The Contribution of Muslims to Science during the Abbasid Period with Special Reference to Medicine (750-945)

Dr. Ashaq Hussain[1]

Abstract:

During the Abbasid period, Muslim culture and civilization was at its zenith. It was a period of economic prosperity and of great intellectual awakening. The Abbasid Caliphate provided the most congenial atmosphere for the advancement of learning and education. In fact, the reign of Mamun-ar-Rashid, who has deservedly been called the "Augustus of Arabs" formed the culmination of the intellectual achievements of the Muslims. He was followed by a brilliant succession of caliphs who continued his work. Muslims gained access to the Greek medical knowledge of Hippocrates and Galen through the translations of their works in the seventh and eighth centuries. These initiatives by Muslims could be seen in the different aspects of the healing arts that were developed. The translation movement of the twelfth century in Latin Europe affected every known field of science, none more so than medicine. The present paper is an attempt to give a detailed contribution of Muslims to science with special reference to medicine. It is in this context the present paper has been analyzed.

Keywords: - Abbasids, Science, Medicine, intellectual awakening, civilization

Introduction

The Muslim concern with education has been an important aspect of the history of Islam. Their association with the institutions of learning has a religious beginning. Through its numerous verses encouraging Muslims to be equipped with knowledge and understanding, the Holy Qur'an gave great impetus to the process of learning and the acquisition of knowledge. The stable foundation of Muslim education stands on two main pillars: the Qur'an and the *Sunnah*. The Qur'an attaches paramount importance to the process and acquisition of knowledge and wisdom. Numerous verses of the Holy Qur'an enjoin its believers to make the search for knowledge a sacred duty.[2] The *hadith* of the Prophet encouraged and persuaded Muslim scholarship to acquire knowledge as well. There are many examples of the Prophet directing his followers to act as pillars of knowledge and understanding: the construction of *Masjid-i-Nabwi,* the prophetic decree to war captives of Badr to teach Ansar children reading and writing, His

---

[1] Post-dDoc Fellow, Centre of Central Asian Studies, University of Kashmir. Email id: aashiqulislam@gmail.com.

[2] Mohammad Akhlaq Ahmad, *Traditional Education Among Muslims: A Study of some Aspects in Modern India*, B.R. Publishing Corporation, Delhi, 1985, p. 1.

persuading his followers to learn foreign languages and to undertake journeys to distant countries demonstrate the vision and contribution of the Prophet in the promotion and development of education. As a result of this, the Muslim concern with knowledge and learning became the hallmark of almost every period of Islamic history. The companions of the Prophet paid special attention to this branch of knowledge on both the individual and the collective levels.[1]

The Qur'an bears ample witness to this emphasis on learning in Islam:

> Read with the name of thy Lord, Who createth, Createth man from a clot. Read, and thy Lord is the Most Bounteous,
>
> Who teacheth by the pen: Teacheth man that which he knew not. (Qur'an 96:1-5)
>
> Allah has also ordained in the holy Qur'an that His servants beg Him: "O Lord! Increase me in knowledge." (Qur'an 20:114)

In another verse of the holy Qur'an Allah proclaims:

> And it is He who hath ordained the stars for you that ye may be guided thereby in the darkness of the land and the sea. Clear have We made Our signs to men of knowledge. (Qur'an 6:95)

The Holy Qur'an repeatedly stresses travel, observation, and contemplation:

> Observe what is in the heavens and in the earth. Do you not see? Do you not think? Do you not contemplate? Will they not regard the camels, how they are created? And the heavens, how it is raised? And the hills, how they are set up? And the earth, how it is spread? (The Qur'an 88:17-20)

The Holy Qur'an was revealed as the epitome of knowledge and wisdom. Most of the Holy Prophet's companions learned the Qur'an by heart. In his discourses, the Holy Prophet explained the meaning and the significance of the various verses of the Holy Qur'an. For the Muslims, therefore, education began with the teaching of the exegesis of the Holy Qur'an, and they were sent to the various tribes to educate people in the basic doctrines of Islam. Islam thus became a dynamic educative movement. After the demise of the Holy Prophet, His companions followed the same practice of teaching in "mosques." The vigor and zeal for the promotion of knowledge and learning continued even after the Prophet. Caliph Abu Bakr encouraged Muslims to learn and understand, and there were efforts to compile a definitie edition of the Qur'an, an act that had not been completeed during the lifetime of the Prophet Muhammad. This reflects the that during this period Islamic education viewed the Holy Qur'an as the core and essential source of knowledge and learning.[2] During the reign of Umar Ibn Khatab. the whole of

