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IBN SINA: PHILOSOPHER AND SCIENTIST OF ISLAM

(Ibn Sina: Ahli Falsafah dan Saintis Islam)

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ABSTRACT

Ibn Sina is one of the greatest scholars in world history. He was a brilliant philosopher who synthesized Islamic theology with Aristotelian thought. His most famous philosophical work is 'The Book of Healing', a vast encyclopedia that covers logic, physics, mathematics, and metaphysics. He also wrote extensively on Ethics, Psychology, and Metaphysics. His work had a profound influence on the development of Western thought. His ideas were studied by philosophers and scientists for centuries. And he is also known as Ibn Sina in the West, and he has developed many science fields, such as Medicine, Astronomy, Mathematics, Philosophy and psychology and classified hundreds of books in different sciences. His most famous scientific work is The Canon of Medicine, a medical encyclopedia that remained a standard medical text in both the Islamic world and Europe for centuries. The Canon covers a wide range of topics, including anatomy, physiology, pathology, pharmacology and surgery. The methodology of this study adopts a qualitative and historical approach to explore the life, contributions and intellectual legacy of Ibn Sina as a philosopher and scientist. The research involves a comprehensive textual analysis of Ibn Sina's major works, including The Book of Healing and The Canon of Medicine, focusing on his contributions to logic, metaphysics, ethics, psychology and medicine. A comparative study is conducted to examine how Ibn Sina synthesized and expanded upon the works of predecessors such as Aristotle, al-Kindi and al-Farabi, highlighting his unique integration of Islamic theology with Greek philosophy. The study also contextualizes Ibn Sina's work within the socio-political and cultural framework of the Islamic Golden Age, exploring the influence of the Samanid Empire and the religious and political dynamics of his time.

Keywords: Polymath; Aristotelianism; Canon of medicine

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ABSTRAK

Ibn Sina adalah salah seorang sarjana terbesar dalam sejarah dunia. Beliau adalah seorang ahli falsafah yang cemerlang yang menggabungkan teologi Islam dengan pemikiran Aristotelian. Karya falsafahnya yang paling terkenal adalah 'Kitab Penyembuhan', sebuah ensiklopedia yang luas yang merangkumi logik, fizik, matematik dan metafizik. Beliau juga menulis dengan mendalam tentang Etika, Psikologi, dan Metafizik. Karyanya mempunyai pengaruh yang mendalam terhadap perkembangan pemikiran Barat. Idea-idea beliau telah dikaji oleh ahli falsafah dan saintis selama berabad-abad. Beliau juga dikenali sebagai Ibn Sina di Barat, dan beliau telah membangunkan banyak bidang sains, seperti Perubatan, Astronomi, Matematik, Falsafah dan Psikologi, serta mengklasifikasikan ratusan buku dalam pelbagai bidang sains. Karya sains beliau yang paling terkenal adalah 'Canon of Medicine', sebuah ensiklopedia perubatan yang kekal menjadi teks perubatan standard di dunia Islam dan Eropah selama berabad-abad. Canon merangkumi pelbagai topik, termasuk anatomi, fisiologi, patologi, farmakologi dan pembedahan. Metodologi kajian ini menggunakan pendekatan kualitatif dan sejarah untuk meneroka kehidupan, sumbangan dan warisan intelektual Ibn Sina sebagai ahli falsafah dan saintis. Penyelidikan ini melibatkan analisis teks yang komprehensif terhadap karya utama Ibn Sina, termasuk Kitab Penyembuhan dan Canon of Medicine, dengan tumpuan kepada sumbangannya dalam logik, metafizik, etika, psikologi dan perubatan. Kajian perbandingan dijalankan untuk mengkaji bagaimana Ibn Sina menggabungkan dan mengembangkan karya-karya pendahulu seperti Aristotel, al-Kindi dan al-Farabi, dengan menonjolkan integrasi unik beliau antara teologi Islam dan falsafah Yunani. Kajian ini juga meletakkan karya Ibn Sina dalam konteks rangka kerja sosio-politik dan budaya Zaman Keemasan Islam, meneroka pengaruh Empayar Samanid dan dinamik agama serta politik pada zamannya.

