

Forgotten Centuries

Islamic Golden Age



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Table of Content

1. Introduction	4
2. The Inspiration Behind Writing	6
3. Dedication	12
4. The Little Boy from Balkh	14
5. A Novel City, a Unique Center	33
6. The Man in the Famous Painting	40
7. The Father of Algebra	53
8. Commentary	60
9. A True Polymath	65
10. A Modern Inventor	74
11. The World-Famous Physician	84
12. The Second Teacher	98
13. Foundational Questions	109

14.	The Father of Social Sciences	111
15.	The Father of Islamic Philosophy	123
16.	Commentary	134
17.	The Father of Pharmacology	136
18.	The Father of Optics	146
19.	Decline and Stagnation	156
20.	Why the West Won?	164
21.	The Story of Our Shame	168
22.	Conclusion	170

Introduction

This book is the story of the forgotten Islamic Golden Age and the forgotten heroes of this age.

The Islamic Golden Age was a remarkable period of intellectual and cultural achievements that occurred in the Islamic world from the 8th to the 13th centuries AD. During this time, Muslim scholars made significant advancements in various sciences, mathematics, medicine, philosophy, literature and architecture.

While the Islamic world was busy innovating, inventing and discovering new things for five centuries, the Western world was asleep.

But now we are sleeping passengers on the train of progress. This is because we forgot our scientific roots.

This book is a living proof of the fact that, we the people of the East, had a vision, we had the power to innovate, discover and invent. And we did it for more than five centuries.

In this book, I present to you, the new Afghan generation, the stories of 11 heroes of the Islamic Golden Age.

I hope this book will serve as a catalyst for you to further explore our past scientific achievements and help pave the way for a better Afghanistan.

The Inspiration Behind Writing This Book

I vividly remember every detail of that peculiar night nearly five years ago. It was 3 AM, the wind howling and light raindrops tapping against my bedroom window.

I tossed and turned in my bed countless times, yet my mind fixated on some pressing questions: What has happened to us, the Muslim nations? Why are we so backward and what is responsible for the Islamic decline and stagnation?

It bothered me immensely that the developed world had gone through three successful industrial revolutions, resulting in the creation of electricity, telephone, planes, cars, the internet and thousands of further inventions, while we the Muslim nations remained mere sleepy, third-

class passengers on the train of progress and prosperity.

I thought to myself: It is 34 years that I have lived in the advanced world. In these years, I saw the West achieve advancements such as the elimination of poverty, 100% literacy, free healthcare and education for all, the best infrastructure in the world and care for the environment. At the same time, we the Muslims nations still struggled with basic social, political and economic issues. And things were getting worse every day.

What bothered me the most was the fact that the Afghan and broader Muslim mindset remained trapped in the 17th, 18th, and 19th centuries.

Why is that, I asked myself?

Sleep eluded me that night as a torrent of thoughts consumed my mind.

It was not unusual for me to suffer from extended periods of sleeplessness. I had suffered from sleeplessness since the age of 19. Almost every night, the thoughts of Ali Shariati, the Iranian philosopher and revolutionary, and those of Sayed Jamaluddin Afghan's dominated my mind. Other times, the Western philosophers invaded my mind.

I was in a state best described by Ali Shariati's concept of *Haboot Dar Kaweer*. By this, Shariati meant a fall into the abyss. On the other hand, I always wondered about Sayed Jamaluddin Afghan's notion of the resuscitation of the Islamic thought. I always wondered what Sayed Afghan meant by this resuscitation.

It was now 4 AM when I managed to muster enough energy to type a question on Google (Google). The question was "What happened to the Muslim world?". To my surprise, the search provided me with the name of a book that was titled "What Went Wrong? The Clash Between Islam and Modernity (What Went Wrong? The

Clash Between Islam and Modernity). The author of this book was Bernard Lewis (Bernard Lewis).

My research on Google, by 6 AM that night, led to the discovery of a pivotal concept called the Islamic Golden Age. I was momentarily stunned when I encountered this concept. A whirlwind of questions flooded my mind. I asked myself: Why I have I not heard about this beautiful concept before? What was the Islamic Golden Age about? What did this age achieve? And who were the heroes of this age?

With these thoughts dominating my mind, I went to work at 8 AM, but my mind was now fixated on the concept of the Islamic Golden Age. I couldn't wait to get back home and continue my research.

That evening when I returned home, I researched Bernard Lewis further, and found that he was the foremost expert in the world on the concept of the decline and stagnation of

Islam. The same day, I ordered his book “What Went Wrong” from the United States. I further bought three more books by Bernard Lewis in electronic formats (e-books) on Amazon.

I spent the next 12 months slowly reading these four books by Bernard Lewis. Each chapter of his books created tens of questions in my mind.

I also bought tens of other books on the Islamic Golden Age and began to read every word, every sentence and every chapter with amazement.

What was staggering for me was the discovery that while we the Muslim world flourished during the Islamic Golden Age and continued to make new discoveries, the Western world was in dark ages.

Allow me to take you on a captivating journey through the Islamic Golden Age, told through the remarkable lives of its legendary heroes. These towering figures shaped not only the East but

also left an indelible mark on the West. Their brilliance and contributions have transcended time, and both worlds owe them a debt of gratitude.

The least we can do is to honour these extraordinary heroes, celebrate the dazzling era they brought to life, and draw inspiration from their enduring legacy.

I present the stories of these heroes to you in the light of 21st century latest research.

Dedication

To the new generation of Afghanistan:

This book is a heartfelt tribute to you, your children, and your grandchildren.

I present this philosophical work within the historical framework often referred to in the Western world as the "attention economy."

The attention economy describes a shift in focus that has occurred with the rise of the information age, particularly influenced by social media. As a result, our attention has increasingly gravitated away from significant matters towards trivial content found on platforms like TikTok, Instagram, and Facebook.

In this context, where serious academic discussions garner little attention, tackling

philosophical and scientific topics can feel like a gamble.

Nevertheless, I remain hopeful that this book will resonate with a few inquisitive individuals who are concerned about our collective future as humanity.

The fundamental questions that philosophers have pursued remain profoundly relevant today. Our current challenges are not only more numerous but also more complex, demanding thoughtful solutions.

Read these pages. Discover the remarkable stories of your historical heroes—extraordinary minds who shaped the world and birthed countless innovations. Embrace their legacy and let their brilliance inspire your own journey!

The Little Boy from Balkh

In the year 987 AD (or 1051 years ago), in the heart of the Balkh region, a mid-level official of the Samanid empire nurtured grand aspirations for his beloved seven year old son. With unwavering conviction, he sensed that his child was destined for greatness. The vision of his son becoming a top official in the opulent court of the king danced in his dreams—an accomplishment that would not only elevate their status further, but also secure their future in a world of uncertainty.

Meanwhile, his mother, a devoted soul from the land of Bukhara, capital of the Samanid empire, poured her heart into fervent prayers, beseeching God for her son's triumph.

Yet, this spirited child harboured dreams as vast as the sky. His insatiable curiosity beckoned him to explore the wonders of the world, and his unwavering dedication fuelled his quest to transform those dreams into reality.

At just a tender age of 10, the young boy reached a remarkable milestone, far beyond what his father had envisioned for him: He memorized the entire Holy Quran, a feat that shimmered like a jewel in his heart.

The little boy's Quran and literature teacher realised his genius from the outset. He knew from day one that the little boy was different. The teacher was amazed at the boy's maturity and his ability to learn at incomprehensible speed. So much so, that the little boy's talents kept his Quran teacher up late into the nights.

Astounded by the boy's genius, the teacher soon realised that he had nothing else to teach the young boy. He had taught the little boy

everything he knew regarding the world of literature and Quranic studies . So the teacher recommended to the boy's father to send him to an Indian greengrocer to teach him arithmetic.

A much similar story followed. The boy soon learnt everything the greengrocer knew about the world of arithmetic.

The little boy's father next sent his son, now around 12 years old, to a famous Islamic scholar by the name Ismail al-Zahid to teach his son Hanafi fiqh. Much like his previous two teachers, the little boy's ability to learn at unprecedented speed astounded al-Zahid. Sensing that the little boy was destined for greatness, Al-Zahid put his heart and soul into teaching the little boy. The little boy showed great enthusiasm to learn fiqh.

Just as was the case with the previous two teachers, the boy's journey with his teacher Ismail al-Zahid came into an end. And just as previously, al-Zahid realised he had nothing else to teach the boy. Al-Zahid recommended to the

little boy's father to familiarise his son with the sciences.

The little boy was now a 15-year old young man. His father invited the physician and philosopher al-Natili to their house to educate the little boy in the sciences of the age.

Together with al-Natili, the little boy who was now a young man, studied the most famous scientific book of the time in logic called Isagoge (Isagoge) which was written by famous Greek thinker Porphyry (Porphyry). Porphyry was a Neo-Platonic (Neo-Platonic) philosopher and his book Isagoge was the standard book on logic for at least 1000 years after his death.

It is important to know what Neo-Platonism (Neo-Platonism) is as our little hero will later become the most famous neo-Platonic philosopher of the eastern land. Neo-Platonism was a philosophical movement inaugurated by the philosopher Plotinus in the third century AD. This philosophy reinterpreted the ideas of the

ancient Greek philosopher Plato. It argued that the world which we experience is only a copy of an ideal reality which lies beyond the material world.

Al-Natili and the little boy next studied Categories of Aristotle (Categories of Aristotle), perhaps the most famous scientific literature of the time.

Imagine this: Our little boy was now 16 years old and he had already studied the two most famous philosophers of the world, Plato and Aristotle, as well as the contemporary philosophical and scientific works associated with these two great minds!

Next in the philosophical and the scientific journeys of the little boy and his teacher Al-Natili were the books Almagest (Almagest) written by Ptolemy (Ptolemy) and Elements (Elements) written by Euclid (Euclid). Almagest was the most famous book of the time on mathematics and astronomy. The Elements was a

mathematical treatise that consisted of 13 books.

Such was the thirst for knowledge of our little hero that while he was studying the sciences of his age, he also limitlessly consumed medical knowledge. He was particularly influenced by the famous works of the physicians Qumri and Abu Sahl.

For our hero, the sun rose with Al-Natili's philosophical and scientific teachings, and the night unfolded into a tapestry of knowledge woven by the two great scholars Qumri and Abu Sahl. Qumri was particularly important because he was a physician at the court of the Samanid Amir Al Mansur.

Just like with his previous teachers, our little hero had outgrown his teacher al-Natili intellectually. Al-Natili told our little hero to continue his research independently.

In this journey of day-night dedication to learning, our hero discovered an unquenchable passion for medicine in particular. This love intertwined with his fascination for the sciences and philosophy. Each day spent in study ignited a spark, revealing a profound connection to the very essence of healing and understanding that fuelled his soul.

It wasn't long before our young hero transitioned from the eager pursuit of medical knowledge to the hands-on practice of healing. He attained medical knowledge at such a breath-taking pace that by the tender age of 17, he had already earned the esteemed title of personal physician to Nuh II, the Amir of the Samanid empire. At the kings court, our hero was able to access numerous books on philosophy, various sciences, mathematics and medicine.

Our hero later moved to Gurganj (گرگانج), the capital of Khwarazm. There he served Khwarazmshah, the ruler of Khwarazm. This

opportunity provided our hero with further access to new books across various fields.

At the fall of Khwarazm and the rise of the Ma'munid (مأمونيان), our young hero became the personal physician of the Ma'munid ruler Abu al-Hasan Ali. Under the Ma'munids, Gurganj became a centre of learning, attracting many prominent figures, our hero's former teacher Abu Sahl al-Masihi, the mathematician Abu Nasr Mansur, the physician ibn al-Khammar, and the philologist al-Tha'alibi (الثعالبي).

By the age of 25, our young hero had already tended to the ailments of numerous kings, rising to the prestigious rank of chief physician in their courts. His accomplishments soared far beyond what his father had ever imagined, his name whispered in awe through the halls of power, where rulers sought his wisdom and skill.

But healing kings wasn't sufficient for our hero. Our intrepid young hero harboured ambitions far beyond merely serving as physician to kings. Serving kings was merely a stepping stone on his grander journey. His true aspiration was nothing less than to etch his name into the annals of human history.

