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The History and Achievements of the Islamic Golden Age

Course Guidebook

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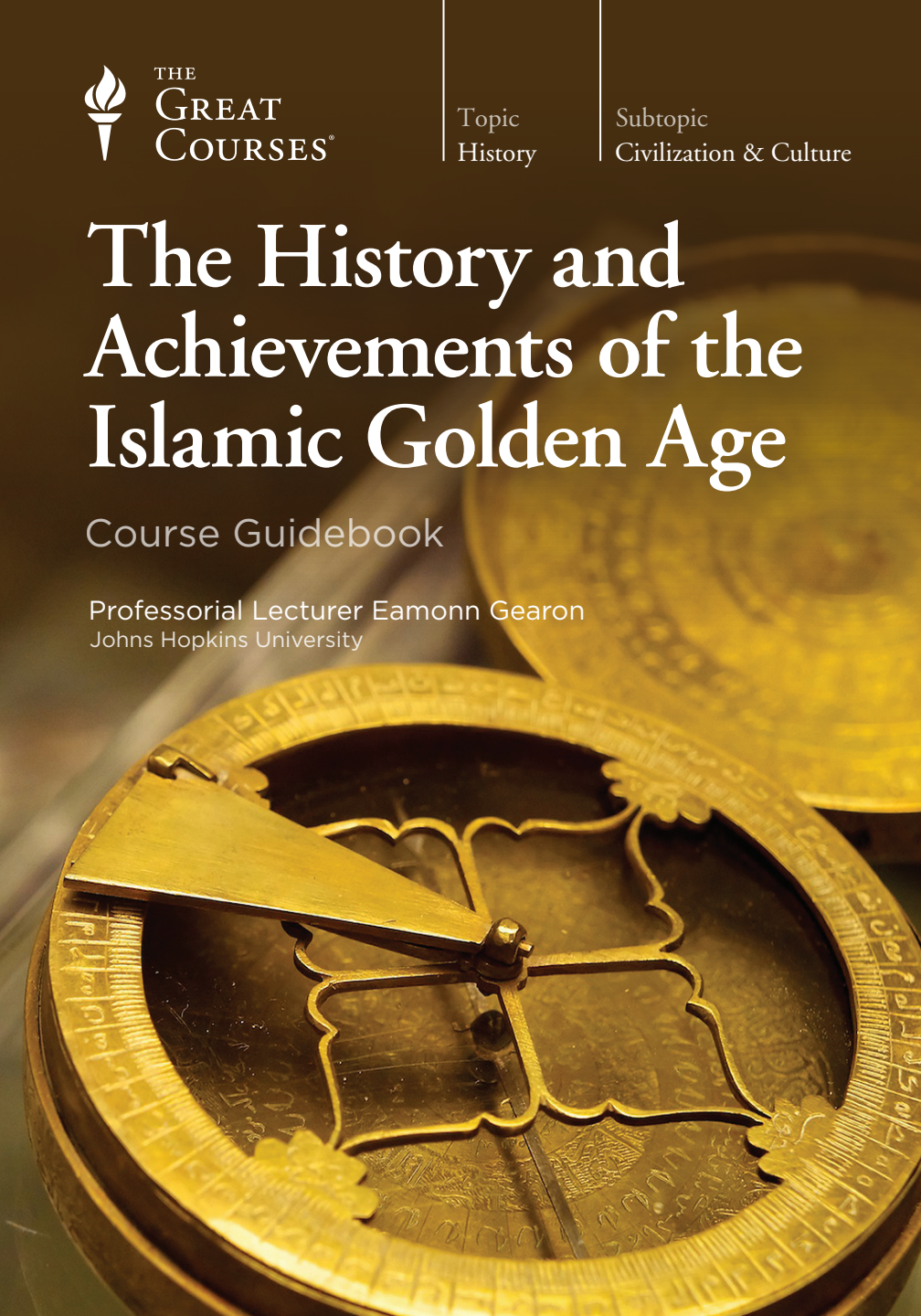

PUBLISHED BY:

THE GREAT COURSES
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researcher into military affairs and Islamist-inspired terrorism across the Middle East for organizations such as Jane's.

A camel expert, Mr. Gearon also spent years living in, traveling, and exploring the Sahara, both with the Bedu people and on a number of solo, camel-powered expeditions. These days, he enjoys his role as a public speaker; his presentations combine elements of Middle Eastern history and contemporary affairs. He is a distinguished speaker on Cunard's flagship *Queen Mary 2* and other vessels.

Mr. Gearon has published extensively on Middle Eastern history, culture, and contemporary politics. A regular reviewer for *The Times Literary Supplement* and other prestigious publications, he is also the author of *The Sahara: A Cultural History*. He has contributed to numerous other titles, including the *Encyclopedia of African History* (edited by Kevin Shillington), *Meetings with Remarkable Muslims: A Collection of Travel Writing* (edited by Barnaby Rogerson and Rose Baring), and *Sahara Overland: A Route and Planning Guide*.