---

1 Masudul Hasan, *History of Islam*, Vol I, Adam Publishers, New Delhi, 2002, pp. 63-64.

2 One of the greatest services rendered to Islam by Abu Bakr R.A was the compilation of the Holy *Qur'an*. There were hundreds of Huffaz (i.e., those who committed the whole Holy *Qur'an* to memory) among the companions during the Holy Prophet's lifetime, but it had not been compiled in book form, although its memorization continued even after the the Holy Prophet's death. In various battles that took place against rebels and false prophets,

the Arab Peninsula, Persia, Syria, and Egypt were under the rule of Islam. Consequently, "mosques" flourished in every nook and cranny of the Islamic empire, and these were places for prayers, religious worship, and centers of knowledge and learning. The place of learning cannot be under estimated. Hadrat Umar (R.A) organized a comprehensive programme for the propagation of Islam in areas recently conquered. Outstanding scholars and teachers were hired for this purpose, some of whom received annual stipends from the state. Education during this period was not confined to spiritual evaluation and worldly gains; it also included the promotion of physical exercises like swimming, horseback riding, and archery.

Although the Umayyad period is known as the period of conquests and the consolidation of Islamic empire, formalizing the educational system, which had hitherto remained largely informal started during this period. Once the Arab empire was established, a primitive system of education, embracing at least the rudiments of knowledge came into existence.[1] Elementary education was by and large established in the early Umayyad period. Mosques, besides being places of worship, served as educational institutions. While the *maktab* was confined to the study of the Holy Qur'an, the "mosques" the academic circles to teach the specialized branches of Islamic learning like *Tafsir, Hadith, Fiqh, Nahw, Adab* etc. These early schools were known *maktaba* at the primary level and *madrasas* at the secondary.[2]

Besides the companions, Umayyads paid little attention to the development of education and advancement of learning. During the Umayyad rule, Medina, Kufa and Damascus were the greatest centres of Islamic education, which was mostly given in "mosques" by celebrated scholars. A short span of rule of Hazrat Umar Bin Abdul Aziz and the intellectual pursuits of Khalid Bin Yazid provided the only real educational

---

a number of *Huffaz* companions were martyred. About 70 *Huffaz* died in the battle against Musailimah al-Khad-dhab. It then occurred to *Hadrat* Umar R.A that necessary steps should be taken to preserve the Holy Qur'an intact in its original form against every kind of danger, and it was not wise to depend exclusively on those who had learned it by heart. Therefore, he urged *Hadrat* Abu Bakr R.A to write it down in the form of a book. Other companions also agreed with Umar's opinion, but *Hadrat* Abu Bakr hesitated in the beginning because it had not been done by the Holy Prophet. However, after some discussion, he agreed and appointed *Hadrat* Zaid bin Thabit R.A for this work. The latter was hesitant at first but later changed his mind and started on the task. *Hadrat* Zaid bin Thabit was the most qualified person for this work because he had acted as an amanuensis to the Holy Prophet, and was one of the companions who had learned the Holy Qur'an directly from Him; Sarwat Saulat, *Milla t-E-Islamia ki Mukhtasar Tareekh* (Vol. 1), Markazi Maktaba Islami Publishers, New Delhi, 2002, p. 93.

1 Muhammad Sohail, *Administrative and Cultural History of Islam*, Dogarsons Al-Karim Market, Urdu Bazar Lahore, 1992, p. 144.

2 Sayyed Nasr Hossein, *Traditional Islam in the Modern World*, Kegan Paul International, New York, 1987, p. 129.

activities during the Umayyad Caliphate.[1] The art of reading and writing, which existed to a limited extent in Arabia before Islam, increased after the advent and expansion of Islam. In the early stages after the spread of Islam, teachers in the elementary places of instruction, *kuttab*, were mainly non-Muslims, especially Christians, and Jews. Elementary education in fact, was a self-sufficient unit and there was no organic link between it and higher education. As such, a widespread system of primary education developed with *maktaba* or *kuttab* as the universal primary school in both urban and rural areas.[2] The Umayyad *khalifa* had taken interest in some branches of sciences known in foreign nations. Mu'awiya, the first caliph of the Umayyad dynasty, was fond of hearing legendary stories, and his grand son Khalid was interested in logic and alchemy. Before the end of the Umayyad rule, Muslims had begun to study history, geography, and astronomy in addition to tradition, philosophy, and theology.[3]