With an unwavering belief in his potential, he envisioned himself scaling the highest peaks of intellectual achievement. Each day, he yearned to make a meaningful impact on the world, spreading positivity like a gentle breeze.

To realize this lofty vision, he plunged into a vast sea of knowledge, devouring medical texts from an array of cultures—Latin, Greek, Indian, Chinese, and Persian—each page a gateway to wisdom waiting to be unlocked.

Now, with his reputation firmly established, our hero's ambition shifted towards a greater legacy. He envisioned creating a monumental work of medical literature, one that would merge the

wisdom of contemporary local practices with the ancient knowledge of Greek, Indian, Chinese, and Persian medicine. Driven by this grand vision, he embarked on the journey of writing his first major book, a text that he hoped would stand the test of time and transform the future of healing arts.

Eager to broaden his understanding, our hero embarked on an ambitious journey that took him far beyond the familiar. He travelled extensively, venturing into the lands of Persia and regions that are now part of Central Asia. In these distant lands, he sought out ancient texts, engaged with local scholars, and immersed himself in the diverse medical traditions that would shape his ground-breaking work. Each step of his travels added depth to his knowledge, further fuelling his dream of creating a timeless medical masterpiece.

In 1014, when our hero was 34 years old, he travelled to Qazvin and Hamadan, in today's Iran. During this period, our hero finished writing

his most famous book **قانون در طب** (The Canon of Medicine) and started writing his second famous book called **كتاب الشفاء** (The Book of Healing).

The *Canon of Medicine* is an encyclopaedia of medicine in five books. It presents an overview of the contemporary medical knowledge of the Islamic world, which had been influenced by earlier traditions including Greco-Roman medicine, Persian medicine, Chinese medicine and Indian medicine.

The *Canon of Medicine* was not merely a ground-breaking work of its time—it became a cornerstone of medical knowledge for centuries. This book merged ancient medical traditions with ground-breaking discoveries in anatomy, pharmacology, and the treatment of diseases. When translated from Arabic into Latin in the 12th century, its influence extended far beyond its origins, profoundly shaping the course of medieval European medicine.

Our hero's magnum opus remained the definitive medical authority for generations, setting the standards for both the Islamic world and medieval Europe. It was so comprehensive and ahead of its time that it continued to be used as a standard medical textbook in Europe well into the 18th century, cementing its place in history as a timeless beacon of medical wisdom.

Our little hero's influence in the world of medicine grew so much that established him as the "father of early modern medicine."

Just imagine: A book written by a young boy from Balkh becoming the standard medical text in Europe, lasting all the way until the 18th century, and earning our little hero the name of "the father of early modern medicine"!

The كتاب الشفاء (Book of Healing), our hero's second book, is a scientific and philosophical encyclopaedia. He began to compose the book in 1014 and completed it around 1020.

The *Book of Healing* is our hero's major work on science and philosophy, and is intended to "cure" or "heal" ignorance of the soul. Thus, despite its title, it is not concerned with medicine.

The Book of Healing is divided into four parts: Logic, natural sciences and mathematics. It was influenced by ancient Greek philosophers such as Aristotle, Hellenistic thinkers such as Ptolemy and earlier Persian/Muslim scientists and philosophers, such as Al-Kindi, Al-Farabi and Al-Bīrūnī.

By now, our hero's father and mother had long passed, never having witnessed the full extent of their son's greatness. In their wildest dreams, they could not have imagined that their little boy would one day be hailed as the father of early modern medicine. Nor could they have foreseen that the books he penned would become the gold standard for medical knowledge, revered for centuries across both the Western and Eastern worlds. Their child, once so small and full

of promise, had written his name into the annals of history, far beyond their most ambitious hopes.

The name of our little hero is ابن سینا (Ibn Sina).



Ibn Sina as imagined by AI

So revered and respected was Ibn Sina in the West that they Latinised his name to Avicenna.

Our little hero from Balkh went on to become a towering polymath of the Islamic Golden Age, whose contributions to medicine, philosophy, astronomy, and various other fields earned him a place among history's greatest minds.

Beyond his achievements in medicine, Ibn Sina's influence extended into philosophy, where his works on metaphysics, ethics, and logic shaped medieval thought in both the Islamic world and Europe.

Our little boy blended Aristotle's teachings with Neoplatonism, and his philosophical treatises became a crucial bridge between classical philosophy and medieval scholasticism (scholasticism).

His thoughts on the nature of the soul, existence, and God inspired intellectuals such as Thomas Aquinas and deeply influenced the development of Western philosophy.

Our hero authored nearly 450 volumes on a variety of topics, with approximately 240 still in existence today. Of these surviving works, around 150 focus on philosophy, while 40 are dedicated to medicine.

Ibn Sina's brilliance and insatiable thirst for knowledge not only shaped the scientific and philosophical landscape of his time but also left an enduring legacy that continues to inspire scholars and thinkers to this day.

Even the great modern scientist Johannes Kepler cites Avicenna's opinion when discussing the causes of planetary motions.

Many institutions in a variety of countries have been named after our little hero in honour of his scientific accomplishments, including the Avicenna Mausoleum and Museum, Bu-Ali Sina University, Avicenna Research Institute and Ibn Sina Academy of Medieval Medicine and Sciences.

The Ibn Sina Prize, established in 2003, is awarded every two years by UNESCO and rewards individuals and groups for their achievements in the field of ethics in science.

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A Novel City, a Unique Center of Knowledge and an Inspiring Empire

There is no question that Ibn Sina was a remarkable genius. However, to fully appreciate his contributions, we must consider the origins of the books he read, the knowledge he acquired, and the teachers who guided him. Without addressing these aspects, it becomes challenging to grasp the significance of the Islamic Golden Age and its impact on human history.

Here, I will share a brief account of the world's largest and most advanced city from the 8th to the 13th century, the story of the greatest library and center of learning in the world at the time, and the Islamic empire that established all of this.

Envision a city thriving 1,200 years ago, a dazzling marvel that held the title of the largest city in the world. Its vibrant streets were alive with the sounds of bustling crowds, where people from all walks of life converged. Traders travelled from distant lands, bringing with them an array of exotic goods that filled the marketplace with colour and excitement. This magnificent city became a melting pot of cultures, each contributing to the rich tapestry of urban life.

Wide, well-maintained highways crisscrossed through the city's heart, facilitating the movement of goods and people alike. Along these major thoroughfares, oil lamps cast a warm, flickering glow, illuminating the paths of late-night wanderers and revelers. The aroma of spices wafted through the air, as restaurants thrived with patrons enjoying sumptuous feasts, laughter, and lively conversation, continuing long into the night.

Above all, this metropolis attracted a diverse array of intellectuals and creatives. Scientists

with their inquisitive minds, philosophers pondering the mysteries of existence, skilled translators bridging cultures, dedicated doctors striving to heal, and talented artists expressing their visions all flocked to this hub of innovation. Together, they shared ideas and collaborated, forming a dynamic community that pushed the boundaries of knowledge and creativity. This vibrant exchange laid the groundwork for advancements that would echo through the ages, solidifying the city's status as the world's foremost center of learning and culture.

This remarkable city was Baghdad, the illustrious capital of the Islamic Empire. Founded in 762 by the Abbasid Caliphate, Baghdad quickly emerged as the vibrant center of science and the arts, pulsating with intellectual and cultural life.

With the encouragement and financial backing of the Abbasid Empire, knowledge from Greek and Latin was translated into Arabic and Persian, facilitating the preservation and dissemination of these important intellectual traditions.

At the center of this groundbreaking intellectual revolution stood the House of Wisdom, the magnificent library of Baghdad. Established by Caliph Harun al-Rashid in the 8th century, it reached its peak of prosperity under his son, Caliph al-Ma'mun, in the 9th century.

The House of Wisdom served as a vital intellectual hub and library, dedicated to the translation, preservation, and enhancement of knowledge. It amassed a vast collection of manuscripts from around the globe, translating important works from various languages, particularly Greek and Latin, into Arabic, thus ensuring the continuity and expansion of scholarly thought.

To grasp the significance of the Abbasid Caliphate, Baghdad, and the House of Wisdom, consider the following:

Philosophy was born in Greece nearly 2,600 years ago, and approximately 2,300 years ago,

Aristotle, a prominent Greek philosopher, established the foundations of modern science through methodologies based on logic and observation.

However, the rise of Christianity as a political power in the West around 1,500 years ago plunged the realms of philosophy and science into the Dark Ages. During this period, books were burned, libraries were destroyed, and many scientists and philosophers faced persecution. As a result, Western Europe, the cradle of scientific and philosophical thought, fell into a thousand-year slumber.

In contrast, it was in Baghdad, under the Abbasid Caliphate, and within the House of Wisdom that new Muslim thinkers would play a crucial role in not only reviving the Greek philosophical and scientific traditions but also advancing them significantly.

When Europe eventually emerged from this millennium of stagnation in the 14th century, it

would be the Islamic scholars—who had preserved and further developed scientific knowledge—who would inspire the European Renaissance, the Enlightenment, and the Scientific Revolution.

This context is essential for understanding the eleven Islamic thinkers featured in this book.

These eleven thinkers, along with many others, thrived during the Islamic Golden Age, a remarkable period that spanned five centuries. Traditionally regarded as lasting from the 8th to the 13th century, this era was marked by significant advancements in science, economics, and culture within the Islamic world.

The Islamic Golden Age was an expansive intellectual movement that encompassed the entire Islamic world, reaching from Afghanistan and Central Asia to Al-Andalus, present-day Spain and Portugal.

Ibn Sina stands out as a remarkable figure from this period. This extraordinary era of inventions, discoveries, and innovations was filled with numerous other notable contributors.

Join us as we delve into the fascinating stories of these influential figures from various regions of the Islamic empire, spanning generations from the 8th to the 13th century.

As you read further, what will become increasingly clear to you is that during this time, Islam was at the forefront of developments in science, philosophy, medicine, the arts, and architecture for over five centuries. Consider the contrast between where we were twelve centuries ago and where we stand today!

The Man in the Famous Painting

Raphael, Michael Angelo and Leonardo Da Vinci are arguably three of the greatest painters and sculptures of all time. I am sure, most of you are familiar with these famous names. The impact of these three individuals on human development and progress in the last millennium reaches far beyond the world of arts.

There is a story about Raphael that vividly depicts the Western world's enormous respect for the thinkers, philosophers, scientists and inventors that helped change the West's destiny and help it achieve prosperous societies.

This Raphael story, at the same time, shows how little respect we pay our own thinkers,

philosophers, scientists and the people who shaped the wider world we inhabit today.

Raphael was employed between the years 1508 and 1511 (about 500 years ago) to create a painting in the Stanza della Segnatura, a most important room in the Vatican, the headquarters of the Roman Catholic Church. This painting is 38.5 square meters. The length of this painting is 7.7 meters and its width is 5 meters.

To imagine the size of this painting by Raphael, a two-story building is only 5.5 to 6 meters high. So imagine a painting that is higher than a two-story building!

This painting took three years to complete.

This painting is called “The School of Athens”. It is considered Raphael’s masterpiece.

The School of Athens painting depicts every great Greek philosopher of their time including Socrates, Plato, Aristotle, Archimedes, Heraclitus and so on. These philosophers lived between

2,300 and 2,800 years ago, but their names live on due to the impact of their thoughts on philosophy and the world of sciences.

The School of Athens also depicts one non-Greek personality. This person is a Muslim thinker called Ibn Rushd.

Imagine Ibn Rushd's place in the Western world, being placed by one of the greatest painters of all time in the midst of the greatest Greek philosophers, on a most important room in the religious epicentre of the Christian world in the form of a masterpiece!

The questions that come to mind are: Who is Ibn Rushd? Where is Ibn Rushd's place in the Muslim world today? How many of us have even heard his name? What are his achievements? And why does the West accord such enormous respect for Ibn Rushd, as depicted by Raphael's School of Athens masterpiece?

Indeed, Ibn Rushd is the Muslim thinker who paved the way for the European Renaissance, the phenomenon that lasted from 14th to 17th century and marked Europe's transition from Dark Ages to modernity, transforming the world of science, arts and culture.

Yes, it was through Ibn Rushd's writings and commentaries on Aristotle in Arabic, which the West translated from Arabic into Latin in the 13th century, that the true revival of Aristotlism took place in the West.