Mr. Gearon has taught one other Great Course: *Turning Points in Middle Eastern History*. ■

Table of Contents

SUPPLEMENTAL MATERIAL

The History and Achievements of the Islamic Golden Age

Scope

The Islamic Golden Age was one of the most remarkable periods of scholarly achievement and cultural flourishing in human history. Covering the years from approximately 750–1250, the advancements made during this period are akin to the blossoming of wisdom in ancient Greece, or the later European Renaissance. Like ancient Greece and the European Renaissance, the Islamic Golden Age was made possible by a happy coincidence of politics, patronage, and great minds.

In addition to covering a 500-year period, your journey through this booming era of cultural flourishing and scientific discovery also covers a vast geographical area. Ranging over three continents—Asia, Africa, and Europe—you will explore events from Cordoba, in modern-day Spain, to Egypt's ancient capital of Cairo, examining such famous centers of trade as Samarqand, in central Asia, and Timbuktu, in the heart of the Sahara. The city of Baghdad, now the capital of Iraq, also plays a central role in the story of the Islamic Golden Age: The period begins in 750 with the rise of the Abbasid caliphate and the Abbasids' decision to establish Baghdad as their new capital, while the sack of Baghdad in 1258 by Mongol hordes marks the story's tragic closing chapter.

As you will learn, one of the more remarkable features of this period, in contrast with ancient Greece and the European Renaissance, is that

although it's called the Islamic Golden Age, its greatest successes came about when Muslim, Jewish, and Christian scholars lived and studied side by side. Conversely, whenever individual rulers abandoned this generally enlightened atmosphere of mutual tolerance and respect, their regimes soon suffered an attendant loss of status and greatness. You will meet giants of philosophy and theology such as al-Kindi, Ibn Sina (known in the West as Avicenna), Ibn Rushd (aka Averroes), and Moses Maimonides, one of the greatest Talmudic scholars who ever lived.

Individual lectures will cover such different fields of study as astronomy and astrology, alchemy and chemistry, water management and agriculture, food, music and storytelling, and major advances in medical theory and practice. You will also meet a man called al-Khwarizmi, from whose name we take the English word "algorithm," and who single-handedly developed a new field of mathematics dealing with "connections"—or, as he called it in Arabic, *al-gebr*—that we know today as algebra. Advances in sacred and secular architecture that took place across the Greater Middle East are also considered, including the rise of the arch, dome, and spire. Although Islam has a general prohibition on drinking alcohol, it was during the Islamic Golden Age that Muslim scientists first worked out the process of distillation.

In the more domestic setting, you will meet a man called Ziryab, who was responsible for introducing Europe to the three-course meal and numerous other enduring and everyday fashions. Taken together, these 24 lectures offer a remarkable journey through one of the most brilliant, and all too often overlooked, periods of achievement in all of human intellectual, scientific, and cultural history. ■

Lecture 1

From Camels to Stars in the Middle East

The Islamic Golden Age was a complex and fascinating period of history that encompassed every area of life and human endeavor. This lecture will provide an overview of this important period by examining the who, what, when, why, and how of the Islamic Golden Age. You will also be introduced in this lecture to several stories, people, and places that will recur throughout the course.

What Is a Golden Age?

- The ancient Greeks were the first to employ the concept of a golden age. To the Greeks, the golden age described a mythical past time, an era when men and gods lived together in harmony and all was right with the world.

- Ever since the Greeks coined the term during the 6th century B.C., it's been used as a reliable metaphor for countless places, empires, and fields of endeavor. For example, the Golden Age of Spain is reckoned to have started as early as 1492 and to have ended no later than 1659. The Golden Age of Children's Literature started around the middle of the 19th century and ended some 80 years later.

- Calling something a golden age is saying that it was the best of its kind (as opposed to the runners-up silver and bronze). The idea of a golden age also conveys an important sense of growth and

progress. Frequently this achievement involves building on past glories while also being progressively forward-looking. However, this does not always mean progressive ideas.

- Consider the complex character of the Sunni Muslim caliph al-Mamun, who ruled for 20 years from 813–833. His capital, Baghdad, was probably the largest city on earth, and his empire was the world's most powerful. This era of the Abbasid caliphate is often seen as the pinnacle of the 500-year Islamic Golden Age, from 750–1258.

- Al-Mamun was deeply imbued with non-Arabian ideas—notably Greek and Persian. One result of this was his heavy investment in research and scholarship. He filled Baghdad with the world's greatest intellects, who continued the important work of scientific and cultural advancement that al-Mamun's father, Harun al-Rashid, had begun when he established the House of Wisdom during his own reign from 786–809.

- Al-Mamun was driven in his search for wisdom by Greek rationalism, a school of thought that dealt with logic and observation, which he believed held the key to unlock most branches of knowledge—including religious faith. Al-Mamun's faith in rationalism brought him into direct conflict with many powerful, religiously conservative scholars.