Science under the Umayyads

Caliph Amir Mu'awiya (602-680) was the first to appoint a Christian as chief secretary at his court; he also appointed Ibn Athal, a Christian physician, as the district magistrate of Hams. The latter translated several medical books into Arabic for the caliph. This was the start of translation work for the Muslims. Prince Khalid bin Yazid (d.704), a grandson of Caliph Amir Mu'awiya, was an expert in Islamic sciences who wanted to learn chemistry and medicine. At that time, the Jewish and Christian scholars were the only skilled persons in the discipline. However, Khalid studied chemistry with Miryanis, a Christian from Ruhban, and authored three treatises in chemistry and patronized much translation of different classical books into Arabic. This stimulated the study of science among the early Muslims, which led to the Islamic resurgence (al-Nadim et al. 1884; Ibn Khallikan 1977; Shibli 1989). This surge in Arabic learning had already begun in Egypt just after the arrival of Islam; within a short time people started to learn Arabic.

Arabic soon replaced Coptic as the *lingua franca* of Egypt. Ibn Nadim reported that, for the first time in the history of Islam, books were translated from Coptic to Arabic by the translators appointed by Prince Khalid. Astafan was the famous translator of that period. Caliph Marwan ibn Hakam (684-685) directed Maserjawayis, a Jewish physician, to translate Bishop Aaron's books on pharmacopoeia from Syriac into Arabic. This book was kept in the royal library at Damascus. Many copies were made by the

---

1 Mohd Sharief Khan, *Islamic Education*, Ashish Publishing House, New Delhi, 1986. p. 20.

2 *Kuttab* were also known as *maktaba* and were meant to teach the children the art of writing the *Qur'an* and some elementary subjects. The *Qur'an*, however became the pivot around which the elementary education revolved. John Esposito, *The Oxford Encyclopedia of the Modern Islamic World*, vol. I, Oxford University Press, 1995, p. 408.

3 Muhammad Suhail, *Administrative and Cultural History of Islam*, Dagarsons, Lahore, 1992, p. 144.

order of Caliph Umar ibn Abdul Aziz (c. 682-720). Ibn Abjar, a physician professor from Alexandria, embraced Islam at the hands of Umar ibn Abdul Aziz who, on becoming caliph, appointed him as chief medical officer in the department of health (Ibn Nadim 1884; Ibn Usaybah 1884; Ibn Juljul et al. 1955; Shibli 1989; Dunlop 1988; Iqbal 2002).

Science under the Abbasids

Allama Iqbal has summed up the Muslim contribution to science in the following verses:

Science was not brought into being by the West,

In essence it is nothing but the delight that lies in creation,

If you ponder well, it is the Muslims who gave it life;

It is a pearl that dropped from our hands. When the Arabs spread over Europe,

They laid the foundation of learning and science.

The seed was sown by these dwellers of the desert,

But the harvest was reaped by the West.

The spirit is from the flask of our ancestors.

Bring the fairy back, because, she hails from our Caucasus.

Medicine

Islamic medicine is one of the most famous facets of Islamic civilization, being one of the branches of science in which the Muslims most excelled. Not only during the Middle Ages were Muslim physicians studied seriously in the West, but even during the Renaissance and the eleventh/ seventeenth century their teachings continued to carry weight in Western medical circles. It was in fact only a century ago that the study of Islamic medicine was completely omitted from the curriculum of medical schools throughout the Occident. In the East, despite the rapid spread of Western medical education, Islamic medicine continues to be studied and practiced and is far from being merely of historical interest.

This school of medicine, which came into being early in the history of Islam, is of great significance not only for its intrinsic value but also because it has always been closely allied with the other sciences, especially with philosophy. The wise man or */: hakim,* who was the central figure in the propagation and transmission of the sciences throughout Islam's history, has usually also been a physician. The relationship between the two is in fact so close that both the sage and the physician are called */:hakim.* Many of the best-known philosophers and scientists in Islam, such as Avicenna and Averroes, were also physicians and made their living through the practice of medicine. (The same is true, incidentally, for Jewish philosophers, such as Maimonides who, besides being a great thinker, was also Saladin's physician).