Ibn Rushd's translations were largely responsible for the most important change in history of medieval thought which resulted in resurrecting Aristotle and introducing him to the Christian West.

In other words, it was because of ibn Rushed that the West rediscovered itself and was able to reconnect with a past that they had lost for more than 1000 years; a past that valued scientific and

philosophical thinking between 2300 and 2800 years ago.



Ibn Rushd, as imagined by AI

Ibn Rushd was the bridge between the West's past and its present.

Yes, it was Ibn Rushd, and the Islamic Golden Age, that helped free the Western mind from the 1000-year old dogma of the Dark Ages of the Christian world!

Our first hero of the Islamic Golden Age, Ibn Sina, hailed from Balkh region. Based on Islamic geography, he was from the far east of the Islamic rule.

Our third hero, Ibn Rushd, born 89 years after the death of Ibn Sina, is from the far west of Islamic rule. He was born in Córdoba, which is part of Spain today. At that time, the region was called Andalus, which refers to parts of today's Gibraltar, Portugal, Spain, and Southern France.

Andalus was ruled by the Muslim سلسله سلطنت المرابطين, centred in the territory of present-day Morocco.

Ibn Rushd was born on 14 April 1126 in Córdoba, in today's Spain. His family was well known in the city for their public service, especially in the

legal and religious fields. His grandfather Abu al-Walid Muhammad was the chief judge of Córdoba and the imam of the Great Mosque of Córdoba.

According to his traditional biographers, Ibn Rush's education was "excellent", beginning with studies in hadith, fiqh medicine and theology. He learned Maliki jurisprudence under al-Hafiz Abu Muhammad ibn Rizq and hadith with Ibn Bashkuwal, a student of his grandfather. His father also taught him about jurisprudence, including on Imam Malik's الموطأ, which Ibn Rushd went on to memorize.

Our hero studied medicine under Abu Jafar Jarim al-Tajail, who probably taught him philosophy too. He also knew the works of the philosopher Ibn Bajjah, and might have known him personally or been tutored by him. He joined a regular meeting of philosophers, physicians and poets in Seville, in today's Spain, which was attended by philosophers Ibn Tufayl and Ibn Zuhr as well as the future caliph Abu Yusuf Yaqub. He

also studied the kalam theology of the Ashari school, which he criticized later in life.

Our hero, Ibn Rushd, was a prolific writer and his works covered a greater variety of subjects than those of any of his predecessors in the East, including philosophy, medicine, jurisprudence or legal theory, and linguistics. Most of his writings were commentaries on the works of Aristotle, widely known is the greatest philosopher and scientist of all time.

According to French author Ernest Renan, Averroes wrote at least 67 original works, including 28 works on philosophy, 20 on medicine, 8 on law, 5 on theology, and 4 on grammar, in addition to his commentaries on most of Aristotle's works and his commentary on Plato's The Republic.

Many of Ibn Rushd's works in Arabic did not survive, but their translations into Hebrew or Latin did.

Ibn Rushd wrote commentaries on nearly all of Aristotle's surviving works. The only exception is Politics, which he did not have access to, so he wrote commentaries on Plato's Republic.

Ibn Rushd classified Aristotle's commentaries into three categories that modern scholars have named short, middle and long commentaries.

Most of the short commentaries were written early in his career and contain summaries of Aristotlean doctrines.

The middle commentaries contain paraphrases that clarify and simplify Aristotle's original text for general audience.

The long commentaries include the complete text of the original works with a detailed analysis of each line. The long commentaries are very detailed and contain a high degree of original thought, and were unlikely to be intended for a general audience.

Ibn Rushd' wrote many works in Islamic theology, the most important of which is **تهافت التهافت**. This philosophical masterpiece is a rebuttal of al-Ghazali's landmark criticism of. This book combines ideas in Ibn Rush's commentaries and his stand-alone works and uses them to respond to al-Ghazali. The work also criticizes Ibn Sina and his Neoplatonist tendencies, sometimes agreeing with al-Ghazali's critique against Ibn Sina.

Ibn Rushd served as the royal physician at the court **سلسله سلطنت الموحدون** and wrote a number of medical treatises. The most famous was **الكليات في الطب**.

Ibn Rushd served multiple tenures as judge and produced multiple works in the fields of Islamic jurisprudence or legal theory. The only book that survives today **بديات المجتهد وحياة المقتصد**.

Ibn Rushd's contributions to theology, philosophy, medicine, psychology, physics and astronomy are too much to discuss in this essay.

Suffice to say that, while we know nothing about this grand hero of the world of Islam, the West has long revered him and held him in high esteem.

The biggest tribute that the West paid to Ibn Rushd and his legacy was to Latinize his name by calling him Averroes.

The West went even further in its respect for Ibn Rushd. They called him “the Father of Rationalism”. Rationalism is the philosophy and methodology upon which all modern sciences rest.

So influential was Ibn Rushd in the West, that his books on medicines were translated from Arabic into Latin in 1255 and reprinted several times. Ibn Rushd books surpassed and replaced all other medical works in the Middle Ages in Europe.

Just think about that! Ibn Rushd’s books on medicine surpassing and replacing all other

medical works that were in existence for 100s of years in Europe!

Today, the genius of Ibn Rushd brings tears to my eyes. And the Islamic world had tens of Ibn Rushds during the glorious 700-year long Islamic Golden Age.

The West's respect for Ibn Rushd is as strong today as the 13th century. His statue today at the University of Barcelona in the city of Córdoba, Spain, is but only one example of the West's ever-lasting respect to Ibn Rushd. They even created a TV series under his Latinized name Averroes.

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The Father of Algebra

Imagine Apps such as Facebook, Google, TikTok, ChatGPT and millions more not existing today if it wasn't for our second hero. This is because all these Apps, much like almost all computer programming, owe their existence to a mathematical concept called algorithm (algorithm). And it was a book by our second hero that gave rise modern algebra which is the foundation of all algorithms.

The name of our second hero is Al-Khwarizmi.

This chapter is particularly important not only because of the intellectual might of Al-Khwarizmi, but because of the particular place he worked in and the general Islamic political context he lived in.

Our third hero, Muhammad ibn Musa Al-Khwarizmi, was a Muslim polymath and

renowned mathematician and scholar during the Islamic Golden Age, and he produced influential works in the subjects of mathematics, astronomy and geography.



Khwarizmi, as imagined by AI

Al-Khwarizmi's achievements can be summarized as creating the modern number system, creating accurate works on geography and astronomy, the development of algebra and coining the number Zero.

His book الكتاب المختار في حساب الجبر والمقابلة (The Compendious Book on Calculation by Completion and Balancing) introduced systematic methods for solving equations and laid the groundwork for modern algebra. His work earned him the title of the "Father of Algebra".

Around 820 AD, our hero was appointed as the astronomer and head of the library of the House of Wisdom.

Our hero compiled his book الكتاب المختار في حساب الجبر والمقابلة between 813–33. This wonderful book presented the first systematic solution of linear and quadratic equations. One of his achievements in algebra was his demonstration

of how to solve quadratic equations by completing the square, for which he provided geometric justifications.

The English term algebra comes from title of our hero's book. His name gave rise to the English terms algorism and algorithm; the Spanish, Italian, and Portuguese terms algoritmo (algoritmo); and the Spanish term guarismo (guarismo) and Portuguese term algarismo (algarismo), both meaning "digit".

In the 12th century, Latin-language translations of Al-Khwarizmi's textbook on Indian arithmetic, which codified the various Indian numerals, introduced the decimal-based positional number system to the Western world. Likewise, Al-Jabr, translated into Latin by the English scholar Robert of Chester in 1145, was used until the 16th century as the principal mathematical textbook of European universities.

Our hero was born in Khwarazm, which was part of Greater Iran at the time, and is now part of Turkmenistan and Uzbekistan.

Al Khwarizmi accomplished most of his work between 813 and 833 AD. At the House of Wisdom studied sciences and mathematics, including the translation of Greek and Sanskrit scientific manuscripts.

Besides mathematics, our hero made excellent contributions to geography, astronomy and cartography, and established the basis for innovation in algebra and trigonometry.

His book *در محاسبه با اعداد هندو*, written about 820, was principally responsible for spreading the Hindu–Arabic numeral system throughout the Middle East and Europe.

It is important to understand just how significant Al-Khwarizmi's new idea were. It was a revolutionary move away from the Greek

concept of mathematics which was essentially geometry.

Algebra was a unifying theory which allowed rational numbers, irrational numbers, geometrical magnitudes, etc., to all be treated as "algebraic objects". It gave mathematics a whole new development path so much broader in concept to that which had existed before, and provided a vehicle for future development of the subject. Another important aspect of the introduction of algebraic ideas was that it allowed mathematics to be applied to itself in a way which had not happened before.

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Commentary

Think of a situation when a civilisation loses its most cherished assets. These assets included science, mathematics, astronomy, medicine, and philosophy. The fall of the Western Roman Empire and the rise of Christianity in the West directly contributed to the loss of these sciences. The result was that the West went to sleep for 1,000 years.

The West was awoken from the 1,000-year-long sleep by the Islamic scholars based on the innovations, discoveries and inventions they made. These discoveries, inventions and innovations are called the Islamic Golden Age. The Islamic Golden Age lasted from 8th to 13th century AD.

The implications are that without the role of the Islamic thinkers, and the impact of the Islamic

Golden Age, there will be no Western enlightenment movement, no scientific revolution and no industrial revolutions today.

Just think about the above!

Also, think where the West is today and where we are!

In relation to the rise of the Islamic Golden Age, we need to understand that nothing is born in a historical vacuum. In other words, nothing great happens in isolation. Scientific phenomena are created because of innovations, discoveries and inventions, but only when there are conducive conditions.

We have to understand the Islamic Golden Age not as product of a single Islamic empire, dynasty or country. Rather, it was a movement, across many Islamic countries, cultures and geographies. It was the product of brilliant minds, many of whom were centuries ahead of their time.

While our current Muslim mindset is trapped in the 17th, 18th and 19th centuries, the heroes of the Islamic Golden Age were many centuries ahead of their times.

In additions, great human feats are established when societies work in a systematic way forward towards improving the lives of their citizens. Great human feats only happen when opportunities for such rise are created.

It's in this respect that we have to give huge credit to the Abbasid Dynasty, alongside the Al-Andalus dynasties, who greatly contributed to the development of the Islamic Golden Age, especially through the direct promotion of arts, philosophy, and scientific progress.

The role of the Abassid caliphate was especially crucial in the development of the Islamic Golden Age.

One of the Abbasid caliphate's major achievements during its golden age was working

with scholars from around the world to make new discoveries.

The Abbasid rule, based on the Islamic Golden Age, was a period of great advances in fields such as science, mathematics, astronomy, medicine, and philosophy.

The Abbasids encouraged the translation of Greek and Roman works into Arabic and built libraries and centers of learning throughout their empire. They also invited scholars from all over the world to come to Baghdad and share their knowledge and expertise. This led to a flourishing of intellectual activity that helped to advance the state of knowledge in many different fields.

Hence, responsible governance forms the bedrock of every remarkable human achievement, anchoring progress and shaping greatness.

Furthermore, with the introduction of paper, information was democratized. The use of paper spread from China into Muslim regions in the 8th century, and then to Spain and then the rest of Europe in the 10th century. Islamic paper makers devised modern manufacturing concepts such assembly-line methods of hand-copied manuscripts to turn out editions far larger than any available in Europe for centuries.

A True Polymath

Our first hero, Ibn Sina was called the father of early modern medicine.

Our second hero, Ibn Rush was called the father of rationalism.

Our third hero, Al Khwarizmi was called the father of Algebra.

Our fourth hero, Al Biruni, has been called the father of many scientific disciplines, including the father of comparative religion, father of modern geodesy, founder of indology and the first anthropologist.

Like all our three previous heroes, Al Biruni was a towering polymath of the Islamic Golden Age.

Al-Biruni, born in 973 AD in the region of Khwarazm (present-day Uzbekistan), is one of the most important figures of the Islamic Golden Age. Al-Biruni made significant contributions to various fields, including mathematics, astronomy, geography, history, and anthropology. His works not only reflect the intellectual vigour of his time but also laid the groundwork for future scientific advancements.