- Al-Mamun and his emergent Sunni Islam branch of the religion in Baghdad had already displaced its predecessors, the Sunni Umayyad branch in Damascus. En route to developing the Baghdad-based Abbasid caliphate into the world's largest empire of the time, al-Mamun's ideas of rational philosophy and scientific enquiry vis-à-vis religion clashed with the traditionalists' view that revelation alone was sufficient for the faith.

- Al-Mamun argued in favor of a more rationalist approach and more original scholarship, and he attempted to undermine the authority of the traditionalist religious scholars by instituting an inquisition. Anyone who refused to accept the caliph's rationalist and free-thinking approach was subject to imprisonment, flogging, and even death by beheading—in a fashion not unlike the Spanish Inquisition of the late 15th century for its reach and terror.

- Religious debates were only one—often peripheral—aspect of the Islamic Golden Age. Countless avowedly religious men of the age—Muslims, Jews, and Christians alike—conducted advanced scientific experiments in optics, medicine, mathematics, and astronomy, as well.

- For example, the Banu Musa, or Sons of Moses—three brothers who worked for al-Mamun and subsequent caliphs—were renowned for creating hundreds of ingenious devices, including water fountains, mechanical toys, and novelty clocks.

- There was also the bacchanalian 8th-century Arab poet Abu Nuwas. Often called the greatest Arabic-language poet of all time,

he delighted in ridiculing the men of religion and scandalizing al-Mamun's court with poems in praise of wine, drunkenness, and both heterosexual and homosexual love. It is said that Abu Nuwas spent most of his life in pursuit not of progress, but of pleasure.

When and Why the Islamic Golden Age Began

- Why the Islamic Golden Age began is an involved question, and the period—like all human history—must be seen as a complex mix of factors that came together at one particular moment.

- One thing to consider is that the Abbasids' military strength at the start of the Islamic Golden Age meant that the caliphate was relatively secure. As a result, rather than spending more on defense, it could shift some of the empire's resources to scientific research.

- A related idea is that the great size of the caliphate—which covered the Middle East, North Africa, Persia, and more—contributed to its economic prosperity. Such expanse also meant diversity, as the cultures, philosophies, religions, and knowledge of Greece, Byzantium, Persia, China, India, and elsewhere were introduced into Abbasid society.

- Start and end dates for the Islamic Golden Age are open to debate, as is the case with many historical periods. In this course, we will be using certain historical dates that have been broadly used since at least the second half of the 20th century. Using these dates, the Islamic Golden Age begins in 750 with the overthrow of the Damascus-based Umayyads and the rise of the Abbasid caliphate. The end date is 1258, when a Mongol horde sacked Baghdad and destroyed its storehouse of knowledge and learning—the so-called House of Wisdom.

- Numerous arguments can be made for alternative dates: for instance, a start date of 762, when the city of Baghdad was founded; or 786, when Harun al-Rashid became caliph. Different end dates

have their supporters, too, including the first European Crusader invasion of the region in 1096. Others point to concluding dates well after 1258—including as late as the 15th and 16th centuries.

How the Islamic Golden Age Happened

- The scientific advances and cultural achievements that lay at the heart of the Islamic Golden Age spread outward from Baghdad first by migrating across the Abbasid empire, and then to the non-Abbasid corners of the Muslim world. Soon they found their way into non-Muslim lands, thereby advancing the cause of learning in Europe and elsewhere.

- How this brilliant burst of human attainment spread is an important but easily overlooked question. It began in the now long-lost House of Wisdom and the translation movement established by Harun al-Rashid in about the year 786.

- Al-Rashid's goal—and that of successive caliphs, starting with his son, the caliph al-Mamun—was to translate every manuscript and book of any intellectual worth, regardless of its geographical, cultural, or religious provenance. Consequently, the wisdom of the pagan Greeks was acquired just as greedily as that of Byzantine Christians, Persian Zoroastrians, and Hindus from India. This was a truly enlightened and areligious approach to knowledge acquisition on the part of the newly emerged Muslim superpower, the Abbasid caliphate.

> One thing to consider is that the Abbasids' military strength at the start of the Islamic Golden Age meant that the caliphate was relatively secure.

- Native Arabic scholarship had itself only recently emerged from its infancy. Fortunately, most caliphs employed the good sense to rely on Jewish, Christian, and other translators in the religious, ethnic, and cultural melting pot that the Middle East had been for millennia.

One of these was the Christian scholar Ibn Ishaq, whose prolific translations—working with his sons—saw him richly rewarded for his efforts.

- Another factor in the broad transmission of knowledge during the Islamic Golden Age was the rise of rival intellectual centers during this time—including in Cordoba, Cairo, and Samarqand—along with the sheer scale of the Muslim world from the 8th century onward.

- Geographers, travelers, and merchants—Muslim and otherwise—were able to move freely throughout the Muslim world during the time, encountering new ideas as they went. One of the most famous of these sojourners was a man named al-Masudi, known as the Arab Herodotus, who traveled from Baghdad to Persia, India, Sri Lanka, and China. The record of his journeys is an invaluable document of the 10th-century world.

