: one is that by which cities and peoples are justly ruled, consisting of honest mores and their maintenance, by which happiness is acquired. The other is the customs introduced to a city that are believed to be good but are not: this rule is called foolish and is divided into many divisions and each is called by its name of what is chiefly sought by it: so, if it seeks wealth, it is called a rule of accumulation; if glory, it is named a rule of glory, and thus, from that which most especially is sought, the name of the lordship changes.

For it shows that the power of a ruler is composed of two characteristics: of these, one consists in knowing rules of universals and the other consists in making use of seeing and hearing and perceiving accurately. For like a doctor, who cannot be a perfect medicator except by recognizing the rules of universals--which are called theory--and by attending to healing and the observation of medicines on illness--which is called practice-- so the character of a ruler is not sufficient to displace human actions according to every possible occurrence , every city, every time, except on the basis of the power of knowledge and the attention to experience.

So this science has two parts: one that recognizes happiness and discerns between truth and probability and understands the effects and duties and customs and acts of free will which are upheld in every city and by all peoples; and it distinguishes the best from what is not the best. The other understands the modes of behavior and the best customs in cities and peoples and it recognizes the actions of rulers by which human actions can be stabilized by observing what is established over them; next, it comprehends the types of characteristics of ruling, how many they are, and what each of them is, and the actions

which each of them performs, and what customary duties and habits each of them requires, so that by these better things the people and cities under his rule might be stabilized as he intends. And this science, of course, is contained in the book which is called *Politics*. It is a part of *Ethics*.

For in this book it teaches what natural conditions and dispositions are fitting to be observed by the sons of kings and by others near to them, so that a man in whom these qualities are discovered might be chosen to rule. Last in this science are these: what mores are fitting to be observed, in regard to the virtue of a king until they are perfected in him, and the king might be made perfect.

The Science of Law is that through which a man is able to come to discover the right thing for every matter in society that a lawgiver did not make unmistakably clear, but that now can been made clear with determination and a method which is right. There ought to be subtlety and circumspection among men in this regard, for comprehending the will of the author of laws as much as is possible. However, in all laws, there are doctrines and deeds. Doctrines are like those that have been established for the cult of God and faith and the world. Deeds are those that are made to the honor of God. For this reason, the science of law has two parts, one in doctrines and the other in deeds.

Here ends the book of Al-farabi *On the Division of all the Sciences*. Thanks be to God.

RESOURCES CONSULTED

I. MANUSCRIPTS AND PRINTED EDITIONS

For al-Farabi's book the most accessible edition is that of Angel González Palencia, *Catalogo de las Ciencias* (Madrid, 1953)which is based upon the Escorial manuscript that probably underlies each of our translations. There is a better critical edition published by Uthman Amin, ed., *Alfarabi: Kitab Ihsa' al-ᶜulum* (Cairo, 1931). For Gerard of Cremona's texts the manuscripts are:Paris, Bibliotheque Nationale MS Latin 9335; Graz, Universitäts Bibliothek, MS II 482 and Brugge, Openbare Bibliotheek, MS 486. For Gundisalvus' *De Scientiis* the manuscripts are: Vienna, Dominikanerklauster MS 121; Vienna, Bibliothek National MS 2473; Worchester, Library of the Cathedral MS Q 81; London, British Library, MS Cotton Vespasian B-X; Oxford, Merton College MS 230; Erfurt, Wissenschaftlich Allegemein Bibliothek Erfurt, MS Amplonia F32; *Idem,* MS Amplonia, Q 295; and Lisbon, Fondo Generale, MS 2299. His text was published in 1638 by a Scotsman, William Chambers in Paris and is reproduced in González Palencia's edition.
The important manuscripts of the *De Divisione Philosophiae* are: Rome, Vatican Library, MS Lat 2186, which is of thirteenth century origin, Oxford , Bodleian Library, MS Digby 76 and Paris, Bibliotheque Nationale, MS Lat. 14700, which deLisle also believed to be of thirteenth century origin.

II. PUBLISHED BOOKS AND ARTICLES

A. About Al-Farabi and the *Ihsa' al-ᶜulum:*

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Michael C. Weber
49 Albury Stone Circle
Nashua, NH 03063

EDUCATIONAL BACKGROUND

Degree	Major	Institution	Year
B. A.	History	Mount Union College	1975
M. Div.	New Testament	Yale University	1979
S. T. M.	New Testament	Yale University	1980
M. A.	Medieval Studies	Boston University	1990
Ph. D.	Medieval Studies	Boston University	1996

HONORS AND AWARDS

Mount Union College: Men's Scholastic Honorary Society, B.A. awarded *magna cum laude* with Honors in History, Fishel History Prize, nominee for Rhodes Scholarship. Yale Divinity School: S.T.M. Thesis bound and kept in divinity library. Boston University: Presidential Fellow, Bishop Baker Fellow, Secretary of the Medieval Society of Boston University.

PROFESSIONAL EXPERIENCE

1992-present	Instructor in History and Humanities, Northern Essex Community College, Haverhill, MA.
	Instructor in Humanities, Daniel Webster College, Nashua, NH.
1991 Fall	Instructor in History, Social Science Department, Middlesex Community College, Bedford, MA.
1991 Summer	Instructor in Religion, Religion Department, Boston University, Boston, MA.
1990 Fall	Teaching Fellow, Religion Department Boston University, Boston, MA.
1990 Spring	Instructor, Prison Program, Metropolitan College, Boston University, Boston, MA.
1986-present	Graduate Student, Interdisciplinary Medieval Studies, Boston University, Boston, MA.

1984-86	Instructor, Charis Ecumenical Center, Concordia College, Moorhead, MN.
1983-86	Campus Chaplain, United Campus Ministries, Moorhead State University, Moorhead, MN.
1980-83	Pastor, Congress Community Church, West Salem, OH.
1977-79	Campus Ministry Intern, Sacred Heart University, Bridgeport, CT.

DISSERTATION

"The Translation and Adaptation of Al-Farabi's *Kitab Ihsa' al-ᶜulum* (*The Enumeration of the Sciences*) in Spain."

PAPERS AND PUBLICATIONS

"Gothic Neo-Arianism and the Study of Heresy" delivered at the Medieval Studies Conference, Plymouth State College, NH, 1990.

"Pseudo-Cufic Decoration in Western Art", forthcoming.