Al Biruni was born into a family that valued education, which likely influenced his intellectual pursuits. Little is known about his early life, but it is believed that he received a comprehensive education in various fields of knowledge available in his time. As a young scholar, he had access to a rich tradition of Greek, Indian, and Persian texts, which he would later draw upon in his own works. His early exposure to diverse cultures and philosophies would shape his approach to knowledge, emphasizing observation, experimentation, and critical thinking.



Al Biruni, as imagined by Al

Al Biruni's contributions to science are vast and varied. He is best known for his work in astronomy and mathematics. One of his significant achievements was the calculation of

the Earth's radius. Al-Biruni developed a method to measure the Earth's circumference using trigonometric principles, which he derived from observations of the horizon and the angles of elevation of celestial bodies. His calculations were remarkably accurate, demonstrating his advanced understanding of geometry and trigonometry.

In addition to his work on the Earth's dimensions, Al-Biruni made substantial contributions to the field of astronomy. He wrote extensively on the movements of celestial bodies and produced astronomical tables that were used for centuries. His observations of the lunar phases, eclipses, and planetary motions were ground-breaking. Al-Biruni's meticulous approach to data collection and analysis exemplified the scientific method long before it was formally established in Europe.

Al Biruni's curiosity extended beyond the physical sciences to geography and cultural studies. His work **كتاب الهند** (Book of India) is a

seminal text that provides a comprehensive account of Indian culture, religion, customs, and scientific knowledge. Written after his travels to India, this work is notable for its objective and respectful portrayal of Indian society. Al Biruni's ability to synthesize diverse cultural perspectives set him apart from many of his contemporaries, who often approached foreign cultures with bias and ethnocentrism.

In كتاب الهند Al Biruni meticulously documented various aspects of Indian life, including its social structure, religious practices, and scientific achievements. He was particularly fascinated by Indian mathematics and astronomy, and he translated key Indian texts into Arabic, facilitating the exchange of knowledge between cultures. His observations about the Indian numeral system contributed to the later development of algebra and arithmetic in the Islamic world and beyond.

Al Biruni's methodological approach was characterized by a commitment to empirical

observation and critical analysis. He emphasized the importance of verifying information through experimentation and observation rather than relying solely on established authorities. This empirical approach was not common in his time, as many scholars adhered to traditional methods of knowledge acquisition.

In his writings, Al-Biruni often distinguished between philosophical speculation and scientific inquiry. He believed that knowledge should be based on evidence and that theories should be tested against empirical data. This perspective laid the groundwork for the modern scientific method, which prioritizes observation, experimentation, and critical reasoning.

Al Biruni's contributions had a profound and lasting impact on various fields of knowledge. His works were translated into Latin and other languages, influencing scholars in Europe during the Renaissance. His mathematical and astronomical concepts were integrated into

European scientific discourse, paving the way for advancements in these fields.

The influence of Al Biruni extended beyond mathematics and astronomy. His approach to cultural studies and his emphasis on empirical observation inspired later scholars in anthropology and social sciences. His respectful treatment of diverse cultures serves as a model for contemporary scholars who seek to understand and appreciate the complexities of human societies.

In the Islamic world, Al-Biruni's legacy continued to thrive. His works were studied by later generations of scholars, and his methodologies influenced the development of scientific inquiry in the region. Al-Biruni is often regarded as a pioneer of interdisciplinary studies, and his ability to bridge the gaps between various fields of knowledge is celebrated to this day.

Al Biruni stands as a towering figure in the history of science and scholarship. His contributions to mathematics, astronomy, geography, and cultural studies exemplify the intellectual richness of the Islamic Golden Age. Through his empirical approach and commitment to understanding diverse cultures, Al Biruni not only advanced the frontiers of knowledge in his time but also laid the groundwork for future generations of scholars. His legacy endures as a testament to the power of curiosity, critical thinking, and the pursuit of knowledge across cultures.

As we reflect on Al Biruni's life and works, we are reminded of the importance of interdisciplinary study and the value of open-mindedness in the quest for understanding the world around us. His contributions continue to inspire scholars and scientists, reminding us that the pursuit of knowledge knows no boundaries.

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A Modern Inventor

We understand robotics as a new and 21st century concept and invention. But what if I told you that a Muslim inventor was the first to conceive of the idea of robotics in the 12th century, or 800 years ago.

But, first, let's discuss what robotics is.

Robotics is the interdisciplinary field that designs, builds, and programs machines capable of performing tasks autonomously or semi-autonomously. It integrates mechanical engineering, electronics, and computer science to create systems that sense, process, and act in physical environments.

The history of science and technology is punctuated by figures whose ingenuity transcended their era.

Among these luminaries stands Ismail al-Jazari (1136–1206), a polymath whose work during the Islamic Golden Age laid the foundation for modern mechanical engineering and robotics.

Known as the “Father of Robotics,” al-Jazari combined artistry, practical engineering, and theoretical insight to create devices that were centuries ahead of their time. His seminal work, *The Book of Knowledge of Ingenious Mechanical Devices* (كتاب في معرفة الحيل الهندسية), remains one of the most influential technological manuscripts in history.

Born in 1136 CE in the region of Upper Mesopotamia, likely in Cizre (modern-day Turkey), al-Jazari lived during a period of intellectual flourishing known as the Islamic Golden Age.

Al-Jazari served as chief engineer at the Artuqid court in Diyarbakır, where he designed hydraulic

systems and mechanical devices for palaces and public works. His position allowed



Al-Jazari, as imagined by Al

him to experiment and refine his ideas over decades, culminating in a body of work that blended utility with elegance.

Completed in 1206, كتاب في معرفة الحيل الهندسية is a masterpiece of medieval engineering. It catalogues 50 mechanical devices, including water clocks, automata, fountains, and water-raising machines.

The book is divided into six chapters, each detailing a category of inventions, accompanied by 174 intricate diagrams and step-by-step instructions. Unlike many contemporaries, al-Jazari documented his work meticulously, ensuring its transmission to future generations. This book is remarkable not only for its technical content but also for its artistic quality. The diagrams are vibrant and precise, reflecting al-Jazari's dual identity as an engineer and an artisan. Scholars have likened the book to a modern "do-it-yourself" manual, emphasizing practical construction over abstract theory.

Al-Jazari's inventions reveal a profound understanding of mechanics, hydraulics, and automation. Here are some of his most notable contributions:

1. The Elephant Clock

Perhaps his most famous creation, the Elephant Clock was a complex water-powered timepiece incorporating elements from diverse cultures—Indian, Greek, and Islamic. It featured an elephant housing a hidden mechanism that marked time through a sequence of movements, including a mahout striking a cymbal. This device symbolized both technological ingenuity and cultural synthesis.

2. Water and Candle Clocks

Al-Jazari designed several types of clocks, including water clocks and candle clocks, which demonstrated his mastery of fluid dynamics and timekeeping. These devices were not merely functional; they were often adorned with elaborate figures and automata, blending science with art.

3. Automata (Early Robots)

Al-Jazari's automata were groundbreaking precursors to modern robotics. He created humanoid figures capable of performing tasks autonomously, such as serving drinks or washing hands. One notable example is the Peacock Fountain, a handwashing device featuring mechanical servants offering soap and towels. Another marvel was a robotic musical band on a boat, designed to entertain royalty.

4. Water-Raising Machines

His practical inventions included Saqiya chain pumps and other water-lifting devices, which were vital for irrigation and agriculture. These machines employed crankshafts and gears—mechanisms that would become fundamental in later engineering developments.

Al-Jazari is credited with the earliest known use of the crankshaft, a component essential to modern engines. This innovation exemplifies his

ability to anticipate mechanical principles that would dominate engineering centuries later.

Al-Jazari's approach was deeply empirical. He emphasized craftsmanship and iterative design, often relying on trial and error rather than abstract calculations. His work reflects a synthesis of theoretical knowledge and practical skill, embodying the spirit of applied science.¹ Moreover, his devices were not purely utilitarian; they were imbued with aesthetic and cultural significance. By integrating artistry into engineering, al-Jazari elevated mechanical design to a form of creative expression.

Al-Jazari's legacy extends far beyond his lifetime. His concepts of programmable automata, hydraulic control, and mechanical gearing prefigure modern robotics and automation. Historians regard his work as a cornerstone in the evolution of cybernetics and control systems.

Leonardo da Vinci and other Renaissance engineers were likely influenced by al-Jazari's designs, which circulated through translations and manuscripts. Today, his principles resonate in fields ranging from robotics to industrial automation, underscoring the timeless relevance of his ideas.

Al-Jazari's inventions were not isolated technical feats; they were embedded in the cultural fabric of the Islamic Golden Age. His work reflects values of knowledge-sharing, aesthetic refinement, and practical utility. In an era marked by political turbulence, his creations offered both functional solutions and artistic delight, serving farmers and entertaining kings alike.

Ismail al-Jazari stands as a towering figure in the annals of science and technology. His fusion of engineering precision, artistic creativity, and practical ingenuity earned him the title of "Father of Robotics" and a place among history's greatest inventors. Through his book

and inventions, al-Jazari not only transformed the mechanics of his time but also laid the groundwork for disciplines that define our modern world. His legacy is a testament to the enduring power of human imagination—a bridge between the medieval and the modern, the practical and the poetic.

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The World-Famous Physician

Our sixth hero Al-Razi cried twice in his life: First when he laid his hands on the book written by Hippocrates (Hippocrates) some 1500 years ago, and secondly when later in his life, he realised that he had transcended Hippocrates' capacity as a doctor and inventor.

Our hero Al-Razi cried first because he could not believe that someone (Hippocrates) could produce such an important work on medicine 1500 years before him. Al-Razi spent many years reading books written by Hippocrates. And he learned from his teacher Hippocrates every day.

Who was Hippocrates that made our hero Al-Razi cry twice?

Hippocrates was a Greek physician and philosopher who lived nearly 2400 years ago. He

is considered one of the most outstanding figures in the history of medicine. He is the "Father of Medicine". Hippocrates was the first person in history to invent the use of prognosis and clinical observation and the systematic categorization of diseases.

Hippocrates was the first man in human history who separated the discipline of medicine from religion, believing and arguing that disease was not a punishment inflicted by the gods but rather the product of environmental factors, diet, and living habits.

In fact, the Hippocrates school of medicine revolutionized ancient Greek medicine, establishing it as a discipline distinct from other fields such as theurgy and philosophy.

This means, it was through Hippocrates that established medicine as a profession for the first time in history.

Following in the foot-steps of Hippocrates, our hero Al-Razi is considered the first professional doctor in history. Al-Razi believed that the field



Razi, as imagined by Al

of medicine should not be for money, but to serve humanity.

Abu Bakr Muhammad ibn Zakariya al-Razi, commonly known as Al-Razi or Rhazes in the West. He was one of the most renowned and influential scholars of the Islamic Golden Age.

Al-Razi's contributions spanned several fields, including medicine, chemistry, philosophy, and alchemy, making him a true polymath.

Born around 865 AD in Rayy, near present-day Tehran, Iran, Al-Razi lived during a period when the Islamic world was a beacon of scientific, philosophical, and cultural progress. He was celebrated for his intellectual curiosity, commitment to empirical observation, and rationalist approach to knowledge. His works and ideas left an indelible mark on both the Islamic and Western intellectual traditions.

Al-Razi's early life remains somewhat obscure, but it is known that he began his studies in his

hometown of Rayy, a city renowned for its learning and scholarly pursuits.

Initially, Al-Razi focused on music and the arts, but later, he turned to philosophy, mathematics, and medicine, fields where he would make his most significant contributions.

His decision to shift to medicine is often attributed to his curiosity about the human body and the diseases that afflict it. He sought practical solutions to medical problems, and his empirical methods distinguished him from many of his contemporaries. Al-Razi's approach was grounded in observation and experimentation, challenging some of the accepted medical ideas of his time.

Al-Razi's most enduring legacy is his work in medicine. He is often regarded as one of the most important physicians in history, and his writings had a profound impact on both Islamic and European medical practices. His medical treatises covered a wide range of topics, from

general medical theory to specific diseases and treatments.

One of his most famous works **الحاوي** (The Comprehensive Book), was an extensive encyclopaedia of medical knowledge. It was a compilation of all the medical information available at the time, including Al-Razi's own observations and experiences. The work demonstrated his vast knowledge of Greek, Indian, and Persian medical texts, which he critically evaluated and synthesized. Al-Razi didn't just accept previous knowledge; he often questioned traditional medical authorities, including the revered works of Galen (Galen) and Hippocrates (Hippocrates).