Where the Islamic Golden Age Took Place

- While Baghdad lay at the heart of the Islamic Golden Age in the beginning, the Abbasid caliphate would eventually lose power at the edges of the empire, including in Andalusia, which is on the Iberian Peninsula of modern-day Spain and Portugal, and in North Africa and bits of central Asia and Persia.

- In time, many of these frontiers rose to become significant centers of culture and learning in their own right. For example, in 10th-century Cairo—the capital of the rival Shia Fatimid empire—the astronomer and mathematician Ibn al-Haytham led groundbreaking studies in optics and other branches of science that eventually were important influences on Leonardo da Vinci and others.

- Further west, in 12th-century Cordoba—in Andalusia—we meet Ibn Rushd. Better known in the West as Averroes, Rushd was a Muslim philosopher who defended the rationalism of Aristotle and became a major and unique influence on the medieval philosophy of all

Statue of Ibn Rushd (1126–1198) in Cordoba

three Abrahamic religions: Judaism, Christianity, and Islam. Here, too, lived one of the greatest Talmudic scholars of all time: Moses Maimonides, the man at the center of what some have called the golden age of Jewish culture in Andalusia. Its end would lead to his flight from Almohad Spain to safety in Fatimid Egypt.

Who Was Involved in the Islamic Golden Age

- In examining what, if anything, is Islamic about the Islamic Golden Age, we're confronted by the age-old problem of labels. The term should not be understood to convey the impression that this 500-year period of cultural and intellectual flourishing was driven by religion. These seeds and flowers were planted in earth under the feet of Muslim rulers, but geography was every bit as prominent, if not more prominent, than religious pursuit.

- Our study of the Islamic Golden Age is not about the history of Islam—or any one of the religions that contributed to this amazing period in human history. Rather, it's about the history and achievements of a civilization that had Islam as its state religion.

- The Muslim Arab caliphs who instigated and sponsored the Islamic Golden Age were among the first to admit the debts they owed to the wisdom of ancient Greece and elsewhere—wisdom that, in many cases, would have been lost forever had it not been for the caliph-sponsored translation movement. However, it would also be wrong—and ahistorical—to portray the Arabs as nothing more than passive receivers of foreign wisdom or, at worst, parasites who took and never gave.

- Arab scholars contributed innumerable original works in every branch of science, mathematics, engineering, technology, and almost every other branch of learning imaginable. Even so, it would be mistaken to imply that the scientific and other intellectual progress of this time and place was the purview of Arabs alone. It was not.

- Bernard Lewis, the British-American historian of the Middle East, once wrote that "[before the rise of Islam] virtually all civilisations…were limited to one region, one culture and usually one race. The Islamic culture of the Middle East was the first that was truly international, intercultural, interracial, in a sense, even intercontinental, and its contribution—both direct and indirect—to the modern world is immense."

- The Islamic Golden Age was an essential intellectual bridge between the ancient empires of Greece and Rome and the later European Renaissance that began in Florence during the 14th century. Even the dullest critic is forced to concede that the rebirth of Western European culture did not happen without the rediscovery of Greek and Roman culture. At the same time, the native Muslim scholars and others who brightened the course of the Islamic Golden Age were no mere custodians of earlier empires.

Suggested Reading

Kennedy, *When Baghdad Ruled the Muslim World*.

Al-Khalili, *Pathfinders*.

Koertge, *New Dictionary of Scientific Biography*.

Lapidus, *A History of Islamic Societies*.

Lyons, *The House of Wisdom*.

Morgan, *Lost History*.

Wallace-Murphy, *What Islam Did for Us*.

Questions to Consider

1. Is it appropriate to speak about the "Islamic Golden Age"? What do we mean when we say "Islamic" in this context?
2. What factors contributed to the dawn of the Islamic Golden Age? How similar was the situation compared to other periods of spectacular human achievement, such as ancient Greece or the European Renaissance?

Lecture 2

Ibn Battuta's Search for Knowledge

A 14th-century Moroccan named Ibn Battuta was the greatest wayfarer and excursionist of his day. He once wrote that traveling "leaves you speechless, then turns you into a storyteller." In this lecture, you will examine the story of the Muslim world through which Ibn Battuta traveled—from Tangier and beyond.

Ibn Battuta's Background

- Ibn Battuta was born on February 25, 1304, almost 50 years after the Muslim capital in Baghdad was destroyed by Mongol hordes.
- The sack of Baghdad in 1258 is regularly cited as the definitive end of the Islamic Golden Age in the Muslim Middle East. Ibn Battuta came through some years later, however, and what he describes does not sound like a ruined civilization:

> The baths at Baghdad are numerous and excellently constructed.... Each establishment has a large number of private bathrooms, every one of which has also a wash-basin in the corner, with two taps supplying hot and cold water. Every bather is given three towels, one to wear round his waist when he goes in, another to wear round his waist when he comes out, and the third to dry himself with. In no town other than Baghdad have I seen

all this elaborate arrangement, though some other towns approach it in this respect.

