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# Reassessing The Scientific Literature Of The Abbasid Period, Its Culture, Philosophy And Intellectual Achievements

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**Abstract**

The Abbasid period refers to a significant era in Islamic history that lasted from 750 to 1258 CE. It marked the time when the Abbasid dynasty, descended from Abbas, the uncle of Prophet Muhammad, held power as the rulers of the Islamic Caliphate. The Abbasid Caliphate succeeded the Umayyad Caliphate and is often remembered for its cultural, scientific, and intellectual achievements. The Abbasids established their capital in Baghdad, which quickly became a center of political, economic, and cultural activity. The city's location along trade routes contributed to its growth and prosperity. The Abbasid period is often referred to as the "Golden Age" of Islam due to the flourishing of arts, sciences, philosophy, and literature during this time. Scholars from various parts of the world were drawn to Baghdad's House of Wisdom (Bayt al-Hikmah), where they engaged in translating, preserving, and advancing knowledge from various civilizations.

## Introduction

One of the defining features of the Abbasid period was the translation movement. Scholars translated classical Greek, Roman, Persian, Indian, and other ancient texts into Arabic, which facilitated the spread of knowledge and contributed to intellectual advancements.

The Abbasid Caliphate played a crucial role in preserving and advancing knowledge in fields such as mathematics, astronomy, medicine, optics, philosophy, and more. Scholars like Al-Khwarizmi, Al-Razi, Ibn al-Haytham, and Al-Farabi made significant contributions to these disciplines.

Cultural Exchange: Baghdad's diverse population facilitated cultural exchange between various ethnic, religious, and linguistic groups. This exchange of ideas and traditions contributed to the enrichment of the Islamic civilization.

Trade and Economic Growth: The Abbasid Caliphate benefited from extensive trade networks that spanned across the Islamic world, connecting regions as far as China and Europe. This economic prosperity supported cultural and intellectual endeavours.

Decline and Fragmentation: Over time, the Abbasid Caliphate began to face internal strife, external invasions, and challenges to its authority. The empire eventually fragmented into smaller states, known as the "Muslim successor states," each with its own ruler and level of power.

Mongol Invasion: The Abbasid Caliphate met its end in 1258 when the city of Baghdad was captured and devastated by the Mongols under the leadership of Hulagu Khan. The last Abbasid caliph, Al-Musta'sim, was killed, and the caliphate officially ended.

The Abbasid period left a lasting impact on Islamic civilization and contributed to the preservation and dissemination of knowledge from various cultures. The advancements made during this era laid the foundation for later developments in science, philosophy, and other fields, influencing both the Islamic world and the broader global community.

**Philosophy**

Insofar as it is possible to determine them by human faculties, philosophy (falsafah) was knowledge of the true cause of things as they actually are to the Arabs. Their philosophy was essentially Greek, modified by the ideas of the conquered peoples and other Eastern influences, adjusted to Islam's mental preferences, and expressed through the language of Arabic. Arabs who were Muslims held the Koran and Islamic theology to be the ultimate expression of religious doctrine. Therefore, their original contribution was made at the intersection of philosophy and religion and philosophy and medicine.

Abu-Yusuf Ya'qub al-Kindi, who likely was born in Kufa around 801 and flourished in Baghdad before passing away in or around 873, was the first independent philosopher to publish a work. Being of pure Arabian ancestry, he was known as "the philosopher of the Arabs". Al-Kindi endeavoured in a Neo-Platonic fashion to combine the views of Plato and Aristotle. He wrote 265 works on different branches of knowledge: philosophy, medicine, astronomy, and mathematics The harmonization of Greek philosophy with Islam begun by al-Kindi, an Arab, was continued by al-Farabi, a Turk, and completed in the East by ibn-Sina, a Persian.