"Al-Hawi" remained a cornerstone of medical knowledge in both the Islamic world and Europe for centuries. It was translated into Latin in the 13th century, where it became known as "Liber Continens", and served as a medical reference in European universities until the Renaissance.

Another of Al-Razi's ground-breaking contributions was his treatise كتاب الجدري والحسبا (On Smallpox and Measles). This work is considered one of the first comprehensive studies of infectious diseases. Al-Razi made detailed clinical descriptions of smallpox and measles, differentiating between the two diseases, which had often been confused by earlier physicians. His observations on the symptoms, progression, and treatment of these diseases were highly accurate and were used as a standard reference for centuries.

What was remarkable about Al-Razi's approach in this work was his insistence on direct observation of patients rather than relying solely on the theories of ancient authorities. He described the incubation period, symptoms, and stages of smallpox and measles with remarkable precision, helping to lay the foundation for modern clinical medicine.

Al-Razi also emphasized the importance of ethics in medicine. In his treatise A Spiritual Physic (A

Spiritual Physic), he discussed the moral responsibilities of physicians, advocating for compassion, honesty, and the well-being of the patient above all. He criticized physicians who were more concerned with profit than with healing, and he believed that medicine should be practiced for the sake of humanity.

This ethical stance, combined with his empirical methodology, made Al-Razi a pioneer in the field of medical professionalism. His focus on patient care, observation, and rationalism set him apart from many of his contemporaries, and his works continued to influence medical ethics and practice long after his death.

While Al-Razi is best known for his contributions to medicine, he was also a prominent figure in the field of chemistry and alchemy. His works in these areas earned him the title of "the father of chemistry" by some historians. His approach to alchemy, much like his approach to medicine, was grounded in experimentation and observation rather than mysticism or

superstition, which was common among many alchemists of his time.

One of Al-Razi's most important works in alchemy and chemistry is كتاب الأسرار (The Book of Secrets). This book was a practical guide to chemical processes, including instructions for the preparation of various substances and compounds. He described the distillation of alcohol, the preparation of acids, and various other chemical reactions, many of which were new at the time. His work laid the groundwork for future developments in the field of chemistry.

Al-Razi's practical approach to chemistry was a departure from the mystical and often secretive practices of earlier alchemists. He believed in the possibility of transforming base metals into gold, as was the goal of many alchemists, but he was more concerned with the practical applications of chemistry for medicine and industry. His work on acids, for example, had a significant impact on the development of industrial chemistry.

In addition to his work in medicine and chemistry, Al-Razi was also a philosopher who engaged deeply with the intellectual debates of his time. His philosophical ideas were often controversial, as he was a staunch advocate of reason and rationalism, sometimes at odds with the religious orthodoxy of his era.

Al-Razi was critical of certain aspects of Aristotelian philosophy, particularly Aristotle's views on metaphysics and the nature of the soul. In his philosophical writings, Al-Razi argued for a more empirical and rational approach to understanding the world. He believed that reason was the ultimate tool for discovering truth and that human beings could arrive at a better understanding of the universe through observation and critical thinking rather than relying solely on religious or metaphysical doctrines.

The Five Eternal Principles

One of Al-Razi's most famous philosophical ideas was his theory of the Five Eternal Principles,

which he believed governed the universe. These principles were:

- 1. God – The creator and sustainer of the universe.**
- 2. Soul – The animating force in living beings.**
- 3. Matter – The physical substance from which all things are made.**
- 4. Space – The void in which matter exists.**
- 5. Time – The continuous flow in which events occur.**

Al-Razi's idea of the five eternal principles was a unique synthesis of various philosophical traditions, including Greek, Persian, and Indian thought. His emphasis on reason and empirical observation, even in metaphysical discussions, reflected his commitment to rationalism.

Al-Razi's influence extended far beyond his own time, both in the Islamic world and in Europe. His works were translated into Latin, and he became known as "Rhazes" in medieval European texts. His medical writings, in particular, were studied

in European universities for centuries and helped shape the development of Western medicine.

In the Islamic world, Al-Razi was celebrated as one of the greatest scholars of his time, although some of his more controversial philosophical ideas were criticized by religious authorities. Nonetheless, his contributions to science, medicine, and philosophy were widely recognized and respected.

Al-Razi was a central figure in the Islamic Golden Age. Al-Razi was part of a tradition of inquiry and scholarship that emphasized the importance of learning, reason, and the pursuit of knowledge.

The institutions of learning that flourished during the Islamic Golden Age, such as the House of Wisdom in Baghdad, were places where scholars like Al-Razi could engage with the ideas of different cultures and traditions. His ability to synthesize knowledge from Greek, Persian, Indian, and other sources made him one of the most important intellectual figures of this era.

Al-Razi's contributions to medicine, chemistry, and philosophy were ground-breaking. His emphasis on empirical observation, rationalism, and ethical practice set him apart from many of his contemporaries and laid the foundation for modern scientific and medical thought. As a polymath of the Islamic Golden Age, Al-Razi's work transcended cultural and geographical boundaries, influencing both the Islamic and Western worlds. His legacy endures as one of the most important thinkers of the medieval period, a testament to the power of reason and inquiry in the pursuit of knowledge.

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The Second Teacher

Our seventh hero, Al-Farabi, also known in the West as Alfarabius (Alfarabius) is widely recognized as one of the most influential philosophers of the Islamic Golden Age and a pivotal figure in the history of philosophy.

Born in 872 AD in Farab (today's Kazakhstan), his contributions span a variety of fields, including philosophy, science, music, logic, and politics.

Often referred to as "The Second Teacher" (the first being Aristotle), Al-Farabi's works bridged the philosophical traditions of ancient Greece and the burgeoning intellectual culture of the Islamic world, laying the foundation for centuries of intellectual inquiry.

This essay delves into Al-Farabi's life, his key works and ideas, and the legacy he left for subsequent generations.



Farabi, as imagined by Al

Al-Farabi was born into a Persian-speaking family in the region of Farab, in what was then the eastern reaches of the Abbasid Caliphate. His early life remains shrouded in mystery, but he is

believed to have received a robust education, possibly in Baghdad, the intellectual heart of the Islamic world at the time. Baghdad was a melting pot of Greek, Persian, Indian, and Arab intellectual traditions, and the Abbasid Caliphate's commitment to translating and preserving classical knowledge facilitated Al-Farabi's education.

He later studied in Harran and perhaps in Damascus and Aleppo, where he found patronage under the Hamdanid ruler Sayf al-Dawla. This relationship allowed him the financial stability and intellectual freedom to produce his most important works. Al-Farabi was known for his ascetic lifestyle, dedicating his life entirely to scholarship rather than material pursuits. He died in 950 AD in Damascus.

Al-Farabi earned the title "The Second Teacher" due to his mastery and development of Aristotle's philosophy. His intellectual contributions include the integration of Greek philosophy into the Islamic tradition and the

synthesis of Platonic and Aristotelian ideas. His work often sought to reconcile the rational philosophy of the Greeks with Islamic theology, a task that later influenced great thinkers like Avicenna (Ibn Sina) and Averroes (Ibn Rushd).

One of Al-Farabi's significant contributions was his work on logic. Building on Aristotle's *Organon*, Al-Farabi expanded the field of logic into two branches: *Takhayyul* (imaginative reasoning) and *Burhan* (demonstrative reasoning). He emphasized the practical application of logic in both philosophical inquiry and daily discourse, making it a cornerstone of intellectual endeavors.

He also classified logic as a tool to achieve knowledge, distinguishing between rhetoric and dialectic, which serve persuasive and exploratory purposes, respectively. By clarifying the functions and limits of logic, Al-Farabi laid the groundwork for future Islamic philosophers and scientists.

Al-Farabi's metaphysical thought revolves around the nature of existence and the relationship between the material and the divine. In his view, God is the "Necessary Existent," a concept that later influenced Avicenna's ontology. Al-Farabi explored the emanation theory, derived from Neoplatonism, to explain the creation of the universe. According to this theory, God, as the source of all existence, emanates intellects, which, in turn, give rise to the celestial spheres and ultimately the material world.

This hierarchical vision of the cosmos reflected a synthesis of Aristotelian and Neoplatonic frameworks, adapted to align with Islamic cosmology. It also served as the basis for Al-Farabi's exploration of human intellect and its potential for achieving unity with the divine.

One of Al-Farabi's most enduring contributions is his political philosophy, primarily articulated in his work *Al-Madina al-Fadila (The Virtuous City)*. In this treatise, he constructs an ideal vision of

society, modeled on Plato's *Republic*. Al-Farabi argues that the ultimate purpose of human life is to achieve happiness, which can only be realized within a virtuous society governed by wise rulers.

In the virtuous city, the ruler serves as a philosopher-king, combining intellectual wisdom with moral virtue. Al-Farabi emphasizes the role of education and justice in creating a harmonious society and critiques cities governed by ignorance or selfish ambition. His political philosophy not only influenced medieval Islamic governance but also resonated with later thinkers during the European Renaissance.

Al-Farabi's expertise extended beyond philosophy and science into the realm of music. His seminal work, *Kitab al-Musiqā al-Kabir* (*The Great Book of Music*), is one of the most comprehensive studies of music in medieval times. In it, he examines the mathematical and scientific principles underlying musical harmony and explores music's psychological effects.

Al-Farabi categorized music as a tool for spiritual and emotional healing, recognizing its potential to influence human behavior and societal harmony. His understanding of music's theoretical underpinnings and practical applications earned him a lasting legacy as a pioneer in the field.

In addition to his philosophical and musical achievements, Al-Farabi made significant contributions to science, particularly in the fields of mathematics, astronomy, and medicine. He sought to establish a unified epistemological framework that could reconcile empirical observation with rational deduction.

In his epistemological works, Al-Farabi proposed a hierarchical classification of sciences, influenced by Aristotle's system. He divided knowledge into theoretical sciences (e.g., metaphysics, mathematics, natural sciences) and practical sciences (e.g., ethics, politics). This classification served as a guide for scholars,

shaping the curriculum of Islamic and medieval European universities.

Al-Farabi's emphasis on logical reasoning and empirical evidence influenced the development of the scientific method. By advocating for the integration of rational analysis with observational data, he paved the way for later advancements in natural philosophy and experimental science.

Al-Farabi's intellectual contributions had a profound and enduring impact on both Islamic and Western thought. His synthesis of Greek philosophy with Islamic principles laid the foundation for the flourishing of Islamic philosophy in the centuries that followed. Notable figures such as Avicenna and Averroes built upon his ideas, further developing the philosophical tradition he helped establish.

Al-Farabi's works were instrumental in shaping the intellectual framework of Islamic philosophy. His reconciliation of reason and faith provided a model for scholars grappling with the interplay

between religious doctrine and philosophical inquiry. His metaphysical and political ideas, in particular, resonated with later Islamic thinkers, who expanded upon his vision of human potential and societal organization.

Through translations of his works into Latin, Al-Farabi's ideas reached medieval Europe, where they influenced scholastic philosophers such as Thomas Aquinas and Albertus Magnus. His commentaries on Aristotle and his exploration of metaphysical and ethical questions enriched the intellectual traditions of the West, contributing to the Renaissance's revival of classical philosophy.

In contemporary times, Al-Farabi's vision of a virtuous society and his commitment to rational inquiry remain relevant. His emphasis on education, ethical governance, and the pursuit of knowledge resonates with modern discussions on social justice, intellectual freedom, and the role of philosophy in public life.

Al-Farabi's life and works exemplify the intellectual vitality of the Islamic Golden Age. As a philosopher, scientist, musician, and logician, he bridged cultural and intellectual traditions, creating a legacy that transcends time and place. His ideas on the nature of existence, the purpose of human life, and the organization of society continue to inspire scholars and thinkers across disciplines.

By integrating the wisdom of ancient Greece with the spiritual and intellectual currents of Islam, Al-Farabi not only preserved classical knowledge but also enriched it, ensuring its transmission to future generations. His enduring contributions underscore the timeless value of philosophy as a means of understanding the world and our place within it.

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Foundational Questions

In this book, I have aimed to offer you, the new generation of Afghanistan, a glimpse into the remarkable world of the Islamic Golden Age and the extraordinary figures who shaped it.