- We must keep two goals in mind as we consider the Muslim world of Ibn Battuta's day: First, we are going to see what it looked like after the Islamic Golden Age is reputed to have ended—all the while noting the intellectual and cultural inheritance that it retained. And second, we're going to reevaluate the somewhat conventional view that the Islamic Golden Age ended as abruptly as the 1258 sack of Baghdad suggests.

- The Middle East has never existed in isolation from the rest of the world. It has always been one with the world and world history. This was as true before the dawn of Islam in the seventh century as it has been ever since. Ignoring this is can lead to misunderstanding—and ignorance.

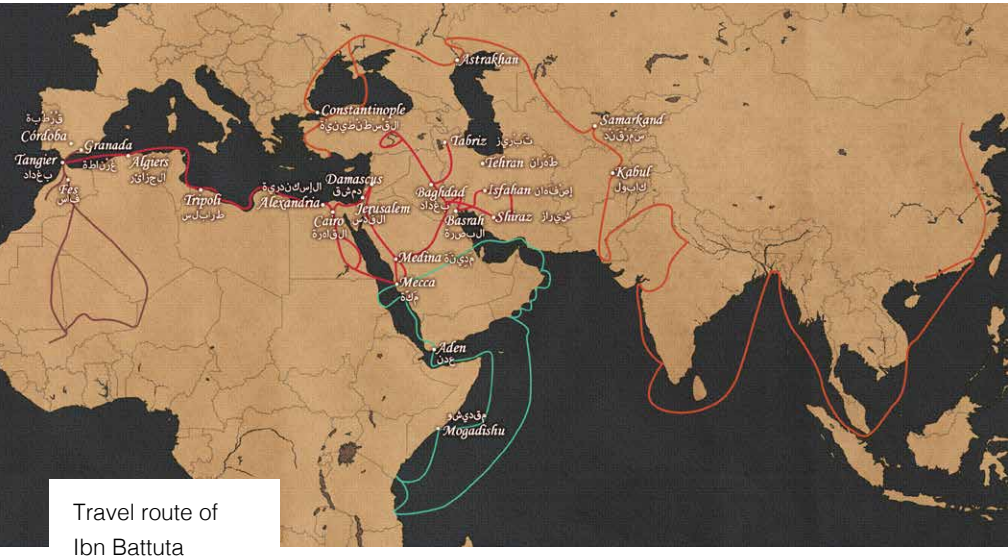
- "Ibn" means "son of" in Arabic, and it's a very common patronymic. "Battuta," on the other hand, is not a common name at all, but rather the word for "duckling." So our intrepid traveler is known to posterity as "The Son of a Duckling."

- Ibn Battuta's family was Berber, or native North African. They were known professionally as Islamic legal scholars, a field in which Ibn Battuta also trained.

- Virtually everything we know about Ibn Battuta's background comes from his writings about his travels. These began in June 1325 as Ibn Battuta set out from his home in Tangier to make the hajj, or pilgrimage, to Mecca. He was 21 years old, and he wouldn't see Morocco again for 24 years.

Ibn Battuta's Travels

- Ibn Battuta's first pilgrimage was to Mecca, in western Arabia, and other holy sites in the Islamic tradition. Apart from the impulse to



Travel route of Ibn Battuta

fulfill his religious duties—and honor Mecca—Ibn Battuta was driven broadly by curiosity of the world around him. He had a thirst for knowledge, and he wanted to get it firsthand.

- To get to Mecca, Ibn Battuta journeyed across North Africa via Tunis, Alexandria, and Cairo, the latter of which he describes as a city "boundless in multitude of buildings, peerless in beauty and splendour, the meeting-place of comer and goer, the halting-place of feeble and mighty."

- From Cairo he went north to Damascus, Jerusalem, and Bethlehem, before eventually turning back south to Medina and Mecca. Damascus had been the capital of the Umayyad empire, which ruled between 662 and 750, before the rise of the Abbasids, who made Baghdad their seat of power.

- When Ibn Battuta was in Damascus, it was still a bustling hub of culture and trade. With a population of approximately 100,000, Damascus sat at a crossroads that connected the Byzantine Empire to the Middle East, as far as Egypt, Persia, Asia Minor (modern Turkey), and the Black Sea.

- For the leg of his journey from Damascus to Mecca, Ibn Battuta traveled as part of a large caravan. The ruling Mamluks—a dynasty of former slave-soldiers who ruled Egypt for more than 250 years—did their best to protect caravans on pilgrimages from Damascus to Mecca. Pilgrim caravans were the lifeblood of the local economy, and it was in the authorities' best interests to keep these paths open and as safe as possible. Nevertheless, bandits were always a concern, and there was safety in numbers.

- After spending a month in Mecca, which entitled Ibn Battuta to the honorific of hajji—or one who has completed the hajj—the young adventurer decided that he wanted to continue his travels instead of going straight home to Tangier. It was at this point that he really began the path to becoming a great traveler.