This close relationship between the philosopher-sage and the physician had much influence on the position which the practitioner of medicine occupied in Islamic society and the conception that the community had of him. The physician was, in general, expected to be a man of virtuous character who combined scientific acumen with moral qualities and whose intellectual power was never divorced from deep religious faith and reliance upon God. In his *Four Discourses,* which is one of the most reliable sources for the scientific and literary activities in medieval Islam, *Nizami i- Arudi* of Samarkand, who flourished in the sixth/twelfth century, describes what was expected of the physician in the following terms:

> The physician should be of tender disposition and wise nature, excelling in acumen, this being a nimbleness of mind in forming correct views, that is to say a rapid transition to the unknown from the known. And no physician can be of tender disposition if he fails to recognize the nobility neither of the human soul; nor of wise nature unless he is acquainted with Logic. nor can he excel in acumen unless he be strengthened by God's aid; and he who is not acute in conjecture will not arrive at a correct understanding of any ailment, for he must derive his indications from the pulse, which has a systole, a diastole, and a pause intervening between these two movements. Now here there is a difference of opinion amongst physicians, one school maintaining that it is impossible by palpation to gauge the movement of contraction; but that most accomplished of the moderns, that Proof of the Truth Abu Ali al-Husayn ibn Abdu'llah ibn Sina (Avicenna), says in his book the *Qanun* that the movement of contraction also can be gauged, though with difficulty, in thin subjects. Moreover the pulse is of ten sorts, each of which is divided into three subordinate varieties, namely its two extremes and its mean; but, unless the Divine guidance assist the physician in his search for the truth, his thought will not hit the mark. So also in the inspection of the urine, the observing of its colors and sediments, and the deducing of some special condition from each color are no easy ,matters; for all these indications depend on Divine help and Royal patronage. This quality [of discernment] is that which we have indicated under the name of acumen. And unless the physician knows Logic, and understands the meaning of genus and species, he cannot discriminate between that which appertains to the category, that which is peculiar to the individual, and that which is accidental, and so will not recognize the cause [of the disease]. And, failing to recognize the cause, he cannot succeed in his treatment. But let us now give an illustration, so that it may be known that it is as we say. Disease is the genus; fever, headache, cold, delirium, measles and jaundice are the species, each of which is distinguished from the others by a diagnostic sign, and in turn itself constitutes a genus. For example, "Fever" is the genus, wherein quotidian, tertian, double tertian and quartan are the species, each of which is distinguished from the other by a special diagnostic sign. Thus, for instance, quotidian is distinguished from other fevers by the fact that the longest period thereof is a day and a night, and that in it there is no languor, heaviness, lassitude, nor pain. Again inflammatory fever is distinguished from other fevers by the fact that when it attacks it does not abate for several days; while tertian is distinguished by the fact that it comes one day and not the next; and double tertian by this, that one day it comes with a higher temperature and a shorter interval, and another day in a milder form with a longer interval; while lastly quartan is distinguished by the fact that it attacks one day,

> does not recur on the second and third days, but comes again on the fourth. Each of these in turn becomes a genus comprising several species; and if the physician be versed in Logic and possessed of acumen and knows which fever it is, what the *materies morbi* is, and whether it is simple or compound, he can then at once proceed to treat it. But if he fail to recognize the disease, then let him turn to God and seek help from Him; and so likewise, if he fail in his treatment, let him have recourse to God and seek help from Him, seeing that all issues are in His hands.[1]

The Abbasid caliphs attached great importance to medicine, and they nourished and nurtured a galaxy of brilliant scientists and scholars who made their most valuable contributions to the culture of the world. Though the Umayyad rulers encouraged medical study, real progress in Arab medicine began with the Abbasids. The first among them was Abu Bakr Muhammad b. Zakariya al-Razi (d.925 C.E), who is rated as the greatest physician of the Islamic world and one of the greatest physicians of medieval times. His celebrated work *Al Hawi* is a comprehensive encyclopedia of medicine spread over ten volumes. He was the greatest clinical and observational physician of the medieval period. He wrote *Kitab al Mansuri*, a ten-volume treatise dealing with Greek science. He was the first to know about allergies, and distinguished it from epidemic hepatitis. His book *Al Judari wal Hasbah* was a standard work on smallpox and measles. He discovered the cause of smallpox in blood ferment and suspected the origin of several diseases to lie in germs. He was the first to write a book on pediatrics, ailments specific to children. In gynecology he advocated the use of a speculum for the examination of the patients. He was also an eminent surgeon and founded a hospital at Baghdad. He lost his eyesight later in life but refused to be operated on, saying "I have seen enough of the world, and have no desire to see it further."[2]

Jurjis b. Jibrail was an eminent physician for the Abbasid caliph Mansur and was in charge of the medical center at Jundishpur in Iran. Jibril b. Bukhtishu was a prominent physician during the time of thecCaliphs Harun ur Rashid and Mamun. During the latter's time, there were as many as 860 registered physicians in Baghdad alone.

One of the famous books on medicine, *Uyun al-Anba*, written by Ibn Abi Usabiya, contains a discussion on medical sciences and also the influence of Greek and Roman medicine on Muslims. During this period, a large number of well-equipped hospitals were established called *Al bemaristan al-Ateeq*. Apart from curing sick people, the health professions were also taught in these hospitals.

