

INSTITUTIONS OF LEARNING IN ISLAM DURING THE CLASSICAL PERIOD (EIGHTH TO SIXTEENTH CENTURIES): A CRITICAL OVERVIEW

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Özet

İslâm medeniyetinin uzun tarihi boyunca değişik türde eğitim kurumları ortaya çıkmıştır. Asırlarca devam eden bilgiyi, hocadan talebeye şahsen nakletme geleneği, medrese kurumunun ortaya çıkmasıyla müesseseleşmiştir. Yüksek himaye ve daha da önemlisi, vakıflardan sağlanan gelirler medrese kurumunun ortaya çıkmasını ve İslam dünyasının geniş coğrafyasına yayılmasını sağlamıştır. Tarihinin ilk dönemlerinde medreselerde sadece dini ilimler ve özellikle fıkıh öğretimi yapılıyordu. Vakıf hukuku ile ilgili anlayışın gelişmesi, vakıftan sağlanan muntazam mali desteğin fıkıh ve dini ilimler dışındaki ilimlerin eğitime de harcanabilmesi kurum bazındaki gelişmelerin temelini teşkil etmiştir. Kuruluş safhasında münhasıran İslami ilimler ve özellikle fıkıh eğitimiyle meşgul olan medreseler uzun gelişme süresi içinde dini olmayan ilimlerle dini olan ilimlerin bir arada öğretildiği okullar haline gelmiştir. Helenistik tesir altındaki halifeler tarafından kurulan Beytü'l-Hikme gibi kurumların kütüphanelerinde başlayan kurumlaşmanın ve tıp, matematik ve astronomi ilimlerinin okutulmasının, tamamen İslâm medeniyetinin ürünü olan medrese geleneğine —bimâristan-medrese ve rasathane-medrese olarak adlandırdığımız modeller ve süreçler aracılığıyla— dâhil edilmesinin neticesi olarak aklî ilimler medreselerde ders programının ayrılmaz bir parçası hâline gelmiştir. Bu entegrasyonun uzun bir süre sonunda gerçekleştiği izahtan varestedir. Biz bu incelememizde bilim eğitimiyle ilgili faaliyetlerin kurum bazında nasıl yürütüldüğü ve bununla ilgili kurumların hangi safhalardan geçerek geliştiği üzerinde durmaya çalışacağız. Ele aldığımız örnekler neticesinde diyebiliriz ki, aklî ilimlerin resmi eğitim faaliyetlerine tedricî olarak dâhil edilişi geç Abbasiler devrinden Selçuklular, İlhanlılar, Timurlular ve Osmanlılar'a kadar kesinlikle yükselen bir eğri çizmektedir.

“The dichotomy in the fields of knowledge was matched by a dichotomy in the institutions of learning.”

George Makdisi, *The Rise of Colleges*, 1981

The institutionalization of teaching mathematical and natural sciences and the transformation that took place from the private master-disciple style of teaching to an organized institutional practice is one of the aspects of the development of academic traditions in Islamic history that is worthy of thorough research.¹ As it is well known, scientific activities in Islam started

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¹ A short summary of this article has first appeared in *Storia Della Scienza* in 2002 with the heading of “Il ruolo delle istituzioni,” *Storia Della Scienza*, v. 3 (Rome: Istituto della Enciclopedia Italiana fondata da Giovanni Treccani, 2002):

through a complex process of transmission of the pre-Islamic scientific heritage of the newly conquered lands and its neighbors where Hellenistic and Indian scientific activities had their long-lasting impact. The necessity to observe the movement of the Moon and the Sun for religious obligations and to determine the qibla along with the need to address the practical needs of expanding lands and growing cities all helped accelerate of scientific activities. The sciences which were transmitted mainly through translations from Greek, Syriac, Pahlavi, and Sanskrit and were referred as the sciences of the ancients (*'ulum al-'awa'il*) had established the fundamental literature for the well-known development and advancement of science in Islam. The “sciences of the ancients” or *'ulum al-'awa'il*, which were also called foreign sciences (*al-'ulum al-dakhila*), rational or intellectual sciences (*al-'ulum al-'aqliyya*) or philosophical sciences (*al-'ulum al-falsafiyya*, *al-'ulum al-hikamiyya* or shortly *al-hikma*) were the sciences transmitted since the Antiquity by the Muslims, and formed an integral part of the new encyclopedia of knowledge, which gradually became a component of teaching activities in official institutions. The term “gradual” must be stressed, because the integration of the foreign rational sciences in the epistemological and educational structures was achieved in steps.

The institutional aspect of the transmission and dissemination process of these sciences did not receive the due academic attention. The development of certain scientific disciplines has been the subject of a wider interest. Yet the historians of science and culture in Islam are expected to take into consideration —along with the internal technical development of certain scientific disciplines like astronomy, mathematics, optics, and medicine— a wider range of factors. They should try to link the history of science to other historical phenomena, not only by explaining the structure and contents of scientific disciplines and through self-assigned problems, methods, and solutions of science, but also through the prevailing intellectual, economic, social, political, and cultural imperatives of a particular epoch. This study is an attempt to address the issues related to institutionalization of the teaching of science and to show the different stages of institutional development.

At the outset of this study, it is quite appropriate to describe the starting point of the research pertaining to the history of institutions of learning in Islam as an unfortunate beginning. As will be shown below, the pioneering studies in this domain were deeply influenced by the proposition made by Ignác Goldziher (d. 1921) that Muslim theologians came to consider as desirable only those branches of learning that had grown directly out of their religion and that the sciences that owed their origin to foreign sources were regarded at least with suspicion.² This divide proposed by Goldziher was further repeated by Gustave E. von Grunebaum (d. 1972) who maintained that “the classification of scientific effort which is meaningful in terms of the Muslim’s ultimate objective is a division into two areas of inquiry: (a) you may inquire into Revelation (*Offenbarungserkundung*); and (b) you may inquire into the world around you (*Welterkundung*). This dichotomy agrees in its result, although not in its rationale, with the fundamental division of the sciences into Arabic and ancient which is generally proposed by Muslim scholars themselves.”³

110-139. A longer version was later published in 2014: “Institutions of Science Education,” *The Oxford Encyclopedia of Philosophy, Science and Technology in Islam*, vol. 1 (New York: Oxford University Press, 2014), 386-397. This full text in English is published here for the first time.

² Ignác Goldziher, “Stellung der alten islamischen Orthodoxie zu den antiken Wissenschaften,” (Berlin: Verlag der Königlich-Akademie der Wissenschaften, 1916), quoted by Sayılı in *Institutions of Science*, 47.

³ Gustave E. von Grunebaum, “Muslim World View and Muslim Science,” *Islam: Essays in the Nature and Growth of a Cultural Tradition* ([Menasha, WI]: American Anthropological Association, 1955), 112.

The supposed anti-philosophical attitude of Muslim scholars constituted the intellectual background of the development of madrasa education in Islam. This “epistemological dichotomy” has also been expressed on the institutional level as George Makdisi (d. 2002) proposed in his study on the historical development of the madrasa entitled *The Rise of Colleges*. Makdisi considers that there is a dichotomy in the fields of knowledge and in the institutions of learning in the Islamic world. For Makdisi, there are two sets of antagonistic sciences: the “religious” and the “foreign.” These are upheld by two types of learning institutions: on the one hand there is the madrasa, which he calls “college,” exclusively devoted to the teaching of religious sciences, and on the other hand, the private establishments where the study of the secular scientific domains was pursued. The madrasa was conceived by Makdisi as an institution devoted only to the teaching of Islamic law, *fiqh*, and the training of jurists, *faqih*s. He stretches his theory to “exclude” all subjects other than law and its ancillaries. He states, “the dichotomy in the fields of knowledge was matched by a dichotomy in the institutions of learning.”⁴ When we look at the works of A. Youssef Eche (d. 1967) and Aydın Sayılı (d. 1993) that prepared the grounds for Makdisi’s definite judgment, we find that these studies were based on fundamentally accepted concepts of “exclusion” and “dichotomy.”

Both Eche and Sayılı belonged to the same generation. The former, a Syrian scholar coming to Paris from *de jure* independent Syria was aspiring to the Arab awakening, so he wanted to foresee in his national heritage a fully-fledged modern library and an advanced academy of sciences.⁵ Meanwhile Sayılı who owed his opportunity to study history of science in Harvard University to Atatürk, the founder of Republic of Turkey, was a true believer and follower of his reforms.⁶

In these pioneering works and what followed them in dealing with the study of the institutionalization of learning and science in Islam is taken up on a general scale on the basis of how learning and science was conceived and how the relationship between the “religious” and non-religious” sciences were foreseen. The prevailing viewpoint in the major studies that have been conducted until now as alluded above centered fundamentally around the assumption of the existence of a dichotomy in the concept of knowledge, as well as “contradiction” among the scholars of the two categories in the formative centuries of the culture of Islam. The culture of Islam was thus considered as a reflection of dichotomization on an individual level and on a cultural one as explained above. The scholar of religious sciences was described as the rival or the enemy of the scholar who dealt with non-religious sciences. A deep rift was assumed between religion and the world, revelation and reason, the foreign and the indigenous, the religious and the rational sciences, their theoretical aspect and practical application. This “dichotomy” and “contradiction” was allegedly brought to the fore at the level of institutions and became a basic viewpoint that shaped the studies on the history of the madrasa, which was the most significant institution that played the central role in the institutionalization of learning.

Sayılı’s study on the history of the madrasa (1941) was conducted within the framework of his research querying the causes for the decline of scientific activities in Islam that started after the supposedly short-lived “golden age” of Islamic science and civilization. Sayılı, who unjustifiably considered the madrasa as the equivalent of the European university, maintained that the

⁴ George Makdisi, *The Rise of Colleges: Institutions of Learning in Islam and The West* (Edinburgh: Edinburgh University Press, 1981), 78.

⁵ Youssef Eche, *Les bibliothèques arabes publiques et semi-publiques en Mésopotamie, en Syrie et en Égypte au Moyen Age* (Damascus: Institut Français de Damas, 1967).

⁶ Aydın Sayılı, “The Institutions of Science and Learning in the Muslim World,” PhD dissertation, Harvard University, Department of the History of Science and Learning, 1941.

theologians who had developed the madrasa system did not believe that the *a'wail* sciences were of any use to the “Muslims in this world or in the next.” In this context, he adopted the supposition made by Goldziher that Muslim theologians came to consider as desirable only those branches of learning that had grown directly out of their religion. Other sciences (e.g., sciences of the ancients) owed their origins to foreign sources and were regarded with suspicion. Sayılı expounds Goldziher’s opinion to the effect that medieval Islam came to consider that the sciences of classical antiquity including philosophy, did not harmonize with Islamic religious ideas.⁷

In his investigation of what he calls “the exclusion of the *a'wail* sciences from the madrasa curriculum,” Sayılı adopted two approaches which he called “methods” where he rationalizes his arguments on the basis of his commitment to the contemporary republican Turkish experience of modernization which was based on the assumption of the decline of Islamic Ottoman civilization as well as taking the European model as an example. The first of these approaches is the assertion that Islam was essentially a non-plastic and stable society and culture and many of its features altered very little until relatively recent attempts of westernization. The distant past can be studied more directly through the recent past, or even, the present. Different mental attitudes, which are not ascertainable through the extant source material, can be grasped by the help of residual evidence. Also, the reactions to the recent attempts at westernization would be helpful in determining the obstacles to the study of the sciences. Secondly, he maintained that arriving at conclusions through rationalization might also be guided by considering the applicability of the same reasoning to Western Europe, which was also a Theo-centric society like Islam. Sayılı, utilizing these approaches in some cases, concludes his dissertation on the institutionalization of science under the influence of his mentor George Sarton’s (d. 1956) theory of the “Golden Age of Science in Islam” (approximately up to 1000 CE) and the firm belief in the paradigm of the decline of Islamic civilization as it was prevailing in the Turkish republican discourse. In this context, he maintains that “In short, in Islam the natural, physical and mathematical sciences derived trivial benefit from the school and from other institutions of science and learning. It is obvious, therefore, that their cultivation had to depend on private instruction i.e., learning from private teachers and by self-instruction.”⁸

Sayılı’s famous book, *The Observatory in Islam*, which is an enlarged version of the chapter on observatory from his PhD dissertation, was published and is considered as the most authoritative study on the subject. In this book on the observatory in Islam, Sayılı elaborately studies the origin and development of the institution of the observatory from the ninth to the sixteenth centuries in the Arab lands, in the East and the West, in the Turco-Mongol and Ottoman realms, and gives examples of the inclusion of rational sciences in the madrasa teaching. One feels uncomfortable with Sayılı’s imposition of all these examples of “exceptional cases” to the rule of exclusion of the teaching of the sciences of the ancients or the rational sciences in the madrasas, and his interpretation of the numerous reliable sources as exceptions that confirm the general rule of “exclusion.” One is indeed impressed with the number of exceptional cases of exclusion offered by Sayılı in a book that is rich with numerous reliable elements of information.⁹

In his study on the development of libraries in general and Bayt al-Hikma and Dar al-hikma/Dar al-ilm in particular, Syrian scholar Eche sees these two institutions as places where philosophical and

⁷ Sayılı, “The Institutions of Science,” 275.

⁸ Sayılı, “The Institutions of Science,” xiii-xv.

⁹ Aydın Sayılı, *The Observatory in Islam and its Place in the General History of the Observatory* (Ankara: Türk Tarih Kurumu Basımevi, 1960).

rational sciences were taught while the madrasas which were endowed as religious foundations were able to banish the non-religious studies from their activities. However, Eche also gives examples that prove the inclusion of rational sciences in institutions endowed as waqf foundations.¹⁰

In this study, we maintain that Islamic civilization through its long history has witnessed the emergence of different institutions of learning. Age-old master-student private practice of instruction shifted towards institutional framework. The high patronage and undoubtedly the provision of stable finance through the establishment of charitable endowments (waqf) had helped the emergence and spread of madrasa institution widely. Madrasas at the early stage of their history, were devoted solely to instruction of religious sciences and particularly Islamic jurisprudence (*fiqh*). The development of waqf provisions and the regular financial support provided by the endowment to be spent on the education of sciences other than *fiqh* and religious sciences formed the basis for the transformation of the madrasa as an institution. As we will try to demonstrate in this essay, education in madrasas during the long process of its evolution came to combine both religious and non-religious sciences that were transmitted from pre-Islamic era. Madrasas became schools where two traditions of learning merged and integrated. Needless to say, this integration process has taken a long time. In this study, we will try to show the invalidity of the established opinions about the madrasa.

This study seeks to clarify some of the issues related to the gradual integration of the “foreign,” mainly Hellenistic, heritage into the official education of the Islamic world. The classical sciences, or as they were called the sciences of the ancients (*‘ulum al-‘awa’il*) were first transferred to the Muslims through translations and developed through official or semi-official patronage, and through personal intellectual inquiry and exploration. The classical heritage became an integral part of knowledge (*‘ilm*), theoretically in the epistemological models established by the Muslim scholars explicitly—being expressed in the different classifications of sciences—and an official component in the teaching activities pursued in some of the Muslim institutions of learning, including the madrasas, i.e., the official institution of learning par excellence.

The institutions of learning and the “sciences of the ancients” in the Islamic world passed through different stages of evolution under the influence of different complex intellectual, social, and cultural factors. The process, which started with the personal interest of the caliphs in the eighth century, acquired an institutional character in the following centuries and found its formal shape in the fifteenth century, and by the sixteenth century, it was well established. Therefore, it would be inaccurate to presume that institutions of learning in Islam in general, and the madrasas in particular, remained static since their first formative phase until the sixteenth century; the time of their blossoming in the Ottoman era, the time of blend among different traditions. One expects to encounter more than one tradition or one type of madrasa education whose course of evolution diverged or converged with the flux of time.

Library-Based Transmission of Learning (Eighth–Twelfth Centuries)

After the rise of Islam, Islamic cities soon became centers where culture flourished and where men of learning, religious scholars, philologists, grammarians, philosophers, book collectors, circles of poets gathered. Instruction was not restricted to the knowledge of the law taught by

¹⁰ Eche, *Les bibliothèques arabes*, 298-299.

religion; it was also enriched by the cultural transactions between the new world of Islam and the ancient cultures, Hellenistic, Persian, Indian, and so on.

Islamic culture reflected the life of the many varied urban circles. The intellectual development was an expression of the two main groups in the cities: the court of the caliphs and the political elite, and the heterogeneous urban communities. The first were bent towards the foreign cultural heritage, Iranian-Hellenistic, and the other in its philosophical, scientific, and artistic branches, while the urban milieu contributed to the development of the religious and mystical sciences, and the Arabic language and literature.¹¹ This distinction was not trenchant and many sciences were sought in both groups, mainly theology, history, and poetry. The cultural life in urban Baghdad well reflected the intense interest of the various social groups for different sciences.

The diversification of literary and scholarly interests that developed in the early Abbasid era had its impact on wider segments of the society. The introduction of the paper as a writing material in the lands of the Abbasid caliphate after the Battle of Talas (134/751) transformed the Abbasid cultural transmission from oral tradition to a book culture.

As of the second/eighth century and until the Mongol invasions, Baghdad was the center where arts and sciences were sought. The various *tabaqat* or biographical dictionaries such as by al-Nadim, Ibn Juljul, al-Qifti, or Ibn Ebî Usaybi'a, provide us with ample proof verifying the quality and amplitude of life in the city as well as cultural life of the scholars, which combined the interest and erudition in both the indigenous Arabic and Islamic sciences as well as the foreign sciences or the sciences of the ancients. In addition to historic accounts and records, perhaps, fiction would offer a vivid and colorful image that is sometimes more revealing than the biographies of scholars. The Arabian nights, albeit partly fanciful, are inspirational mirrors for the cultural image of Abbasid life. Not only the scholars, but chatterbox barbers were also portrayed as scholars. In the "Tale of the Tailor," the barber boastfully draws an inflated picture of his capacities. He describes himself as "a barber who is an astrologer, one learned in alchemy and white magic; syntax, grammar and lexicology; the arts of logic, rhetoric and elocution; mathematics, arithmetic and algebra; astronomy, astromancy and geometry; theology, the traditions of the Apostle and the commentaries of the Koran."¹²

Whatever was the historic reality in such an example of Baghdadi society, it is obvious that these skills and knowledge were essentially acquired through personal channels of transmission, from master to disciple and through individual acquisition and transfer of learning from one culture to the next. With the passage of time, passing on knowledge and in particular, some areas of knowledge such as the sciences of the ancients (*'ulum al-'awa'il*), crystallized into more official methods of transmission. The institutional line developed along with the personal quest.

In the early Abbasid era, the caliphal library which became to be known during the reign of both caliphs Harun al-Rashid and al-Ma'mun as Bayt al-Hikma/The House of Wisdom emerges as an institute related to different cultural and scholarly activities with particular focus on the sciences of the ancients. This library was an example for similar and smaller libraries established by bibliophile courtiers of caliphs. Two centuries later, the Fatimid caliph established a bigger institute with similar name Dar al-Hikma / The House of Wisdom.

¹¹ Ira M. Lapidus, *A History of Islamic Societies* (Cambridge: Cambridge University Press, 1994), 81-82.

¹² *Arabian Nights in 16 Volumes, vol. 1: The Book of the Thousand Nights and a Night*, trans. Sir Richard F. Burton, ed. Romesh C. Dutt, A. V. Williams Jackson (New York: Cosimo, 2008), 305.

Despite the scarcity of available information, some modern scholars claimed that common features can be found between Hellenic Athenian, Ptolemaic, and Sassanid institutions of learning and those institutions which were developed by Muslims, mainly in Baghdad and later in Cairo. According to this opinion, *Hikma* foundations display elements of similarity with some previous educational foundations, such as the philosophical schools in Athens, the Museum of Alexandria, and Jundishapur.¹³ However these scholars do not provide any convincing evidence in support of their opinion. So, the theoretically plausible idea that the Abbasid institution called the House of Wisdom was inspired from Greek or Persian institutions is an independent issue that deserves further serious research.

Islamic Hellenism was not solely the product of the conquests of Alexandria and Antioch; it derived largely from what was already present within the Sassanian realms.¹⁴ It is also plausible that the Abbasid Caliph al-Ma'mun and Fatimid Caliph al-Hakim patterned their *Bayt al-Hikma* and *Dar al-Hikma* on the examples of Persian Jundishapur (Gundaysabur/Gondeshapur).¹⁵ Sarton suggests that Jundishapur truly flourished under Nushirwan the Just (531-579), after the expulsion of Nestorians from Edessa in 489 and the banishment of Neo-Platonists from Athens in 529.¹⁶ It became one of the greatest cosmopolitan shelters for philosophy and science, be it Greek, Jewish, Christian, Hindu and Persian.¹⁷ Jundishapur's fame lies in its importance as a secular cultural center, reputed for its tradition of medicine, which was a source of inspiration for the intellectual activity in Islam.¹⁸ Its role seems to have been more important for the transmission of knowledge than creative scientific activities.¹⁹ No doubt that Jundishapur, through its physicians, was one of the main channels through which Greek science, medicine and other sciences of the ancients were introduced into the Abbasid Empire. Jundishapur was not only a great *bimaristan* (*shifakhane*, *dar al-shifa*, hospital), it was also described as a center of medicine and philosophy, as well as a translation center where many Greek medical texts were transposed by physicians into Syriac. Many renowned physicians were gathered there, among them were members of the famous Bakhtishu family who had been Abbasid court physicians for generations.

The expansion of the Abbasid rule to encompasses the lands of both Byzantine and Sasanid Empires brought together scholars from various cultural circles and having diverse backgrounds where some of them were excelled in their scientific pursuits. At the moment we cannot establish a linear relationship between classic institutions and the Abbasid House of Wisdom. The claims to this effect are rather fictitious narratives, hence comes the need to fresh and serious monographs.

¹³ Eche is one of the first scholars to advance these claims. See Eche, *Les bibliothèques arabes*, 48-55.

¹⁴ Francis E. Peters, *The Harvest of Hellenism: A History of the Near East from Alexander the Great to the Triumph of Christianity* (New York: Simon & Schuster, 1970), 568.

¹⁵ Heinz Halm, *The Fatimids and Their Tradition of Learning* (London: I.B. Tauris, in association with the Institute of Ismaili Studies, 1997), 72-73; Sayılı, "Gondeshapur," *Encyclopedia of Islam, 2nd Edition*, ed. P. Bearman, Th. Bianquis, C.E. Bosworth, E. van Donzel, W.P. Heinrichs (Leiden: Brill, 1979), 2: 1120; Ali Akbar Siassi, "L'Université de Gond-i Shapur et l'étendue de son rayonnement," in *Mélanges d'orientalisme offerts à Henri Massé* (Tehran: Imprimerie de l'université, 1963), 366-374.

¹⁶ George Sarton, *Introduction to the History of Science* (Huntington, NY: R. E. Krieger, 1975), 1: 417.

¹⁷ Sarton, *Introduction*, 417-435.

¹⁸ Sayılı, "Gondeshapur," 1120.

¹⁹ Sarton, *Introduction to the History of Science*, 1: 419.

Bayt al-Hikmah²⁰

The term *hikma* means wisdom in the Arabic language, but it also, as explained above, stands for the non-religious sciences that comprehend the so-called classical sciences, sciences of the ancients inherited from antiquity or *'ulum al-'awa'il*, literally science of the ancients, foreign sciences or *al-'ulum al-dakhila*, rational sciences or *al-'ulum al-'aqliyya* and philosophical sciences or *al-'ulum al-falsafiyya*.²¹ The earliest and most important center we know of that included the word *hikma* in its name and that housed those who were interested in the study of the classical sciences was the famous *Bayt al-Hikma* of Baghdad. The secondary literature depicts the Abbasid House of Wisdom as a full-fledged modern university or academy of sciences.