- Again in the company of a pilgrim caravan, Ibn Battuta set out across the Najd—the desert heart of the Arabian Peninsula, in modern-day Saudi Arabia—before arriving in Najaf, in modern Iraq. There he visited the shrine of Muhammad's slain cousin and brother-in-law, Ali, who according to the Sunni tradition was the fourth caliph, or successor to Muhammad.

- Next, Ibn Battuta left the caravan he'd accompanied—which was bound for Baghdad—and instead headed for Persia, where he would spend the next six months visiting the Islamic medieval cities of Isfahan, Shiraz, and Tabriz. Isfahan, Shiraz, and Tabriz were large, flourishing cities active in region-wide trade, and they are a good example of the post–Islamic Golden Age cultural continuum.

- After visiting Persia, Ibn Battuta at last made his way to Baghdad. Arriving 70 years after the destruction of the former Abbasid capital, he wrote: "The western part of Baghdad was the earliest to be built, but it is now for the most part in ruins.... [And] the hospital is a vast ruined edifice, of which only vestiges remain." Nevertheless, the rebuilding of Bagdad had begun even during the reign of Hulagu Khan, the Mongol leader who'd ordered it destroyed.

- From Baghdad, Ibn Battuta visited a few sites in today's northern Iraq, including Mosul and the Sinjar Mountains, which has been the homeland of the Yazidis since the 12th century. The Yazidis are Kurdish speakers indigenous to modern Iraq, Syria, Turkey, and Armenia. The Yazidis' religion is an ancient, monotheistic faith that played a part in the development of the ancient Assyrian, Babylonian, Persian, and Jewish civilizations of the Middle East and was itself influenced by the Zoroastrian religion of Persia and Islamic Sufism.

- Ibn Battuta next traveled back to Arabia, completing his second hajj, before moving on to Yemen. To reach Yemen, he sailed across the Gulf of Aden—a deepwater basin between the Red and the Arabian Seas—to Somalia. From there, he sailed around the Horn of Africa and down the east coast of Africa via Mogadishu, in Somalia; Mombasa, in Kenya; Zanzibar; and as far south as Kilwa, in modern Tanzania. Ibn Battuta then sailed back up the coast to Oman.

The Yazidis are Kurdish speakers indigenous to modern Iraq, Syria, Turkey, and Armenia.

- He sailed next to the Persian Gulf on his way to his third hajj, in Mecca, and then on to various cities in Anatolia—including Constantinople, the capital of the declining Byzantine Empire, around 1332. At this moment in history, the Ottoman Empire was emerging in northern Anatolia. The Ottomans were, at least in terms of their cultural achievements, another worthy successor to the Abbasids. This should make us consider carefully

any claims about the end of cultural progress in the Greater Middle East coinciding with the end of the Islamic Golden Age.

- From Anatolia, Ibn Battuta visited the central Asian states of Afghanistan and India. From there, he made his way south to the Maldives—consisting of 26 coral atolls in the Indian Ocean—where he spent nine months before moving on again to Sri Lanka. He then traveled eastward to Burma, Malaysia, Sumatra in Indonesia, and possibly on to China.

- Ibn Battuta's journey homeward took approximately three years. Arriving in Damascus in 1348, the itinerant traveler learned that his father had died 14 years earlier. He resolved to go straight home. He reached Tangier in 1349 and discovered that his mother had also died a few months earlier, a victim of the Black Death.

- Ibn Battuta said that he lost most of his family, friends, and teachers from his early life to the Black Death, a pandemic of the bubonic plague. He was left totally bereft. Far from a glorious homecoming, he decided that there was nothing to keep him at home in Tangier, and he resumed his travels.

- Arriving in Andalusia, Ibn Battuta visited the city-state of Granada, one of a few remnants of the former caliphate of Cordoba, which once covered most of southern Spain and Portugal.

- Crossing the Strait of Gibraltar again, Ibn Battuta set his sights south and traveled to the Empire of Mali. He arrived in 1352 in what would later become the legendary city of gold, Timbuktu, in the heart of the Sahara. Ibn Battuta ventured 1,500 miles across the Sahara to reach Timbuktu—a hard journey, but still possible thanks to trade networks that connected the various Muslim Saharan kingdoms.

- Not always happy in his peregrinations, Ibn Battuta wrote disgustedly of the poverty and alien customs he encountered crossing the Sahara. He described the oasis of Taghaza as "a village with nothing

Ibn Battuta ventured 1,500 miles across the Sahara to reach Timbuktu.

good about it" and "the most fly-ridden of places." He was, however, impressed with the large amounts of gold being sold there.

Underappreciated Achievements

- In 1367, the year before Ibn Battuta died, Petrarch—an Italian Renaissance scholar and poet often called the father of humanism—wrote a letter to Pope Urban V in which he said, "I shall scarcely be persuaded that anything good can come from Arabia; but you learned men, through some strange mental illness, celebrate them with great, and unless I am mistaken, undeserved trumpeting."