Ishaq b. Imran (one of the famous doctors commonly known by people as "Sumsa") left a number of medical works, one of which was called *Nuzhat'ul Nafs*, dealing with bronchial asthma. One of his students 'Abu Yaqub Ishaq al-Israli' wrote a famous book

---

1 From Nizami i- Arudi, *Chahar Maqala,* translated by E. G. Browne (E. J. W. Gibb Memorial Series, VoL Xl, 2. London: Luzac and Co., 1921), pp. 76-77.

2 Prof. Masadul Hasan, *History of Islam,* Vol I, Adam Publishers, New Delhi, pp. 671-72.

on fever called as *Al-Himayat*. This book comprises five volumes and is still being read in the Muslim world. His other book on diet and drug therapy is *Al Aqawil Fi Tabail Gazayati wal Adwiya*. Its several copies are still present in the library of Istanbul, Paris, and Germany. He has also written a book on urine and urine analysis.

The most outstanding physician, whose writings have been of universal import, was 'Ali ibn al-Abbiis al Majusi (the Latin Haly Abbas). As his name indicates, he was of Zoroastrian descent (Majusi means "Zoroastrian"), but was himself a Muslim. Although little is known of his life, one can conclude from the dates of some of his contemporaries that he flourished during the second half of the fourth/tenth century, dying around 385/995, and that he hailed from Ahwaz near Jundishapur. Haly Abbas is best known for his *Kamill al-Sina'ah (The Perfection of the Art)* or *Kitab al-maliki (The Royal Book* or *Liber Regius),* which is one of the most well-written medical works in Arabic and remained a standard text until the works of Avicenna appeared. The *Liber Regius* is of particular interest in that in it Haly Abbas discusses the Greek and Islamic physicians who preceded him, making a frank judgment of their virtues and shortcomings. Haly Abbas has always been regarded as one of the chief authorities on Islamic medicine, and many stories have been recorded, revealing his acumen in treating various diseases. The following is a well-known example.

The author of the *Kamilu's-Sina'at* was physician to Adudu'd-Dawla in Pars, in the city of Shiraz. Now in that city there was a porter who used to carry loads of four hundred and five hundred maunds on his back. And every five or six months he would suffer from headaches and become restless, remaining so for ten days or a fortnight. One time when he was suffering and after seven or eight days, in which he had several times decided to kill himself, one day this great physician happened to pass by his house.

The porter's brothers ran to meet him, did reverence to him, and, imploring him by God Most High, told him about their brother's condition and headache. "Show him to me," said the physician. So they brought him before the physician, who saw that he was a big man, of bulky frame, wearing a pair of shoes each of which weighed a maund and a half. Then the physician felt his pulse and asked for and examined his urine. Then he said, "Bring him with me into the open country." They did so, and on their arrival there, he bade his servants take the porter's turban from his head, cast it round his neck, and twist it tight. Then he ordered another servant to take the shoes off the porter's feet and strike him twenty blows on the head, which he accordingly did. The porter's sons lamented loudly, but the physician was a man of consequence and consideration, so they could do nothing. Then the physician ordered his servant to take hold of the turban which he had twisted round his neck, to mount his horse, and to drag the porter after him round the plain. The servant did as he was bid, and made him run far afield, so that blood began to flow from his nostrils. "Now," said the physician, "let him be." So he was let alone, and there continued to flow from him blood stinking worse than carrion. The

man fell asleep in the blood that flowed from his nose, and three hundred *dirhams'* worth of blood escaped from his nostrils before the hemorrhage ceased. They then lifted him up and took him home. He never woke but slept for a day and a night, and his headache passed away and never again returned or required treatment. Then 'AQudu'd-Dawla questioned the physician as to the rationale of this treatment. "0 King," he replied, "that blood in his brain was not a matter which could be eliminated by an aperients of aloes, and there was no other method of treatment than that which I adopted."[1]

The works of Haly Abbas, as well as those of most of the other early physicians in Islam were overshadowed by those of Ibn Sina, the most influential of all Muslim physicians and philosophers who for many centuries held the title "Prince of Physicians" in the Occident and who dominates Islamic medicine to this day in the East. The name of Ibn Sina and his influence can be seen wherever and whenever the sciences have been studied and cultivated in the Muslim world, and not least of all in medicine, in which the perfection, and lucidity of his works put many previously written treatises in the shade. Like many of the other celebrated philosophers and scientists of Islam. Ibn Sina practiced medicine in order to gain a livelihood, while his love for knowledge took him to all branches of the philosophy and the sciences of his day. In many of these he became peerless, especially in Peripatetic philosophy, which reached its apogee with him. Yet this intense devotion to philosophy did not make him in any way a worse physician. On the contrary, his intellectual powers enabled him to unify and systematize all the medical theories and practices of the earlier centuries into a vast synthesis that clearly bears the imprint of his genius.