Kata kunci: *Polimatik; Aristotelianisme; Kanun perubatan*

INTRODUCTION

This article reviews Ibn Sina, the Philosopher and Scientist of Islam. Abū-ʿAlī al-Ḥusayn ibn-ʿAbdallāh Ibn-Sīnā (ca. 970-1037) was the preeminent philosopher and physician of the Islamic world. In his work he combined the disparate strands of philosophical/scientific[1] thinking in Greek late antiquity and early Islam into a rationally rigorous and self-consistent scientific system that encompassed and explained all reality, including the tenets of revealed religion and its theological and mystical elaborations. In its integral and comprehensive articulation of science and philosophy, it represents the culmination of the Hellenic tradition, defunct in Greek after the sixth century. It dominated intellectual life in the Islamic world for centuries to come, and the sundry

reactions to it, ranging from acceptance to revision to refutation and to substitution with Para philosophical constructs, determined developments in philosophy, science, religion, theology, and mysticism. In Latin translation, beginning with the 12th century, Ibn Sina's philosophy influenced mightily the medieval and Renaissance philosophers and scholars, just as the Latin translation of his medical Canon, often revised and formed the basis of medical instruction in European universities until the 17th century.

Arabophone Jewish[2] and Christian scholars within Islam, to the extent that they were writing for their respective communities and not as members of the Islamic commonwealth, accepted most of his ideas (notably Maimonides in his Arabic Guide of the Perplexed and Bar Hebraeus[3] in his Syriac Cream of Wisdom). The Jewish communities in Europe used Hebrew translations of some of his works, though they were far less receptive than their Roman Catholic counterparts, preferring Averroes instead. The Roman Orthodox in Constantinople were quite indifferent to philosophical developments abroad (and inimical to those at home) and came to know Ibn Sina's name only through its occurrence in the Greek translations of the Latin scholastics that began after the 4th Crusade. In his influence on the intellectual history of the world in the West (of India), he is second only to Aristotle, as it was intuitively acknowledged in the Islamic world where he is called "The Preeminent Master" (al-shaykh al-raʾīs), after Aristotle, whom Ibn Sina called "The First Teacher" (al-muʿallim al-awwal).

LITERATURE REVIEW

Ibn Sina remains a towering figure in the history of philosophy and science, whose intellectual legacy bridges the worlds of Greek, Islamic, and medieval European thought. His philosophical system, most notably outlined in the Kitab al-Shifa, integrates Aristotelianism, Neoplatonism, and Islamic theology, creating a profound synthesis that influenced generations of thinkers. Scholar like Dimitri Gutas[4] have emphasized Ibn Sina's exploration of existence, particularly his theory of the Necessary Existent (Wajib al-Wujud), which echoes Islamic views of God as the ultimate self-sustaining reality. His metaphysical contributions shaped the development of Islamic philosophy and deeply influenced later thinkers, including al-Ghazali and Mulla Sadra. In medicine, Ibn Sina's Canon of Medicine became the authoritative text in both the Islamic world and medieval Europe, thanks to its systematization of medical knowledge, from anatomy to pharmacology, and its empirical approach to clinical practice. His pioneering work in introducing quarantine practices during epidemics further solidified his reputation as a forward-thinking physician.

Beyond philosophy and medicine, Ibn Sina's contributions to natural sciences, particularly in optics and astronomy, were groundbreaking. His work on light and vision was later influential to European scientists like Roger Bacon[5] and Johannes

Kepler[6]. Though he did not advance observational astronomy, his theoretical insights into planetary motion and his commentary on Ptolemy's Almagest shaped the trajectory of Islamic astronomical thought. Ibn Sina's influence extended beyond the Islamic world, especially through the Latin translations of his works during the 12th century, which played a pivotal role in transmitting classical Greek and Islamic knowledge to Europe.