- Petrarch's undisguised fear and loathing of the Muslim world—and his claims to cultural superiority and uniqueness—wantonly ignored the fact that he (like all of us) was an inheritor and beneficiary of the intellectual advances that occurred as part of the Islamic Golden Age.

- The 19th- and 20th-century Italian philosopher and historian Benedetto Croce famously said, "All history is contemporary history," meaning that all historians operate against the backdrop of their own times, with all the concerns, prejudices, and wisdom that that necessarily involves. For Petrarch, the rising power of the Ottoman Empire in the late 13th and early 14th centuries posed what he saw as an almost apocalyptic threat—that of a new, rising Muslim power threatening the West.

- The Ottomans had conquered beyond their heartland of northwestern Anatolia and established themselves in the Hellenic world of Byzantium (modern Greece) by the time Petrarch was writing to the pope. This was likely the root of Petrarch's distress, as well as his inability to separate the intellectual achievements of diverse groups of people in the Muslim world of one era from the military conquests of another set of people with the same religious background in his own day.

Suggested Reading

Daniel, *Islam and the West*.

Dunn, *The Adventures of Ibn Battuta*.

Ibn Battuta, *The Travels of Ibn Battuta*.

Mackintosh-Smith, *Travels with a Tangerine*.

Questions to Consider

1. How do Ibn Battuta's writings inform or correct our view of the Muslim world in the century following the 1258 sack of Baghdad?
2. Was Petrarch's antipathy toward the Muslim world primarily driven by political or religious concerns? Was he right?

Lecture 3

Arabian Nights Caliph: Harun al-Rashid

In this lecture, you will learn about Harun al-Rashid, an 8th- and 9th-century Abbasid emperor who is perhaps best known today for his numerous appearances in the book *The Thousand and One Nights*. Al-Rashid played an important role as midwife to the Islamic Golden Age, an era of shining intellectual, cultural, and technical innovation. As you will learn in this lecture, however, the period was no stranger to intrigues at court, within the vast Abbasid empire, and with neighboring powers.

Harun al-Rashid and the Barmakids

- Harun al-Rashid was born in 766 (or possibly 763) near Tehran, in modern-day Iran. His first name is the Arabic equivalent of the biblical Hebrew name Aaron, meaning "a high place" or "exalted." The surname al-Rashid—which was bestowed upon him later—is Arabic for the "rightly guided," "upright," or "just."

- Al-Rashid's mother was a strong-minded former slave named Khayzuran, originally from Yemen. His father, Mohammed al-Mahdi, was the caliph, the supreme religious and political leader of the time.

- A few years before Harun al-Rashid's birth, his great-uncle led a successful revolt against the former Arab Muslim dynasty known as the Umayyads, who were based in Damascus. Al-Rashid's grandfather, Abu Ja'far Abdallah ibn Muhammad al-Mansur,

succeeded the great-uncle in power and established Baghdad as the seat of the new caliphate. This empire came to be known as the Abbasid dynasty, and it would rule for the entirety of the Islamic Golden Age—from 750 until the Mongol sack of Baghdad in 1258.

- During the Abbasid uprising, a family of Persian origin—from the city of Balkh, in the northern part of modern-day Afghanistan—supported the revolt and were richly rewarded during al-Mansur's rule, which lasted from 754–775. This family was known as the Barmakids. Three generations of Barmakids played important roles in the development of the Abbasid empire—and in creating the conditions for the Islamic Golden Age to flourish. They were also very influential on the young Harun al-Rashid.

- Alexander the Great first captured the Barmakids' ancestral home of Balkh around 330 B.C., calling it Bactra. The territory fell to the Muslim Arabs' expansionist aims around 663. The Barmakids, although originally Buddhist leaders, moved to Basra in southern Iraq and converted to Islam.

- At the time of the Abbasid rebellion against the Umayyads, the Barmakids' patriarch—Khalid ibn Barmark—administered the family's territory in modern-day Iraq, overseeing military forces and collecting the local land tax. The Barmakids were known for their tolerant views on religion and philosophy, and they would come to be known for their support of the arts and sciences that emerged during the Islamic Golden Age.

- In approximately 779, the young Harun—as a boy of about 14 at the time—was named to lead an Abbasid military expedition against the Christian empire of Byzantium. He was accompanied by Khalid ibn Barmark's well-trained and capable son Yahya, who looked closely after his royal charge and ensured that the mission would be hailed as a success. That the two men subsequently ended up in jail together proved to be only a temporary inconvenience. Khalid ibn Barmark himself had run afoul of al-Rashid's grandfather,

al-Mansur, at one point, and al-Rashid's mother had helped to restore his privileges.

- Al-Rashid's elder brother, Al-Hadi, briefly ascended to the caliphate. But he died shortly after under mysterious circumstances. As a result, al-Rashid, now 20 years old, became the fifth Abbasid caliph. Khalid ibn Barmark's son Yahya was made vizier, or chief minister. The year was 786, and Baghdad was the largest city in the world outside of China.