Bayt al-Hikma was first and foremost a library, undoubtedly the palace library²² during the reign of caliph Harun al-Rashid (r. 170- 193/786-809) and was given its full impetus by al-Ma'mun (r. 198-218/813-33), himself extremely talented in many of the branches of sciences such as grammar, philosophy, medicine, poetry, astrology and an avid reader and lover of the sciences of the ancients.²³

The main difficulty in comprehending the nature of the Abbasid palace library, at times referred to as *Khizanat al-Hikma* (Repository of Wisdom) and at others as *Bayt al-Hikma* (House of Wisdom), is how to situate this library within the overall framework of the multifaceted cultural and scientific activities in the era of the two caliphs, Harun al-Rashid and al-Ma'mun, generally known as the golden age of the Islamic civilization. What is certain about these activities is that they were, in the main, held under caliphal patronage. Indeed, the poets, the literary figures, religious scholars, physicians, astronomers, and astrologers who belonged to different religions and hailed from varied origins exercised their activities under the patronage of the caliph and with his financial support.

Careful and critical examination of the available information provided by the primary sources that have reached us has undoubtedly clarified many misunderstandings and helped to undo the fanciful portrait of the House of Wisdom. As for the claims that all these varied activities used to take place within the House of Wisdom and inside its "specialized departments," we have clearly shown that this claim has no historical support.

There are certain specific figures as mentioned by the primary sources who were attached to the palace library and who did work there officially. They, however, are few and quite limited in number but they stand as a proof to the existence of some mode of organized institutional work within the palace library that goes beyond the mere collection and preservation of books and encompasses other activities such as authoring, translating, and copying books.

The issue of the transmission of the Greek scientific legacy into Arabic should be dealt with by accounting a multiplicity of factors in the framework of the emergence and development of Islamic civilization. It is obvious that social need was a significant factor in the development of the translation movement. Yet besides this, intellectual needs and drives that influenced this movement, which displayed variety, were also important. It is well known that there was a need for the learning

²⁰ For critical and comprehensive overview, see İhsanoğlu, *The Abbasid House of Wisdom: Between Myth and Reality* (London: Routledge, forthcoming).

²¹ A. M. Goichon, "Hikma," *EF*, 3: 377-8.

²² Olga Pinto, "The Libraries of the Arabs during the Time of the Abbasides," trans. F. Krenkow, *Islamic Culture* 3 (1929), 220.

²³ Abu al-Faraj Muhammed Ibn Ishaq, *The Fihrist*, ed. Ayman Fu'ad Sayyid, 2 vols. (London: Al-Furqan Islamic Heritage Foundation, 2014), 1: 358-359.

of mathematics, astronomy, and medicine for answering the needs of the state and society (calendar, land measurement and survey, medical care, etc.) and observation of the religious duties (lunar calendar, determination of the qibla (the direction of Kaaba) for prayers, time-keeping, etc.). However, the intellectual dimension of the translation movement which evolved together with the organization of the newly developing central state and urban society should be understood in the light of the influence of the driving force of the new religion. For this, one should study the process of formation of the ideological needs of the societies in big cities, the interests and needs of the people as well as the place of the adherents of various views and schools in this transmission.

In the middle of the eighth century, rival schools emerged and new questions arose in linguistics, hermeneutics, theology, and jurisprudence, while the number of scholars and writings in these fields increased considerably, and specialization became more pronounced. Interest in Greek legacy was partly linked to research activities in Islamic disciplines. Thus, in the ninth century, it was only in Baghdad that this movement was affected by the Hellenistic scientific legacy, particularly in mathematical sciences.²⁴

The organization of translation activities shows that it was rather on a large scale. In a few decades, Euclid's *Elements* were translated three times, Ptolemy's *Almagest* twice, and many other works were translated from Euclid, Ptolemy, and Apollonius; and within a century, several works of Archimedes, Diophantus, Hero of Alexandria, and Pappus. These translation activities were neither arranged according to the historical sequence (chronological order) of the original Greek authors, nor were they made haphazardly. In fact, it was a deliberate undertaking, the text to be translated was selected and then its manuscripts were traced.

Rashed argues that these large-scale unsystematic translations, which were nevertheless deliberately organized, are connected with one important aspect, overlooked in the studies on the history of institutionalization of science in Islam. Insufficiently stressed for obvious reasons is the deep-seated connection between translation and research. Research, depending on the circumstances, preceded the translation itself or was contemporary with it, or yet was more or less indirectly set in motion by the translation of another text in a neighboring domain. The translation of Greek texts into Arabic was carried out to make available in Arabic, the texts necessary for training of researchers or even the advance of research (e.g. the translation of Archimedes's work aimed at facilitating studies on the measurements of areas and volumes).²⁵

Translation movement is one of the most significant and outstanding cultural phenomena observed in the early Abbasid era. Before discussing if translation activities were conducted in the House of Wisdom on institutional level or more on personal and individual level, it is appropriate to shed some light on salient features of this movement. The caliphs sponsored the translations that were organized and distributed systematically according to a set hierarchy. Especially during al-Ma'mun's reign, it could be said that translation became a state activity and was the catalyst for the development of many other scholarly genres such as adaptation and commentary.²⁶ It is observed that works were divided according to the aptitude of each translator. Yuhanna ibn al-Batriq (d. between 796 and 806) mostly worked on translating philosophical works of Aristotle and Epicure

²⁴ Roshdi Rashed, "Problems of the Transmission of the Greek Scientific Thought into Arabic: Examples from Mathematics and Optics," *History of Science* 27 (1989), 199-201.

²⁵ Rashed, "Problems," 201-202.

²⁶ L. E. Goodman, "The Translation of Greek Materials into Arabic," in *Religion, Learning, and Science in the 'Abbasid Period*, ed. M. J. L. Young, J. D. Latham, and R. B. Serjeant (Cambridge: Cambridge University Press, 1990), 478-479.

from Greek into Arabic while al-Hajjaj ibn Matar (between 786 and 833), who was specialized in the fields of astronomy and mathematics, translated Ptolemy's and Euclid's works. The most renowned of all the translators was Hunayn ibn Ishaq (809-873). He studied under Yuhanna ibn Masawayh (d. 243/857) who was a scholar attached to the Bayt al-Hikma; also, a student of one of the famous Bakhtishu physicians of Jundishapur. Hunayn worked under Yuhanna, while both of them were in the service of al-Ma'mun. He later became private physician to al-Mutawakkil. Hunayn is said to have made translations from Aristotle, Plato, Galen, Hippocrates and Dioscorides.²⁷ The remuneration of the translators by the caliphs varied with the work they translated. It is related that al-Ma'mun gave Hunayn an amount of gold that equaled the weight of the translated work. This is perhaps why, comments Ibn Abi 'Usaybi'a, the paper used was so thick, the lines so spaced apart and the writing so large!²⁸

In order to clarify whether the translation was an institutional or rather an individual process, a careful study of the list of works of Hunayn ibn Ishaq should shed light on this issue.²⁹ The valuable information found in the long bibliographic list of the translations of Galen's works made by Hunayn ibn Ishaq and recorded in his epistle to Ali bin Yahya gives significant clues as to how, why, and for whom this important chapter of the translation movement was carried out. The translation activities that he made individually or together with his colleagues and students lasted more than thirty years. Among the frequently mentioned names that placed orders for numerous translations during his productive years are physicians, the Banu Musa brothers, famous intellectual statesmen of the period, and private library owners.³⁰

In listing his numerous translations, Hunayn only notes that some of them were made during the periods of Caliphs al-Ma'mun, al-Mutawakkil, and al-Wathiq (r. 842-847) but does not mention in any case that these translations were ordered by them; for instance, he mentions that he translated certain works to Yahya bin Musawayh during the reign of al-Mutawakkil and to Muhammed bin Musa during the reign of al-Wathiq. We note that the names and identities of the people that placed the orders differ according to their preferred language. If the translation is from Greek into Syriac, it is obvious that the people that placed the orders are the physicians that came from Jundishapur to Baghdad. If the translated works are in Arabic, it is possible to find people of Arabic origin or Arabic speaking people among those who have placed the orders.

Among the many works personally translated, revised or edited by Hunayn, there is no information indicating that they were made in the name of the House of Wisdom or any other institution. Yuhanna Ibn Masawayh (d. 243/857)³¹, who was Hunayn's teacher, was among the names listed; considering that he was a physician and the founder of the Bimaristan in Baghdad and had the need for the translations of Galen's works in this capacity, it is obvious that the translations made by Hunayn from Greek into Syriac were for the benefit of Masawayh as well as the other physicians that

²⁷ Ibn Juljul, *Ṭabaqāt al-aṭibbā' wa-al-ḥukamā'* (Cairo: Institut français d'archéologie orientale, 1955), 68; Yūsuf al-Qifti, *Kitāb Aḥbār al-'ulamā' bi-aḥbār al-ḥukamā'* (Cairo: Maṭba'at al-Sa'āda, 1326 [1908]), 117-122; Ibn Abi Usaybia, *'Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'*, ed. Niza'r Raza, (Beirut: Dar Maktabat al-Hayat, [1990]), 257, *passim*; Eche, *Les bibliothèques arabes*, 9-57; Goodman, "The Translation of Greek Materials," 480-494.

²⁸ Ibn Abi Usaybia, *'Uyūn al-anbā'*, 270-71.

²⁹ On Hunayn and his works, see Boris Rosenfeld and Ekmeleddin İhsanoğlu, *Mathematicians, Astronomers and Other Scholars of Islamic Civilisations and Their Works (7th to 19th c.)* (Istanbul: IRCICA, 2003), 37.

³⁰ Hunayn ibn Ishaq, *Über Die Syrischen und Arabischen Galen-übersetzungen*, ed. Gotthelf Bergsträsser (Leipzig: In Kommission bei F.A. Brockhaus, 1925). For a reprint of this long list, see Fuat Sezgin, *Arab-Islamic History of Science, Islamic Medicine*, vol. 18 (Frankfurt: Institute of History of Arabic-Islamic Science, 2008).

³¹ For Masawayh, see Rosenfeld and İhsanoğlu, *Mathematicians*, 32.

came from Jundishapur. Probably, here we can trace an institutional dimension through the Bimaristan in creating the demand for translation of medical texts.

In fact, it is clear that these translations were made upon professional request and did not have any connection with the House of Wisdom. The orders placed for other translations indicate that they were made for scholars, interested statesmen, and private library owners. Considering that the Banu Musa, according to al-Nadim³² paid approximately 500 dinars a month to several translators including Hunayn, Thabit ibn Qurra, and others for their services in compiling, translating books, and attendance (*mulazama*) means that the translation movement at this time was not a monopoly belonging to the Caliph and was not limited to the House of Wisdom.

Regarding the places where these translations were made, it did not have to be in a specific place; as with other compilations and writings, it could be anywhere that provided the facility for intellectual work. There is an interesting anecdote among the information given by Hunayn. While working with Salmawayh in correcting the Syriac translation of one of Galen's works that was badly translated, Hunayn had the Greek text and Salmawayh had the Syriac translation; they compared the two and started to make the corrections according to the original text. Meanwhile he emphasizes that correcting a bad translation was more difficult than translating the original text; he adds that Salmawayh told him better to translate this work from its Greek original. In giving this explanation, he states that he completed the translation during al-Ma'mun's military campaign to al-Raqqā; that is, while they were accompanying the army. In addition to these interesting remarks, he says that after completing it, the translation was sent to Baghdad for copying.

In evaluating the examples and information included in his long bibliography, there is no information that indicates his holding a position of "superintendent on translation" (*Amin ala al-terjeme*) as referred by Ibn Juljul or being in charge of the library-academy as maintained by Meyerhof.³³ What is a more important outcome is the fact that not all translations made in this period were conducted in the House of Wisdom under royal patronage. There is no supporting information or evidence for this claim. Ibn Juljul's reference to Hunayn was to the effect that he was entrusted with translations, made translations himself, and helped to supervise and edit the translations made by others. It is obvious that the development of the translation movement, like other literature, compilation and other creative intellectual pursuits were enhanced by the patronage and encouragement of not only the caliphs but also the individuals, as well as the emergence of demanding readership among the courtly elites and intellectuals, as well as interested professionals of his time.

At any rate the nonexistence of specific information about the role of the House of Wisdom in the translation movement should not mean that the House of Wisdom did not witness scholars and translators who were engaged in translating texts and contributing to the translation movement.

Stating that Bayt al-Hikma was an institution where some of the translations and compilations from Persian and Greek sources were made is correct. However, apart from these examples, it is not possible to come across any strong evidence proving that all translated or written books, especially those mentioned by al-Nadim, were written or translated in the House of Wisdom during this period.

³² Al-Nadim, *Fihrist*, 2: 143.

³³ Max Meyerhof, *Von Alexandrien nach Bagdad* (Berlin: Verlag der Akademie der Wissenschaften, 1930), 389-429.

These baseless claims are put forward in some modern publications.³⁴ Though the majority of these books were translated or written under the auspices of and with the financial support of the caliphs and prominent statesmen and scholars, it may be surmised that authors or translators prepared them in their own working premises. It is possible that translation activities were carried out in an organized way and there are hints and references that suggest the possibility of their having a connection with Bayt al-Hikma. Al-Qifti in his biography of Hunayn Ibn Ishaq narrates that he set down (*qa'ada*) among the translators to translate [Greek] books on wisdom to Syriac and Arabic.³⁵ The verb "*qa'ada*" in this context means that there was a place where these group of translators would sit and do translations. Undoubtedly, the House of Wisdom would be an appropriate place for such activities.

One of the well documented examples of al-Ma'mun's patronage for scholars is the story of famous Arab grammarian Ibn al-Farra (d. 207/822) and his book *al-Hudud*. The report handed down to us by al-Khatib al-Baghdadi (d. 1071) in his famed book on the history of Baghdad indicates that Ibn al-Farra, upon approaching al-Ma'mun, received instructions to write a book that would compile the principles of Arabic grammar. Al-Ma'mun also allocated a special room for him at the Domicile (*al-dar*) and delegated slave maids and servants to attend to all his needs so that he may not endure any yearnings or feelings of estrangement. There were people even to keep him informed of the prayer times, scribes to record what he dictated, and still others to meet his financials needs, until he finished compiling the book *al-Hudud* after two years, which al-Ma'mun ordered to be copied and kept in libraries (*khaza'in*), then he was allowed to mix with people.³⁶ This account is an example of the ideal and comprehensive patronage and care to which any scholars aspires so that he may dedicate himself to authorship.

The text of al-Khatib al-Baghdadi includes two terms that are worthy of a particular pause, namely "*al-dar*" (domicile) and the "*khaza'in*" (repositories). The word "*al-dar*" with the definite article is bound to refer to a particular place.³⁷ It is an abbreviation of *Dar al Khilafa* (The Caliph's residence of *Dar al-Ma'mun*). This would mean that al-Ma'mun had allocated a special place for Ibn al-Farra in his own palace or its annexes. There is ample indication in the text also that al-Ma'mun provided him with all that one may require to dedicate oneself to scholarly work, along with servants, scribes, and caretakers, all of which cannot be housed together in the palace library. Once he was through with the book's craft, the Caliph made a point of having it reproduced in several copies to be kept in libraries. Despite this clear narrative, there is a tendency in contemporary writings to state that such scholarly activities were carried out within the House of Wisdom.³⁸ There are other examples in biographical sources that show the generous allocations made by the Caliph to scholars covering

³⁴ There are unjustified claims to this end in some newly published studies. See for example the strange lists in Attallah's book. See Khedr Ahmed Attallah, *Bayt al-Hikma fi 'Asr al-'Abbasyin* (Cairo: Dar Al Fikr Al-Araby, n.d.), 258-320.

³⁵ Al-Qifti, *Kitāb Ahbār*, 171-177.

³⁶ This story was reported by al-Khatib al-Baghdadi, al-Hafedh Abubakr Ahmed, *The History of Baghdad or The City of Peace* (Cairo, 1931), 14: 149-150; Yaqut al-Hamawi, *Mu'jam al-Udaba* (Cairo, 1938), 2: 12-13; Shamsuddin Abu al-Abbas Ibn Khalkan, *Wafiyatul A'yan Wa Anba' Abna'u Zaman*, ed. Ihsan Abbas (Beirut, 1969), 6: 177. The period over which Ibn al-Farra authored the book, *al-Hudud* is said to be "several years" in al-Baghdadi's report, whereas Ibn Khalkan sets it at "two years" and it is the latter that we have considered as most likely.

³⁷ In classical Arabic, "*dar*" means a house; mansion; a house of large size, comprising a court or a house comprising several sets of apartments and a court; a place of abode, which comprises a building or buildings and court. See E.W. Lane, *Arabic-English Lexicon* (Cambridge : Islamic Texts Society, 1984), 931.

³⁸ For example, see Abd al-Jabbar Naji, *Bayt al-Hikma al Baghdadi* (Baghdad, 2008), 8, 59.

their needs, providing them premises full of facilities and awarding them after completing their work. The nonexistent mention of the House of Wisdom in these accounts does not mean categorically the absence of an institutional involvement. Nevertheless, in order to confirm and to have a definite opinion on this subject and other activities related to the House of Wisdom, new sources should be explored. The unique example of the tutoring of the three brothers of Banu Musa in the House of Wisdom upon the instructions of al-Ma'mun stands as proof of a possibility of providing this source of education under the roof of the House of Wisdom.

Regarding the relation of the House of Wisdom with Muta'zila movement and al-Ma'mun's policy of inquisition (*mihna*) in his support to the issue of the createdness of the Qur'an and favoring its proponents, those who supported his views made use of his palace library where it held numerous books on Hikma/Wisdom, and furthermore that he supported them financially. Hence this library became known as Bayt al-Hikma/House of Wisdom because of its collection of books on Hikma/Wisdom and for being a place where they had philosophic deliberations and disputations. Between the death of al-Ma'mun in 833, four months after his declaration of the Inquisition, and Mutawakkil's abandoning the inquisition in 850, we can expect that the involvement of the royal library with such activities did not last long. Meanwhile we have no information about what happened to the House of Wisdom and its relationship with the supporters of the inquisition.

At this point of our assessment of the functioning of the House of Wisdom, it became obvious that there was only one institute in the Abbasid Caliph's palace, but it acquired two names. The first name was a straightforward depiction as a library to be mentioned with its founder or promoter's name. The second name was an attribution to its collection of books related to the pre-Islamic knowledge of sciences (*ulum al-awa'il*) and philosophy (*hikma*) and becoming associated with a philosophically motivated school of thought. Thus, its depiction as the House of Wisdom became an established compound name.

As for the claims that all these varied activities used to take place within the House of Wisdom and inside its "specialized compartments" have no historical support. Generations of scholars addressing the history of the House of Wisdom overlooked historical context and they were reading about modern institutions in classical texts, idealizing their structure and functioning in a way that reflected their own ambitions. As a matter of fact, the concept of an academy structured around the European model or modern university is anachronistic and inadmissible, and any discussion to that end would be meaningless.

There are, to all evidence, certain specific figures as mentioned in the primary sources who were attached to the palace library and who did work there officially. They are quite limited in numbers, but they stand as a proof to the existence of some mode of institutional, organized work within the palace library that goes beyond the mere collection and preservation of books and encompasses other activities such as authoring, translating, and copying books.

As for depicting al-Nadim's book *al-Fihrist*, which offers real chronicles of the cultural activities and constitutes a record of what al-Nadim witnessed in terms of authorship and translation activities in the first Abbasid era, as a catalogue of the House of Wisdom or claiming that all the scholars, literary figures, translators, astronomers, astrologers, and physicians who lived and practiced during that era used to write or translate books as official employees at this sort of "academy" that would have had well-defined programs and specific budgets similar to what we have today, it simply does not coincide with the available historical narratives and is certainly anachronistic.

The private libraries, heirs to *Bayt al-Hikma* established by Abbasid bibliophile statesmen and scholars, friends of the caliphs or their employees in *Bayt al-Hikma* (e.g., Fath b. Haqan (d. 861), Ali b. Yahya al-Munajjim (d. 888), and sons of İbn Musa Shakir) were open to visitors. In their semi-official libraries called *Khizanat al-Hikma*, on a more modest and private scales, they followed the pattern pursued by the caliph in *Bayt al-Hikma*. The sciences of the ancients were among the sciences promoted and pursued in these libraries and even after al-Mutawakkil put an end to the *Mihna*. The survival of these libraries indicates clearly that the reaction created towards the Mu'tazilites was not directly aimed at the sciences they promoted but using these sciences to criticize Sunni doctrines. Reaction against Mu'tazila was not because of their dealings with classical sciences but rather advocating their belief of the createdness of Qur'an.

Baghdad was a cultural center where men of science gathered, encouraged by the Abbasid caliphs, their viziers, and after 334/945, the Buwayhid amirs as well. Interestingly enough, if the Abbasid caliphs who regarded the achievements of a certain form of cultural integration under their Islamic banner as a central mission of the dynasty³⁹ suppressed the Mu'tazilites on a political level, they shared some of their scientific interests on a private level. The reaction of al-Mutawakkil against the *mihna* (850) most probably did not intend to stifle the intellectual life as much as it aimed at limiting the political activities and involvement of some powerful circles. On an official cultural level, *Bayt al-Hikma* had played a vital and indelible role in the introduction and assimilation of the foreign philosophical science into Islamic culture but because of its association with Mu'tazilism, and some of its office bearers with Shu'ubism and other movements, it was not sustainable for a long time socially and politically. We could perhaps say that its influence remained on a cultural level, rather than on an institutional one. On the other hand, one could view the Abbasid *mihna* as both a catalyst and an obstacle. A catalyst because it accelerated and encouraged the transfer and dissemination of the sciences of the ancients and an impediment, for it might have retarded their incorporation into the teaching of the official institutions. The Abbasid era, the *mihna* with the adoption of Mu'tazilism as an official doctrine, the ethnic rivalries, the support of Shi'ism were all movements that shared and encouraged a common intellectual interest in the classical sciences, their pursuit and their translation but their patronage had ulterior motives and perhaps hindered to some extent their integration in the institutional life.

Dar al-Hikmah

It is in Cairo that another caliphal institution, *Dar al-Hikma*, also known as *Dar al-'Ilm*, was founded by the sixth Fatimid Caliph al-Hakim (r. 985/1021). It is claimed to be modeled on the Abbasid *Bayt al-Hikma* of Baghdad. It was founded in 395/1005 in order to prove al-Hakim's enthusiasm and tolerance for Sunnism to the rebellious Malikite population that resisted the Ismaili Fatimid regime.