Now, it is your turn to explore and delve deeper into the ideas of the Islamic Golden Age and the remarkable achievements of this period.

I wish to leave you with the following three foundational questions:

- 1. What happened to these thinkers and their achievements?**
- 2. Why haven't we had thinkers, philosophers and innovators for the past 6-7 centuries?**

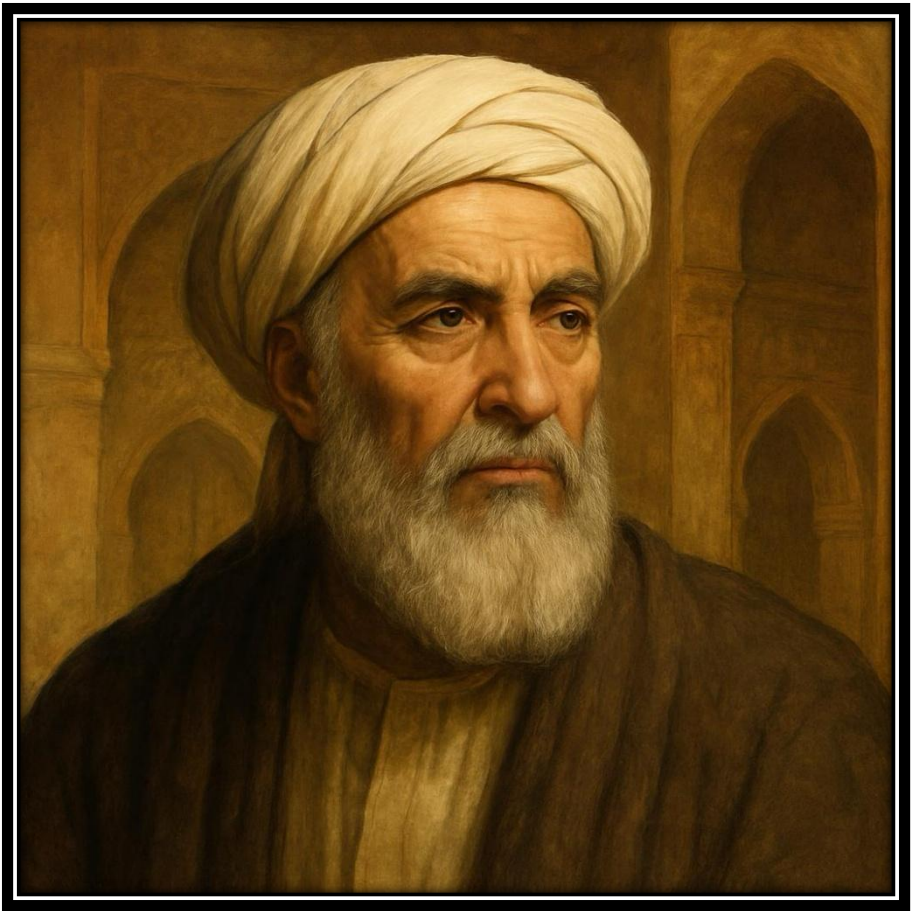
3. Why did the ideas of and achievements of the Islamic Golden Age heroes take off in the West, inspiring scientific, political and industrial revolutions and not in the East?

The Father of Social Sciences

Ibn Khaldun: The Father of Social Sciences and the Architect of History

The story of Ibn Khaldun (1332–1406) is the story of a man who dared to think differently—a historian, philosopher, and sociologist far ahead of his time.

Born in Tunis during the height of Islamic civilization, Ibn Khaldun's contributions transcended his era and left an indelible mark on the intellectual heritage of humanity. His masterpiece, the *Muqaddimah* (or *Introduction*), laid the groundwork for disciplines that would not fully develop until centuries later, earning him the title of “the father of sociology, historiography, and economics.” Yet, to simply label Ibn Khaldun a pioneer is to underestimate the richness of his



Ibn Khaldun, as imagined by AI

ideas and the extraordinary life that shaped them.

This essay explores Ibn Khaldun's intellectual legacy, delving into the ideas that made him a visionary, the context in which he lived, and the enduring relevance of his work in modern times. From his groundbreaking theories on the rise and fall of civilizations to his insights into human behavior and economics, Ibn Khaldun's life offers a fascinating lens through which we can understand not only his era but also our own.

To appreciate Ibn Khaldun, we must first understand the tumultuous world in which he lived. Born into a family of Andalusian Arab descent, Ibn Khaldun came of age during a period of political fragmentation and intellectual ferment in the Islamic world. The once-mighty Abbasid Caliphate had fractured into smaller states, and the Maghreb—his home region—was a battleground for rival dynasties like the Hafsids, Marinids, and Zayyanids. Meanwhile, the plague swept through Europe and the Middle East, decimating populations and destabilizing societies.

This chaos provided fertile ground for Ibn Khaldun's intellectual development. He witnessed firsthand the rise and fall of rulers, the fragility of empires, and the constant interplay of power, economics, and culture. It was a world in flux, where old certainties were crumbling and new paradigms were emerging. These experiences would profoundly influence his later work, as he sought to uncover the underlying patterns behind historical events.

Ibn Khaldun's most famous work, the *Muqaddimah*, was written as an introduction to a universal history of the world. Yet, it quickly outshone the main text, becoming a standalone masterpiece celebrated for its originality and depth. In the *Muqaddimah*, Ibn Khaldun sought to go beyond the mere narration of events. He aimed to understand *why* civilizations rise and fall, proposing that history is governed by universal laws rooted in human nature and social dynamics.

Central to Ibn Khaldun's philosophy is the concept of *asabiyyah*, or social cohesion. He argued that the strength of a civilization depends on its *asabiyyah*—the collective solidarity and sense of purpose that bind people together. Initially strong in tribal societies, *asabiyyah* enables groups to conquer and establish empires. However, as civilizations grow wealthy and complacent, their *asabiyyah* weakens, leading to decadence and eventual collapse.

This cyclical theory of history was revolutionary in its time. While earlier historians often attributed historical change to divine will or the actions of great men, Ibn Khaldun emphasized structural and sociological factors. His analysis foreshadowed the work of later thinkers like Oswald Spengler and Arnold Toynbee, who similarly explored the rise and fall of civilizations.

Another striking aspect of the *Muqaddimah* is its discussion of economics. Ibn Khaldun identified labor as the source of wealth—a concept that predates Adam Smith's *Wealth of Nations* by

centuries. He also explored the interplay between taxation, productivity, and state revenue, arguing that excessive taxation stifles economic activity and undermines the state—a principle echoed in modern economic theories like the Laffer Curve.

Ibn Khaldun was also a pioneer in historiography, the study of how history is written. He emphasized the importance of critical thinking and skepticism when analyzing historical sources. Recognizing that historians are often biased or misinformed, he developed a rigorous methodology for evaluating evidence, including cross-referencing accounts and considering the motives of narrators. This scientific approach to history was a significant departure from the uncritical chronicles of his predecessors.

Ibn Khaldun's life was as remarkable as his ideas. He was not an ivory-tower scholar; he was a man of action who navigated the treacherous waters of medieval North African politics. Over the course of his career, he served as a judge,

diplomat, and advisor to various rulers, often finding himself embroiled in court intrigues and power struggles.

In 1375, seeking refuge from political turmoil, Ibn Khaldun retreated to a remote fortress in Algeria, where he began writing the *Muqaddimah*. This period of solitude allowed him to reflect deeply on the patterns he had observed in his turbulent career. Yet even after completing the *Muqaddimah*, his life remained eventful. In 1382, he traveled to Egypt, where he was appointed the chief judge of the Maliki school of Islamic law. He later met the infamous conqueror Tamerlane during a diplomatic mission, leaving us with a vivid account of their encounter.

Throughout these experiences, Ibn Khaldun maintained a remarkable ability to adapt and thrive. His resilience and pragmatism not only ensured his survival but also enriched his understanding of human nature and society, which he poured into his writings.

Ibn Khaldun's ideas were centuries ahead of their time, and their influence has only grown with hindsight. While his work was initially confined to the Islamic world, it began to attract Western attention in the 19th century, thanks to translations by scholars like William MacGuckin de Slane. Since then, his insights have resonated across disciplines, from sociology and economics to political science and historiography.

Ibn Khaldun's emphasis on social structures and collective behavior makes him a precursor to modern sociology. Thinkers like Émile Durkheim and Max Weber, though unaware of his work, echoed many of his ideas about the interplay between society and the individual. Today, sociologists continue to draw on his concept of *asabiyyah* to study group dynamics and social cohesion.

Anthropologists, too, have found value in Ibn Khaldun's work. His observations on the transition from nomadic to sedentary societies, and the cultural shifts that accompany this

process, remain relevant to studies of human development.

In economics, Ibn Khaldun's insights into labor, taxation, and trade have earned him recognition as a proto-economist. His idea that prosperity depends on a balance between state intervention and individual enterprise prefigures the debates that dominate economic theory to this day.

Finally, Ibn Khaldun's contributions to historiography have inspired generations of historians. His insistence on critical analysis and his rejection of superstition and myth in historical writing were revolutionary, setting the stage for modern historical scholarship.

In our fast-changing world, Ibn Khaldun's ideas remain strikingly relevant. His cyclical theory of history offers a sobering reminder of the impermanence of power and the dangers of complacency. His emphasis on social cohesion speaks to the challenges of maintaining unity in diverse and polarized societies. And his insights

into economics and governance provide valuable lessons for policymakers grappling with issues like inequality and state capacity.

Moreover, Ibn Khaldun's intellectual humility and commitment to critical inquiry serve as a model for scholars and thinkers in any field. At a time when misinformation and ideological rigidity threaten to cloud our understanding of the world, his example reminds us of the importance of questioning assumptions and seeking truth.

Ibn Khaldun was a man of his time and yet a man for all times. Rooted in the cultural and intellectual traditions of the Islamic world, he transcended them to create a body of work that speaks to universal human concerns. His *Muqaddimah* is not just a historical text; it is a timeless meditation on the forces that shape our lives and societies.

In studying Ibn Khaldun, we do more than honor a great thinker. We gain a deeper understanding of ourselves and our place in the grand narrative

of history. His life and ideas challenge us to think more critically, live more wisely, and build societies that endure. Seven centuries after his death, Ibn Khaldun remains not just a figure of the past but a guide to the future.

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The Father of Islamic Philosophy

Abu Yusuf Ya'qub ibn Ishaq al-Kindi (c. 801–c. 873 CE), widely known as Al-Kindi, occupies a distinguished place in the annals of history as one of the most influential thinkers of the Islamic Golden Age. As the first prominent philosopher in the Islamic world, Al-Kindi earned the epithet "The Philosopher of the Arabs."

Al-Kindi's contributions spanned various disciplines, including philosophy, mathematics, astronomy, medicine, chemistry, and music, making him a polymath in the truest sense. By integrating Greek philosophy with Islamic theology, Al-Kindi laid the foundations for the intellectual tradition that would flourish in the Islamic world for centuries.

Al-Kindi was born in Kufa, Iraq, around 801 CE during the Abbasid Caliphate, a period marked



Al-Kindi, as imagined by Al

by cultural and scientific advancement. His family belonged to the Kinda tribe, which traced its roots to southern Arabia. Kufa, an important

center of learning and culture, provided Al-Kindi with access to diverse intellectual traditions.

He later moved to Baghdad, the epicenter of the Islamic Golden Age, where he was associated with the Bayt al-Hikma (House of Wisdom). The House of Wisdom was a renowned institution established by the Abbasid caliphs, dedicated to the translation and study of Greek, Persian, Indian, and other scientific texts. It was here that Al-Kindi began his work of harmonizing Greek philosophy with Islamic thought, a project that would define his intellectual legacy.

Al-Kindi's most significant achievement was his role in introducing Greek philosophy to the Islamic world. He was profoundly influenced by the works of Aristotle, Plato, and other Greek thinkers, but he was not merely a translator or commentator. Instead, Al-Kindi sought to adapt and refine these ideas within the framework of Islamic theology.

Al-Kindi believed that philosophy and religion were not mutually exclusive but complementary

paths to truth. In his view, philosophy provided rational tools to understand the divine order, while religion offered spiritual guidance. This synthesis is evident in his treatise *On First Philosophy (Fī al-Falsafa al-ūla)*, where he argues that both reason and revelation originate from God and, therefore, cannot contradict each other.