METHODOLOGY

Methodology of this study adopts a qualitative and historical approach to explore the life, contributions, and intellectual legacy of Ibn Sina as a philosopher and scientist. The research involves a comprehensive textual analysis of Ibn Sina's major works, including The Book of Healing and The Canon of Medicine, focusing on his contributions to logic, metaphysics, ethics, psychology, and medicine. A comparative study is conducted to examine how Ibn Sina synthesized and expanded upon the works of predecessors such as Aristotle, al-Kindi, and al-Farabi, highlighting his unique integration of Islamic theology with Greek philosophy. The study also contextualizes Ibn Sina's work within the socio-political and cultural framework of the Islamic Golden Age, exploring the influence of the Samanid Empire and the religious and political dynamics of his time. An interdisciplinary approach is adopted, drawing from philosophy, science, medicine, and history to provide a holistic view of his impact. Additionally, the research investigates the reception of Ibn Sina's works in both the Islamic world and medieval Europe, with a focus on the Latin translations in the 12th century and their influence on Western scholars. Finally, a critical analysis of Ibn Sina's enduring significance in modern philosophy and science is conducted to assess his legacy in contemporary intellectual discourse.

Life and education

Ibn Sina was born in the 10th century in the village of Afshana, which like much of Central Asia at the time was ruled by the Samanid Empire, a Sunni Muslim state of Iranian origin. The period was marked by the breakdown in the Baghdad-based Abbasid Caliphate's central authority and the rise of independent Muslim entities. Despite this relative political instability, the intellectually friendly atmosphere that the Abbasids had fostered in the Islamic world endured, with scholarship heavily entwined with the study of religion. It was in this context that Ibn Sina was raised by a father who had adopted the Ismaili branch of Shia Islam. While the young Ibn Sina did not follow in his father's religious footsteps, choosing the Hanafi school of Sunni Islam, it is likely that debates with the Ismailis were formative in his intellectual development, both religious and secular. Speaking of his interactions with the Ismailis in his autobiography, Ibn Sina writes: "I would listen to them and comprehend what

they were saying but my soul would not accept it... and they began to summon me to it with constant talk on their tongues about philosophy, geometry, and Indian arithmetic." Typical of other Islamic intellectuals of the period, Ibn Sina's education was a mix of religious and secular subjects, such as mathematics, medicine and philosophy.

By the age of 10 he had memorized the Quran and by his mid-teens he had earned a reputation as a physician. A devout Muslim, the young Ibn Sina dedicated a significant amount of time to the study of Islamic texts and Greek philosophy, seeking to marry the two by proving the existence of God using logic and reason, rather than blind faith. By the age of 32, the scholar was appointed vizier of the Buyid state after treating its emir, Shams al-Dawla. Once the monarch died, Ibn Sina declined an offer made by his son and successor to continue in the role.

Legacy in Islamic Philosophy

Islamic philosophy is related to but distinct from the theological doctrines and movements in Islam. al-Kindi for instance, one of the first Islamic philosophers, flourished in a milieu in which the dialectic theology *(kalām)* of the *Muʿtazilah* movement spurred much of the interest and investment in the study of Greek philosophy, but he himself was not a participant in the theological debates of the time. al-Rāzī, meanwhile, was influenced by contemporary theological debates on atomism in his work on the composition of matter. Christians and Jews also participated in the philosophical movements of the Islamic world and schools of thought were divided by philosophic rather than religious doctrine. Ibn Sina stands as one of the most towering figures in the history of Islamic philosophy, with an intellectual legacy that stretches far beyond his time. His influence permeates not only the Islamic intellectual tradition but also Western philosophy, particularly during the medieval period. His works in multiple disciplines, including metaphysics, logic, ethics, epistemology, medicine and the natural sciences, solidified his status as a polymath whose ideas continue to resonate today. Here's an expanded exploration of his lasting impact.