Hikma in Fatimid Ismaili understanding is an esoteric knowledge; the *batin* that resided in the Imam of the time and was communicated by him through the *da'is*. This distinction between exoteric *zahir*, i.e., the apparent meaning of the Qur'an and the sharia'a, and *batin*, i.e., the inner and hidden meaning of the revelation, is one of the characteristics of Ismaili doctrine, and had deeply influenced the educational system erected in their communities. As the Ismaili Imam, divinely inspired and the upholder of knowledge and wisdom, was seen as the sole authoritative interpreter of the sacred

³⁹ Goodman, "The Translation of Greek Materials," 478.

texts, obedience to him was made an absolute duty for every believer. "Knowledge ('ilm) and wisdom (hikma) are, according to Ismaili belief, gifts from God, revealed to humanity through His prophets."⁴⁰

According to the Ismaili doctrine 'Ali was the *was'i* of the prophet Mohammed; only his successors and the Fatimid Imam-caliphs are in position of possessing the knowledge of *batin* and it is their duty to educate the believers and to teach them the wisdom/*hikma*. This was achieved through the *da'wa* and its representatives, the *da'is*.⁴¹ The *da'i* is required to acquire profound knowledge of other religions, logic, philosophy, history, geography, physics, and metaphysics as well as other sciences that enable him to educate the Ismaili community; he is responsible for, meanwhile, to be well equipped for the discussions among scholars of different opinions and faiths.

The sixth Fatimid caliph al-Hakim invited eminent scholars from all locations and faiths to take residence in the Fatimid capital Cairo and teach in a new institution he was founding. Cairo in the Fatimid period was a prospering center of culture and science that attracted scholars from all over the Islamic world. The Fatimid Imam-caliphs increased the attraction to their new capital by their generosity.

By founding *Dar al-Hikma* it seems that al-Hakim aimed at appeasing the Sunnite population and yet, at the same time, he was founding an institution where the intellectual elite was being prepared for the assimilation and dissemination of the Isma'ili doctrine, the *hikma*. The foundation of the *Dar al-Hikma* was a political move on the part of the Caliph who, after having tried to force the population into the Isma'ili faith was forced to retrieve and exhibit Sunnism; but the result of this religious-political turbulence was the foundation of a magnificent institution located in a building near the palace of al-Hakim.

In the Fatimid *Dar al-Hikma*, there are some references to teaching activities when compare with the Abbasid House of Wisdom thanks to surviving accounts from eyewitness al-Musabbihi (d. 420/1029), the chronicler of the caliph whose accounts are partially preserved in al-Maqrizi's *Hitat*⁴² and from the reporting of his contemporary historian al-Antaki (d.451/1066).⁴³

They tell us that the inauguration of *Dar al-Hikma* took place on the Saturday the 10th of Jumada II 395 H. / March 1005. Books on different topics were transferred from the royal libraries (*Khazain*) and from the rich libraries of the scholars to the new institution of *Dar al-Hikma* and after curtains were hung on its doors and corridors, scholars were invited.

Dar al-Hikma's library is reported by contemporary sources as having "contained books that were never seen with any other King." These books were transferred from the repositories of books from the royal libraries (*khazain*) and from scholars' rich libraries.⁴⁴ Musabbihi in his account on the year 383 (before the establishment of *Dar al-Hikma*) describes the caliphal library by saying it holds forty repositories including one repository for ancient sciences containing 18,000 books. It had more than one copy for the same book, sometimes as many as one hundred copies. Al-Maqrizi tells us that the royal library had more than 200,000 volumes of books belonging to *fiqh* of different *madhhabs*,

⁴⁰ Halm, *Fatimids*, 17.

⁴¹ Halm, *Fatimids*, 71.

⁴² Taqi ad-Din Abu l-'Abbas Ahmad b. 'Ali al- Maqrizi, *Kitab al-mawa'iz wa'l-I'tibar bi-dikr al-hitat wa'l-atar*, ed. Ayman Fu'ad Sayyid (London: Al-Furqan, 1995), 4: 502-503.

⁴³ Yahya b. Sa'id Al-Antaki, *Kitab at-ta'rih al-mujmu' 'ala t-tahqiq wa-attasdiq*, ed. L. Cheikho (Paris, 1962), 188.

⁴⁴ Court Chronicler, al-Musabbihi as quoted by al-Maqrizi, *Hitat*, 2: 502.

grammar, philology, prophetic traditions (Hadith), history including history of kings, astronomy/astrology, chemistry, and *ruhaniyat* (spiritual sciences and precious copies of proportionate gilded and illuminated *Moshafs*).⁴⁵ Al-Maqrizi on this library narrated that “it had 1.600.000” books.”⁴⁶

Al-Musabbihi tells us that after the building was furnished, decorated and books transferred to its library, servants and service staff were employed. Qur’an reciters (*qurra*), jurists (*fuqaha*), astronomers/astrologers (*munajjimun*), grammarians and philologists, and physicians joined.⁴⁷

The verb used by al-Musabbihi to explain the participation of the above mentioned scholars was *jalasa*, which means “sat up” however by extension *jalasa* means to sit for teaching or participate in scholarly discussion and disputation.⁴⁸

The most important feature in this institution was the introduction of teaching for those who wanted to learn and it was offered officially. In both sources mentioned above, after the building was furnished and decorated, scholars of different disciplines, Qur’an reciters (*qarri*) jurists (*fuqaha*), astronomers (*munajjimun*) grammarians and philologists as well as physicians were assembled there, and they were engaged in scholarly pursuits. Peoples from different segments of society were allowed to visit the Dar al-Hikma to read and study books and copy them or to learn. They were provided pens, papers, and ink pots. Guardians, servants, domestics, and others were employed to serve there. It is also clearly stated that allowances (*rizq*) from the exalted office (the caliph) were to be paid to those who were admitted officially to join the *Dar al-Hikma* for scholarly activities including *faqihs*, and those who were part of service staff.⁴⁹ According to al-Antaki, there were also those who were employed to teach different sciences. Al-Antaki on this issue says “he [Caliph al-Hakim] organized there [Dar al-Hikma], a group of people [qawm] to teach people [al-nas], sciences.”⁵⁰

As already shown above the scholarly activities associated with Dar al-Hikma were not reported in detailed manner in the available primary sources. Hence it is difficult to discern which activities and scientific achievements of that era could be attributed to Dar al-Hikma. Here similar situation to that of the Abbasid House of Wisdom is observed. However, the most important scientific production of this institution according to Heinz Halm was the works of Ali b. Yunus and the Ibn al-Haysam.⁵¹ Ali b. Yunus al-Sadafi (circa d. 950/1009) was the chief astronomer of the observatory on the Muqattam mountain and the author of *Zij al-Hakimi*.⁵² Ibn al-Haysam (d. 965/1041), the prominent physicist, mathematician, and the founder of the experimental science, was well known for his pioneering work on optics.⁵³

⁴⁵ Al-Maqrizi, *Hitat*, 2: 502, 6/1: 392.

⁴⁶ Al-Maqrizi, *Hitat*, 2: 502.

⁴⁷ Al-Maqrizi, *Hitat*, 2: 502.

⁴⁸ For the meaning of *jalasa* in this context see, Makdisi, *Rise of Colleges*, 11. In the English translation of the above mentioned quotation, there is a slide shift of meaning. The Arabic verb “*jalasa*” was translated as “lectures were held.” See Halm, *Fatimids*, 73.

⁴⁹ Al-Maqrizi, *Hitat*, 2: 502-503, 4: 392.

⁵⁰ Al-Antaki, *Kitab at-ta’rih al-mujmu’*, 188. In this quotation the verb “*rettebe*” was translated as “lecturers employed.” See Halm, *Fatimids*, 73.

⁵¹ Halm, “Dar al-Hikma,” *Encyclopedia of Islam Third Edition* (EI³), ed. Kate Fleet, Gudrun Kramer, Denis Matringe, John Nawas, Everett Rowson, http://dx.doi.org/10.1163/1573-3912_ei3_COM_25866 (last access: February 7, 2022).

⁵² Rosenfeld and İhsanoğlu, *Mathematicians*, 282

⁵³ Rosenfeld and İhsanoğlu, *Mathematicians*, 328.

Al-Musabbihi narrates that in the year 403/1012, groups of mathematicians, logicians, jurists and physicians were given separate audiences with the Caliph al-Hakim and they were invited to debate among themselves. Then he would bestow on all of them garments (robes of honor) and gave them gifts.⁵⁴

Despite several moves, advanced by al-Hakim to appease the Sunni population, it was not an easy task for scholars to work with him because of his peculiar behaviors. For instance, in 404/1015, he arrested the astrologers and did not free them until they promise him that they will not practice their profession.⁵⁵

The Fatimid House of Wisdom's remarkable difference from the Abbasid predecessor is its endowment made by Caliph al-Hakim in 1010 which allowed it to survive until the end of the Fatimid era which was also the end of the *Dar al-Hikma*.

In the surviving fragment of the endowment deed which covers besides the House of Wisdom, Al-Azhar and other institutions, there is a description of the amount of money to be allocated to the *Dar al-Hikma*. Looking carefully to the breakdown of the expenditures of this annual allocation of 257 dinars raises an important question regarding the teaching activities expressed in contemporary accounts. The endowment deed clearly denotes that besides allocations to current expenses, there are mentions of the allowance to be paid to the librarian (48 dinar) and the servant (15 dinar). As for the teaching activities the only reference is related to allocation of 12 dinars for scholars studying there.⁵⁶

After the deduction of all expenditures, there is no explanation about the remaining amount of 48 dinar. It is also interesting that the provisions of the deed concerning al-Azhar does not have mention of education activities.⁵⁷ These remarks raise a question on whether the payment to be made to the teachers in the two institutions were not made from the endowment revenues but from the state's budget or the caliph's treasury.

In modern scholarship, it is widely accepted that *Dar al-Hikma* was established as an institution to appease the overwhelming Sunni population in Egypt, even though it was put from day one under the jurisdiction of the chief da'I, the head of Ismaili missionaries. The founder al-Hakim adopted pro-Sunni policy which lasted until 400/1010. It was an instrument of al-Hakim's unsettled religious policy and it also acted as an institution of learning to serve scholars, and everybody interested to acquire knowledge of both religious and classic sciences. After the death of al-Hakim, the focus of education activities shifted towards Ismaili da'wa. During al-Hakim's time this was only just one aspect, and *Majalis al-Hikma* (Council's of Wisdom), where formal education of Ismaili doctrine was inculcated and candidates for da'is were recruited, would meet not in *Dar al-Hikma* but inside the royal palace.

In the year 461/1068, due to the economic crisis the unpaid soldiers plundered the treasures of the palace, they also looted the library of the *Dar al-Hikma*. In the year 513/1119, a band of sectarians occupied the *Dar al-Hikma* so the caliph closed the institution for the fear that it became a hiding place for the Nizari conspirators. It was reopened on 517/1123 under the name of the new House of Wisdom (*Dar al-Hikma al-Jadid*). It became so intensely involved in Ismaili da'wa and started to

⁵⁴ As reported by al-Maqrizi, *Hitat*, 2: 503.

⁵⁵ Eche, *Les bibliothèques arabes*, 88, 89.

⁵⁶ Al-Maqrizi, *Hitat*, 2: 503.

⁵⁷ Halm, *Fatimids*, 75.

function as a part of Isma'ili missionary work that it was rarely mentioned in the contemporary sources.

After the new House of Wisdom was reopened, the sources are silent about its activities until 567/1171 when the Ayyubids took power in Egypt and put an end the Fatimid rule and to *Dar al-Hikma*.

Once more hikma/wisdom/sciences of the ancients were used as instrument in fighting the mainstream of Islam the Sunni/Asha'ri school and it was not welcomed by some Sunni scholars who considered it as an agent of heterodox onslaught.

Thus at this point of the study it is obvious that the two caliphal foundations mentioned above, namely *Bayt al-Hikma* and *Dar al-Hikma* failed to establish the model for the future permanent institutions because their ideological background was not rooted in the main trend of the social and cultural life of Islam. They went against the general popular tendencies whether they were supportive of the Mu'tazili *mihna* as was the case of *Bayt al-Hikma*, or supported Isma'ili missionary work as in the *Dar al-Hikma* while the masses were Sunnis. It is obvious that the private libraries that remained aloof from political disputes were not subject to controversy.

The limitation of these attempts can be interpreted on two levels: on the one hand, they involved marginal and radical schools of thought which antagonized the mainstream, the ulema, and the people. These institutions could not yet fit into the social context and be in agreement with the widely accepted cultural values; also, they lost their legality when the political support was withdrawn. On the other hand, we note an evolution in the financial functioning of the institutions studied. At first, they relied on the patronage of the caliph, or on an individual support or were supplied with the caliph's personal wealth. They were not secured or legalized by the laws of waqf. It was only in 400/1010 that al-Hakim, five years after the opening of *Dar al-Hikma*, endowed it according to the laws of the waqf. This less personal and less vulnerable financial source gave a more permanent and lasting foundation to the later institutions through the legislation of the waqf and in total harmony with the laws of the *shari'a*.

The Rise of Madrasas

Madrasas as schools of higher education dedicated to teaching religious sciences and auxiliary arts came to existence due to the development of a legal status in the waqf law—a charitable trust—to finance education. Madrasas began to gain wide acceptance in the second half of the eleventh century where the instruction was free, and students were entitled to have free accommodation and stipends.

The first madrasas started to appear in the regions of Transoxania and Khorasan in the eleventh century during the rule of Turkish dynasties: the Ghaznavid, Karahanid, and the Seljuk dynasties. They were the first to give royal support and patronage.⁵⁸

In this context it should be noted that Shiite Buwaihids (932-1056) were ruling in Iraq and Ismaili Fatimid Shiite dynasty alleging descent from Prophet Mohammad's daughter Fatima were ruling in Egypt and North Africa (909-1171). Seljuk Sultan Tugrul (r. 1037-1063) put an end in 1055 to the rule

⁵⁸ See Al-Maqriz's *Hitat*, 4/2: 451-453. See also Richard N. Frye and Aydın Sayılı, "Turks in the Middle East Before the Seljuks," *Journal of the American Oriental Society* 63 (1943), 194-207.

of Buwaihids in Baghdad. Baghdad came to be the epicenter where almost a standard model of madrasas known as Nizamiye Madrasa attributed to Nizam al-Mulk (d. 1092) the famous vizier of Seljuk Sultan Alpaslan (r. 1063-1072) and his son Sultan Melikshah (r. 1072-1092) to expand in Western part of the Abbasid caliphate.

The first Nizamiye madrasa was established in Baghdad in 1067 to teach fiqh on the Shafiite school and the Ash'arid doctrine. This was the first madrasa in Islam that teacher and students would receive allowances from waqf revenues.⁵⁹ The Nizamiye Madrasa model expanded all over the western part of the Abbasid caliphate where the rulers were politically determined to enhance the Sunni-Ash'ari understanding against the Shiite creed.

Western part of the Abbasid caliphate, in Egypt, Syria, and North Africa come under the rule of Ayyubid Sultan Salah al-Din (r. 1174-1193) who abolished the Ismaili Fatimid caliphate and realigned the country in allegiance with Baghdad based Sunni Abbasid caliphate. Salah al-Din and his successors spread the establishment of numerous madrasas all over the places under their rule particularly in Egypt and Syria.

Madrasas were established all over the Islamic world under successive empires and states: the Seljuk Empire (1037-1194); Seljuk Sultanate of Rum (Anatolia) (1077-1306); the Ilkhanate (1256-1335) and the Ottoman Empire (1299-1922). In the Ottoman era, they established many madrasas in the European provinces came under their rule including in Hungary (1641-1667).

An outstanding example of how far madrasa as an institution of learning was considered necessary for the rulers and appreciated by the people is the mobile madrasa established by Ilkhanid Sultan Uljayto (r. 1304-1316) who adopted Islam as an official religion. The Madrasa-e Sayyare-e Soltani, i.e., sultanic mobile madrasa was meant to continue its education program in residence and travel (*hâzar wa safar*) with the sultan. This madrasa had around hundred students whose costs along with their teachers and other employed staff were paid by the Sultan himself.⁶⁰

Dealing with teaching programs of madrasas we avoided using European terms of "curriculum" and "syllabus" since these teaching programs were the result of inner academic evolution that was not dictated by upper official authorities. Meanwhile we have to keep in mind that it was the privilege of the founders to assign the *madhhab* (school of jurisprudence) that madrasas has to follow and also to expect them to intellectually sustain their struggle against their adversaries.

Bimaristan-Madrasa Model (Twelfth-Thirteenth Centuries)

Medical Schools Before Islam

Medicine in Islam was influenced by two medical schools of Alexandria and the Jundishapur in the Sasanid Empire. The Arabs first contact with Greek medicine was in the early Umayyad period after they conquered Syria, Iran, and Egypt. The Greek medicine had its immense influence on Islamic medicine besides the Persian and Indian medicine too.⁶¹

The Alexandria school was functioning about until (100/719) and teaching in philosophy and medicine was instructed in Greek. The medical school of Alexandria influenced the medicine in Islam

⁵⁹ Al-Maqrizi, *al-Mawaiz wa al-itibar fi zikr al-hitat wa al-alhar* (London: Al-Furqan Foundation edition, 2013), 4: 2.

⁶⁰ Abd Allah b. Fazl Allah al-Shrazi Wassaf, *Tahrir-i Tarihi Wassaf*, ed. Abd al-Mohamad Ayeti (Tehran, 1372 [1993]), 541.

⁶¹ On the history of medicine, see Manfred Ullmann, *Die Medizin im Islam* (Leiden: Brill, 1970), 20.

widely through providing medical texts as *summaria Alexandrinorum* and their translations to Arabic. This institution in Alexandria lasted until the early eight century CE when caliph Umar (r. 99/717 – 101/720) ordered to transfer it to Antioch and other cities.⁶² Hence the medical teaching content of the late Alexandria school became the basis of professional medical education in Islam.⁶³ Meanwhile the academic model of Jundishapur, i.e., the combination of theoretical and clinical education, became the pattern for Islamic hospitals.⁶⁴

In less than a century and with the accumulation of medical material and handbooks, medical students were recommended to study this literature. Al-Razi's (d. circa 925) *Kitab al-Mansur* and *Kitab al-Murshid* were recommended as medical textbooks.⁶⁵

There were three methods of acquiring medical education in medieval Islam. First, some were taught by fathers, one famous example is Bahtishu family members who we know had about nine generations of physicians from the same family. The second was self-education. And the third was by teacher in private or in class which is the subject matter of this study.

In the eleventh century the Egyptian physician Ibn Ridwan (988-1061)⁶⁶ conveys his personal experience through the account narrated by Ibn Usaybia:

If the student had a natural disposition for the subject was young enough (between puberty and twenty-one) and had a good teacher, he could, like Galen, acquire the requisite medical learning in three years. If the medical students could not find a competent teacher, he could study Hippocrates on his own after a training in logic, but this course of study would take longer. In either case, the student must, then, study with the most capable practitioner accessible to him.⁶⁷

The Bimaristans established in the major cities of the Muslim world, Baghdad, Damascus, Cairo, and elsewhere undoubtedly had a kind of clinical training.⁶⁸ One of the early examples from the tenth century belongs to the famous Abubakr al-Razi narrated by al-Nadim which describes Razi as an instructor and physician:

used to sit in his (majlis) with students around him. Alongside of them were their students, and still other students were with them. A patient would enter and describe his symptoms to the first persons who met him. If they had knowledge [of what was wrong, good], but if

⁶² Michael W. Dols, *Medieval Islamic Medicine: Ibn Ridwān's Treatise "On the prevention of bodily ills in Egypt"* (Berkeley: University of California Press, 1984), 4, argues that Alexandria school lost its fame and vigor in the centuries before the advent of Islam. It had been Christianized and its medical literature was subjected to condensation and commentary.

⁶³ Dols, *Medieval Islamic Medicine*, 4.

⁶⁴ Ullmann, *Die Medizin im Islam*, 22.

⁶⁵ Ullmann, *Die Medizin im Islam*, 132, 134, and for other examples 141, 151, 152, 165; on al-Razi see, Rosenfeld and İhsanoğlu, *Mathematicians*, 142.

⁶⁶ For Ibn Ridwan, see Rosenfeld and İhsanoğlu, *Mathematicians*, 369.

⁶⁷ Ibn Abi Usaybia, *Uyūn al-anbā'*, 2: 101. English version quoted from Dols, *Medieval Islamic Medicine*, 29.

⁶⁸ On bimaristan in general see, D. M. Dunlop, "Bimaristan," *El²*, 1: 1222-1224; A. Terzioğlu, "Bimaristan," *TDV İslam Ansiklopedisi* (Istanbul: ISAM, 1992), 6: 163-178; Ahmad Issa Bey, *Tarih al-Bimaristan fi al-Islam*, 2nd edition (Beirut, 1981).

they did not [have the required knowledge], he would pass from them to others. Then if they hit [upon the diagnosis, good], but if not, al-Razi himself would discuss the case.⁶⁹

This account from the tenth century could be considered as one way of clinical training in hospitals. However, we do not have numerous examples for the clinical training up to this date. The clear examples which we have for both clinical training as well as teaching in class come from late twelfth and early thirteenth century. Ibn Abi Usaybia' (d. 1203-1270) tells us about his own experience as medical student in the Nuri Bimaristan in Damascus.

Teaching Medicine in Bimaristan

The thirteenth century witnessed an important development in the course of institutionalizing the teaching of sciences. The famous Nuri Bimaristan and al-Dakhwar Medical Madrasa in Damascus and the Mustansiriyya Madrasa in Baghdad triggered the integration process of the inherited classical science of medicine among others.

The Nuri Bimaristan, one of the largest and longest living institutions, was established in Damascus by Nur al-Din Zengi (r. 1146-1174) towards the middle of the twelfth century and had two innovative features. First, it was endowed as a waqf, a charitable foundation. Thus, the teaching of the science of medicine was formally included in an official institution, marked a major step towards the institutionalization of medical education. Second, the hospital also had a library, the books of which had been presented by Nur al-Din Zengi. This provided for the theoretical aspect of teaching. Because of these abovementioned two features *bimaristan* was slowly and gradually assuming the characteristics of a teaching institution. We shall quote here a passage from the biography of the Damascene physician and scholar Abu'l-Majd b. Abi'l-Hakim (d. 570/1170) that gives us a picture of the life and activities of the physicians in this *bimaristan*:

..And he (Abu'l-Majd b. Abi'l-Hakim) sat in the well-equipped main room, or *iwan*, in the *bimaristan* and started consulting (*ishtighal*). Nur al-Din (Zengi) had endowed the foundation of the *bimaristan* with many books on medicine. They were in the cabinet, in the center of the *iwan*, and a group of doctors and students who would come to learn from him; he would then discuss medical subjects with the students and teach them while busy consulting and researching, checking books for as long as three hours after which he would go back to his home.⁷⁰

Ibn Abi Usaybi'a's description of his own life as a medical student allows us to disengage some of the main educational methods during the seventh/thirteenth centuries. Education was conducted through fellowship (*sohba*), assistantship (*mulazama*), reading textbooks, clinical training and other methods. The teaching resulted in the cultivation of the student's abilities, the intellectual (by reading) and the technical (by clinical observation). Teaching was to some extent "formalized"

⁶⁹ Al-Nadim, *Fihrist*, 2: 305-306; Bayard Dodge, *The Fihrist of Al-Nadim: A Tenth-Century Survey of Muslim Culture* (New York: Columbia University Press, 1970), 701-702.

⁷⁰ Ibn Abi Usaybia, *Uyūn al-anbā'*, 728.

and also a part of the daily life. The transmission of medical knowledge was not only a matter of classes or training in the *bimaristan* but it also took place in the homes and even in military camps.

The biography of Muhadhhab al-Din al-Dakhwar (d. 628/1230), one of the leading and renowned physicians of the Nuri Bimaristan, as narrated by his student Ibn Abi Usaybi'a, provides important information on how the teaching tradition of the *bimaristan* was transformed to a system of independent medical school.