One of his key contributions was his defense of philosophy against its critics within the Islamic community. Some scholars and theologians viewed philosophy as a foreign import incompatible with Islam. Al-Kindi countered this by emphasizing that philosophy—the pursuit of wisdom—was a universal endeavor that could enhance one's understanding of the divine.

In metaphysics, Al-Kindi's work focused on the nature of being, causality, and the existence of God. He adopted and adapted Aristotle's concept of the "first cause" to argue for the existence of a singular, eternal, and necessary being—God. However, unlike Aristotle, Al-Kindi

emphasized God's transcendence and role as the creator of the universe, aligning his metaphysical views with Islamic theology.

Al-Kindi also explored the nature of the soul, emphasizing its immortality and its connection to the divine. He believed that the soul's ultimate purpose was to attain knowledge of God, a journey that required both intellectual and moral discipline.

In the realm of epistemology, Al-Kindi distinguished between different types of knowledge, including sensory perception, rational thought, and divine revelation. He argued that human reason, while powerful, had limitations and needed to be complemented by divine guidance. This hierarchical view of knowledge underscored his effort to reconcile Greek rationalism with Islamic spirituality.

Beyond philosophy, Al-Kindi made groundbreaking contributions to various scientific disciplines. His work often involved the application of mathematical principles to solve

practical problems, reflecting his interdisciplinary approach.

Al-Kindi's contributions to mathematics included studies on arithmetic, geometry, and number theory. He is particularly remembered for his pioneering work in cryptography. In his treatise *On Deciphering Cryptographic Messages (Risāla fī Istikhrāj al-Mu'amma)*, he introduced frequency analysis, a method for breaking ciphers by analyzing the frequency of letters in a text. This technique laid the foundation for modern cryptography and remains relevant in contemporary data security.

Al-Kindi's work in astronomy and optics was equally influential. He wrote extensively on the movement of celestial bodies, timekeeping, and the structure of the cosmos. In optics, he built upon the theories of Euclid and Ptolemy, studying the nature of light and vision. His treatise *On the Rays of Light (De Aspectibus)* explored how light interacts with objects and the

human eye, foreshadowing later developments in the field.

In medicine, Al-Kindi wrote numerous treatises on topics ranging from anatomy to pharmacology. He was particularly interested in the therapeutic properties of plants and other natural substances, compiling detailed manuals on their uses. He also emphasized the importance of mathematics in medicine, advocating for precise measurements in the preparation of drugs.

Although Al-Kindi engaged with the field of alchemy, he was critical of its more speculative aspects. In his treatise *On the Refutation of the Art of Alchemy* (*Risāla fī Ibḥāl al-Kimiyā'*), he argued against the transmutation of base metals into gold, emphasizing the need for empirical observation and logical reasoning in scientific inquiry.

Al-Kindi was also a notable figure in the field of music theory. He studied the mathematical basis of musical scales and explored the relationship

between music and human emotions. His work on the therapeutic effects of music anticipated modern approaches to music therapy. By analyzing the physics of sound and the structure of musical instruments, Al-Kindi enriched the theoretical foundations of music in the Islamic world.

Al-Kindi's influence extended far beyond his lifetime. As a pioneer in the translation movement, he played a crucial role in preserving and transmitting Greek philosophical and scientific knowledge to the Islamic world. His works were studied and expanded upon by later Muslim philosophers, such as Al-Farabi, Avicenna (Ibn Sina), and Averroes (Ibn Rushd). Moreover, his integration of reason and faith inspired subsequent generations of thinkers in both the Islamic and Christian worlds.

During the Middle Ages, many of Al-Kindi's works were translated into Latin, contributing to the European Renaissance. His ideas influenced medieval scholars such as Thomas Aquinas, who

engaged with Islamic philosophy to reconcile faith and reason in Christian theology.

In contemporary discussions, Al-Kindi's emphasis on intellectual curiosity, interdisciplinarity, and the harmony between faith and reason remains highly relevant. His pioneering work in cryptography, for example, underscores the enduring importance of scientific innovation. Similarly, his advocacy for critical thinking and empirical observation resonates with modern scientific methodologies.

Al-Kindi's life and work exemplify the rich intellectual heritage of the Islamic Golden Age. As a philosopher, scientist, and polymath, he bridged cultural and intellectual traditions, creating a synthesis that continues to inspire. His contributions to philosophy, science, and the arts laid the groundwork for subsequent advancements in a wide range of disciplines. By championing the compatibility of reason and faith, Al-Kindi demonstrated the transformative

power of knowledge, leaving a legacy that transcends time and place.

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Commentary

The developed world stands at the threshold of what is being termed as the fourth industrial revolution, a transformative era marked by the emergence and integration of ground-breaking technologies. This exciting phase promises to revolutionize various aspects of our lives, introducing advancements that could redefine industries, enhance communication, and improve our overall quality of life.

As we delve into the historical context of these innovations, it becomes increasingly evident that a significant number of enlightened thinkers and pioneers from the Muslim world played a crucial role in making these remarkable advancements possible. Their contributions laid the groundwork for many modern technologies and scientific principles that we often take for granted today.

While there are countless individuals who can be celebrated as heroes of the Islamic Golden Age, I have chosen to highlight only ten of them in this discussion. Each of these remarkable figures has left an indelible mark on the world, showcasing the incredible intellect and creativity that flourished during this period.

My sincere hope is that this book serves as a catalyst for inspiration among my young readers. I encourage you to delve deeper into the rich history of the Islamic Golden Age and to uncover the stories of the many heroes whose innovations and ideas continue to shape our contemporary world. By exploring these narratives, I believe they will develop a greater appreciation for the diverse contributions our heroes made to science, art, and culture that have emerged from this significant era in history.

The Father of Pharmacology

Al-Baytar, often referred to as the "father of pharmacology," was a prominent figure in the history of medicine and pharmacy during the Islamic Golden Age. His contributions to the field of pharmacology, botany, and medicine have had a lasting impact on both Islamic and Western medicine.

To understand Al-Baytar's contribution to the world that we live in today, imagine this scenario:

During antiquity, or between the period of 2800 and 1500 years ago, humans discovered and invented 1000 medicines. During the Islamic Golden Age, the Islamic scholars invented nearly 400 new medicines. It was Al-Baytar who systematically compiled these 400 new additions

and added it to the previously 1000 known medicines.



Al-Baytar as imagined by Al

Baytar achieved this feat in the form of his most famous work, "Kitab al-Jami fi al-Adwiya al-

Mufrada," (The Comprehensive Book on Simple Medicaments). This book is considered one of the most important texts in the history of pharmacology. This book contains detailed descriptions of over 1,400 medicinal substances, including plants, animals, and minerals, along with their properties, uses, and preparation methods.

Al-Baytar organized the substances alphabetically, making it easier for practitioners to locate information. He often provided practical advice on preparation methods, dosages, and potential side effects, which was quite advanced for the time.

Al-Baytar's empirical methodology set him apart from many of his contemporaries. Rather than relying solely on ancient texts, he conducted first-hand studies and experiments. His travels allowed him to gather information from various cultures and regions, enriching his knowledge base.

This empirical approach laid the groundwork for the scientific method, emphasizing observation, experimentation, and documentation. His work encouraged others to pursue knowledge through direct investigation rather than mere speculation.

Al-Baytar, whose full name was Abu Muhammad Abd Allah ibn Ahmad al-Baytar al-Malaki al-Dimashqi, was born in 1197 in Malaga, Spain. He belonged to a family of scholars and was well-educated in various fields, including medicine, botany, and natural sciences. His upbringing in an intellectual environment fostered his curiosity and passion for the natural world.

Al-Baytar's education was significantly influenced by the rich traditions of Islamic scholarship, particularly in the fields of medicine and natural sciences. He studied under renowned scholars and developed a deep understanding of the works of earlier Greek and Roman physicians, as well as Islamic scholars such as Ibn Sina and Al-Razi.

Al-Baytar travelled extensively throughout the Mediterranean region, including parts of Spain, North Africa, and the Middle East, to collect samples of plants and study their medicinal properties. His first-hand experiences allowed him to challenge previous assumptions about certain substances and to introduce new findings based on rigorous observation.

Al-Baytar's methodology was revolutionary for his time. He rejected the reliance on ancient texts alone and advocated for a more scientific approach to medicine. He documented the effects of various herbs and compounds, emphasizing the importance of dosage and the preparation of remedies. This approach laid the groundwork for modern pharmacology and established principles that are still relevant in contemporary medicine.

Al-Baytar's contributions extended beyond pharmacology to the field of medicine as a whole. His work provided a comprehensive guide for physicians in the Islamic world,

influencing medical practice for centuries. He was among the first to categorize medicinal plants based on their therapeutic properties, which aided in the development of systematic approaches to herbal medicine.

Moreover, Al-Baytar's influence reached Europe, particularly during the Renaissance when scholars translated his works into Latin and other languages. His texts served as a bridge between ancient knowledge and new scientific discoveries, facilitating the exchange of ideas between the Islamic world and Europe. His impact is evident in the works of later European botanists and pharmacologists who built upon his findings.

Al-Baytar's legacy is significant in the history of science and medicine. His approach to pharmacology and botany marked a turning point in the understanding of medicinal substances, emphasizing the importance of empirical research and observation. His work has been recognized by historians and scholars as a

pivotal moment in the development of modern science.

In addition to documenting medicinal properties, Al-Baytar made significant contributions to the classification of plants. He identified and described numerous species, some of which were previously unknown in the Islamic world. His classification system helped lay the foundation for future botanical studies.

By categorizing plants based on their therapeutic effects, Al-Baytar established a framework that would influence herbal medicine for centuries to come. His meticulous descriptions of plants included information on their habitat, morphology, and preparation, which were essential for botanists and herbalists.

In contemporary times, Al-Baytar's contributions are celebrated in various ways. Institutions and organizations dedicated to the study of botany and pharmacology often reference his work as a foundational text. His name is associated with

several species of plants, showcasing his lasting impact on the field of botany.

Furthermore, Al-Baytar's story serves as a reminder of the rich intellectual heritage of the Islamic Golden Age. His work exemplifies the spirit of inquiry and innovation that characterized this period, demonstrating the importance of interdisciplinary collaboration in advancing knowledge.

Al-Baytar's contributions to the fields of pharmacology, botany, and medicine have left an indelible mark on the history of science. His emphasis on empirical observation, systematic categorization of medicinal plants, and rejection of reliance on ancient texts alone paved the way for modern scientific methods in medicine.

As we reflect on Al-Baytar's legacy, it is essential to recognize the interconnectedness of knowledge across cultures and the importance of preserving and celebrating the achievements of scholars from diverse backgrounds. Al-

Baytar's work not only enriches our understanding of the past but also inspires future generations of scientists and medical professionals to pursue knowledge with curiosity and rigor.

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The Father of Optics

Ibn al-Haytham, known in the Western world as Alhazen, was a groundbreaking Arab scientist whose work in the fields of optics, mathematics, and astronomy significantly influenced the course of science. Born around 965 CE in Basra, which is in present-day Iraq, he emerged during a time of immense intellectual curiosity and cultural flourishing in the Islamic Golden Age. His contributions have earned him the title "Father of Optics," and his methodologies laid the groundwork for the modern scientific method.

Ibn al-Haytham was born into a scholarly family, which fostered his early interest in science and mathematics. His education was rich and varied, encompassing not just the natural sciences but also philosophy and theology. He moved to Cairo, Egypt, where he immersed himself in a vibrant intellectual environment, surrounded by scholars and thinkers. The transition to Cairo

proved pivotal, as it was here that he began to delve deeply into his studies, particularly in optics.



Al-Haytham, as imagined by Al

During his early career, Ibn al-Haytham worked on various projects, including a proposal to construct a dam on the Nile River. However, his ambitions led to political turmoil, resulting in his imprisonment. It was during this period of confinement that he turned his focus inward, dedicating himself to scientific observation and experimentation. This shift marked the beginning of his most significant contributions to science.

The culmination of Ibn al-Haytham's work is encapsulated in his monumental treatise, "Kitab al-Manazir" (Book of Optics), written around 1021 CE. This seven-volume work is considered one of the most influential texts in the history of science. In it, he systematically explored the nature of light, vision, and the properties of lenses and mirrors.