The leading philosopher of the 4th/10th century was Abu Nasr al-Farabi (Alpharabius) (d. 339/950 – 1). He especially acquired fame with his commentaries on the logical works of Aristotle. His system of philosophy, as revealed by his several treatises on Plato and Aristotle, was a syncretism of Platonism, Aristotelianism and Sufism and won him the enviable title of “the second teacher” (al-mu‘allim al-thani), the first teacher being Aristotle himself. Besides a number of commentaries on Aristotle and other Greek philosophers, al-Farabi composed various psychological, political and metaphysical works, of which the best-known are the Risalat Fusus al-Hikam (epistle containing bezels of wisdom) and the Risalah fi Ara Ahl al-Madinah al-Fadilah (epistle regarding the opinions of the people of the superior city). In the latter and in his al-Siyasah al-Madaniyah (political regime), al-Farabi, inspired by Plato’s Republic and Aristotle’s Politics, presents his conception of a model city, which he conceives as a hierarchical organism analogous to the human body.

All his predecessors were thrown into insignificance by an author who lived a century after al-Farabi Abu Ali ibn Sina (d.1037), well known in Western literature by the name Avicenna, called by the Arabs al-shaykh al-ra'is. Among his scientific works the leading two are the Kitab al-Shifa (book of healing), a philosophical encyclopaedia based upon the Aristotelian tradition as modified by Neo-Platonic influences and Moslem theology, and Al-Qanun fi al-Tibb (Canon of Medicine), which represents the final codification of Greco-Arabic medical thought. This Canon, with its encyclopaedic contents, its systematic arrangement and philosophic plan, soon worked its way into a position of pre-eminence in the medical literature of the age, displacing the works of Galen, al-Razi and al-Majusi and becoming the text-book for medical education in the schools of Europe. He contributed the most important works in Arabic on the theory of music.

Ibn Sina was indebted to al-Farabi in his philosophical views. It was Ibn Sina, however, who placed the sum-total of Greek wisdom codified by his own ingenuity, at the disposal of the educated Muslim world in an intelligible form. Through him the Greek system, particularly that of Philo, was rendered capable of incorporation with Islam.

**Physics**

Muslim scientists have named physics as Ilm- al-tabiya. Abu Yusuf Yaqub Al-Kindi (died: 871 AD) is the first physicist, who has discussed various branches and topics of physics in about forty-four books and magazines on optical physics. He studied the waves and discovered the laws and principles that determine the speed of falling bodies and presented his research on the speed of light. Kundi's important work about optics is Ilm al-

Basr. He has presented important researches on geometrical and physiological visuals. He is considered the inventor of visual science.
Abu Bakr Razi is also counted among the experts in physics. Although he is best known as a physician. Razi investigated the mutual attraction of various objects and the gravitation of the earth and in his book "Sabab wa quwwat al-Arz fi al-Samaa" proposed the theory that the earth is suspended in the atmosphere due to its mutual gravitation.

Abu Nasr Farabi was an expert in various sciences and arts. He has divided knowledge into five chapters and separate branches under each chapter in his book Ihsa al-Uloom. Optics is associated with mathematics in this division and eight branches of physics are identified. Among the magazines of Ikhwan al-Safa, seventy verses have been discussed on the subject of matter, understanding, scenes and elements and non-physics. In them, the nature of matter, the composition of matter, the composition of elements, the occurrence of earthquakes, the fall of the sun and the falling sisters of the moon, and the scientific causes of various natural phenomena are described.

According to some scholars, the famous philosopher and physician Ibn Sina was more of a physicist than a philosopher. He has presented basic research on all topics of physics such as motion, force, space, light, heat, and weight. Al-Biruni was also a physicist. It is his research that the speed of light is more than the speed of sound. He has explained the scientific aspects regarding the water pressure and smoothness of the surface.

**Medicine**

Arab medicine started with the translation and study of the great Greek physicians. Its independent development was due to the wide range of experience acquired in the public hospitals which, on the model of the Sasanid academy of Jundishapur, were established as early as the 3rd/9th century of the Abbasids through their vast empire. This translation and the concomitant explanatory activity, together with the hospital practice, very early gave rise to an extensive independent literature. Owing to the widely spread contagious eye-disease, chiefly the trachoma, ophthalmology was the first and ever remained the foremost of the medical sciences.