After the Shaykh Muhadhhab al-Din - May God have mercy upon him! - had accomplished his work in the *bimaristan*, examined the patients among the state officials, the notables and others, he would go home, start reading and studying, and surely also copying books. When he had finished his work, he would allow people in. Physicians and students would start flooding in. He would teach every single one of them, discuss specific issues and explain them according to everyone's ability. He would then talk with those who excelled among the study-circle present even though the subject would require more research and clarification. He would always hold between his hands a copy of the book the student was reading and when he caught a mistake in the student's copy, he would order him to rectify it. The copy of Shaykh Muhadhhab al-Din was faultless and most of the time written by him. He kept beside him the necessary medical books as well as the linguistic works of al-Jawhari, *al-Sihah*, of Ibn al-Faris, *al-Mujmal* and the book on botany by Abi Hanifa al-Dinawri. When the people were done reading, he would retire, eat something and use the remaining hours of the day memorizing, studying and reading. Most of his nights were spent on his own studies and work (*ishtighal*).⁷¹

It is the deep interest of al-Dakhwar in medical sciences that was the catalyst for the officialization of the teaching of medicine in Damascus. The above text is quoted at length for it tells us how "personal tutoring" was the teaching imparted by al-Dakhwar. Each student was taught specific medical problems according to his abilities and talents. The teaching took place in the "al-Dakhwar" house. With al-Dakhwar, the teaching of medicine, while it still kept its personalized character, became more collective and acquired a new official flavor. According to his biographer, in the year 628/1230, al-Dakhwar fell ill, his speech was impaired, and he could no longer receive his students at home and teach as in the past. After al-Dakhwar died, in accordance with his will, his home where he used to lecture and lead the workshops was converted into a madrasa for the teaching of the science of medicine. Al-Dakhwar who wanted his house to be filled with students even after his death, endowed it so that it would remain as during his lifetime, and it became the first madrasa for medicine that we know of in Islam.

This medical school functioned for at least two centuries after the death of its founder and it was emulated by two of his contemporaries namely Najm al-Din Ibn Labdud (d. 670/1272) and Imad al-Din al-Rabi al-Danisiri (d. 686/1287).⁷²

⁷¹ Ibn Abi Usaybia, 'Uyūn al-anbā', 728-736; Makdisi, *Rise of Colleges*, 205-7.

⁷² For these medical madrasas, see Abd al-Qadir b. Mohammed al-Nu'ymi al-Dimashqi, *al-Daris fi Tarikh al-Madaris*, ed. Ja'far al-Hasani (Damascus, 1988), 2: 126-138.

Mustansiriyya Madrasa

At the time when the private home of al-Dakhwar was made into a madrasa for the sole purpose of teaching medicine, another madrasa founded in Baghdad by the Abbasid caliph transformed the pattern of education in Islam. It initiated many novelties related to the concept and system of education as well as the teaching of several sciences inherited from the pre-Islamic times that were integrated with the native Islamic sciences.

As its name indicates, al-Madrasa al-Mustansiriyya was founded by al-Mustansir bi-Llah, penultimate caliph of the Abbasid dynasty (r. 1192-1242). Although only a few decades away from the bloody termination of his dynasty by the Mongol horde in 1258, al-Mustansir's reign offered a period of relative stability, propitious to the building of religious, social, and cultural foundations and was described as "the lull before the fatal storm"⁷³ the final downfall before the sweeping Mongol onslaughts.

The Mustansiriyya was the first madrasa to be founded by a caliph, as a major cultural initiative of the thirteenth century it was conceived and built between 625/1227 and 633/1233. It operated for centuries with only two intervals during Hulagu's and Timur's invasions.

The Mustansiriyya was one of the most generously endowed foundations. Its most outstanding feature was being the first madrasa in the history of collegiate education that offered the teaching of the four Sunni schools of law in its educational program. Students from all the *madhhabs* would be admitted to the madrasa rather than only the students who followed the *madhhab* upheld by the madrasa, as was the case.

The caliph endowed the foundation "with extraordinary provisions"⁷⁴ al-Dhahabi states, "the foundation was endowed to an extent that surpasses description and that the yearly aggregate of the endowments of the Mustansiriyya college reached over 70,000 *mithkals*."⁷⁵ The Mustansiriyya indeed disposed of very large funds and the waqf provided many facilities to the orphans and students, and generously remunerated its teachers. During its years of activity, Mustansiriyya was administered by a director (*nadhir*) with the help of a supervisor (*mushrif*) and a clerk (*katib*). The service staff included people who fulfilled various functions such as architects (*mi'mariyya*), ten attendants (*farrash*), three gatekeepers, attendants for the baths (*hammam*), a cook, servants, etc. The stipends and daily provisions of each post were defined in very specific terms.⁷⁶ The nature of the teaching and the number of the teachers appointed for every section was clearly specified in the stipulations of the deed of trust. The *waqfiyya* stipulated that there should be 248 jurists, or students in law, that is four times 62, each 62 belonging to each one of the four Sunni schools of law (*madhhabs*). For every *madhhab*, one *muderris* (professor) and four *mu'ids* (assistants) would be assigned. A shaykh and his assistant would teach the Holy Quran to thirty young students. A shaykh would transmit the science of *hadith* or traditions of the Prophet to ten students and finally, the physician in the medical service or the *tabib* attached to the Mustansiriyya would teach the science of medicine (*tibb*) to ten students. The total number of the students was 298. In addition to these major branches, all the students were

⁷³ Philip Hitti, *History of the Arabs* (New York, 1981), 483.

⁷⁴ Al-Suyuti, *Tarihu'l-Hulefâ*, ed. Ibrahim Salih (Damascus, 1997), 545; al-Suyuti, *History of the Caliphs*, trans. H. P. Jarrett (Amsterdam, 1970), 486-487; Cemaleddin İbn Vasil, *Müferricü'l-Kurûb fî Ahbârî benî Eyyûb*, ed. Hassanein Rabie (Cairo, 1977), 5: 316; Şemseddin ez-Zehebî, *Düvelü'l-İslâm* (Cairo, 1974), 1: 136; Şemseddin ez-Zehebî, *Tarihu'l-İslâm ve Vefeyâtü'l-Meşâhir ve'l-Âlem*, ed. Ömer Abdüsselam Tedmürî (Beirut, 1987), 7-8.

⁷⁵ Al-Suyuti, *Tarihu'l-Hulefâ*, 545; al-Suyuti, *History of the Caliphs*, 487.

⁷⁶ es-Safedî, "Ârâ' ve Efkar," *Mecelle el-Mücemma' el-İlmî el-Arabî* 4, no. 1 (1924), 41-42.

taught grammar by a *nahawi* (grammarian) and mathematics by a mathematician. The library had a *khazin* (director) a *mushrif* (superintendent) and a *munawill* (assistant librarian). Every school of law (*madhhab*) had its own *imam*, its own *reciter* of the seven readings of the Quran and a preacher; and the mosque had one *muezzin*.

The unique trait of the Mustansiriyya lies in its inclusiveness of the traditional madrasa teaching activities together with sciences pertaining to the world of the ancients. Al-Mustansir elaborated on the traditional madrasa as well as on the traditional *bimaristan*. He combined the two as though he wished to provide a global type of education for the care of the body and the soul. Education and training of the physicians, now officialized, went hand in hand with the teaching of law that was the primary constituent of the madrasa, funded by the charitable foundation (*waqf*). Meanwhile, for the first time in the history of collegiate education, we have evidence of the inclusion of some different disciplines in the educational program. The historian al-Irbili's report provides us with most interesting details on the variety of the courses: "(The Mustansiriyya was) the focus of all, the apex of Islam, the convergence of all the Muslim trends, the science of jurisprudence, legal theory and methodology, similarities and differences among legal schools, the science of prosody and the sayings of the Prophet, the knowledge of the lawful and the unlawful, the study of the laws of inheritance, the laws of descent and distribution, arithmetic and geodesy, medicine, the science of how to benefit from animals, healthcare and care of the body."⁷⁷ These elements of information are also reiterated by a second chronicler, the author of *Kitab al-Hawadith*: "It was stipulated (in the deed of the endowment) that the Mustansiriyya should include students in the science of the laws of inheritance and arithmetic as well as the many other sciences the exhaustive enumeration of which would be but too lengthy."⁷⁸ Although the list of the sciences in *Kitab al-Hawadith al-Jami'a* is not as comprehensive as the one given by al-Irbili, it is significant to quote *al-Hawadith* for its author adds another crucial detail not explicitly mentioned in Irbili, and not available to us since the *waqfiyya* of the Mustansiriyya has not come down to us: the inclusion of the teaching of arithmetic, the laws of inheritance and other sciences was "stipulated in the *waqfiyya*" of the Madrasa al-Mustansiriyya. Indeed, as far as classical sources are concerned, this is the first case where some sciences which were considered to be part of the so-called sciences of the ancients or '*ulum al-'awa'il*' had been officially integrated and assimilated as fields of study of their own and as part of the formal program of the madrasa.

The fact that al-Mustansiriyya included outstanding medical and pharmaceutical facilities with a teaching program is mentioned in all the major and minor historical accounts at our disposal.⁷⁹ Not only the Mustansiriyya provided healthcare and ensured the training of ten young assistants but it also owned a pharmacy. In the pharmacy, "various potions and remedies"⁸⁰ were stored. The pharmacy was considered to be another division of the *bimaristan*, itself part of the madrasa where all kinds of remedies, drugs and potions were administered by the physician and his assistants.⁸¹ The standards of the medical care and teaching offered in the Mustansiriyya were most probably very high, the highest at the time. We know of a certain physician, Abu Ali ibn Abd Allah also known as Sanjar who strove until he was allowed to "sit in the medical *iwan* facing the Mustansiriyya."⁸²

⁷⁷ Irbilî, *Hulâsât ez-Zehab el-Mesbûk* (Baghdad, 1964), 287.

⁷⁸ Bashshar Awwad Marouf and İmad Abdüsselam Rauf, eds., *Kitab el-Havadis* (Beirut, 1997), 86.

⁷⁹ İbn Vasil, *Müferricü'l-Kurûb*, 5: 316; Marouf and Rauf, *Kitab el-Havadis*, 81.

⁸⁰ İbnü'l-İbrî, *Tarîhu Muhtasari'd-Düvel* (Beirut, 1890), 425.

⁸¹ İbn Vasil, *Müferricü'l-Kurûb*, 5 : 316.

⁸² İbnü'l-Fuvâtî, *Telhîsu Mecma'i'l-Edeb fî Mu'cemi'l-Elkâb*, ed. Mustafa Cevad (Damascus, 1967), 4/2: 1063.

However, we should here specify that the Mustansiriyya medical teaching program was not conceived as an independent medical school⁸³ but it was primarily designed as a *bimaristan*⁸⁴ where the physician of the Mustansiriyya and his ten assistants provided the necessary healthcare facilities for the jurists⁸⁵ the staff and students, totaling to some 350 people living in the same place.

One of the stipulated clauses of the lost deeds is as follows: “that there should be (in the *madrasa*) a skillful physician engaged in the teaching of ten people (students) enjoying the same rights as the students of *hadith*.”⁸⁶ We are also told: “In the year 633, the *iwan* that was built opposite the *Madrasa* al-Mustansiriyya was completed with a hall where the physician would sit with the people busy with the science of medicine around him and would consult with the patients seeking treatment.”⁸⁷ The sources quoted above describe the place where the physician of the Mustansiriyya sat with his medical students in the *iwan* opposite the Mustansiriyya *Madrasa*.⁸⁸ As evidenced from this, the activity of the teaching of medicine was not organized in an independent *madrasa*. Rather, it was one of the various sciences pursued and conceived as part of the formal education of the Mustansiriyya. Ibn al-Ibri in his account gives us information that supports this assessment: “The Mustansiriyya had an assigned physician who would visit and consult with his patients every early morning.”⁸⁹ It is also clear from the above quoted texts that the physician that would be appointed to the Mustansiriyya was referred to as physician (*tabib*) not professor (*muderris*).

The Mustansiriyya was also famous for its clock that answered to another need of the residents of the madrasa by indicating the hour of the day and the time of the prayers. The caliph in his madrasa provided for all the intellectual needs of the residents without forgetting the practical facilities like the bath (*hammam*) for all the students and the staff.

To show the tolerant atmosphere that dominated the Mustansiriyya madrasa and the eagerness of its students to study both Islamic sciences and the sciences of the ancients, the following account related by the al-Kutubi is extremely revealing;

Al-Kutubi tells us that one of the Shafi'i jurists at the time of al-Mustansir, Safi al-Din al-Mughanni was also very well versed in literature, music, the science of controversy or *ilm al-khilaf*, the sciences of the ancients and he was a very fine calligrapher. He even started lute lessons and was even more gifted in music than in calligraphy.⁹⁰ However, we have no information on whether the music classes were given within the Mustansiriyya or outside. Yet, this is an indicative piece of information because it reflects the atmosphere of tolerance that prevailed in the *madrasa*. This is not a unique case for this Baghdadi madrasa but it is an early example for many other madrasas to be found all over in the Arabic, Turco-Mongolian, Persian and Turkish Ottoman madrasas.

⁸³ Naci Marouf, *Tarih Ulemâ el-Mustansiriye* (Baghdad, 1976), 1: 25.

⁸⁴ el-Kütübî, *Fevâtü'l-Vefiyât*, ed. İhsan Abbas (Beirut, 1973), 4: 170.

⁸⁵ İbn Vasil, *Müferricü'l-Kurâb*, 5 : 316.

⁸⁶ Marouf and Rauf, *Kitab el-Havadis*, 85; es-Safedî, “Ârâ' ve Efkâr,” 42.

⁸⁷ Marouf and Rauf, *Kitab el-Havadis*, 111.

⁸⁸ İbnü'l-Fuvâtî, *Telhîsu Mecma'i'l-Edeb*, 4/2: 1063.

⁸⁹ İbnü'l-İbrî, *Tarîhu Muhtasari'd-Düvel*, 425.

⁹⁰ el-Kütübî, *Fevâtü'l-Vefiyât*, 2: 411; İbnü'l-Fuvâtî, *Telhîsu Mecma'i'l-Edeb*, 4/3: 79.

Dissemination of the *Bimaristan-Madrasa* Model

The establishment of Mustansiriyya Madrasa in Baghdad, as a result of a process of institutional development, marked a beginning of further developments in education. Although it is not easy to determine the course of this influence in detail, meanwhile if the available sources are studied from this perspective, they will provide some clues. Besides, the use of historical material, which has not been thoroughly searched so far, will yield some clear examples in this matter.

Rulers, commanders, scholars and students who came to Baghdad from various parts of the Muslim world during and after the reign of Caliph Mustansir were enchanted by the magnificence of the Mustansiriyya complex which was a great example and a perfect model. Among the influences this institution exerted, the foremost was the provision of education in the four legal schools of Islam; another significant contribution was the provision of medical care and education in one complex, as well as other educational activities within the framework of the same institute. All this was provided by the financial support of the religious endowment.

While exploring these influences, one should also consider the division made deeper in the Islamic world by the Mongol invasion of Baghdad (1258) that took place shortly after the construction of Mustansiriyya. Although the rise of the Fatimids in the West and the Seljukids in the East had previously created a shifting border between Syria and Iraq, this border was consolidated by the annihilation of the Abbasid Caliphate by the Mongols in 1258 and consequently the Islamic world was divided into two political and cultural zones.

The political division, however, could not be called a division between the Arabs and Persians, because, as Albert Hourani clearly points out, from the eleventh century onwards most ruling groups in both areas were neither Arab nor Persian in origin, language, or political tradition, but rather Turks descended from nomadic pastoral peoples of inner Asia.⁹¹ Nevertheless, in the period following the destruction of the caliphate, this division became clearer between two great cultural zones. In the first zone, until the rise of the Ottomans, Persian culture was the dominant urban culture for centuries. This zone had its center in the plateaus of Iran and extended westwards into Anatolia and to the lands beyond, conquered by Ottoman Turks in Europe and eastwards into Central Asia and the new Muslim Empires of India. Although Arabic remained the language of religion, learning and law, literary life was dominated by the tradition of Muslim Iran. In Central Asia and Anatolia, Turkish vernacular and literature developed.⁹²

The second zone, namely the old Arabic-speaking centers of civilization consisted of the ruined province of Iraq and the new center of Egypt where the Syro-Egyptian empire of imported Mamluks of Turkish stock (mainly from the Kipchak country north of the Black Sea) ruled. In the Mongol aftermath in the Arabic-speaking countries, the center of gravity had finally moved from Iraq to Egypt.⁹³

One observes that amidst this growing cultural diversity the Mustansiriyya influence assumes various forms. The institutional development in the first zone, where Turco-Mongolian dynasties were dominant and Persian and Turkish languages developed at differing levels, is the subject matter of the following sections of the present article and we will discuss them later. Now we shall try to examine some examples to clarify the influence of Mustansiriyya pertaining to the second zone.

⁹¹ Albert Hourani, *A History of the Arab Peoples* (London, 1992), 87-9.

⁹² Bernard Lewis, *The Middle East* (London, 1996), 78-99.

⁹³ Lewis, *Middle East*, 100-104.

The successors of Salahaddin Ayyubi who put an end to the Fatimid dominance in Egypt continued with the activity of establishing new madrasas, an activity initiated by the founder of the dynasty in order to spread Sunnite Islam. After Mustansiriyya started to operate in 1233, al-Malik al-Salih Najm al-Din Ayyub (r. 1240-1249) built the Salihiya Madrasa in Cairo in 1241, the first madrasa to provide education in the four Muslim schools.⁹⁴ In time, especially during the Mamlukid period, there was an increase in the number of madrasas providing education in the four schools. Among the significant examples of madrasas which were founded by the Mamluk sultans and provided education in the four schools were Zahiriyya Madrasa (1264) founded by Baybars (r. 1260-1277), Mansuriya Madrasa (1285) established by Muhammad bin Qalawun (r. 1280-1290), Nasiriyya Madrasa whose construction was started by Kitbugha (r. 1295-1247) and completed by Muhammad bin Qalawun (second r. 1299-1309) and finally Sultan Hasan's (r. 1347-1351, 1354- 1361) monumental mosque-madrasa whose famous colossal building did survive to this day.

After citing briefly some examples regarding the Mustansiriyya influence on jurisprudence (*fiqh*) education, we shall now dwell on two examples pertaining to the sciences of the ancients, which is the main topic of the present work. The first one is related to the mosque built by and named after Ahmed ibn Tulun (r. 868-884), who established the first Turkish dynasty in Egypt. At the end of the thirteenth century, one witnesses a significant development within this mosque regarding education in medicine and the science of timekeeping (*miqat*). As we will explain later, this was obviously realized by the influence, or on the model of Mustansiriyya. During the power struggles, a Mamluk named Husam al-Din Lajin who hid in this mosque promised that he would repair and renovate the ruined building if he ever came to power.⁹⁵ When he became the sultan (r. 1297-1299), he carried out his promise and also established an endowment for the mosque. If we examine carefully the deed of trust of this endowment prepared upon the order of Lajin and whose significant parts reached us, it shows to what extent it was based on the model of Mustansiriyya. The first sections of this document dated 21 Rabi al-Sani/December 1268 are missing, but fortunately the important parts mentioning the classes held in the Ibn Tulun Mosque are extant.

Similar to the situation in the Mustansiriyya Madrasa, the deed of trust states in detail that there are four professors (*mudarris*) and their teaching assistants (*mu'ids*) for the four legal schools; allowances were provided for 30 students of each legal school in addition to 15 students of Quranic exegesis and 20 hadith students as well as their instructors (*shaykh*) and tutors.

It is clear from the summary information presented above, that the Mustansiriyya example was taken into consideration in the preparation of the deed of trust as ordered by Sultan Lajin. The only branch of education modeled completely on the Mustansiriyya was medicine. It seems that this is the first case where the sciences of the ancients were taught concurrently with religious sciences in a mosque or madrasa in Egypt. The deed of trust prescribes the appointment of a physician well versed in the science of medicine and experienced in the treatment of diseases and, just as in Mustansiriyya, the assignment of ten medical students who will be educated there. According to the document, the physician will also be in charge of the teaching, and he is allowed 100 *dirhems*, while all the students are allowed a total of 100 *dirhems*.

From the legible parts of the deed of trust it is understood that the physician would teach his students the science of medicine and they would in return study necessary texts as well as help him when needed. In this part of the document no specific title for the physician who gives the medical

⁹⁴ Al-Maqrizi, *Hitat*, 2: 373.

⁹⁵ Al-Maqrizi, *Hitat*, IV/2 : 485; ibn Taghribirdi, *en-Nüjūmu'z-Zahire* (Cairo, [nd]), 8: 106-107.

education is mentioned. Although, unlike the case with Mustansiriyya, we do not have detailed information concerning the health services provided, one understands that the main purpose of the medical education at the Ibn Tulun Mosque was the provision of health services for the people involved in the religious education at the mosque as well as the training of physicians force in order to cater for the health requirements of the society. Although we have in hand a significant part of the deed of trust, it is not possible to find more information on the medical education, especially on its duration and on what days and how the courses were conducted. Among the innovations in education provided at Ibn Tulun Mosque was the teaching of the science of timekeeping (*miqat*).⁹⁶

After this first introduction of Mustansiriyya in Cairo, one observes a continuation of its impact on a greater scale. Half a century after Sultan Lajin, similarities with the above-discussed case are also seen in the deed of trust of the monumental mosque-madrasa built by Sultan Hasan bin Muhammad (r. 1347-1351, 1354-1360) where education in the four legal schools were provided. According to the deeds of trust, the superintendent (*nazir*) of Sultan Hasan Endowment would appoint from among Muslims a physician and a oculist (*kehhal*) who would come to the complex every day and cater for the health of the employees and students, be them resident in the complex or not. In addition, the superintendent of the endowment would also appoint a surgeon together with whom he would carry out services similar to those provided by their colleagues.⁹⁷ There is no explanation in the text in our hand regarding the provision of medical education in addition to these health services.

One witnesses that with the passage of time the influence of Mustansiriyya model spread to a vast region. Thus, in the cultural zone which included Egypt, that is, Arabic-speaking Turkish-ruled lands, education in medicine and *miqat* commenced and regular health services were given at mosque-madrasa educational institutions that provided religious education. This shows that medical education acquired another institution in addition to the conventional *bimaristan* and the private education based on master-disciple relationship.

The most remarkable feature of the development which took place in this cultural zone was that, unlike the case with Mustansiriyya, medicine and science of time keeping (*miqat*) which was a sub-discipline of astronomy, were taught not at independent madrasas, but at the most traditional of the educational institutions of Islam, that is, the mosque. This demonstrates that at that time there was no sensitivity to the institutional teaching of these sciences and even they were integrated into the corpus of Islamic sciences.

Observatory-Madrasa Model (Thirteenth-Fourteenth Centuries)

After the downfall of the Abbasid caliphate, while the first years of Mongol rule in the caliphate's eastern part wreaked havoc, the later Ilkhanid regime resumed the historic trend towards state centralization of power and recreated the brilliance of the Seljuk Turkic-Iranian monarchical culture. Beginning with the reign of Ghazan Khan (r. 1295-1304), the Ilkhanids rebuilt cities, redeveloped irrigation works, and sponsored agriculture and trade in the conventional way of the Middle Eastern empires.⁹⁸

⁹⁶ Waqf al-Sultan Husam al-din Lachin, 21 Rebi al-Akhar, 694 H., Hujja No: 17, Cairo: Dar al-Wathiq al-Qawmiyya.