One of his key contributions was the revolutionary theory of vision. Prior to Ibn al-Haytham, the prevailing belief was that vision occurred when light emitted from the eye

interacted with objects. He challenged this notion by proposing that vision is the result of light rays traveling from objects into the eye. This marked a significant advancement in understanding how we perceive the world around us.

Ibn al-Haytham's experiments with light led him to discover the principle of the pinhole camera—an early form of the camera obscura. By demonstrating how light travels in straight lines and how images can be formed through a small opening, he laid the groundwork for future developments in photography and optics. His description of the pinhole camera not only illustrated the principles of light and shadow but also provided a practical application that would resonate through the centuries.

What sets Ibn al-Haytham apart from his contemporaries is his unwavering commitment to empirical observation and experimentation. He believed that knowledge should be derived from direct experience rather than from the

authority of ancient texts. This empirical approach marked a departure from the predominant philosophical traditions of the time, which often relied on speculation and deduction.

In "Book of Optics," he meticulously documented his experiments and results, emphasizing the importance of replicating findings. His systematic methodology included carefully controlled experiments, observations, and the use of diagrams to illustrate his points. This rigorous approach anticipated the scientific method that would later be formalized in the works of Galileo and Newton.

One of his notable experiments involved the study of refraction, where he explored how light bends when passing through different mediums. He demonstrated this phenomenon using prisms and water, allowing him to explain why objects appear distorted when viewed through a glass of water. His work in this area not only advanced the understanding of light but also contributed

to the field of geometry, as he developed mathematical models to describe these optical phenomena.

In addition to his groundbreaking work in optics, Ibn al-Haytham made significant contributions to mathematics and astronomy. His studies in geometry included explorations of conic sections and the properties of parabolic mirrors. His work in mathematics was foundational, influencing subsequent scholars in the Islamic world and Europe.

Ibn al-Haytham's contributions to astronomy were equally noteworthy. He sought to improve the accuracy of astronomical observations and calculations, presenting critical challenges to the Ptolemaic system that had dominated for centuries. He conducted observations of celestial bodies and attempted to provide more accurate measurements of their movements. His work in this area laid the groundwork for later astronomers, including Copernicus and Tycho Brahe, who would build on his findings.

The legacy of Ibn al-Haytham is profound and far-reaching. His writings were translated into Latin and other languages during the Middle Ages, becoming essential references in European universities. Scholars such as Roger Bacon and Johannes Kepler drew inspiration from his ideas, recognizing the significance of his contributions to optics and the scientific method.

The impact of Ibn al-Haytham's work can be seen in various fields, including physics, astronomy, and even psychology. His exploration of light and vision influenced the development of theories related to perception and the understanding of how humans interact with their environment. His emphasis on observation and experimentation paved the way for the scientific revolutions that would follow in Europe.

Moreover, his influence extended beyond the realm of science. In art, the principles of light and shadow elucidated in his work became crucial for artists during the Renaissance, shaping their

approach to perspective and realism. The interplay of light and shadow in painting and architecture can be traced back to the foundational principles established by Ibn al-Haytham.

Ibn al-Haytham's life and work exemplify the spirit of inquiry that characterized the Islamic Golden Age. His groundbreaking contributions to optics, mathematics, and scientific methodology have left an indelible mark on the history of science. By championing experimentation over dogma and emphasizing the importance of observation, Ibn al-Haytham not only advanced the understanding of light and vision but also set the stage for the emergence of the scientific method.

His story is a testament to the power of curiosity, creativity, and the relentless pursuit of knowledge. Ibn al-Haytham's legacy continues to inspire scientists, scholars, and artists alike, reminding us of the interconnectedness of different fields of study and the enduring impact

of innovative thinking on the course of human understanding. In celebrating Ibn al-Haytham, we not only honor a remarkable scientist but also acknowledge the rich intellectual tradition that has shaped our understanding of the natural world. His life is a beacon of intellectual achievement, illustrating the transformative power of inquiry and the timeless quest for knowledge.

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Decline and Stagnation of the Islamic Golden Age

Looking at the Islamic Golden age through the lives of our heroes, it is clear that the Islamic Golden Age was a remarkable intellectual and cultural achievements that occurred in the Islamic world from the 8th to the 13th centuries. During this time, Muslim scholars made significant advancements in various fields such as science, mathematics, medicine, philosophy, literature, and architecture.

Our heroes built upon the knowledge of ancient civilizations, particularly Greek and Roman civilizations, and expanded it through their own contributions. The Islamic Golden Age saw the establishment of renowned centers of learning, such as the House of Wisdom in Baghdad, where scholars from different cultures and backgrounds worked together, translating and

preserving ancient texts and conducting groundbreaking research. The discoveries and innovations made during this period laid the foundation for many scientific and philosophical ideas that continue to shape our world today.

The obvious question that arises is that what happened to the Islamic Golden Age? What was responsible for its decline and stagnation?

The collapse of the Islamic Golden Age was the result of a complex interplay of political, economic, social, and cultural factors that collectively undermined the achievements of this remarkable period in history. These factors include:

1. Political Fragmentation:

The Islamic Golden Age was largely supported by a unified political structure under the Abbasid Caliphate, which

provided stability and patronage for scholars, artists, and scientists. However, by the 9th and 10th centuries, the central authority of the Abbasids weakened due to internal strife, succession disputes, and the rise of regional powers. The emergence of independent dynasties, such as the Fatimids in North Africa and the Umayyads in Spain, led to a fragmented political landscape. This decentralization diluted the collaborative spirit that had fostered innovation and cultural exchange, as different regions became preoccupied with their own local governance and conflicts.

2. Invasions and Wars:

The Islamic world faced numerous invasions that disrupted its stability and prosperity. The most significant of these was the Mongol invasion, culminating in the sack of Baghdad in 1258, which was the cultural and intellectual heart of the Islamic world. The destruction of libraries, schools, and

institutions during these invasions resulted in a tremendous loss of knowledge and intellectual heritage. Additionally, the Crusades, which began in the late 11th century, diverted resources and attention from internal development to military conflicts, straining the economies and societies involved.

3. Economic Decline:

The economic prosperity that supported the Islamic Golden Age was linked to vital trade routes connecting Europe, Africa, and Asia. However, as European maritime powers began to explore new routes and establish trade networks, the traditional land-based trade routes that passed through the Islamic world began to lose significance. This economic shift weakened the financial foundations of many Islamic states, reducing their ability to fund educational and scientific endeavors. Additionally, the rising costs of defense

against invasions and the loss of trade revenues further strained economies, leading to poverty and instability.

4. Religious Intolerance:

As the Islamic world evolved, particularly from the 11th century onward, there was a growing emphasis on orthodoxy and a backlash against philosophical thought. The rise of conservative movements and scholars who promoted a strict interpretation of Islam often viewed the rationalist and scientific methodologies of earlier scholars as heretical. This shift resulted in the suppression of intellectual inquiry, with many scholars facing persecution or forced to flee. The decline in patronage for sciences, philosophy, and the arts led to a stagnation in intellectual progress and a retreat from the inquiry-driven culture that had characterized the Golden Age.

5. Loss of Interest in Science and Philosophy:

The focus on religious studies at the expense of scientific inquiry marked a significant cultural shift. As theological debates became central to educational institutions, the scientific inquiries that had previously flourished began to wane. Scholars who once pursued mathematics, astronomy, medicine, and philosophy found their interests sidelined, and many works from earlier periods went untranslated or ignored. The intellectual environment became less conducive to innovation and critical thinking, leading to a stagnation in scientific advancement.

6. Plague and Health Crises:

The arrival of the Black Death in the 14th century had a profound impact on the population of the Islamic world, as it did in

Europe. The massive loss of life resulted in labor shortages, economic decline, and social disruption. The breakdown of communities and the weakening of trade networks further exacerbated the challenges faced by Islamic societies. The public health crises made it difficult to maintain the same level of educational and cultural pursuits that had characterized the Golden Age, as communities struggled to recover from the devastation.

7. Colonial Encroachment:

By the late medieval period and into the early modern era, European powers began establishing colonies and exerting influence over Islamic territories. The rise of colonialism not only undermined local political structures but also imposed foreign economic systems that disrupted traditional ways of life. The exploitation of resources and the imposition of external

governance diminished the autonomy and cultural identity of many Islamic societies. This colonial pressure made it increasingly difficult for these societies to support the kinds of intellectual and cultural pursuits that had once thrived during the Golden Age.

Why the West Won?

In the section on Three Foundational Questions, I asked three questions. Below is question number 3 which I repeat here:

Why did the ideas and achievements of the heroes of the Islamic Golden Age take root in the West, sparking scientific, political, and industrial revolutions, but not in the East?

This question delves into a complex historical dynamic, shaped by various political, cultural, and social factors. Several key reasons contribute to this divergence between the West and the East:

1. Political Fragmentation and Stability:

By the late medieval period, many parts of the Islamic world were politically fragmented, with the rise of regional

powers and internal conflicts. In contrast, parts of Europe began to centralize power, laying the groundwork for nation-states. Stable political structures in Europe enabled the sustained investment in scientific inquiry and technological progress.

2. Intellectual Exchange and Universities:

During the Renaissance, European scholars actively translated, studied, and built upon the knowledge from the Islamic Golden Age. Universities in Europe became centers of learning, where ideas were freely exchanged and debated. This academic culture, along with the invention of the printing press, made knowledge more accessible and spread scientific ideas rapidly across the continent.

3. Colonial Expansion and Wealth:

European colonialism played a major role in financing scientific research and industrial innovation. The wealth generated from colonies allowed European nations to invest heavily in science, technology, and infrastructure. The East, particularly the Islamic world, experienced economic challenges and colonial pressures that hindered similar progress.

4. Religious and Cultural Factors:

In parts of the Islamic world, there was a gradual shift towards religious conservatism during and after the decline of the Golden Age, with some scholars and rulers opposing certain types of philosophical and scientific inquiry. In contrast, the European Enlightenment saw a separation of church and state, with intellectuals advocating for reason, experimentation, and skepticism, which accelerated scientific advancements.

5. Industrial Revolution and Technological Momentum:

Europe's embrace of the ideas from the Islamic Golden Age coincided with the dawn of the Industrial Revolution, a period of unprecedented technological and economic transformation. This created a feedback loop of innovation and progress, while many Eastern societies faced economic and technological stagnation due to external pressures and internal challenges.

In summary, while the Islamic Golden Age laid the foundations for many of the advances in science, mathematics, and philosophy, various historical factors—such as political fragmentation, colonialism, and differing cultural trajectories—meant that these ideas took hold more strongly in the West, fueling its revolutions in science, politics, and industry.

The Story of Our Shame

The story of the Islamic Golden Age is a story of shame for us. It is the story of our shame because none of us are familiar with the term Islamic Golden Age. I have never heard the term Islamic Golden Age from any Afghan or Muslim.

Why?

Why have the names of our Islamic Golden Age heroes died in our countries, but are alive and celebrated in the West until today?

Secondly, during my research, I found no Muslim sources to rely on for writing this book. All the sources are Western. Why?

It should be clear to us that we Muslims are sleepy nations because we forgot our scientific roots and by doing so, resorted to superstitions.

The real shame is that without the Western celebration of these Muslim heroes, we would never heard of these heroes and the Islamic Golden Age.

Conclusion

Today we stand at the cusp of a fourth industrial revolution. The ship of the first, second and third industrial revolutions passed us while we were asleep.

This book is a living proof of the fact that, we the people of the East, had a vision, we had the power to innovate, discover and invent. And we did it for more than five centuries.

But what happened to us? Why is it that it is centuries that we are asleep?

I have provided my answers to some of these questions in various parts of this book.

I invite the new generation of Afghanistan, and the future generations of Afghanistan, to explore this book, understand the deep themes of the book, and eventually ask themselves some deep and foundational questions.

In the last 250 years, the Western world has achieved, 100 literacy, near 100% employment for all their population, free education opportunities, healthcare for all, the best infrastructure in the world, and care for the environment.

Why not us? Why can't we achieve these things?

This book is designed to create questions in your mind and encourage you to seek to innovate, discover and invent.

I hope this book would have served it purpose to help you create a better Afghanistan for the future generations.

The End