The oldest systematic treatise on this branch was the Daghal al-Ayn (The Disorder of the Eye) by the Syrian Christian physician to Harun al-Rashid's successors, Yuhanna ibn Musawayh (d. 243/857).

The earliest textbook of ophthalmology known was Ashr Maqalalat fil Ayn (Ten Treatises on Eye), ascribed to his pupil Hunayn ibn Ishaq.

His contemporary, Ali ibn Sahl Rabban al-Tabari (flourished in the 3rd/9th century), an Iranian Christian who turned Muslim and became the physician of the Caliph al-Mutawakkil, wrote in 236/850 – 1 his Firdaus al-Hikma (Paradise of Wisdom), one of the oldest compendiums of Medicine, which, based on Greek and Indian sources, also treats of astronomy and philosophy.

Their contemporary Thabit ibn Qurra wrote the first known collection of "pandects" i.e., recapitulation of the whole of medicine, which, divided into 31 volumes, treats of hygiene and all the known diseases.

However, as early as the 4th/10th century these compilations of antique sources gave way to inspiring encyclopaedic works comprising, among other things, the results of modern research.

The first and, doubtless, the greatest figure of this new school in the East and, indeed one of the greatest physicians of Islam and of all times was Abu Bakr Muhammad ibn Zakariyya al-Razi of Baghdad, in Europe Rhazes (d. 313/925 – 6), a Persian born Muslim. Practicing alchemy in his youth, he turned entirely to medicine. He practiced as director of hospitals of his native country of Khurasan and later at Baghdad. As a practitioner he acquired such a great fame that he was invited even to princely courts as physician-in-ordinary. He is credited with the invention of the seton in surgery. In his celebrated works, numbering over 100, half of his entire literary activity, he treated anatomy and separative diseases, the most famous of his smaller writings dealing with smallpox and measles (al-Judari wal Hasba). However, the most lasting effect was due to his masterwork Kitab al-Hawi (The Comprehensive Book), a systematic thirty-part encyclopaedia of the whole

domain of medicine and chirurgy, including all Greek, Syriac and earlier Arab medical knowledge. His second great work was Al-Tibb al-Mansuri (Mansuric Medicine) dedicated to the Samanid prince Mansur ibn Ishaq.

Al-Razi had several prominent contemporaries. The Persian Ali ibn al-Abbas (d. 384/994 – 5), known to Europe as Haly Abbas, wrote his Kamil al-Sina'a al-Tibbiyya (Treasures of Medical Practice), also Called Al-Kitab al-Maliki (The Royal Book) known as Liber Regius in Europe, mainly on dietetics and the materia medica, a work more concise than al-Razi's al-Hawi.

The most illustrious name in Arabic medical annals after al-Razi's is that of ibn-Sina (Latin Avicenna, through Heb. Aven Sina, 980-1037), called by the Arabs al-shaykh al-ra'is. Among his scientific works the leading two are the Kitab al-Shifa (book of healing), a philosophical encyclopedia based upon the Aristotelian tradition as modified by Neo-Platonic influences and Moslem theology, and Al-Qanun fi al-Tibb (Canon of Medicine), which represents the final codification of Greco-Arabic medical thought. This Canon, with its encyclopedic contents, its systematic arrangement and philosophic plan, soon worked its way into a position of pre-eminence in the medical literature of the age, displacing the works of Galen, al-Razi and al-Majusi and becoming the textbook for medical education in the schools of Europe. In the last thirty years of the fifteenth century, it passed through fifteen Latin editions and one Hebrew. Its materia medica considers some seven hundred and sixty drugs. From the twelfth to the seventeenth centuries this work served as the chief guide to medical science in the West and it is still in occasional use in the Muslim East.

**Mathematics**

Mathematics in this period included astrology and astrology along with arithmetic, as these sciences depended largely on mathematics. Muslims have introduced the world to the numbers used in calculations. That is why Europeans call them (Arabic Numbers).