⁹⁷ "The Trust Deed of Sultan Hasan," no. 881, Awqaf, 457-458. Quoting from Amin *el-Awqâf ve el-Hayât el-İctimâ'iyye fi Mısır*, 171-175.

⁹⁸ Lapidus, *A History*, 276-280; Lewis, *Middle East*, 102-104.

However, from the first day onwards, Mongol rulers and princes were closely interested in ‘ulum al-‘awa’il. This interest that went way beyond personal interest, resulted in the increase of favor and support of the sciences of the ancients in the Islamic world and was instrumental in its dissemination, education and institutionalization, as will be explained in detail in the examples that will be given later.

Mangu Khan (r. 1251-1259) and his brother and successor Hulagu (r. 1256-1265), as well as most of the Mongol rulers, were learned men in the domain of sciences. Education and learning blossomed under their rule and the official concern for ‘ulum al-‘awa’il or sciences of the ancients in general, and astrology and astronomy in particular, was intensified.⁹⁹

Maragha Observatory

The Maragha observatory, with its large scientific staff, established in the Ilkhanid Capital by Nasir al-Dîn al-Tusi (1201-1274) is considered as the peak of the evolution of that institution in Islam, and its huge library was thus not only an institution for research in astronomy, but it also had the characteristics of a scientific academy with excellent opportunities for scientific contact and exchange of ideas. In addition to astronomers, its staff undoubtedly contained technicians and personnel connected with administrative work.¹⁰⁰

Was this due to the fact that in general Hulagu and the Mongol rulers heavily relied on astrological predictions in their personal and political lives? Interestingly enough, the Maragha observatory does not only reflect the Mongol taste for astronomy, it presents a most interesting and unique feature that is undoubtedly the result of a blend between the Mongol beliefs and the Islamic law: the Maragha observatory and its library were funded by waqf revenues which are the official revenues of pious foundations according to the rules of the Islamic law.¹⁰¹ In a way, Nasir al-Dîn al-Tusi, who was the driving spirit and scholarly mastermind behind the foundation of this observatory, was skilled in using the astrological propensity of the yet non-Muslim Mongol rulers such as Hulagu and Abaka. Sayılı observes that the observatory was endowed with a *waqf* and concludes that this endowment was therefore important not only as a mere source of income, but also as a sign of a more complete integration and harmonization with Muslim culture and civilization.

Allocation of the waqf revenues to support the building and functioning of an observatory to provide financial source for the study and research of the sciences of the ancients by this “Islamic” funding system must be considered as a breakthrough in the legislation of the waqfs. We do not know about the viewpoints and the stand taken by the ulema during the reign of Hulagu and his successor Abaqa, when the different activities related to Maragha observatory were at its zenith and it was known to be funded by revenues collected from different waqfs in the lands under the sovereignty of the Ilkhanids.

The most outstanding feature of the Maragha observatory related to this study is the “instruction activities” associated with it. It is clear from various reports that significant instruction activities were exercised in this institution. We do know that Nasir al-Din al-Tusi had many students,

⁹⁹ Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *Histoire des Mongols de la Perse*, ed. and trans. Etienne Quatremère (Paris: Imprimerie Royale, 1836), 1 : 325, 402-403.

¹⁰⁰ Sayılı, *Observatory*, 207. For al-Tusi see, Rosenfeld and İhsanoğlu, *Mathematicians*, 606.

¹⁰¹ es-Safedî, “Ârâ’ ve Efkar,” 1: 179; el-Kütübî, *Fevâtü’l-Vefiyât*, 247.

numbering at least one hundred.¹⁰² The famous Qutb al-Din al-Shirazi (d. 710/1311) was one of them. We also know that a group of students followed Nasir al-Din al-Tusi on his last trip to Baghdad before his death (1274).¹⁰³ Such information clearly shows the intensive teaching activity of Nasir al-Din al-Tusi but it does not necessarily imply that classes on astrology, astronomy, philosophy or other branches pertaining to the so-called *'ulum al-awa'il* were held in the observatory. Maragha was an observatory, not a madrasa. Sayılı, who believes in the theory of the exclusion of the *'ulum al-awa'il* from the official teaching of the madrasas, postulates that one of the outstanding features of the Maragha observatory is seen in the important instruction activities that were exercised. He adds, there is no doubt that earlier observatories were also helpful in the transmission of the knowledge of astronomy and of the *'awa'il* sciences in general. As the *awa'il* sciences were not included in the teaching program of the madrasas, the transmission of the knowledge of these subjects had to depend upon private instruction, and at least a limited number of private students and apprentices of astronomy must have had access to the instruments at the disposal of their masters. This would serve to supplement theoretical teaching by practical instruction. Practicing astronomers at least probably received the best part of their education when they had access to the observatories in their capacity as assistants.¹⁰⁴

Abu al-Faraj (d.1286) known in the West as Bar Hebraeus, lived at Maragha and lectured on geometry and astronomy. In his short account of the death of Nasir al-Din al-Tusi, he reports that since al-Tusi was in charge of all the Ilkhanid waqfs, "he used to allot stipends to the teachers and the pupils who were with him."¹⁰⁵

Thus, the long association of Nasir al-Din al-Tusi with his students could be understood in terms of being funded by the revenues received from waqfs. The different historical accounts, besides the fact that few months before his death a large number of his students and fellows (*telâmizatihi wa ashabihi*) accompanied him on his last visit to Baghdad and stayed with him until his death,¹⁰⁶ emphasize the traditional master-disciple relationship and meanwhile suggests the possibility of funding such teaching activities from the waqf revenues.

Perhaps then, for want of other decisive clues, it could be said that there is a strong probability that the Maragha observatory "sanctioned" the teaching of the *'ulum al-awa'il* that were incorporated into the different scholarly activities at the observatory, as well as funding from the waqf revenues. Thus, besides the Damascus *bimaristan*, Dakhwar Madrasa and Baghdad Mustansiriyya that mainly dealt with medicine, this is the first example we know of in the history of Islam, where teaching astronomy and related sciences were funded by money endowed as pious foundation.

What concerns us here is that Maragha was a transitional landmark in the institutionalization of the sciences of the ancients. Maragha was an inspiration for Ghazan Khan's complex of buildings at *Shamb* in Tabriz, which in turn bears strong similarities with the *Rab' Rashidi* founded by Rashid al-

¹⁰² Fuad Köprülü, "XIII. Asırda Maraga Rasathanesi Hakkında Bazı Notlar," *Belleten* 6, no. 22 (1942), 221n15; Sayılı, *Observatory*, 206.

¹⁰³ es-Safedî, "Ârâ' ve Efkâr," 1: 183; el-Kütübî, *Fevâtü'l-Vefiyât*, 3: 251.

¹⁰⁴ Sayılı, *Observatory*, 218. For al-Shirazi, see Rosenfeld and İhsanoğlu, *Mathematicians*, 668.

¹⁰⁵ Gregory Abu'l-Faraj, *The Chronography of Gregory Abû'l-Faraj (1225-1286)*, ed. and trans. Ernest A. Wallis Budge (Amsterdam: APA, 1976 [1932]), 451. For al-Faraj, see Rosenfeld and İhsanoğlu, *Mathematicians*, 633.

¹⁰⁶ es-Safedî, "Ârâ' ve Efkâr," 1: 183; el-Kütübî, *Fevâtü'l-Vefiyât*, 3: 251.

Din, Ghazan Khan's vizier. Indeed, Ghazan Khan (d. 703/1304) had visited the Maragha observatory several times¹⁰⁷ and also established his observatory as a waqf.

A definite evolution is already perceived here, with the observatories endowed as waqfs (Maragha and Tabriz) to the madrasas, the official teaching institutions that were also endowed. There is a progressive move towards an even more assertive institutionalization of the sciences of the ancients, namely the inclusion of these very "secular" sciences in the Islamic learning and teaching institution par excellence, the madrasa.

The *Shamb-i Ghazan*: Institutionalization of the Teaching of the *Hikamiyyat*

Ghazan Khan, the first Ilkhanid ruler who embraced Islam, pioneered great changes and innovations in the cultural and educational life during his reign by imitating the Muslim rulers, specifically the Great Seljuk sultans.

Ghazan Khan brought new dimensions to the interests of his successors in education and science. Changing the tradition of burial of the Mongol Kings, he ordered building a tomb like the great Seljuk Sultan Sanjar's tomb in Merv.

Ghazan Khan (r. 694/1295-703/1304) "the altruistic emperor"¹⁰⁸ was highly praised by the historians and chroniclers of the time, for his courage on the battlefield, for his piety, justice and equity, as well as his inquisitive mind in matters of learning and sciences. Khwandemir relates that "historians have recorded that Sultan Mahmud Ghazan was a *padishah* with intelligence and insight, familiar with learning and the sciences, whose perspicacious nature delved into questions and whose intelligence encompassed various crafts."¹⁰⁹ He occupied himself with learning and teaching, two purposes that are reflected in the building complex known as *Shamb-i Ghazani* or *Shambi-i Tabriz*.¹¹⁰ For instance, Ghazan Khan was so well acquainted with the history of the Mongols, we are told, that Rashid al-Din consulted with him when writing his famous *Jami' al-Tawarikh*: "With respect to the lineage and protocol of the Mongol sultans he was extremely learned, so much so that when Khwaja Rashid was composing the *Jami'*, he obtained most of his information from Ghazan Khan."¹¹¹ The Khan was also knowledgeable in many other fields such as languages,¹¹² medicine, geology, and astronomy besides his mechanical abilities and his skill in crafts.¹¹³ He also discovered a new antidote that was named *Tiryaq-i Ghazan*. Rashid al-Din continues to say that Ghazan impressed his astronomers with the invention of a hemispherical astronomical instrument designed for solar observations,¹¹⁴ and the building complex, comprising a charitable foundation, under the name of *Abwab al-Birr* (Gates of Benevolence) of *Sham* (Shamb), containing a domed structure that is based upon the principles of the

¹⁰⁷ Rashid al-Din, *Histoire des Mongols*, 104, 131, 173.

¹⁰⁸ Ghiyath al-Din Muhammad Khwandamir, *Habibu's-Siyar*, vol. 3: *The Reign of the Mongol and the Turk*, trans. and ed. W. M. Thackston, 2 vols. (Cambridge, MA: Department of Near Eastern Languages and Civilizations, Harvard University, 1994), 3: 106.

¹⁰⁹ Khwandamir, *Habibu's-Siyar*, 3: 89.

¹¹⁰ Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *Geschichte Gāzān-Hān's aus dem Ta'riḥ-i-mubārak-i-Gāzānī des Rašīd al-Dīn Faḍlallāh b. 'Imād al-Daula Abūl-Hair*, ed. Karl Jahn (London: Luzac, 1940), 169; Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *Jamī'u't-tawarikh: Compendium of Chronicles*, ed. and trans. W. M. Thackston (Cambridge, MA: Department of Near Eastern Languages and Civilizations, Harvard University, 1998-1999), 3: 769.

¹¹¹ Rashid al-Din, *Geschichte*, 171; Rashid al-Din, *Jamī'*, 3: 767; Khwandamir, *Habibu's-Siyar*, 3: 89.

¹¹² Khwandamir, *Habibu's-Siyar*, 3: 89.

¹¹³ Rashid al-Din, *Geschichte*, 172; Rashid al-Din, *Jamī'*, 3: 768.

¹¹⁴ Rashid al-Din, *Geschichte*, 173; Rashid al-Din, *Jamī'*, 3: 768.

design of the said instrument.¹¹⁵ Ghazan Khan's benevolent nature and avidity for learning are well reflected in the *Shamb-i-Ghazan* with its various institutions that are aimed both at charity and learning.

The Shamb did not only contain a mausoleum but also a mosque, a Sufi *khanaqah*, two madrasas, a hospice for the *sayyids*, one hospital, an observatory, one library and archive, a superintendent's house, a cistern, a bath house (*sabil*), and a primary school for one hundred children. "At about the same time, Ghazan Khan had other swampy places, adjacent to the lofty dome, improved, and there were built a congregational mosque, the Shafi'iyya *madrasa*, the Hanafiyya *madrasa*, a *khanaqah*, the *Dar al-Siyada*, an observatory, the *Bayt al-Kutub* (library), the *Bayt al-Qanun* (archives) where the registers of administrative and fiscal codes Ghazan Khan had ordered for the welfare of the population were kept, a residence for the superintendent, the *Saqqa* cistern, and the *Sabil* bath."¹¹⁶

The chroniclers of Mongol rulers such as Wassaf, Rashid al-Din and Khwandamir wrote down the names of the institutions surrounding Ghazan Khan's tomb and gave brief information about each.¹¹⁷ However, Rashid al-Din who wrote a summary of Abwab al-Birr's deed of trust, gave substantial information about the religious, social welfare, educational and scientific institutions within this complex of buildings. According to his record, the following buildings and institutions were housed in the complex:

The Gunbed-i 'Âlî or mausoleum (*al-Qubba al-'Aliya*) where the Quran reciters (*hafidhs*) were employed.

Congregational mosque, where a *khatib* (an orator), an imam, a *muezzin*, a *mukabbir*, and '*amala* (workers) were employed.

Khanaqah or Sufi lodge with a Sheikh, the Sufis, an *imam*, one *qawalan* (reciter), one *khadim* (servant) and '*amala* (workers). Ghazan Khan stipulated that in the Khanaqah "every morning and evening the poor and unfortunate were to be given food, and twice a month the Sufis and reciters were to gather for recitation and a *sama*'. On that day food and sweets were to be cooked for them."

Two madrasas, Shafi'iyya and Hanafiyya with *muderrises* (teachers) and *mu'ids* (assistants), *fuqaha*, students of jurisprudence, and '*amala* (workers) were engaged.

Dar al-Siyadah with a *naqib* (supervisor), a cook and "servants to prepare food for visiting Sayyids, descendants of Prophet Mohammad, who are passing through."

Dar al-Shifa or hospital, complete with a *tabib* (physician), *kahhal* (occulist), *jarrah* (surgeon), *khazin* (director), *khadim* (servant), '*amala* (workers).

Bayt al-Kutub or library, attended by a *khazin* (librarian), a *munawill* (assistant librarian) and a *farrash* (attendant).

Bayt al-Qanun or archives, attended by a *khazin* (director), a *katib* (copyist), and a *farrash* (attendant). This was where the administrative registers and the fiscal codes ordered by Ghazan Khan for the welfare of the population were kept.

¹¹⁵ Rashid al-Din, *Geschichte*, 173-4; Rashid al-Din, *Jami'*, 3: 768.

¹¹⁶ Khwandamir, *Habibu's-Siyar*, 3: 107; Rashid al-Din, *Jami'*, 3: 787; Abdullah b. Fazlullah eş-Şirazi Vassaf, *Tarih-i Vassaf el-Hadra*, ed. Muhammed Mohdi Isfahanî (Tehran, 1338 [1959]), 382-3; Abdullah b. Fazlullah eş-Şirazi Vassaf, *Tahrir-i Tarih-i Vassaf*, ed. Abd el-Muhammed Ayetî (Tehran, 1372 [1993]), 229-30.

¹¹⁷ Vassaf, *Tarih*, 382-3; Vassaf, *Tahrir*, 229-30; Rashid al-Din, *Geschichte*, 204-214; Khwandamir, *Habibu's-Siyar*, 3: 107.

Bayt al-Mutawalli, the superintendent's residence, attended by a *bawwab* (doorman).

Hawdhane, or cistern, with a *farrash* (attendant).

The *Sabil* bath (*hammam*), which had an attendant, one scrubber, one barber, a clothes keeper, and a furnace stoker.

The institution that we shall dwell on in detail is the observatory mentioned as "Rasadkhane." Rashid al-Din who gives an account of the summary of the deed related to the observatory which he shortly quotes as "*rasad*" states that those who received money from the waqf were, the *mudarris* who taught "*Hikamiyyat*" and his *mu'id* (assistant), the students, the *khazin* (librarian) and *munawill* (his assistant) and other employees, some of which were charged with the maintenance of the instruments used in the observatory.

For Sayılı this observatory was not comparable in size or importance to the Maragha observatory. The account of Ghazan Khan's instructions about the construction of the new observatory suggests that it was destined for certain, specific kinds of work.¹¹⁸ The account of Wassaf about this institution explains its functions: "a place for the observation of the movements of the planets (*kawakib*) and for the instruction of students desirous of learning astronomy (*Maksad-ı tullab-ı nujum*), as a center of activity on calculations and compilation of astronomical tables and the determination of the events of time."¹¹⁹ However, as we mentioned above, the observatory in Tabriz was not an institution by itself but rather a part of the greater *Shamb-i Tabriz*.

Thus it is obvious that the main objectives in establishing the "*rasad*" institution besides conducting certain observations, was the teaching of mathematics, astronomy, and time-keeping "*hikamiyyat*" and secondly, determining the exact times for the prayers and other acts of worship, and thirdly, preparing the calendar. The building of an institution that was smaller than the observatory, under the name of *rasad*, started a new tradition in building waqf complexes. Later the *rasads* would be built near the mosques and the madrassas and would also be referred to by this name during the Ilkhanid period. An example is the Rukniyye madrasa built in the city of Yezd in Iran. This tradition would be carried to the Ottoman Empire and widely encountered under the name "*muvaqqit-hane*" which was founded within numerous building complexes (*külliyeler*).

Wassaf in his account on the complex of building in Sahamb-i Ghazan speaks about another institution that he calls "*hikamiyya*". There is a discrepancy between the two editions of Wassaf's history concerning the functions of this institution. While the early edition says it was meant for the treatment of the illnesses of psychological nature by physicians of mental ailments, the newly printed abridged copy states that this institution was allocated to the residence of philosophers (*hukema*) and the teaching of philosophical sciences (*hikma*). Since Rashid al-Din and Khwandamir do not give any information in this respect and a building under this name does not appear in their lists, it looks that the early edition is more reliable since there would not be two institutions for the purpose of teaching *hikma* in the same foundation.

The Tabriz foundation had a much wider scope than Maragha that was essentially designed as an observatory for research, with some instructional activities on the side. The *Shamb-i-Ghazan* answered two needs; firstly, as a charitable foundation and secondly, as a center of learning and teaching. The waqf revenues not only provided all the employees and workers with "handsome

¹¹⁸ Sayılı, *Observatory*, 230-1.

¹¹⁹ Vassaf, *Tarih*, 382; Sayılı, *Observatory*, 231.

wages,”¹²⁰ but also met the maintenance expenses. A detailed listing of the type of expenses is given by Rashid al-Din in his *Tarikh-i Mubarak* and Khwandemir in his *Habibu's-Siyar*. “He (Ghazan Khan) ordered that the superintendent and workers in the endowment should arrange without stint, year by year and month by month, for the repair of the observatory tools and instruments, for potions, medicines, food, sweets, incense, and the necessities of the hospital; for the mending and repair of books in the library, for expenses incurred in recopying the archives, for the price of pitchers, cups, vats, and pots for the cistern, and for all necessary expenses for the bath.”¹²¹ The deed of trust even includes such items as furnishings and lamps for the building. In addition, a rather substantial amount of money was devoted to humanitarian purposes such as providing the ageing sayyids, *ulemas* and wise men with office and shelter within the institutions; two thousand sheepskin robes that had to be purchased every year to be distributed among the deserving; care and education of the orphans; shelter and nurses for abandoned infants; burial and funeral expenses for destitute strangers; food for the birds in winter; assistance and distribution of cotton to five hundred widows every year; building bridges over small canals so that the poor could easily cross roads; assisting servants who were in trouble because they had broken their masters’ jugs.¹²² These stipulations are interesting and different from those encountered in the deeds of trust that have been studied until now. Rashid al-Din wrote his *History* in 1317, which indicates that at this date the foundation was still functioning.

As already explained earlier, Maragha observatory was funded by waqf revenues, which were instituted by Hulagu and Tusi. This represented a major step in incorporating the sciences of the ancients in the Islamic tradition. On the other hand, in Shamb-i Ghazan a further step was taken in the institutionalization of the education of the sciences of the ancients. The waqf in Shamb provided revenues for the benefit of a professor (*mudarris*), an assistant (*mu'id*), and students, as well as the librarian and other persons connected with the observatory. This clearly indicates that the observatory officially included a well-organized school for the teaching of mathematics and astronomy. As far as our information goes, this is the first example of its kind. Tabriz went one step further than Maragha. Astronomy and the related sciences of the ancients were not only researched but also taught in the Shamb’s observatory where a *muderris* of *hikamiyyat* was employed, a most crucial point that shows that not only the *hikamiyyat* were taught or pursued on a personal basis or transmitted from the master to the disciple, but also it was taught in official institutions of learning. The *hikamiyyat* had been institutionalized as a part of the Islamic foundation and was situated next to the mosques, madrasas or centers of Islamic jurisprudence, *Sufi khanaqahs*, and other traditional religious institutions of the Islamic world.

The Rab'-i Rashidi: A Merger between the Various Sciences and Vocations

The building complex comprising religious, educational, and social welfare institutions funded by waqf revenues reached its zenith with the *Rab'-i Rashidi* that was founded by Rashid al-Din, the vizier and physician, historian, and one of the most outstanding intellectual figures - after Nasir al-Din al-Tusi - of the Ilkhanids. This complex, which was inspired by the previous models, was also called *Abwab al-Birr*, i.e., the Gates of Benevolence, after the Shamb-i Ghazan. The institutional

¹²⁰ Khwandamir, *Habibu's-Siyar*, 3: 107.

¹²¹ Khwandamir, *Habibu's-Siyar*, 3: 107.

¹²² Rashid al-Din, *Geschichte*, 209-217; Rashid al-Din, *Jami'*, 3: 782-687; Khwandamir, *Habibu's-Siyar*, 3: 107; Fuad Köprülü, “Vakıf Müessesesinin Hukukî Mahiyeti ve Tarihî Tekâmülü,” *Vakıflar Dergisi* 2 (1942), 21.

development that thrived from the beginning of Mustansiriyya reached a higher level while encompassing wider areas of activity. In the *Rab'i Rashidi* complex various religious, social and economic institutions, which previously had not come together, were gathered within the boundaries of a small city or district where numerous people lived in accord and enjoyed different cultural, social and economic activities. The information we have on the *Rab'* is drawn from its original *waqfiyya*, which survived and fortunately was found to be intact. It was published both in the facsimile and edited form and describes the objectives, administration and the staff of the *Rab'* in detail. Our study will be related to the main centers of instruction in the *Rab'*: the *bayt al-ta'lim*, the artisans school, the *masjid*, and the *dar al-shifa*.

Ten young orphans who were selected to study the Qur'an and elementary education in the *bayt al-ta'lim* could later attend the professional training program for crafts. The second instructional activity in the *Rab'* was the training of artisans and craftsmen "*ahl al-sana'i' wa'l-muhtarifah*."¹²³ It was the trustee (*mutawalli*) who selected the trade for which the students had an inclination or predisposition. The 220 young apprentices (*ghulams*) were provided with facilities to learn a craft or a profession. They could become calligraphers (*khattati*), musicians (*qawwali*), painters (*naqqashi*), goldsmiths (*zargari*), gardeners (*baghbaru*), canal diggers (*kariz-kani*), farmers (*dihqana*), builders (*mi'mari*) or they could practice other trades (*hirfa*). As much as possible, their art was transmitted from father to son.¹²⁴ The *mutawalli* selected the apprentices most of whom came from the slave families and knew them personally. The artisans were recruited from the Turks, Qazwinis, Greeks, Georgians, Indians, Ethiopians, Slavs, Armenians, and "the blacks" among others. Rashid al-Din seems to prefer the apprentices of Turkish background.¹²⁵ The two hundred and twenty apprentices were all married to slave girls (*jariyas*). They were not assigned to a specific area or locality in the waqf; rather they were attached to the master artisans who trained them. The number of apprentices was limited, and in the case one was advanced in age or became sick or disabled, a son would replace him and receive the same payment and advantages as his father.