Other influential thinkers include the Persians al-Farabi and Ibn Sina, as well as the Spaniard Averroës (Ibn Rushd), whose interpretations of Aristotle were taken up by both Jewish and Christian thinkers. When the Arabs dominated Andalusian Spain, the Arabic philosophic literature was translated into Hebrew and Latin. In Egypt around the same time, the philosophic tradition was developed by Moses Maimonides and Ibn Khaldūn. The prominence of classical Islamic philosophy declined in the 12th and 13th centuries in favour of mysticism, as articulated by thinkers such as al-Ghazālī and Ibn al-ʿArabī, and traditionalism, as promulgated by Ibn Taymiyyah. Nonetheless, Islamic philosophy, which reintroduced Aristotelianism to the Latin West, remained influential in the development of medieval Scholasticism and of modern European

philosophy.

Metaphysics and the Concept of Existence

Ibn Sina's contributions to metaphysics are foundational to both Islamic and Western philosophical thought. His detailed treatment of the nature of existence, *wujud* (existence), and mahiyya (essence) has profoundly shaped the way later thinkers in the Islamic world, and beyond, approached metaphysical questions. Ibn Sina posited that *wujud* is the most fundamental reality, distinct from mahiyya, which refers to the essence or the "whatness" of a thing. For Ibn Sina, understanding the difference between existence and essence was key to understanding the nature of the universe. One of his most important metaphysical ideas is the distinction between the Necessary Existent *(wajib al-wujud)* and contingent beings *(mumkin al-wujud)*. The Necessary Existent is the being whose existence is necessary and independent of anything else, and Ibn Sina identified this with God. All other beings, by contrast, are contingent they depend on something else for their existence. This hierarchical view of existence has deeply influenced later Islamic philosophers, particularly in their discussions of cosmology and theology.

The Nature of God and the First Cause of Ibn Sina's understanding of God as the First Cause is central to his metaphysical system. In his work Kitab al-Shifa (The Book of Healing), he argues that everything in the universe arises from a chain of causality that ultimately traces back to the Necessary Existent, which he identifies as God. This cosmological argument is a sophisticated synthesis of Aristotelian causality and Islamic monotheism. Unlike Aristotle's Prime Mover, which is impersonal and detached, Ibn Sina's Necessary Existent is a purposeful, unified being who is the source of all creation. Ibn Sina's emphasis on God's simplicity, immateriality, and eternality, combined with the concept of causality, has shaped Islamic views on the nature of divine attributes. His work on God's essence and the relationship between God and the universe influenced later Islamic theologians like al-Ghazali, and it also made its way into medieval Christian and Jewish thought, especially through the works of figures like Thomas Aquinas and Maimonides.

In terms of epistemology, Ibn Sina was a rationalist who emphasized the central role of the intellect *(aql)* in acquiring knowledge. However, he also argued that divine revelation, as provided through religious teachings such as the Quran, complemented human reason by offering truths beyond the grasp of human intellect. This synthesis of reason and faith represents one of the defining aspects of his philosophy. His epistemological framework asserts that human beings have innate intellectual capacities that allow them to discern abstract truths, particularly in metaphysical and moral matters. He also emphasizes that knowledge is gained not only through sensory

experience (*hiss*) but also through intellectual abstraction. He distinguished between different types of knowledge empirical knowledge, which arises from sensory experience and intellectual knowledge, which comes from reason and reflection on universal principles.

Ethics: The Role of Philosophy in Moral Perfection In ethics, Ibn Sina believed that the ultimate purpose of human life is to attain intellectual and moral perfection. He drew heavily from Aristotelian ethics, especially in his concept of the rational soul, which he saw as the highest part of human nature. He argued that through the cultivation of virtues such as wisdom, courage, and temperance individuals could purify their souls and approach a state of harmony with the Necessary Existent. For Ibn Sina, the philosopher had an essential role in guiding individuals toward ethical excellence. He viewed philosophy not only as a tool for gaining knowledge but also as a means to achieve moral perfection. In this sense, the philosopher's role extended beyond mere intellectual pursuit; it involved helping others understand the ethical principles that lead to spiritual fulfillment.