Abu Ali al Hussain bin al Sina (d.1037 C.E.), known to the West as Avicenna, was the most distinguished Muslim physician of the medieval times and was known as "The Prince of Physicians." Ibn Sina wrote a large number of medical works in Arabic, and also a few in Persian, including treatises on particular diseases, as well as poems summarizing the basic principles of medicine. His masterpiece, however, is *The Canon of Medicine,* which is certainly the most widely read and influential work of Islamic medicine. This vast opus, which was one of the books most often printed in Europe during the Renaissance, in the Latin translation of Gerard of Cremona, comprises five books: general principles, simple drugs, diseases of particular organs, local diseases that have the tendency to spread over the body, such as fever, and compound drugs. In these books, Ibn Sina summarized medical theory and practice in such a fashion that the canon became once and for all the authoritative source of Islamic medicine.

He possessed much clinical insight and is given credit for the first description of several drugs and diseases, such as meningitis, which he was the first to describe

---

[1] Nizami-i Arudi, *Chahar Maqala.* pp. 90-91.

correctly. But it is essentially his penetration and understanding of the philosophical principles of medicine, on the one hand, and his mastery of the psychological treatment of physical ailments or "psychosomatic medicine," as it is called today, on the other, that he is celebrated. He propounded the theory of "humors" of the body, and it was he who first discovered the contagious nature of tuberculosis. His masterpiece *The Canon of Medicine* is regarded as the Arab reply to the great works of Hippocrates and Galen.

Many case histories are attributed to Ibn Sina that have become part and parcel of Persian and Arabic literature and have transcended the bounds of medical science. Some of these stories have become so commonly known that they have been adopted and transformed into Gnostic tales by the Sufis, while others have entered into the folklore of the Islamic people. Islamic medicine reached its apogee with Razi and Ibn Sina, becoming incorporated into the writings of these men in the definitive form it was to take for later generations of students and practitioners. The medical student usually began his formal studies with the *Aphorisms* of Hippocrates, the *Questions* of Hunayn bin Ishaq and the *Guide* of Razi; then he passed on to the *Treasury* of Thabit ibn Qurrah, and *The Book of Al Mansur* of Razi; finally, he undertook the study of the *Sixteen Treatises* of Galen, the *Continens* and the *Canon.* The *Canon* of Avicenna thus became the final authority in the medical profession, its study and comprehension being the aim toward which the whole medical curriculum was directed. Even during later centuries, when many other important medical encyclopedias were written in both Arabic and Persian, the *Canon* continued to preserve its exalted position. Its author, along with Razi, reigned as the supreme medical authority in the West until the seventeenth century and in the East to the present day.

Abul Qasim al-Zahraawi (d. 428 A.H), known to the West as Albucasis, was among the most respected physicians and surgeons of the medieval period. He is remembered for his breakthroughs in surgery as well as for his medical encyclopedia, which was used in medical schools in Europe until the seventeenth century. He was also the inventor of many surgical instruments, some of which are still used today. He wrote *At Tasneef Liman 'Ajaza an At-Ta'leef*, a 30-volume encyclopedia and is considered the first encyclopedia on medicine and history. He was the first surgeon to perform surgical operations such as lithotomy or the removal of gall stones, tonsillectomy, and fissuring the throat to facilitate the breathing.

The contribution continued and reached its highest perfection under Abu Jafar Ibn al-Jazzar (905-984), who conducted his research in Caravan. His father and uncle were both physicians and famous medical practioners. Jazzar became famous nationally and became the court physician of Caliph Mui'z (952-971). Over 30 books are attributed to Jazzar, but most of these have been lost, he has compiled a famous medical encyclopedia called *Za'd al-Musafir wa Qut al-Hadir*. This book is divided into two parts, one containing the first four treatises and is divided into 86 chapters and discusses diseases of the head such as hair and skin ailments. He also discusses headaches, migraines,

insomnia, Cremates, facial paralysis. He also discusses eye, ear, and mouth hygieneand makes referencs about common cold, thyroid and some cardiac ailments, tonsillitis, irregular heart movements, breast cancer, and digestive problems.