The main instructional section, the school, was also located in the mosque, like the *bayt al-ta'lim*. There were imams and *muezzins* who called and conducted the prayers in the mosque, while the instruction was given under the direction of a director (*murattib*). The instruction was carried out by two teachers (*muderrises*) and one teaching assistant (*mu'id*) that were appointed by the *mutawalli*. There were twelve students who were divided into two unequal groups. The first *muderris* was a specialist in *tafsir* and *hadith* and his two students (*talib-i 'ilm*, *muta'allim*) received instruction in the sciences of *tafsir* and *hadith*. The daily two hours' teaching was continued the whole week except on Tuesdays, Fridays, and the holidays. The second *muderris* had to be a scholar of varied interests (*mutafannin*) and taught the *usul al-din* and *usul al-fiqh*, the *furu'al-fiqh* to the group of ten advanced students, in addition to any subject the students wished to learn. The most interesting point here is that as a consequence, the latter had to be "a specialist in the rational, legal, literary, mathematical, and other sciences "*aqli, shar'i, adabi, hisabi wa ghayriha*"¹²⁶ and preferably be "*sahib dhawq bashid dar*

¹²³ Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *Vakifname-i Reb'i Reşidi*, ed. Iraj Afshar and Mujtaba Minovi (Tehran, 1978), 150, 159, 192; Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *Sevanih el-Efkâr Reşidi*, ed. Muhammed Takî Daniş (Tehran, 1358 [1979]), letter 52; Reuben Levy, "The Letters of Rashid al-Din Fadl Allah," *Journal of the Royal Asiatic Society* 78, no. 1-2 (1946), 74-78.

¹²⁴ Rashid al-Din, *Vakifname*, 150; Rashid al-Din, *Sevanih*, letter 52, 290-291.

¹²⁵ Rashid al-Din, *Vakifname*, 150-152; Rashid al-Din Fazl-Allah Ibn Ebi al-Khar, *al-Waqfiya al-Rashidiya: Facsimile of the Fourteenth Century Original Edition Drawn by Himself and by His Order*, ed. Iraj Ashar and Mujtaba Minovi (Tehran, 1972), 190-192.

¹²⁶ Rashid al-Din, *Vakifname*, 130.

suluk,” and he had to know, in dealing with his students, how to work in a friendly atmosphere.¹²⁷ In the summer he would teach in the *suffa bozorg* (the large room), and in the winter under the dome of the *Rawda*, which was the *masjid al-shatawi* (the winter mosque). The *muderris* had to be a follower of the Shafi’i *madhhab*.

The students had to be bachelors and show eagerness for learning and studying. They were selected for a period of five years at the end of which other groups replaced them. When their term of five years was over, the *mutawalli* would select another qualified group of students to replace them. Moreover, if a student did not pay attention to his studies or showed signs of laziness, then the *mutawalli* could replace him even though his five years’ term was not completed.”¹²⁸

It is noteworthy that the teacher and the teaching assistant for the “different sciences” received a higher salary than that of *tafsir* and *hadith*. It is clearly seen in the *waqfiyya* that the second group is given more importance by the founder, as can be attested by the amendment to the trust deed drawn in 1315 increasing the number of *mu’ids* and students, as well as paying higher salaries to the teachers.

While Rashid al-Din allowed the students to select the subjects of their own choice, they were faced with two stipulations. Firstly, they were obliged to read Rashid al-Din’s works and make their copies.¹²⁹ The interesting point that should be emphasized here is the second stipulation. He lays down the condition that the ten students (*faqih*s) who will study law (*fiqh*) theology (*usul al-din*) and other sciences, will not read and occupy themselves with philosophy, while those who already have read philosophy will not be accepted here. The reason for his opposition is significant and he clarifies it with the following words: “Their character is spoilt and they become arrogant” (*mizaj-i ishan mukkabbat ve kustah shude bashend*).¹³⁰ Was this a stand against the people who studied philosophy and who are thought to have peculiar manners or was it a desire to drive them away from the *madrasa* education because of their “heterodox ideas”? Both these thoughts are worth discussing. However, no matter what Rashid’s personal ideas were, the second one was the prevailing factor.

Another significant point in Rashid al-Din’s *waqfiyye* is the absence of the term *ulum al-awail* that was replaced by *ulum al-aqliye* and specifically *ulum-i hisabi* (mathematical sciences). The substitution of terminology can be seen as the indication of a different understanding and attitude and an important change. The point that should be emphasized here is that this was not a semantic or a verbal change; indeed, some of the sciences of the ancients or the sciences that belonged to the pre-Islamic civilizations became a part of the body of knowledge that the Muslim students had to learn. In this context, Ibn Khaldun’s dual classification is the best articulation of this understanding. Ibn Khaldun with his classification of the sciences into two as “*aqli*” (rational) and “*naqli*” (traditional/transmitted) dissolves in the same pot, the Islamic and Arabic sciences, as well as the sciences that were inherited by the Muslims from the ancient civilizations.

At the *Rab’-i Rashidi*, in addition to the *madrasa* education of transmitted sciences that followed the Nizamiye tradition and as the result of the development that started at the Mustansiriyya, there was the possibility of reading some of the ancient sciences – apart from the religious sciences – under the

¹²⁷ Rashid al-Din, *Vakıfname*, 130.

¹²⁸ Rashid al-Din, *Vakıfname*, 131.

¹²⁹ Rashid al-Din, *Vakıfname*, 240-241.

¹³⁰ Rashid al-Din, *Vakıfname*, 173-4.

title of “*aqli*” (rational sciences) with the exception of philosophy. For this reason, one of the two *mudarrises* that were appointed here had to be knowledgeable about “*aqli and hisabi*” that is (rational and mathematical) sciences and teach the students who wished to learn them. The rational sciences, among them the ‘*ulum al-‘awa’il*’ or sciences of the ancients, were once more included as an integral part of the teaching options of the waqf-based madrasa and as a requirement for the qualification of its teacher. This development that took place in the *Rab-ı Rashidi* will be seen in the later madrasas as well.

The term *ulum al-aqliyye* that appeared in this trust deed would replace the *ulum al awail* and in some cases these sciences – with the exception of philosophy – would be included among the sciences that a madrasa student was required to read. It is observed that after the conquest of Istanbul in 1453, with the arrival of some Timurid scholars who were patronized by the Ottoman sultan, this tradition was officially accepted in the Ottoman madrasas. It is our opinion that perhaps the reason for the usage of the term “*akli ilimler*” (rational sciences) instead of *ulum al awail* was to relieve the uneasiness felt about the latter, which in addition to logic and philosophy contained the science of mathematics, astronomy, and natural sciences. From then on, the term “rational sciences” that was used in *Rab-ı Rashidi*, would be considered as a deterrent for the philosophical understanding that would form a potent source of heterodox beliefs.

This educational complex differed from the *Shamb-i Ghazan* where a separate institution was installed for the education of astronomy or observation. The absence of an observatory there can be interpreted as a lack of interest in astronomy on Rashid al-Din’s part; or it could be that as he was not of Mongol origin, he did not share the same interest and enthusiasm the Mongols had for astronomy and the prediction of the unknown. We do not have sufficient information to assert whether the ulema’s opposition was effective in this instance or not.

As to the *dar al-shifa’* (hospital), it had a permanent staff which consisted of one physician (*tabib*), one surgeon (*jarrah*), one oculist (*kahhal*)¹³¹ and according to Rashid al-Din’s fifty second letter, a bonesetter (*mujabbir*) and an apothecary (*sharabdar*).¹³² With the amendment made in 1315, an assistant (*mu’id*) was appointed to the physician, and three more students were accepted, bringing the total of the medical students to five.¹³³ As in the Mustansiriyya, the *tabib* had a double function, that of physician and teacher. A *mu’id* assisted the physician in teaching or consulting and prescribing the medicines. According to one of Rashid al-Din’s letters, in addition to these “full-time” physicians, fifty “visiting” physicians would come from India, China, Egypt, Syria and other countries. They consulted and taught at the *Dar al-Shifa* every day and were given ten students to teach unlike the resident physicians who had a class of five.¹³⁴

The students of medicine were selected very carefully. The whole week, they received theoretical instruction in the mornings and assisted the physicians during the consultations that took place in the afternoons. Mondays and Thursdays were full days. According to the original waqfiyya, the two medical students were provided with lodgings and each one received an annual salary of fifteen dinars and three manns of bread a day (one mann 5/6 kg.). Like the others, the young resident medical students followed a training that lasted for five years, at the end of which their places were

¹³¹ Rashid al-Din, *Vakıfname*, 148n1.

¹³² Rashid al-Din, *Sevanih*, letter 52, 290.

¹³³ Rashid al-Din, *Vakıfname*, 148n1.

¹³⁴ Rashid al-Din, *Sevanih*, letter 52, 286-291.

filled with new students.¹³⁵ Medical care was a facility that was offered to all the residents in the *Rab'* and the physicians visited the sick people in their houses. The apothecary (*sharabdar*) would prepare the prescribed medicine and deliver it to the patient. The hospital was divided into two sections, one for contagious and the other for minor illnesses. The hospital was kept clean and several male nurses "*khadimu'l-marda*" were at the service of the patients. The physician would even have special foods prepared for the patients. The hospital had a drugstore and every Monday and Thursday medicine was distributed to the sick. The medicine was prescribed by the physician and given under the supervision of the *khazin* and the *sharabdar*.¹³⁶

The library (*bayt al-kutub*)¹³⁷ was an indispensable complement of the schools in the *Rab' al-Rashidi* and it was one of the most famous and largest libraries of the time. According to the *waqfiyya*, the library was divided into two major parts, the right wing for the "*naqli*" works that dealt with transmitted sciences and the left wing for the "*aqli*" sciences, that is the rational domain. All the books were carefully classified and inventoried. There were two librarians (*khazins*) and two *munawills* who were in charge of giving out the books, one for each section of the library.

The *Rab'* was unique for it brought many complementary sciences and crafts together, perhaps for the first time in the history of institutions of learning in Islam. The *bayt al-ta'lim*, Quranic religious schools, taught the children the science of the Qur'an and the *bayt al-hiraf*, a center for practical technical training, taught the adolescents a craft or an art, providing them with a profession. The madrasa, a center for religious legal study, taught them the pivots of the law and its interpretation as well as the rational sciences; the *Dar al-Shifa* attended to the physical wellbeing of the people and the education of medical students, while the *dar al-tasawwuf* more commonly referred to as *khanaqa*, answered the spiritual blossoming and the aspiration of a few. Thus, the domains of *fiqh*, *hadith*, *tafsir*, the rational sciences, literary arts, medicine, crafts and arts, Qur'an and Sufism were brought together under the umbrella of the waqf. What is even more striking in the *Rab' al-Rashidi* is the fact that the teaching of the sciences of the ancients was not restricted to the observatory or the hospital halls, or the premises of an independent madrasa building, but was taught in the mosque itself, "a center par excellence" for religious practices and teachings.

The *Rab'i Rashidi*, merging various fields of knowledge would serve as a model for others, in particular the Timurid Ulugh Bey and the Ottoman sultans.

Samarkand: Madrasa as the Catalyst of a Scientific Movement

The Ilkhanids established institutions of education, science, and charity in their Azarbaijani capital cities like Maragha and Tabriz and contributed to significant developments in these fields. It would not be wrong to assume (and find supporting examples) that several influences —if not on the same scale— were spread to the other cities of Azarbaijan and the other lands they ruled such as Iran, Anatolia and the neighboring regions. Yet the first dynasty inspired by the Ilkhanids were the Timurids while the second one was the Ottomans; both of which produced monuments and institutions of equal magnificence. Samarkand was the Timurid capital. During Ulugh Bey's reign (1394-1449) a marvelous example of this influence and an advanced sequel are seen.

¹³⁵ Rashid al-Din, *Vakıfname*, 136.

¹³⁶ Rashid al-Din, *Vakıfname*, 182.

¹³⁷ Rashid al-Din, *Vakıfname*, 197.

Ulugh Bey was the grandson of Timur (1370-1405), one of the great Asian emperors, who was born in a Turkicized-Islamized tribe of Mongol origin and who founded an empire that stretched from Northern India to Syria and Anatolia.

In 1370 he became a successor to the Chaghatay branch of the Mongol rulers in Transoxania and made Samarkand his capital. The city of Samarkand had already become a flourishing center of art and intellectual activity during the reign of Timur, but a few decades later, the scientific movement gained even more impetus during the life of his grandson, Muhammad Turgay Ulugh, son of Shahrukh, son of Timur. He was known as Ulugh Bey.

Ulugh Bey himself was a man of learning and the driving force behind the renewed cultural and scientific impulse in Samarkand. Ulugh Bey's nature and interests as a scientist are described in detail in the letters written by Giyath al-Din al-Kashi, one of the prominent scholars in Samarkand. Giyath al-Din tells us that Ulugh Bey was endowed with an exceptional memory and talent for languages; he knew Arabic, Turkish, Persian, Mongolian, some Chinese, as well as the art of prosody and versification.¹³⁸ He was quite an accomplished scholar, mostly in the fields of mathematics and astronomy. Kashi relates some stories to that effect: "His Majesty has great skill in the branches of mathematics. His accomplishment in these matters has reached such a degree that one day, while riding, he wished to find out to what day of the solar year a certain date would correspond which was known to be a Monday of the month of Rajab in the year eight hundred and eighteen and falling between the tenth and the fifteenth of that month. On the basis of these data, he derived the longitude of the sun to a fraction of two minutes by mental calculation while riding on horseback."¹³⁹

Samarkand had long been a center for scientific research. Ulugh Bey's double-fold interest in the scientific and religious fields as well as his views on secular learning which formed a bond between nations were also effective in this new stage of development where secular sciences were included in the religious institutions. As mentioned above, this movement had started in the Mustansiriyya and progressed throughout the Ilkhanid period. The Samarkand Madrasa, besides being a school for traditional Islamic education, was a center for scientific teaching. Most probably this was what triggered the construction of the observatory, with which it had very close working bonds, as shall be described in the following paragraphs. The two institutions, the madrasa and the *rasad* were interdependent bodies founded by the same ruler, employing the same scholars, and teaching classes on shared topics.

The two inscriptions on the facade of the Ulugh Bey's madrasa give the date of its completion as 820-823/1417-1420.¹⁴⁰ Hafiz Abru (d. 833/1430) confirms the date of the completion of the construction of the madrasa as Muharram 823/January 1420 and that Ulugh Bey built also a *khanaqah* next to it.¹⁴¹ This madrasa's *waqfiyya* did not reach us. However, Devletshah (1427-1495), who lived in the Timurid court all his life, gives information about this institution. He describes in detail the grandeur of the madrasa and its condition right after the death of its founder. "Ulugh Bey built such a madrasa in

¹³⁸ Mohammad Bagheri, "A Newly Found Letter of AlKāshī on Scientific Life in Samarkand," *Historia Mathematica* 24 (1997), 247.

¹³⁹ Sayılı, *Uluğ Bey ve Semerkanddeki İlim Faaliyet Hakkında Gıyasüddin-i Kaşî'nin Mektubu* (Ankara, 1960), 77; Bagheri, "Newly Found Letter," 247-249.

¹⁴⁰ V. L. Vyatkin, *Pamyatniki Drevnostey Samarkanda* (Semerkand, 1927), 2, cited in Kishimjan Eshenkulova, "Timurlular Devri Medrese Eğitimi ve Ulum el-Evail-Matematik, Astronomi ve Tıp," MA thesis, Istanbul University, 2001), 54.

¹⁴¹ Hafiz Ebru, *Zübdetü't Tevârih-i Baysungurî*, Süleymaniye Library, ms. Fatih 4370/1, 558^b-559^a.

Samarkand that the decorations and details of which cannot be seen anywhere else in the world. Today there are more than 100 students who are boarded there and receive salaries.”¹⁴²

As to the second institution in question, the observatory, we read that Ulugh Bey visited the site of the Maragha observatory during his childhood and under the influence of Kashi, who explained to him the usefulness of some of its instruments, whereupon he decided to reproduce some of the features of observation found in Maragha.¹⁴³ Kashi, somewhat proudly states: “an observatory like that of Maragha was founded as I had suggested.”¹⁴⁴

The observatory was probably built around the year 823/1420 and remained active for a period of thirty years, throughout Ulugh Bey’s lifetime, and even a few years after his death.¹⁴⁵ The observatory (*rasad*) was not built before the madrasa but the same year as the madrasa at the earliest. However, most scholars seem to agree that the foundation of the madrasa predates that of the *rasad*. According to Kari Niyazov, the observatory was founded four years after the madrasa was constructed. The instruction in astronomy in the madrasa served as the starting point for the foundation of the observatory. The same author continues to say that in Ulugh Bey’s madrasa a special place was allocated for astronomical observations.¹⁴⁶ This leads us to one of the most pertinent questions in this article. As based on the available sources and interpretations, we stated that the building of the madrasa preceded that of the observatory, or at the latest, it was built the same year. Yet, to what extent did the madrasa, a center for the study and teaching of religious sciences, act as a catalyst for the building of the observatory, a center for research and occasional teaching of some of the rational sciences recognized as part of the *‘ulum al-‘awa’il*?

Among the scientists that made up the scientific circles around the Samarkand madrasa and observatory, it was the Bursa-born Kadizade,¹⁴⁷ Ulugh Bey’s teacher, who unquestionably was the most interesting personality. Kadizade was one of the three dominating personalities in the scientific movement in Samarkand, the other two being Giyath al-Din Jamshid¹⁴⁸ and Ali Qushji.¹⁴⁹

Kadizade was born in Bursa in 1359 to a family of scholars, closely associated with the Ottoman sultans. As a young man Kadizade was a student in the Bursa madrasas and was taught astronomy and mathematics by the Turkish scholar Shams al-Din Muhammad Hamza al-Fanari.¹⁵⁰ Kadizade left Bursa for Samarkand and he was considered to be one of the most distinguished scholars in the early Ottoman times. In one passage of *al-Shaqa’iq al-Nu’maniya* dealing with Kadizade, Tashkopruzade¹⁵¹ says that: “Kadizade became a professor here [in the Samarkand madrasa], and his rank came to be more elevated than the other professors. The other professors would come, together with their students, to listen to Kadizade’s lectures. Occasionally Ulugh Bey too would attend these lectures.”¹⁵² Tashkopruzade adds: “Ulugh Bey noticed deficiencies in the astronomical tables of earlier times and

¹⁴² Devletşah Semarkandî, *Devletşah Tezkiresi*, trans. Necâti Lugal (Istanbul: Tercüman, 1977), 429.

¹⁴³ Sayılı, *Uluğ Bey*, 98.

¹⁴⁴ Bagheri, “Newly Found Letter,” 246.

¹⁴⁵ Sayılı, *Observatory*, 270-272.

¹⁴⁶ Kari Niyazov, *Astronomicheskaya Shkola Ulugbeka* (Moscow, 1950), 50-66.

¹⁴⁷ Rosenfeld and İhsanoğlu, *Mathematicians*, 808.

¹⁴⁸ Rosenfeld and İhsanoğlu, *Mathematicians*, 802.

¹⁴⁹ Rosenfeld and İhsanoğlu, *Mathematicians*, 845.

¹⁵⁰ Rosenfeld and İhsanoğlu, *Mathematicians*, 806.

¹⁵¹ Rosenfeld and İhsanoğlu, *Mathematicians*, 974.

¹⁵² Ahmed İbn Mustafa Taşköprülüzâde, *eş-Şekâ’iku’n-Nu’mâniye fî Ulemai’d-Devleti’l-Osmâniye*, ed. Ahmed Suphi Furat (Istanbul: Edebiyat Fakültesi Basımevi, 1985), 15-16; Sayılı, *Uluğ Bey*, 42.

decided to set up new observations. For this purpose, he brought into being an observation well in Samarkand. He started observations first with Giyath al-Din Jamshid. Shortly after Jamshid's death, Kadizade was charged (*tawalli*) with the work. In his time too this affair could not be completed. For Kadizade also died before finishing it, and it was therefore completed by Ali Qushji.¹⁵³ Tashkopruzade mentions that he himself read two of Kadizade's works, *Sharh Ashkal al-Ta'sis* and *Sharh al-Mulakhkhas fi al-Hay'a*. He studied them with his father, who had read them from his maternal uncle Molla Mohammed al-Niksari¹⁵⁴, who in turn had studied them with Fathullah Shirvani. Kadizade himself, the author of these works, was Shirvani's teacher.¹⁵⁵ This chain of teaching starting in the Samarkand madrasa and the observatory delineates the line for the transmission of knowledge from Samarkand to the Ottoman land.

The madrasa and the observatory are connected to each other as research and teaching centers. The *müderis* and the scientist work closely with each other. Debates take place between the scientists in the observatory and the scientists in the madrasa. Kashi who was attached to the observatory describes the scientific life in Samarkand that was centered on the madrasa:

The most pre-eminent among the scientists are at the present gathered together in Samarkand. Professors lecturing on all the sciences are numerous and the majority among them is occupied with the mathematical sciences... In each branch of science in existence, in fact, the majority of the people well-versed in that branch are assembled here...Every few days, His majesty, the King, is present at the circle of listeners, and when he is present lectures on the mathematical sciences are preferred. This servant (Kashi) too began to attend the lectures. One of the procedures adopted here, in order to weigh attentively the caliber of these seekers of knowledge, is that the person who joins the circle of listeners is unaware of the problem which shall be brought forth, whereas the people of the *Madrasa* make a thorough study of the subject and refresh their knowledge on the matter for this particular occasion.¹⁵⁶

Kashi in another letter to his father confirms the fact that Ulugh Bey often came to the madrasa to attend classes. "His Royal Majesty visits the school [*madrasa*] once every few days, and attends a class for some time, and I am in His Majesty's company. [On these occasions] we do not know at all what the lesson will be about, nor what problem will be brought up, [whereas] the teacher and students have studied it together the night before."¹⁵⁷ This again confirms the fact that classes and debates on mathematics were conducted in the madrasa and during these sessions the teachers and students from the madrasa compared their knowledge with that of the scientists in the observatory. Often, no differentiation is made between the jurists and the scientists and Kashi does not even specify whether they taught in the madrasa or worked in the observatory. In his letter Giyath al-Din indifferently uses the term *mudarris* for the scientists in the Samarkand observatory as well as for the jurists in the madrasas, while traditionally it was an appellation that normally designated only the teacher of jurisprudence in the madrasa.

¹⁵³ Taşköprülüzâde, *eş-Şekâ'iku'n-Nu'mâniye*, 17.

¹⁵⁴ Rosenfeld and İhsanoğlu, *Mathematicians*, 871.

¹⁵⁵ Taşköprülüzâde, *eş-Şekâ'iku'n-Nu'mâniye*, 15-16.

¹⁵⁶ Sayılı, *Uluğ Bey*, 78.

¹⁵⁷ Bagheri, "Newly Found Letter," 224.