Ahmad Abdullah Habash Hasib (died 829 AD) was an expert in mathematics and geometry. He compiled a map based on trigonometry and invented the method of co-tangent in six angles. Abbas bin Saeed was an expert in nuclear mathematics and science. Among his books on mathematics is Kitab al-Ashqal. Abul Tayyib Sind bin Ali (died: 839 AD) was also a famous mathematician. He has several books on Mathematics and Numerology. Among them, Kitab al-Hasab al-Hindi, Kitab al-Jama' wa al-Tafirq, Kitab al-Quwat'a and Kitab al-Jabr wal-Muqaba are very important. The most important achievement in mathematics is that of Hamad bin Musa al-Khwarizmi (died 850 AD). At the request of Caliph Mamun Rashid, Al-Khwarizmi wrote a book called Ilm al-Hisaab, in which he explained the principles and rules of calculation. Al-Khwarizmi presented Algebra as a consistent mathematics in his second work, Kitab Al-Mukhtasar Min Hasab al-Jabr wal-Muqabah, due to which he is considered the founder of Algebra.

**Astronomy**

The scientific study of astronomy in Islam was begun under the influence of an Indian work, the Siddhanta (Ar. Sindhind), brought to Baghdad (771), translated by Muhammad ibn Ibrahim al-Fazari and used as a model by later scholars. Early in the ninth century the first regular observations with fairly accurate instruments were made in Jundishapur (south-west Persia). In connection with his Bayt al-Hikmah, al-Ma'mun erected at Baghdad near the Shammasiya gate an astronomical observatory under the directorship of a converted Jew, Sind ibn-Ali, and Yahya ibn Abi Mansur. Al-Ma'mun's astronomers performed one of the most delicate geodetic operations — the measuring of the length of a terrestrial degree. The object was to determine the size of the earth and its circumference on the assumption that the earth was round. Among the eminent astronomers of the period was Abul Abbas Abmad al-Farghani (Alfraganus), whose principal work, al-Mudkhi ila Ilm Hay'at al-Aflak.

**Al-Battani**

Between 877 and 918 Abu Abdillah Muhammad ibn Jabir al-Battani (Albategnius), unquestionably the greatest astronomer of his nationality and time and one of the greatest in Islam, made his observations and studies in al-Raqqa. Al-Battani was an original research worker. He made several emendations to Ptolemy and rectified

the calculations for the orbits of the moon and certain planets. He proved the possibility of annular eclipses of the sun and determined with greater accuracy the obliquity of the ecliptic and presented original theories on the determination of the visibility of the new moon.

**Al-Biruni**

At Ghazna in eastern Afghanistan lived Abu al-Rayhan Muhammad ibn Ahmad al-Biruni (973-1048). He was considered the most original and profound thinker that Islam has produced in the domain of the physical and mathematical sciences. He produced in 1030, an account of the whole science of astronomy entitled al-Qanun al-Mas‘udi fi al-Hay'ah wa al-Nujum. Al-Tafhim li Awa'il Sina'at al-Tanjim, a concise catechism of geometry, algebra, astronomy, and astrology, was written by him in the same year. Al-'Athar al-Baqiya 'an al-Qurun al-Khaliya, his first publication, focused primarily on the calendars and eras of ancient peoples. These works by al-Biruni make precise determinations of latitudes and longitudes and intelligently discuss the then-controversial theory of the earth's rotation on its axis.

**Umar al-Khayyam**

Of the Saljuq sultans, Jalal al-Din Malikshah patronized astronomical studies. He established in 467/1074 – 5 at al-Rayy or at Naysabur an observatory where there was introduced into the civil calendar an important reform based on an accurate determination of the length of the tropical year. He invited the renowned 'Umar al-Khayyam to his new observatory for this task of reforming the outdated Persian calendar. The calendar named after his patron al-Tarikh al-Jalali, which was created as a result of al-Khayyum and his associates' research, is even more precise than the Gregorian calendar. The former causes an error of one day every 3330 years, whereas al-Khayyam's causes an error of one day every 5000 years or so, it appears.

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