Influence on Islamic and Western Philosophy

Ibn Sina's synthesis of Aristotelian logic and Neoplatonic metaphysics with Islamic theology had a profound impact on subsequent Islamic philosophers, such as al-Farabi, al-Ghazali and Mulla Sadra. His work also shaped the development of Islamic schools of thought, particularly the Peripatetic school, which continued to engage with Aristotelian philosophy in light of Islamic teachings and his influence was not limited to the Islamic world. His ideas were transmitted to Europe, particularly through the Latin translations of his works in the 12th century. His writings, especially The Book of Healing and The Canon of Medicine, were studied by Christian scholars such as Thomas Aquinas and influenced the development of medieval Scholasticism. Aquinas, for example, drew heavily from Ibn Sina's ideas on causality, the nature of God, and the relationship between reason and faith.

In addition to philosophy, Ibn Sina's medical and scientific works were groundbreaking. His Canon of Medicine became a standard medical text in both the Islamic world and Europe for centuries. Ibn Sina made significant advancements in fields such as pharmacology, anatomy, and psychology. His views on mental health, including the connection between mental and physical well-being, foreshadowed modern psychological theories. He also made contributions to the natural sciences, such as his theories on motion, light, and celestial phenomena. Ibn Sina: The Persian polymath Ibn Sina was an 11th century Persian philosopher, physician, pharmacologist, scientist and poet, who exerted a profound impact on philosophy and medicine in Europe and the Islamic world.

Canon of Medicine, first translated from Arabic into Latin during the 12th century, was the most important medical reference book in the West until the 17th century, introducing technical medical terminology used for centuries afterwards. He also described the anatomy of body parts, such as the eye and the heart. A skilled botanist, he also mentions the effect plants and roots had on the human body. A key medical contribution was his work on the effect of quarantines on limiting the spread of illness, arguing that a 40-day period of self-isolation was essential in order to stop infections from affecting others. Outside of medicine, his important works included The Book of Healing, which was split into four sections and covered an array of subjects, such as mathematics, metaphysics, natural sciences and logic.

His scientific works included arguments that light had a specific speed, descriptions of how sound travelled through air, a theory on motion and psychological works on the relationship between mind, body and the ability to perceive. In a form of pre-modern psychiatry, the physician also described how mental ailments, such as depression and anxiety, had an impact on the body. Others fields of interest included natural phenomena, such as earthquakes and cloud formation. With regard to the former, the polymath said tremors were a result of the movement of land and activity underneath the Earth. As an astronomer, Ibn Sina observed the planet Venus against the disc of the sun and was able to conclude that the planet was closer to the Earth than to the sun. He also found that the SN 1006 supernova, which was observable for three months at the turn of the first millennium CE, was temporarily the brightest object in the sky, outshining Venus and observable even during daylight.

Ibn Sina's Canon established a tradition of scientific experimentation in physiology without medicine as we know it would be inconceivable. For example, his use of scientific principles to test the safety and effectiveness of medications forms the basis of contemporary pharmacology and clinical trials. He has been in the news recently due to his work on contagions. He produced an early version of the germ theory of disease in the Canon where he also advocated quarantine to control the transmission of contagious diseases. Uniquely, Ibn Sina is the rare philosopher who became as influential on a foreign philosophical culture as his own. He is regarded by some as the greatest medieval thinker. Aristotle believed the soul had three parts: vegetative, animal and rational. Ibn Sina adopted this structure, but added his own interpretations. He saw the rational soul as separate from the body and capable of existing after death. This concept laid the groundwork for his ideas on human freedom and the afterlife. He was a highly original philosopher, who wrote at a time when extraordinary poise was required to balance the requirements of reason and faith in a way that satisfied him. Equally, he was self-conscious about the debt he owed to his philosophical predecessors in a way only matched by scholastics in Europe and Ibn Sina, a towering figure in Islamic intellectual history, drew heavily from the wellspring of Aristotelian

thought. Here, we explore some key Aristotelian concepts that became foundational pillars in Ibn Sina's philosophical system:

• The Architecture of the Soul and the Power of Choice: Much like Aristotle's tripartite soul (vegetative, animal and rational), Ibn Sina envisioned a similar structure. He, however, elaborated on the rational soul, proposing its independence from the body and its potential for continued existence after death. This concept laid the groundwork for his ideas on human free will and the possibility of an afterlife.

• The Tools of Logic and the Quest for Ultimate Reality: Aristotle's emphasis on logic as the bedrock of clear reasoning resonated deeply with Ibn Sina. He actively incorporated logic into his philosophical inquiries. Additionally, Aristotle's Metaphysics, which delved into questions of being, existence, and knowledge, served as a source of inspiration for Ibn Sina's own exploration of these fundamental themes.

• Understanding the Natural World: A Dialogue with Physics: The realm of physics and natural science, as explored by Aristotle, became a springboard for Ibn Sina's investigations. He grappled with Aristotelian ideas on motion, change and the structure of the cosmos. While he didn't always agree with Aristotle's conclusions, this intellectual engagement shaped his own understanding of the natural world.

• It's important to note that he did not simply adopt Aristotelian ideas wholesale. He often disagreed with Aristotle's conclusions, particularly when they conflicted with Islamic theology. For example, while Aristotle believed the universe was eternal, he argued for a created universe with a beginning.

• Ibn Sina's philosophical system, which incorporated Aristotelian ideas along with Islamic theology and his own original insights, had a profound influence on medieval philosophy, both in the Islamic world and in Europe.

It is important to remember that he was not a mere copyist. He often challenged or reinterpreted Aristotelian ideas when they clashed with Islamic theological concepts. For instance, while Aristotle believed in an eternal universe, he argued for a universe with a distinct beginning, aligning his ideas with Islamic beliefs about creation and his philosophical framework, a unique blend of Aristotelian thought, Islamic theology and his own original insights, exerted a profound influence on medieval philosophy, shaping discourse both in the Islamic world and later in Europe.

Influence in philosophy and science

In 1919-20 British Orientalist and acclaimed authority on Persia Edward G. Browne

opined that "Ibn Sina was a better philosopher than physician, but al-Rāzī [الرازي] a better physician than philosopher", a conclusion often repeated ever since. But a judgment issued 800 years later begs the question: By what contemporary measure is an appraisal of "better" made? Several points are needed to make the philosophical and scientific views of these men comprehensible today. Theirs was the culture of the Abbasid Caliphate (750-1258), the final ruling dynasty built on the precepts of the first Muslim community (الأمة) in the Islamic world. Thus, their cultural beliefs were remote from those of the 20th-century West and those of their Hellenistic predecessors. Their worldview was theocentric (centered on God) rather than anthropocentric (centered on humans), a perspective known to the Greco-Roman world. Their cosmology was a unity of natural, supernatural, and preternatural realms. Ibn Sina's cosmology centralized God as the Creator the First Cause, the necessary Being from whom emanated the 10 intelligences and whose immutable essence and existence reigned over those intelligences. The First Intelligence descended on down to the Active Intelligence, which communicated to humans through its divine light, a symbolic attribute deriving authority from the Quran.