From Kashi's letter again, we learn that there were three teachers in the school of His Majesty: "(1) Chief-*muderris* Kadizade, whose mind, according to Tashkopruzade's description, is enslaved by mathematics (2) Mawlana Muhammad Khani who surpasses the other by far in sciences other than mathematics: he is endowed with a phenomenal memory, so he teaches from memory most science lessons and he studied astronomy with Sayyid Sharif; (3) Mawlana Abu'l-Fath whom His Majesty met in Herat, who is versed in Islamic jurisprudence and has composed [a tract on] astrolabe reading. He teaches only the latter subject."¹⁵⁸ This shows that the jurists were also involved in scientific research and writing, and that rational sciences, mathematics, astronomy, and others were taught in the madrasa. Kashi adds also that Mawlana Muhammad Khani was "occasionally present [at the court] or meeting [His Majesty] at the observatory site."¹⁵⁹ This is a detail that once more proves that the madrasa teachers concomitantly worked at the observatory. The madrasa and the observatory founded by Ulugh Bey were two inseparable institutions.

If one takes into consideration the information provided by Giyath al-Din in his letters, one reaches the conclusion that the lives of the madrasa and the observatory were intertwined; there was no separation between an institution that was historically meant to teach the religious domains and the one that researched the mathematical and astronomical sciences which were considered as part of the "sciences of the ancients."

As far as the funding of the madrasa and the observatory in Samarkand is concerned, there is no doubt that the madrasa was made into a waqf according to the Islamic tradition. Therefore, the teaching that took place in the madrasa was stamped with the seal of the religious law. We do not have much information concerning the madrasa's deed of trust. Once more, it is Kashi who provides us with the utmost information. In his letter to his father, Kashi reports that Ulugh Bey,

had donated a charitable gift *sadaqa*, amounting to thirty thousand *Kopaki dinars*, of which ten thousand had been ordered to be given to students. [Thus] ten thousand odd students steadily engaged in learning and teaching and qualifying for a financial aid were listed. There are the same number [of students] among the notables and their sons who resided in their own homes. Among them there are five hundred persons who have begun [to study] mathematics. His Royal Majesty the World-Conqueror, May God perpetuate his reign, has been engaged in this art [i.e., mathematics] for the last twelve years. Students too are indeed inclined to it and are working hard on it: [in fact] they are trying their hardest. This art is taught at twelve places - a number inferior to that of teachers. Thus nowadays [the state of teaching and learning mathematics in Samarkand] has no parallel in Fars and in Iraq.... There are twenty-four calculators *mustakhrij*, some of whom are also astronomers and some have begun [studying] Euclid ['s Elements].¹⁶⁰

It is not clear whether the observatory was endowed with waqf revenues like the madrasa or not; and whether the above information given by Kashi also applied to the observatory or not. As for the library, it was in the service of the scholars associated with Ulugh Bey's important scientific and educational enterprise. Sayılı found one reference to a library with one librarian in Giyath al-Din's

¹⁵⁸ Bagheri, "Newly Found Letter," 246.

¹⁵⁹ Bagheri, "Newly Found Letter," 246.

¹⁶⁰ Bagheri, "Newly Found Letter," 243.

*Miftah al-Hisab*¹⁶¹ but he concluded that its relation to the observatory, or the madrasa, was not clear. He added that it might as well have been Ulugh Bey's private library.¹⁶²

In short, the madrasa, i.e., undoubtedly a waqf institution, was closely associated with the observatory, itself a potential waqf institution, like the observatories of Tabriz or Maragha. Both institutions employed teachers who were masters in the religious sciences, or in the secular sciences, or both at the same time. In view of the information offered and in response to the question posed above, we could safely conclude that a legally endowed madrasa was a center for scientific teaching and had become a catalyst for the creation of another scientific institution, the observatory, whether the latter was or was not legally endowed with waqf revenues like the madrasa. The teaching of astronomy, as previously seen in the Maragha and Ghazan Khan observatories and now in Samarkand, was transferred to the madrasa, the institution meant for the teaching of Islamic religious sciences and jurisprudence.

This brings us one step further in our conclusion: scientific research and teaching was pursued in a waqf-endowed foundation, and the Samarkand madrasa—a center par excellence for teaching mathematics and astronomy—was the catalyst for the building of an observatory for the study and teaching of one or several of the sciences of the ancients.

A dichotomy between the group of sciences known as religious or secular, rational or *awail* sciences is not a matter of consideration, indeed the two are taught within the same institution, which is the madrasa. This is evidence of the progress in the integration of the two branches of science that may have had an influence on the madrasas of the following period, specifically the Ottoman madrasas. The young scholar Ali Qushji would carry this influence from Samarkand to the newly conquered Ottoman capital.

Pre-Ottoman Anatolian Madrasas

Parallel to the consolidation of the Turkish rule in Anatolia and Turkification of its population, many religious, educational, and social service institutions of Islamic civilization were established and spread in these lands which once belonged to the Eastern Roman Empire. Among them were the new madrasas that emerged in many settlements in Anatolia under the Seljuk and Ilkhanid rulers as well as Turkish principalities. Educational life in these newly-established madrasas developed in a form parallel to the academic traditions and educational styles which had gained a certain format through Nizamiya Madrasas which were established in old cultural centers under the Great Seljuk Empire and took root during the reigns of two powerful sultans like Alp Arslan and Melikshah. It is plausible that these newly established madrasas were open to the influences of change emerging outside Anatolia and especially in the Turco-Iranian realm.

The cultural development in Turkish Anatolia flourished in the second half of the twelfth century and the important cultural and artistic works were produced during the thirteenth century. Contemporary Western and Islamic sources acknowledge the fact that urban life in the main Anatolian cities of the thirteenth century was more developed than life under the Byzantine administration. The Seljuks built up the whole infrastructure of Sunni Islam in Anatolia.¹⁶³ With the

¹⁶¹ Giyaseddin, *Miftâhü'l-hisâb*, Nuruosmaniye Library, ms. 2967, 2^a-2^b.

¹⁶² Sayılı, *Observatory*, 281.

¹⁶³ Lapidus, *A History*, 86-89.

spread of madrasas in the Seljuk lands and the countries under their rule, literacy was increased while the spread of hospitals bearing various names such as *dar al-shifa*, *dar al-sihha*, *shifahane*, *bimarhane* or *maristan* dispensed healthcare services to the population which was not available previously. The spread of educational and health facilities contributed to the affluence and prosperity in these areas and this in turn helped the promotion of literature, art, and scientific activities.

Sultans of the Great Seljuk Empire, the Anatolian Seljuks and some begs supported and promoted the scholars involved in the study of these disciplines. Moreover, sources indicate that some of the sultans and chieftains or begs were personally engaged in these activities. Around that time, we start noticing some changes in the madrasa education that started to incorporate some of the rational sciences in their teaching activities. In this essay, we shall confine ourselves to certain aspects of this patronage and the related activities in Anatolia, an area studied on a lesser extent in comparison to the Great Seljuk Empire.

There are historical reports that describe the involvement of the Anatolian Seljuk sultans in astronomy. The most notable is the one made by the historian Ibn al-Athir (1160-1233). He wrote that Kutalmish Beg, father of Rukneddin I Sulayman Shah (1075-1086), who was the founder of the Anatolian Seljuk State, knew the sciences of the stars and other sciences as well. According to him, the rulers from this lineage also knew about the sciences of the pre-Islamic period and the Hellenistic heritage, including mathematics, astronomy, and medicine. They, he added, supported the people who were involved in these sciences. Al-Jazari author of the famous book on automata was a protégé of the Artuk Beg, Mahmûd b. Muhammed bin Kara Arslan (1200-1222). There is another well-known example of the patronage extended to the scholars by the Turkish rulers of Anatolia: a famous man of learning with diverse interests, Abd al-Latif al-Baghdadi (1220-1229),¹⁶⁴ who left us about 170 works on the religious sciences, philosophy, medicine, mathematics, and literature, wrote some of his important works under the patronage of the ruler of Erzincan, Alâ al-Din Dawud b. Behram, one of the descendants of Mengücek Oğulları. Although there are many other patrons and scholars worth mentioning, we shall focus on the institutional developments as such.¹⁶⁵

These examples in addition to many others could be cited to illustrate the profound interest in rational sciences that prevailed in the courtly milieu of the Turkish rulers of Anatolia. This interest had its reflection on the newly formed urban life in the cities and towns of Anatolia where a great number of madrasas were established. Both this courtly interest and the influence of the developing educational and scientific life taking place in the older and more rooted Islamic cultural centers formally provided the gradual integration of sciences in the madrasa education which acquired its first legal form in the time of the Ottoman Sultan Mehmed II in the middle of the fifteenth century. Thus, the above-discussed counterparts of the *bimaristan-madrasa* and *observatory-madrasa* models emerged in the pre-Ottoman and early Ottoman periods before the ultimate integration of rational sciences into the madrasa education took place.

One of the examples depicting the provision of astronomy education in Anatolian madrasas where we may observe the importance of the Ilkhanid influence as related to Qutb al-Din al-Shirazi (d. 1311), who as a student and assistant of Nasir al-Din al-Tusi at the scientific circle of Maragha observatory, came in search of learning to the city of Konya in Anatolia. He was appointed as the

¹⁶⁴ Rosenfeld and İhsanoğlu, *Mathematicians*, 568.

¹⁶⁵ İhsanoğlu, ed. *Osmanlı Astronomi Literatürü Tarihi* (Istanbul: Research Centre For Islamic History, Art and Culture (IRCICA), 1997), 1: lix-lxvi.

judge (*qadi*) to the cities of Sivas and Malatya. While he was teaching at the Gökmedrese in Sivas, which was also known as the Sahibiye Madrasa, he wrote his important book on astronomy *Nihayât al-Idrâk fî Dirâyât al-Aflâk* in 1282 and taught his students from this work. We have clear evidence that three years after he had written his book, he was still giving lectures based on the same book in the same madrasa. One of his students reported that in 1284, while al-Shirazi was still teaching in the madrasa, he was taught from this book and even made a copy of his teacher's manuscript for himself. Thus, there is no doubt that al-Shirazi taught astronomy in the Gökmedrese.¹⁶⁶

Like the Sivas Madrasa in Eastern Anatolia, the Jaja Beg Madrasa of Kırşehir and the Wajidiyya Madrasa of Kütahya in central and Western Anatolia are examples that show that the rational sciences were part of the institutional teaching. Sayılı refers to them in his well-known study on *The Observatory in Islam*. The madrasa in Kırşehir was built in 1272 by Nur al-Din Jibril ibn Jaja. Ibn Jaja was the governor of Kırşehir during the time of the Seljuk Sultan Gıyaseddin Keyhüsrev ibn Kılıç Arslan. This madrasa's deed of trust did not have any written statement that said astronomy was to be included in the official teaching. Nevertheless, there are some historical accounts, which relate that the minaret of this madrasa was originally an observation tower used for astronomical purposes.¹⁶⁷ Likewise, there are several reports on the existence of an "observation well" at Jaja Beg Madrasa in Kırşehir and Wajidiya Madrasa in Kütahya.¹⁶⁸

In the Turkish madrasas, as in the case of Nizamiye Madrasas, initially it could be maintained that there was a reluctance to teach rational sciences in the madrasas as part of their regular teaching program, which included primarily religious sciences, and secondarily, the complementary topics such as Arabic language and literature. However, because of the encouragement and support of the Seljuk sultans, Ilkhanid rulers and Turkish begs, the rational sciences were not altogether categorically "excluded" from the Anatolian madrasas. They were taught either because the teachers chose to teach them or because the students requested them to be taught. Thus, a new tradition began to emerge in the Anatolian madrasas. The example of the Sivas Gökmedrese is an obviously clear-cut case, and Sayılı's reports on the Kütahya Wajidiyya Madrasa, and the Jaja Beg Madrasa in Kırşehir, as well as many others may be cited to substantiate this point. A study of the numerous records of scientific manuscripts copied during pre-Ottoman and Ottoman times will surely provide ample evidence for the assumption made above and illustrate two aspects of the education carried on in some Anatolian madrasas.¹⁶⁹ The first aspect is the formal education conforming to the objectives written in the foundation deed consisting basically of religious sciences and the supplementary Arabic language and literature lessons. The teachers were appointed and were paid for pursuing this objective in education, and the students were given stipends for the same reason. The second aspect is the teaching of rational sciences that was outside this formal requirement; nevertheless, given under the roof of the madrasa. It consisted of lessons in rational sciences given by professors, who were knowledgeable in these subjects, to students who showed interest in these very topics. The rational branches of learning like logic (*mantiq*) had been naturally accepted and assimilated in the teaching of the madrasas. As to *'ilm al-kalam*, it was recognized as being the expression of theology or philosophy in its Islamic form. Furthermore, from reading the biographies of the learned men who were trained in pre-Ottoman Anatolia, it is assumed that teaching of rational sciences took place since the inclusion of courses on rational sciences did not bring undue expense

¹⁶⁶ İhsanoğlu, "Il ruolo delle istituzioni," 3 : 110-139.

¹⁶⁷ Sayılı, *Observatory*, 253-254.

¹⁶⁸ Sayılı, *Observatory*, 257.

¹⁶⁹ İhsanoğlu, *Osmanlı Astronomi*, 1 : xxvii-lxxxv.

to the foundation and attracted much interest from the students. The pre-Ottoman Anatolian madrasas fostered and contributed to the new tradition in teaching by including some of the rational sciences in their activities.

Ottoman Madrasas

The madrasa system inherited from the Seljuk Turks was adopted and enriched by the Ottomans. The construction of a madrasa next to a mosque became a tradition among the Ottomans and an integral part of their policy of conquest. Thus, they carried this institution of learning everywhere and established it in the lands they administered, in Asia Minor and Europe¹⁷⁰ This tradition was geared towards the provision of the necessary religious, scientific and educational services for the society, and particularly for the training of the administrative and legal personnel for the state. It was in this fashion that the Ottoman state was able to provide itself with knowledgeable manpower according to the requirements of Islamic jurisprudence and customary practice.

The first Ottoman madrasa was built in Iznik (Nicea) by the second Ottoman monarch Gazi Orhan Beg just after he conquered the city in 1331. He established a pious foundation in order to meet the financial needs of the madrasa. Iznik Madrasa (est. 1331) trained the students in religious sciences in their totality, and famous religious scholars such as Dawud al-Kaysari, Taj al-Din al-Kurdi and Ala al-Din Aswad taught here. There is no doubt that the *waqfiyya* of this madrasa was prepared in the pre-Ottoman tradition. It contains only one sentence about the tutorial activities: “the student in search of knowledge (*talib al-ilm*) should attend classes in the madrasa every day of the week.”¹⁷¹ As found in the extant texts of the deeds of trust of the early Ottoman madrasas, it seems that the education offered in these madrasas was left entirely up to the initiative of the professors, provided that it was within the framework of the conditions laid down by the waqf and according to the established academic traditions.

After examining the educational activities in the texts of the extant fifteenth century Ottoman madrasa *waqfiyyas*, one might think that they were influenced by the developments that took place in the pre-Ottoman Anatolian madrasas. Yet there were examples that would justify the Nizamiya model or the “exclusion” theory upheld by Makdisi. There are two examples that categorically prohibit involvement with philosophical sciences. Umur Beg Madrasa is an example of the madrasas that followed the supposed Nizamiya tradition. Timurtash Pasha’s son Umur Beg (d. 1434) founded this madrasa in Bergama. Today there is nothing left of this madrasa except its deed of trust, where the objective of the education is clearly stipulated as the teaching of *tafsir*, *hadith*, the methodology of jurisprudence (*usul al-fiqh*) and the branches of jurisprudence (*furu al-fiqh*). The deed clearly stipulates that the “philosophical sciences” would not be taught.¹⁷² The second example, *dar ul-hadith* was founded by Sultan Murad II in the capital city of Edirne in 1435, approximately at the same time as the Bergama Madrasa and it focused on the study of *hadith*. Its deed of trust explicitly forbids any involvement in the study of philosophical sciences. The founder of the waqf stipulated the following: “The *muderris*, or professor, will teach the students the sciences prescribed by the religious law and

¹⁷⁰ For an approximate number of Ottoman madrasas, see İhsanoğlu, “Osmanlı Eğitim ve Bilim Kurumları,” in *History of Ottoman State and Civilization*, ed. İhsanoğlu (Istanbul: IRCICA, 2002), 2 : 413-511.

¹⁷¹ Ekmeleddin İhsanoğlu, “Emergence of the Ottoman Medrese Tradition,” in *Studies on Ottoman Science and Culture*, Variorum Collected Studies, ed. Ekmeleddin İhsanoğlu, 118-168 (London: Routledge, 2021).

¹⁷² Ekrem Hakkı Ayverdi, *Osmanlı Mimarisinde Çelebi ve II. Sultan Murad Devri 806-855 (1403-1451)* (Istanbul, 1972), 270.

the literary arts (*al-ulum al-shariyya va al-funun al-adbiyya*) and under no circumstance philosophical sciences (*al-funun al-falsafiyya*) will be taught. There, every day, *hadith* and the subjects related to it will be taught by the professor.”¹⁷³

The two examples mentioned above could be taken as proof supporting Makdisi’s view that the rational sciences were “excluded” from the madrasa education. Yet even the mere fact of having a stipulation for “exclusion” in the deed suggests that some teaching of the philosophical and/or rational sciences had been previously undertaken.

It is noteworthy that these two clear examples pertaining to the prohibition occurred in the fifteenth century and in close times. The fact that prohibition was expressed in words clearly shows that unlike the case of the old tradition, philosophy entered the madrasas, therefore those who wanted to follow the old tradition or those who believed in the “harm” of the philosophy tried to fight it. To understand this negative attitude towards the teaching of the “philosophical sciences” better, it is important to look at this issue in terms of the fact that philosophy was used by heterodox religious groups and marginal political movements against the mainstream Islamic thought, as well as in the framework of the relationship between philosophy and *ilm al-kalam* in the fourteenth century and afterwards. *Kalam* should not be seen as apologetics as it is often claimed, but rather as a rational enquiry into the revealed truth. It is “an argumentative approach to religion, which sought, through discussion and discursive thought, to interpret and transform the content of the Islamic revelation into a rationally-based doctrine.”¹⁷⁴ As such, *kalam* would be a science parallel to philosophy, an attempt to offer an alternative philosophy to *falsafa* (by which Sabra means the foreign body of philosophies, mainly the Hellenistic ones).¹⁷⁵ The foreign *falsafa* inherited from the pre-Islamic cultures and the native Islamic *kalam* are “competitors.” This does not mean that *falsafa* was rejected or “excluded” by Islam. On the contrary, the Muslim philosophers (*falasifa*) tried to adapt this foreign philosophical body and integrated it in their own Islamic culture and faith despite the suspicion of some. Nevertheless, the attitude toward the rational sciences other than *falsafa*, namely arithmetic, geometry, astronomy, and music, was different, perhaps because science was not a direct competitor of *kalam* the way that *falsafa* was, and generally the specialized scientific disciplines were not perceived as sciences that posed a threat to religion.

It is important to establish whether or not the prohibition of the “philosophical sciences” found in the above-mentioned deeds of trust refers to philosophy in general or to the heterodox ideas like those of the Ismailis who threatened Sunni Islam in the tenth–twelfth centuries by targeting certain religious beliefs with philosophical arguments as well as other philosophical doctrines that led to the denial of the existence of God. This can only be done by looking into the intellectual history of Anatolia during that period and by paying careful attention to the meaning of “philosophy” and “philosophical sciences,” which seemed to mean doctrines or sciences that put forward arguments that went against the religious beliefs and supported heterodox trends.

Thus, if we were to assume that the “philosophical sciences” as such were rejected, it is important to determine whether these sciences were banned as a whole or not, and whether this ban included mathematical sciences (*al-ulum al-ta’limiyya*) or not. The search for the answers to these questions will help us draw a picture of the cultural life prevalent in Anatolia during that period and in general

¹⁷³ Mustafa Bilge, *İlk Osmanlı Medreseleri* (Istanbul, 1984), 221.

¹⁷⁴ A. I. Sabra, “Science and Philosophy in Medieval Islamic Theology: The Evidence of the Fourteenth Century,” *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 9 (1994), 11.

¹⁷⁵ Sabra, “Science and Philosophy,” 23.

of the development of sciences in the Islamic world. Whatever the outcome of the above debates is, the stipulations found in the deeds of trust of the two above mentioned madrasas prohibiting the teaching of “philosophy” show that there was a conservative attitude vis-à-vis the inclusion of some sciences in the teaching activities of madrasas. The conservatives, labeled “traditionalists” by Makdisi, were definitely against the teaching of subjects other than religious sciences and the related fields. Founders like Sultan Murad II and Umur Beg, or rather their scholarly entourage, were under the influence of conservative scholars who did not wish to have these subjects taught in the context of their madrasas. These scholars were the legal authorities who would draw up the deed and had the jurisdiction over its proposed activities. The explicit restrictions included in the deeds actually provide us with clear evidence that the philosophical sciences, at least some of them, were —or had been— taught in some Ottoman madrasas. As a consequence, their explicit prohibition in the stipulations of the deeds had become necessary for the founders who wished to avoid including them in the teaching activities of their madrasas.

The Ultimate Integration

As seen in the examples given above, the target of the Seljuk madrasas and the early Ottoman madrasas founded before Fatih Sultan Mehmed II (r. 1444-1446 and 1451-1481) followed the tradition of the Nizamiyas and aimed mainly at spreading religious education in general and jurisprudence (*fiqh*) in particular. However, the fact that we find in some of the Seljuk madrasas some “observation wells” and hospitals (*şifahanes*) built close by the madrasas, reveals a definite interest in teaching medicine and astronomy, which correspond to what has been described above as *observatory-madrasa* and *bimaristan-madrasa* models. During the pre-Ottoman and early Ottomans eras (before the reign of Mehmed II), the madrasa teaching program did not officially include philosophical, mathematical, and natural sciences. They were taught, as had been done in the past, outside the madrasas, or in the madrasas without having been explicitly mentioned in the deeds of trust, or in the hospitals (*şifahanes-bimaristan*) or in the houses of the learned men.

The turning point in the history of madrasa teaching and the shift from the traditional Nizamiyya system towards a more comprehensive institutional model took place during the time of Mehmed II. One can say that this significant transformation —which would eventually lead to the official teaching of both rational and transmitted sciences under the roof of madrasas— was brought about as a result of the impact of many factors. First, there was the personal interest of the sultan in the rational sciences and his patronage of the scholars. Second, this new tradition seemed to draw directly from the Timurid institutions of learning, which included the teaching of the rational sciences. Finally, we have to mention the role of Ali Qushji (d. 1474), the famous mathematician and astronomer, who served both the Timurid ruler Ulug Beg and the Ottoman Sultan Mehmed II. Qushji was brought up in Samarkand where the tradition of teaching astronomy and mathematics in the madrasa had already been established. Thus, Qushji was instrumental in importing the Timurid Samarkand tradition to the Ottomans.

The traditional system went through an important change in a very short period of time. We believe that comparison between two madrasas established by Mehmed II in different places and times in the newly conquered Istanbul, would provide clues about the development of teaching programs. Sultan Mehmed II, built two compounds having madrasas, chronologically the first in the complex which is known as Eyüp Külliyesi was founded in 1458-59. We learn from its deed of trust that education in its madrasa concerns the ones who wish to “pursue the fundamental sciences

prescribed by the religious law and their ancillaries, as well as all the other noble transmitted (*naqli*) sciences.”¹⁷⁶ This implies that the goal of formal education was to teach all the religious sciences besides other transmitted (*naqli*) sciences. Thus the teaching objective of this madrasa was in legal conformity with the established pattern.