Muslims endowed hospitals as a matter of religious obligation. Under Caliph Al Mamun, there were sixty hospitals in Baghdad and there were hospitals in all important cities of the empire. Adud Daula constructed a hospital at Baghdad that was the wonder of the age. It was conspicuous for its spacious buildings, sophisticated medical treatments, and distinguished specialized staff. Nur ud din Zangi constructed a hospital in Damascus. Salah ud din Ayyubi converted one of the Fatimid palaces in Cairo into a hospital. Abdul Wahid al Marrakeshi established a hospital in Marrakesh. In addition to general hospitals, institutions like mental hospitals, institutions for the blind, and institutions for special diseases were also set up.

According to Syed Amir Ali (*The Spirit of Islam*), the science of medicine and the art of surgery are the best indications of a people's genius and, as a severe test of the intellectual spirit of a faith, were developed to the highest degree by the Arabs. He observes that medicine had undoubtedly attained a high degree of excellence among the Greeks, but the Arabs perfected it and brought it close to the modern standard. The Muslims invented pharmacy and were the founders of the institutions now called dispensaries.

Prof. Hitti (*History of the Arabs*) acknowledges that the Muslims made remarkable advances in the creative use of drugs,. They established the first apothecary, founded the first school of pharmacy, and produced the first pharmacopeia.

The medical tradition, basing itself upon the works of Avicenna, Rhazes, and the other early masters, continued to flourish in Egypt and Syria, in the Maghrib and Andalusia, and in Persia and the other Eastern lands of Islam. In Egypt, where eye diseases have always been prevalent, it was ophthalmology that was especially developed, even leaving a profound impression on the West, as can be seen in such Arabic words as retina and cataract. Even in pre-Islamic days, Egyptian ophthalmologists, such as Antyllos and Demosthenes Philalethes, were well known. Intense study continued in this branch during the Islamic period as well. The first important treatise on the eye was the *Note-Book* Oculists 'Ali ibn Isa (Jesu Haly) of Baghdad, composed at the end of the fourth/tenth century, and followed shortly by the *Book of Selections on the Treatment of the Eye* by Canamusali who was the physician of the Egyptian ruler Al-Hakim. These works remained authoritative in their field in the Occident until the dioptrics of Kepler was published and continued to be consulted until the eighteenth century when the study of this branch of medicine was revived in France. The court of al-Hakim was also the scene of the activities of Alhazen, who was the greatest of the Muslim opticians and who also conducted many studies of the structure and illnesses of the eye, especially with respect to the problem of vision was concerned.

Egypt was also the center of activity of many other famous physicians, such as the fifth-/ eleventh-century Ali ibn Ridwan (the Latin "Haly Rodoam"), who wrote commentaries on the works of Galen, and carried on a series of bitter debates with Ibn Butlan, the author of *The Calendar of Health,* who had come from Baghdad to settle in Cairo. The hospitals and libraries of Cairo always drew physicians from near and far, as when, for example, two centuries later, Ibn Nafis, who was born in Damascus, finally settled in Cairo, dying there in 687/1288.

Ibn Nafis, whose importance became known only a generation ago, was the discoverer of the lesser or pulmonary circulation, which was thought until recently to have been discovered in the sixteenth century by Michael Servetus. Ibn Nafis made a critical study of the anatomical works of Galen and Avicenna, publishing it as *The Epitome of the Canon.* It became a popular work of medicine and was translated into Persian. Ibn Nafis describes the lesser circulation, which marks one of the major discoveries of Islamic medicine, as 'follows:

> When the blood has been refined in the Right Ventricle, it needs be that it pass to the Left Ventricle where the Vital Spirit is generated. But between these two there exists no passage.
>
> For the substance of the heart there is solid and there exists neither a visible passage, as some writers have thought, nor an invisible passage which will permit the flow of blood, as Galen believed. But on the contrary the pores of the heart are shut and its substance there is thick. But this blood, after being refined, must of necessity pass along the Pulmonary Artery into the lungs to spread itself out there and to mix with the air until the last drop be purified. It then passes along the Pulmonary Veins to reach the Left Ventricle of the Heart after mixing with the air in order to become fit to generate the Vital Spirit. The remainder of the blood, less refined, is used in the nutrition of the lungs. That is why there are between these two vessels (i:e., the Pulmonary Arteries and Veins) perceptible passages.[1]

Of later Egyptian physicians, one can refer to the eighth-/fourteenth-century al-Akfani and Sadaqah ibn Ibrahim al-Shiidhili, the author of the last important ophthalmological treatise to come from Egypt. Also of significance is Da'ud al-Anlaki, who died in Cairo in 1008/1599, and whose not unoriginal *Treasury* is an indication of the state of Islamic science and medicine during the sixteenth century, at the very moment when the stream of science in Europe was beginning to move in a new direction, away that in which it had flowed for so many centuries.