Ibn Sina's most important work of philosophy and science is Kitāb al-shifāʾ (الشفي كتاب), which is a four-part encyclopedia covering logic, physics, mathematics, and metaphysics. Since science was equated with wisdom, Ibn Sina attempted a broad unified classification of knowledge. For example, in the physics section, nature is discussed in the context of eight principal sciences, including the sciences of general principles, of celestial and terrestrial bodies, and of primary elements, as well as meteorology, mineralogy, botany, zoology, and psychology (science of the soul). The subordinate sciences, in order of importance, as designated by Ibn Sina, are medicine; astrology; physiognomy, the study of the correspondence of psychological characteristics to physical structure; oneiromancy, the art of dream interpretation; talismans, objects with magical power to blend the celestial forces with the forces of particular worldly bodies, giving rise to extraordinary action on earth; theurgy, the "secrets of prodigies," whereby the combining of terrestrial forces are made to produce remarkable actions and effects; and alchemy, an arcane art studied by Ibn Sina, although he ultimately rejected its transmutations.

Mathematics is divided into four principal sciences: numbers and arithmetic, geometry and geography, astronomy, and music. Logic was viewed by Ibn Sina as instrumental to philosophy, an art and a science to be concerned with second-order concepts. While he was generally within the tradition of al-Fārābī (الفارابي) and al-Kindī(الكندي), he more clearly dissociated himself from the Peripatetic school of Baghdad and utilized concepts of the Platonic and Stoic doctrines more openly and with a more independent mind. More importantly, his theology the First Cause and the 10 intelligences allowed his philosophy, with its devotion to God as Creator and the

celestial hierarchy, to be imported easily into medieval European Scholastic thought.

CONCLUSION

Ibn Sina's contributions to medicine were nothing short of groundbreaking. His most famous work, The Canon of Medicine, became a standard medical text for centuries in both the Islamic world and Europe. His writings on anatomy, physiology and pharmacology laid the foundation for future advancements in medical understanding and his influence extended far beyond his own time. His philosophical ideas sparked debates and inspired generations of thinkers, both in the Islamic world and later in Europe. Even today, scholars continue to delve into the complexities of his thought, finding new insights and appreciating his enduring legacy. He was a polymath who redefined the intellectual landscape of his era. His legacy continues to inspire and challenge us, reminding us of the power of reason, the pursuit of knowledge and the harmonious dialogue between philosophy, science and faith.

Endnote

1. It should be borne in mind that in the early Islamic period, as also in antiquity and (for the most part) late antiquity, philosophy and science were synonymous Philosophy was a generic term that referred both to what we call science and also to the humanities, as is obvious from the work of Aristotle himself (metaphysics and biology and physics, and also politics and poetics)

2. In North Africa, some Jews are arabophobe, speaking a Judeo-Arabic language, and others are francophone, speaking French; and in some areas there are "Arabized" Jews who dress quite like Arabs.

3. Bar Hebraeus was a medieval Syrian scholar noted for his encyclopaedic learning in science and philosophy and for his enrichment of Syriac literature

4. Dimitri Gutas (born 1945, in Cairo) is an American Arabist and Hellenist specialized in medieval Islamic philosophy, especially Ibn Sina who serves as professor emeritus of Arabic and Islamic Studies in the Department of Near Eastern Languages and Civilizations at Yale University. New Haven, Connecticut, United States.

5. Roger Bacon (1214–1294) was an English philosopher, Franciscan friar, and one of the early proponents of the empirical method in science. Known for his pioneering work in optics, alchemy, and mathematics, Bacon emphasized the importance of observation and experimentation in understanding the natural world. His most famous work, Opus Majus (1277), advocated for empirical research, which laid the groundwork for later scientific approaches during the Renaissance. Bacon's theories on light and vision, including the use of lenses for magnification, were ahead of his time and had a lasting impact on the field of optics.6. Johannes Kepler (1571–1630) was a German astronomer, mathematician, and physicist, widely recognized for his formulation of the laws of planetary motion, which became fundamental to the development of modern astronomy. Kepler used empirical data from astronomer Tycho Brahe to provide the mathematical basis for the heliocentric model of the solar system, revolutionizing the understanding of planetary motion. His laws, particularly the elliptical orbits of planets and their relationship to the Sun, laid the foundation for Isaac Newton's work on gravitation. Kepler also made significant contributions to optics, particularly in understanding the refraction of light and developing the modern concept of the camera obscura.

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