Mehmed II built another bigger compound to be on his name, Fatih Külliyesi, between 1463-1470, shortly after the foundation of the Eyüp Külliyesi. It included eight intermediate madrasas called “*tetimme*” and eight high madrasas called “*sahn*” (literally, courtyard). The deed of trust of this complex of madrasas shows a very different educational goal and reflects a major change in the Ottoman madrasa system. Among the Turkish madrasas recorded until the time of Mehmed II, we find for the first time, the deed of trust stipulates that the employment of professors should depend on their knowledge, not only in the transmitted sciences, but also in the rational ones. The *waqfiyya* lists the qualifications of the professors appointed to teach in the higher colleges “*sahn*”: they must be “knowledgeable in the principles and basics of both transmitted and rational sciences.” However, we do not find an implicit stipulation in the deed of trust of the Fatih Madrasa to the effect that the professors were required to teach both transmitted and rational sciences. Nevertheless, there is but a clause stating that they should teach “*anwa'i-'ulum ve ma'arif*”, that is “the various sciences and learning” while their helpers, the assistants (*mu'ids*), have to be skilled in “various arts” (*funun-i shatta*) and teach the students the art of critical discussion (*mubahatha* and *mukataba*) under the direction of the professors. Another implicit reference to rational sciences is included in the introductory descriptive statement about the qualifications of the teachers in the *sahn* (courtyard) madrasas.¹⁷⁷ “The basic foundation of the studies in high colleges is based on philosophical (*hikma*) precepts and geometrical rules.” “*Hikma*,” a term found in the deed, refers to philosophy, geometry, and other rational sciences indicates that these were indeed part of the basic education in this madrasa. These explicit and implicit references clearly show that the goal of collegiate education had changed. *Fiqh* was no longer the exclusive subject taught, rather, many different sciences were introduced into the teaching program without any restriction being imposed on them.

This change becomes much more explicit with the Süleymaniye Madrasas which were established almost one century later by Süleyman the Magnificent (r. 1520-1566). In one of the clauses of the deed of trust of these madrasas, it is clearly stipulated that the task of the *mudarris* should be “to teach the student religious sciences and to enlighten him with true knowledge.” The deed also stated for the first time that the professor should teach “the seekers of knowledge in classrooms, on school days, from the textbooks in use during that time. Students were to be taught both transmitted and rational arts through the questioning of one another and through the discussion of the topics.”¹⁷⁸ In this sentence, the use of the terms “*tadris*” and “*mudhakara*” unequivocally indicates that the formal madrasa education during the reign of Süleyman the Magnificent was expanded to integrate officially the so-called rational sciences as a subject to be studied in the classroom. The “*mudhakara*” of all the rational (*maqul*) and transmitted (*manqul*) sciences was thus legalized, and the professor was formally asked to impart them to his students.

There are various information and historical accounts to the effect that this ultimate integration of rational and transmitted sciences taking place during the reign of Süleyman I made a wider impact

¹⁷⁶ *Fatih Mehmet II Vakfiyeleri* (Ankara: Cumhuriyet Matbaası, 1938), 262-263.

¹⁷⁷ For the fadscimila of the vakfiye in Arabic, see Tahsin Öz, *Zwei Stiftungsurkunden Des Sultans Mehmed II. Fatih* (Istanbul: German Archaeological Institute, 1935), 17 and 117.

¹⁷⁸ Kemal Edip Kürkcüoğlu, ed., *Süleymaniye Vakfiyesi* (Ankara: Vakıflar Umum Müdürlüğü Neşriyatı, 1962), fsk. 83-4/32.

on the madrasa education in the Ottoman world and that these two categories of *manqul* and *ma'qul* comprising various sciences became widespread. This development observed in the Turkish-speaking part of the Ottoman Empire was also clearly witnessed in Rumelia, its cultural extension, which consisted of the European provinces. It is also possible to see the examples of this influence in some Arab madrasas which were located in older cultural centers and whose educational traditions were formed before those of the Ottomans. For instance, there are scholarly examples showing that in the seventeenth century the ulema in Damascus, who had close relationships with the center in Istanbul, taught rational sciences in line with this tradition. Among them is mentioned that a Damascene scholar used to prepare wax geometrical models and compare them with the diagrams in the textbooks during his geometry class.¹⁷⁹

Teaching Programs in the Ottoman Madrasas

It appears that the textbooks used for instruction at madrasas were, in the first instance, prepared so as to provide every Muslim individual with the knowledge required for religious and worldly matters. Clearly, the most fundamental goal of madrasa education was to ensure that Muslims be brought up as knowledgeable and morally correct individuals.

The legal code (*kanûnnâme*) pertaining to education prepared during the reign of Süleyman I indicates that it is necessary to understand the mystery of creation, to establish a state which operates in an orderly fashion and to reveal the realities of the world in order to ensure the perpetuity of order in the world and the well-being of humanity, and to realize all these things it is essential that one must comprehend the universe created by God as well as learning the teachings of the prophets. To the extent that it can be clearly determined from the code written in the dense style used for official documents during that period, the views of Ottoman administrators with regard to education indicate that the purpose of education in the first instance involves the pursuit of science and wisdom (*hikmet*) and then an explication of virtue, talent, religion, and the sharia in that order, as well as the development of human faculties and capacities. The sultan was held personally responsible for ensuring that this was carried out.

Though it is not possible to determine a standard teaching program of the Ottoman madrasas in a clear and detailed manner from contemporary sources, one can, however, provide a basic yet only partial outline of what was taught by examining the biographies of teachers and scholars associated with the Ottoman madrasas, their diplomas, the *waqfiyyas* and regulations pertaining to the madrasas.

From the beginning to the very end of his education, a student at the Ottoman madrasa would be required to read a large number of books in different fields of study. There are differences with regard to the subjects a student would study at the various madrasas from century to century, up until the founding of the *Dârü'l-hilâfeti'l-Âliyye Madrasas* in 1914 during the Second Constitutional period. It is possible to follow these changes by examining the education of Tashkopruzade Ahmed b. Isameddin during the sixteenth century and the classes he later taught as a teacher, as well as by examining the education of Kâtib Çelebi in the seventeenth century. It is also possible to obtain detailed information about the subject from a little-known source about the madrasa education titled *Kevâkib-i Seb'a* (Seven Planets) written in 1739 at the request of French Marquis de Cammont, a

¹⁷⁹ Muhammed Emin b. Fazlullah Muhibbi, *Hulâsatü'l-Âsâr fî A'yani'l-Karni'l-Hâdi Aşer* (Beirut, [1284]), 4: 330-331.

member of the “Republic of Letters.” It is also possible to learn something about the madrasa education and methods of instruction during that century from a book by Italian Priest Abbot Toderini titled *De la littérature des Turcs*. For the nineteenth century, it is possible to get quite a clear picture and examine the nature of the madrasa education from the autobiography of Ahmed Cevdet Pasha.¹⁸⁰

During the course of a student’s education, the books that he would read would be in this order. The first three were morphology (*sarf*), syntax (*nahiv*) and logic (*mantık*) in that order, and the last two were hadith and commentary on the Qur’an (*tafsir*). In between the first three studies and the last two, subjects such as elocution (*âdâb-i bahs*), preaching (*vaaz*), rhetoric (*belâgat*), study of philosophical theology (*kelâm*), philosophy (*hikmet*), jurisprudence (*fıkıh*), inheritance (*ferâiz*), tenets of faith (*akaid*), and legal theory and methodology (*usûl-i fıkıh*) were pursued. There would occasionally be differences in the order and presentation with respect to these studies.

Kevâkib-i Seb’a provides us with very valuable information about the manner in which students proceeded with their lessons. The students had five classes a week and each lesson consisted of certain lines (*satır*) that had to be studied before attending the class. The student would spend eight to nine hours studying his lesson the day before and the next day in the class, each student would take turns reading the passages from the text to the teacher; after the teacher presented his interpretation, each student would present his viewpoint on the subject, then they all would engage in a discussion. After having thoroughly analyzed and researched the lesson, the students would return to their rooms and continue studying until they came into the presence of their teacher the next day.

Kevâkib-i Seb’a indicates that students would study the sciences according to an established tradition during the stages of abridgment (*iqtisar*), moderation (*iqtisad*), and detailed deliberation (*istiqsâ*), with each stage having three sub-stages. It continued as follows:

In other words, a text without any proof offered would be referred to as *iqtisar*, if there was some degree of proof, it would be called *iqtisad*, and if the text was thoroughly examined, bringing in the required proof to criticize and disprove those with opposing views, it would be called *istiqsâ*. Books in all fields of study could be viewed in relation to each other as *iqtisar*, *iqtisad* and *istiqsâ*. However, when one examines most of these books, one can think of every field of study as having three stages or degrees with the ones close to *iqtisar* considered as part of the category of *iqtisar*; those close to *iqtisad* to be considered in the category of *iqtisad*; and the elaborated texts would be considered within the *istiqsâ*. The reason for this introduction being that there is no end to the books in every area of study. However, to make it easy for students, three levels of books are given to them to read for each of the three levels in each of the fields of study mentioned. Making use of those three levels, the students will develop skills in the particular field of interest. If the student is especially bright, it might suffice for him just to do the highest level. If he is less qualified, then he could suffice with the second level and if even less capable than that, then he would make do with the third level. Each field of study has many branches or sub-fields. But because life is short it is best that books of short length be selected for each discipline and read in the proper order. At a later time one should on occasion also read

¹⁸⁰ For detailed explanations, see İhsanoğlu, “Osmanlı Eğitim ve Bilim Kurumları,” 2: 365-393.

lengthier books to develop one's mind. Without first examining fundamental principles, studying lengthy books will only confuse a person. As a result, there may for the three levels in each branch of study be a total of nine levels, if each of the levels has in turn been divided into lower, middle and upper ones. In some cases, the materials are completed with attention given to all nine, at other times by only examining a portion of the nine.¹⁸¹

The many examples we know of clearly allow us to state that mathematical sciences such as arithmetic, geometry, algebra, and astronomy, and natural sciences such as classical physics were taught in the Ottoman madrasas. The examination of most of the biographies or autobiographies of the Ottoman ulema indicate that these sciences were studied after the divine philosophy (*hikmet*) and prior to the most esteemed subject of the commentary on the Qur'an (*tefsîr*). *Kevâkib-i Seb'a* indicates, however, that some of these subjects were dealt with in a less formal manner in *kalam* class by discussing such books as *Şerhü'l-Mevâkif* and *Şerhü'l-Makasid*:

As much as books such as *Şerhü'l-Mevâkif* and *Şerhü'l-Makasid* pertain to theology (*kalam*) they contain all of the auxiliary sciences, divine philosophy, astronomy, geometry and arithmetic. Geometry and arithmetic are subjects that are easily apprehended, and because they do not require much deep thought, are not studied as separate subjects. They are taken up along with the above-mentioned sciences. There is a book titled *Eşkâl-i Te'sis* in geometry at the *ıqtisar* level that they would read. Following that, they would read Euclid with its proofs at the *istiqsa* level. For arithmetic at the *ıqtisar* level there is *Bahâiyye* that they would read. Subsequently, they would report on Ramazan Efendi and Çulli, which were close to the *ıqtisad* level. Because astronomy involves the use of the imaginative powers and supposition and is therefore more difficult than geometry, they study it later as a separate subject. It is offered at the appropriate level. It is common knowledge that scholars do not weary of the temperament of students and always give Tuesdays and Fridays off from classes in order to encourage them in their studies. Students use those two days for the preparation of materials they need and during the summertime they go off on trips and picnics. Even there they do not remain idle, but undertake discussions of arithmetic, geometry, astrolabes, *rub'u* (quadrant), land surveying, Indian, Coptic and Ethiopian arithmetic, *parmak hisâbı* (finger count), mechanics and other such sciences which do not require independent lessons. During the winter, they engage in conversation, devote themselves to solving puzzles (*muammâ*) and riddles, to *mukadarât* (measuring and comparing), to history, poetry, prosody and to classical *dîvân* poetry. Some of them are occupied with the occult sciences, but the teachers do not allow them to follow such pursuits because such subjects occupy too much of their time.¹⁸²

From *De la littérature des Turcs* written by Toderini, who was resident in Istanbul between October 1781 and May 1786, we learn that there were teachers instructing young children in geometry and the time between rhetoric and philosophy lessons was allocated to this area of mathematics. He says that he visited the Vâlide Madrasa twice and observed that at that time the

¹⁸¹ Cevat İzgi, *Osmanlı Medreselerinde İlim: Riyazî İlimler* (Istanbul: İz Yayıncılık, 1997), 1: 76.

¹⁸² İzgi, *Osmanlı Medreselerinde İlim*, 73-74.

students had assembled to listen to their geometry lesson and they were using an Arabic translation of Euclid.¹⁸³

This ultimate integration of rational and transmitted sciences which took place in the fifteenth and sixteenth centuries that became manifest in the Ottoman madrasas, created a great cultural legacy and scientific tradition which survived till the nineteenth and even the twentieth centuries. Today it is still possible to come across some of its traces in a few educational circles still continuing with traditional education in some parts of the Muslim world.

With the establishment of western-style educational and scientific institutions in several Islamic countries in the nineteenth century within the framework of modernization attempts in education, the madrasa education lost its significance. In a later phase, within the context of the modernization of the madrasa education itself, several changes in the form and content were planned and in some of these successful modernization examples, books introducing modern science began to replace the previous Islamic scientific literature.

Conceptual Framework of the Ottoman Madrasas

It is possible to draw a parallel between the transformation of the institutional aspect of education and the conceptual development of understanding of science in the madrasa education. These changes manifest themselves in both the theoretical definition and understanding of “ilm” and the terminology used in practical terms for madrasa education.

Corresponding changes that occurred in the terms that referred to those who sought knowledge, i.e., the students of madrasas are also witnessed. The changes from the time of the pre-Ottoman Seljuk madrasas until that of the Süleymaniye Madrasas also manifested a shift in the terminology describing the student. The terms referring to the students, “*faqih*” or “*mutafaqqih*” that were part of standard madrasa terminology, were also current in the descriptive deeds of the Anatolian Seljuk madrasas. The beginners were called “*mubtadi*,” the intermediates “*mutawassit*,” and finally those who had become skilful enough to reason or reflect upon legal matters, that is those who mastered the *istidlal*, were called “*mustadill*.” As we look at the early Ottoman madrasas, we see that the same terminology is used. However, as the scope of education widened, the nomenclature also changed, and the subsequent Ottoman texts generally referred to the students as “*talaba-i ulum*” or “*tullab-i ulum*” (which means “seeker(s) of knowledge, or sciences”). We came across this expression in the deeds of trust of *Rab-ı Rashidi*. In the Ottoman madrasas, those who were at the beginner level were called “*suhte*” and those at the advanced level were called “*danişmend*.” The terminology used in the codes of law related to later madrasas also corroborates the shift in the aims of collegiate education. Thus, such education was no longer exclusively limited to *fiqh* and had acquired a much broader scope.

The evolution that is reflected in the terminology that applies to the teaching of the Ottoman madrasas is also detected in the epistemological system of the Ottoman encyclopaedist Tashkopruzade (1495-1561). Tashkopruzade lived at a time that witnessed the peak of the development of the Ottoman madrasas. He belonged to a family of ulema, or religious scholars, among whom many were madrasa teachers. He deals with the classification of sciences in his famous encyclopedia *Mevzuat el-'Ulum*, which is considered to be one of the finest sixteenth century literary

¹⁸³ İhsanoğlu, “Osmanlı Eğitim ve Bilim Kurumları,” 2: 248-250.

works. For Tashkopruzade, the goal of learning in Islam is “*marifetullah*,” the knowledge of God. The reason behind the acquisition of a science is teleological or *gayevi*. One should study all sciences, and it is only when our capacity limits us, advises Tashkopruzade, that we must concentrate on the study of the principles of religion, that is, on theology. The principles of religion strengthen the foundations of faith (*iman*), while *fiqh* helps differentiate between the lawful (*halal*) and the unlawful (*haram*), and Sufism (*tasawwuf*), that is, “the fruit of faith and the finality of Islam” lead to perfection (*ihsan*). *Tafsir* and *hadith* are contained in the above sciences. In this way the acquisition of knowledge will grant one eternal happiness. Tashkopruzade divides the existence into four categories: in the script (*fi'l-khutut*), in the speech (*fi'l-alfadh*), in the intellect (*fi'l-adhhan*), and in the reality (*fi'l-a'yan*). In his division, the realization of every existence leads to the next one, onto the ultimate being. Script leads to speech, onto that which is in the intellect, and ultimately to certainty. Real existence is in the true and real being (*al-wujud al-haqiqi al-asil*).

Tashkopruzade records about 300 different branches of arts and sciences, mentioning the names of the famous authors who dealt with them and the works devoted to these branches. He divides sciences into seven main sections based on the above four categories of existence. Tashkopruzade's classification system based on this ontological grouping shows a mutation from epistemology to ontology. He calls each section a “large tree” (*dawha*). The first three *dawhas* correspond to the first three ontological categories (1) the script, (2) the speech, and (3) the intellect. All the remaining *dawhas* of sciences belong to the fourth ontological category; thus, in this category of existence, that of true existence, sciences are grouped into four sections:¹⁸⁴

Theoretical sciences (theology, natural, and mathematical sciences)

Practical sciences (ethics, politics, administration, and domestic economy)

Sciences prescribed by the religious law

Esoteric sciences or the knowledge of the inward (*'ilm al-batin*) (devotion, customs, actions that lead to perdition and actions that lead to salvation).

According to this classification, learning starts with the script and the speech and leads to its true finality which is man's own inner perfection, the cleansing of his heart, his inclination towards good deeds and his spiritual advancement. It is interesting to note that Tashkopruzade's classification of the sciences places religious and rational sciences as pertaining to the same level of existence and treats them in pedagogical perspective.

Tashkopruzade's understanding of knowledge can be seen as the culmination of the development of the concept of *'ilm* (knowledge), where all human knowledge—rational (*aqli*), transmitted (*naqli*), and Sufi (*yaqini*)—melt in one ontological unity of human experience and knowledge that leads to eternal happiness. In the light of the above, we can see Tashkopruzade's classification of sciences as a developed form that assimilates the Ghazalian and the Khaldunian systems, which contained the

¹⁸⁴ See Taşköprizâde, *Miftahü's-Saade ve Misbahü's-Siyade fi Mevzuatü'l-Ülûm* (Cairo: Darü'l-Kütüb el-Hadise, 1968), 1: 78-69; Taşköprizâde Ahmed Efendi, *Mevzuatü'l-Ülûm*, v. I, trans. Kemaleddin Mehmed, (İstanbul: İkdâm Matbaası, 1313 [1896]), 1:116. Unfortunately, the Turkish version of this important work by Taşköprizâde has not been critically edited and published scientifically until now. Likewise, the critical publication of the original Arabic text printed in Cairo in 1968 needs to be reviewed. The Cairo edition is based on the copies of the Dar al-Kutub al-Misriye and the Azhar Mosque Library and the first of the three editions we previously identified in Hyderabad. The Arabic and Turkish texts we have once again show the need for serious publications based on original manuscripts. In our quotations, we tried to compensate for the existing errors by using both texts.

starting points for a unified view of sciences and knowledge. For Ghazali (1058-1111) the uniting factor between the various sciences was their complementarity; for Ibn Khaldun (1332-1406) it was an epistemological one; and for Tashkopruzade it became ontological, a merging of human experiences. The rational, legal, and mystical sciences are therefore part of one and the same category, *wujud al-a'yan* or true existence. Tashkopruzade went one step further by bringing the Ghazalian and Khaldunian theory to completion, that is, to a stage of total integration. Thus, with this evolution of the concept of *ilm*, the Ottoman madrasas, starting from the era of Mehmed II, had included the rational sciences in their formal education, which was to take its definitive shape during the time of Süleyman the Magnificent. Therefore, we can regard the evolution of this concept as a catalyst for the change in the understanding of formal collegiate education.

The growing assimilation of the rational sciences into the official teaching system is also reflected in Tashkopruzade's second important work, *Shaqa'iq-i Nu'maniya*, which contains the biographies of Ottoman scholars who lived during the reigns of the first ten Ottoman monarchs (from Osman I to Süleyman I). According to the statistics based on this important work, the distribution of works authored by scholars (who were mainly in the madrasa milieu) in various disciplines during the reign of the first ten sultans were as follows. Rational sciences: 25.7%; history, literature, and ethics: 25.7%; exegesis: 22.8%; jurisprudence: 14.2%; Sufism: 8.5%; scholastic theology and the tenets of faith *aqa'id*: 2.8%.¹⁸⁵ This study shows that the scholarly life that centered around the madrasas was clearly being transformed in such a way that rational sciences ended up occupying a prominent place in this milieu.

Conclusion

In his definition of the rational sciences Ibn Khaldun tells us that:

The intellectual (rational) sciences are natural to man, in as much as he is a thinking being. They are not restricted to any particular religious group... They have existed (and been known) to the human species since civilization had its beginning in the world... These sciences were more extensively cultivated by the two great pre-Islamic nations, the Persians and the Greeks... Muslim scientists assiduously studied the (Greek sciences). They became skilled in the various branches. The (progress they made in the) study of those sciences could not have been better.... They surpassed their predecessors in the intellectual sciences.¹⁸⁶

Rational sciences or intellectual sciences were an integral part of the culture in the Islamic world and became gradually a component of the teaching activities of its official institutions. The madrasa was an institution "indigenous" to Islam, which in time incorporated the sciences that were not native to the culture. The madrasa is seen by Makdisi as a third stage in the formation of the teaching institution in Islam, the first two being the masjid and the masjid-inn. Madrasas, which were originally meant as institutions for the teaching of jurisprudence (*fiqh*), did not initially

¹⁸⁵ Hulusi Lekesiz, "Osmanlı İlmî Zihniyetinde Değişme, Teşekkül - Gelişme - Çözülme: XV-XVII. Yüzyıllar," MA thesis, Ankara, Hacettepe University, 1989, 169.

¹⁸⁶ Ibn Khaldun, *The Muqaddimah: An Introduction to History*, trans. Franz Rosenthal (Princeton, NJ: Princeton University Press, 1980), 3: 111-116.

“include” the teaching of sciences other than jurisprudence as such and the sciences related to jurisprudence. One may indeed argue that there were circumstances in the cultural history of Islam when a bias against philosophy is detected because of its use against the main Sunni trend as we mentioned earlier. This “sensitivity” should be placed in its own context, keeping in mind that marginal groups sometimes used *philosophy* as a doctrinal or political weapon against the main school of Islam, i.e., Sunni doctrine, furthermore, *philosophy* could be perceived as a “competitor” to *kalam*. The teaching of the sciences of the ancients including *philosophy* was initially transmitted through personal channels rather than through official institutions. We have argued that the rational sciences became an integral part of the cultural life not only on an individual level, but also on an institutional one. The institutionalization process which started with the libraries known as the House of Wisdom established by the caliphs went on through the integration of the teaching of the sciences of medicine, mathematics and astronomy within the madrasa tradition which was completely a product of the Islamic tradition. Through what we have called *bimaristan-madrasa* and *observatory-madrasa* models and processes, the rational sciences were made an integral part of the teaching program in the madrasas, that is the official institutions for teaching in Islam.

In lights of the various examples, we studied so far, we observed that the gradual inclusion of the rational sciences into the official teachings of madrasas from the time of late Abbassids through the Seljuks, Ilkhanids, Timurids and to the Ottomans, delineate a definite ascending curve.

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