Islamic medicine in Spain also owes a great deal to the Zuhr or Avenzoar family, which, for two generations, produced several famous physicians, and even a woman doctor who gained some fame for her mastery in the art of healing. The most famous member of the family was Abu Marwan 'Abd al-Malik, who died in Seville around 556/1161. He left several works behind, of which the *Book of Diets* is the most

---

[1] From *The Epitome of the Canon* in Elgood, *A Medical History of Persia,* p. 336.

important. These writings mark him as the greatest Andalusian physician in the clinical aspects of medicine, second only to Rhazes in this domain.

Among Andalusian physicians, there were also several well-known medical philosophers. Ibn Tufail, the author of the philosophical novel, *Living Son of the Vigilant,* was also a competent physician, as was his successor on the philosophical scene, Averroes. This famous philosopher, whom we shall treat more fully elsewhere, was officially a physician; and composed several medical works, including a medical encyclopedia entitled *The Book of Generalities on Medicine,* along with commentaries upon the medical works of Avicenna. Averroes's career was also, in a sense, followed by Maimonides. Born in Cordova in 530/1136, he set out early in life for the East, finally settling in Egypt. By his birth and early upbringing, however, he belongs to the Spanish scene. Maimonides wrote ten medical works, all in Arabic, of which the most famous is *The Book of Aphorisms Concerning Medicine* which, like many of his other works, was also translated into Hebrew.

The Spanish physicians and scientists are also to be remembered for their special contribution to the study of plants and their medical properties. It is true that important works on drugs had been composed in the East – such as the fourth-/ tenth-century *Foundations of the True Properties of Remedies* by Abu Mansur al-Muwaffaq, which is the first prose work in modern Persian, or the pharmacological works of Mesue Junior. But it was the Spanish and Maghribi scientists who made the greatest contributions in this field between medicine and botany. The commentary of Ibn Juljul on Dioscorides was followed in the sixth/twelfth century by the *Book of Simple Drugs* of the Tunisian physician, Abu'l Salt. He in turn was followed a few years later by al-Ghafiqi, the most original of the Muslim pharmacologists, who in his above-cited work, also entitled *Book of Simple Drugs*, gave the best description of plants to be found among Muslim authors.

The work of al-Ghafiqi, as already mentioned, was completed a century later by another Andalusian, Ibn al-Baitar who was born in Malaga and died in Damascus in 646/ 1248.

The greatest of the Muslim botanists and pharmacologists, several of his works have survived, including *The Complete Book of Simple Drugs* and *The Sufficient Book of Simple Drugs,* in which all that was known to the pharmacologists, as well as three hundred drugs not previously described, was recorded alphabetically and discussed in detail. These works, among the most important fruits of Islamic science in the field of natural history, became the source for much of the later writing in this field in the East. In the West, however, they had little influence, since they came at a time when most of the translations from Arabic into Latin had already taken place and the intellectual contact, which had become established between Christianity and Islam during the fifth/ eleventh and sixth/ twelfth centuries was coming to an end. As far as Islamic science itself is concerned, Ibn al-Baitar represents the last important figure of a long line of

great Spanish botanists and pharmacologists who, from that land of beautiful gardens and diverse flora, dominated this branch of learning, a part of natural history and botany, as well as of medicine.

Conclusion

While concluding that it can be said that science and medicine reached its zenith during the Abbasid period. Bertrand Russell remarks:

> Arabic philosophy is not important as original thought. Men like Avicenna and Averroes are essentially commentators. Speaking generally, the views of more scientific philosophers come from Aristotle and the Neoplatonists in logic and metaphysics, from Galen in medicine, from Greek and Indian sources in mathematics and astronomy, and among mystics religious philosophy has also an admixture of old Persian beliefs. Writers in Arabic showed some originality in mathematics and in chemistry---in the latter case, as an intellectual result of alchemical researches. Mohammedan civilization in its great days was admirable in the arts and in many technical ways, but it showed no capacity for independent speculation in theoretical matters. Its importance, which must not be underrated, is as a transmitter. Between ancient and modern European civilization, the dark ages intervened. The Mohammedans and the Byzantines, while lacking the intellectual energy required for innovation, preserved the apparatus of civilization---- education, books, and learned leisure. Both stimulated the West when it emerged from barbarism---the Mohammedan chiefly in thirteenth century, the Byzantines chiefly in the fifteenth. In each case the stimulus produced new thought better than any produced by the transmitters-----in the one case scholasticism, in the other the Renaissance (which however had other causes also).