- From its carefully planned foundation just two decades earlier, Baghdad had grown into a sprawling metropolis with a population of between 800,000 and 1 million people. The greater Abbasid caliphate stretched from modern-day Morocco in the west to modern Turkey in the north and eastward across Persia and Afghanistan into Pakistan, up to the Aral Sea and portions of central Asia.

- Approximately 20 percent of the world's population lived within the Abbasid caliphate at its peak, and the empire covered 8 percent of the earth's land surface.

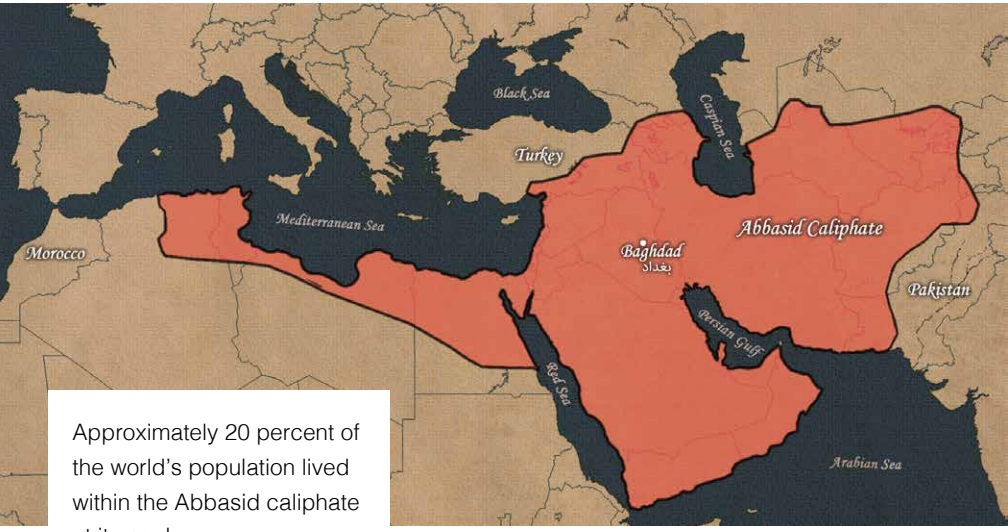
- Despite this vast empire, the Arabs lagged behind the artistic and cultural achievements of civilizations such as China, Byzantium, and Persia, reflecting their very recent emergence as a world power. Harun al-Rashid's fondness for—and appreciation of—Persian civilization can be seen as influencing his decision to surround himself with Persian advisors, most notably the Barmakids.

The Engine Room of the Age

- Although the height of the Islamic Golden Age lay a generation or more ahead, al-Rashid's caliphate was empowered by a large degree of territorial security at home, an overflowing treasury, and the new caliph's love of learning.

- Among al-Rashid's contributions to the Islamic Golden Age were the steps he took toward establishing the largest depository of books in the world in Baghdad. It was a concentration of learning and literature that would flourish for close to 450 years. This nexus also evolved into an important new intellectual force known as the translation movement, which preserved ancient works and ignited new thinking.

- Scholars in the employ of Harun al-Rashid made use of the collective wisdom of any—and every—civilization they came into contact with. They began by eagerly copying works from ancient Greece and



Approximately 20 percent of the world's population lived within the Abbasid caliphate at its peak.

Persia. The net spread from there, taking in texts for translation in the Chinese and Indian languages, as well as a multitude of Middle Eastern languages, including Hebrew, Aramaic, Syriac, and Assyrian.

- The caliph himself was said to be personally interested in poetry and philosophy. He also employed scholars to conduct original research in a myriad of other subjects, including astronomy, astrology, medicine, physics, mathematics, geology, and metallurgy.

- Harun al-Rashid's adventure in learning was assisted enormously by something that the earlier caliphate, the Umayyads, had gained for the Middle East: the technology required to make paper. Imported from China either immediately after the Battle of Talas, in 751, or very shortly thereafter, affordable papermaking on a large scale radically altered the translation process and made widespread transmission possible through the simple expedient of producing multiple copies of any title.

- Scores of scribes were necessary for translation work and for the production of multiple copies of individual titles. Non-Muslim Jewish, Christian, Zoroastrian, and other scholars were all employed and well paid. Such employment was highly sought after, regardless of race or religion.

- When members of Baghdad's wealthy elite saw the interest and investment Harun al-Rashid was ploughing into scholarship, they decided to throw some money in that direction as well. Soon, wealthy merchants and military men were sponsoring their own scholastic efforts. After starting with translations of mathematical and tactical manuals from Persia, India, and China, locals soon produced their own, new work.

The Arabian Nights

- In the sprawling collection of folk tales known as *The Thousand and One Nights*—which have provided delightful storytelling opportunities for centuries and kept many a lamp burning—Harun al-Rashid is depicted as a powerful caliph who walks among his people in disguise at night. His royal court exudes opulence and a hint of menace. Many Western fantasies about what used to be called the Orient come from these tales. And if there's intrigue in the air, then Harun al-Rashid is at the center of it.

- Harun al-Rashid comes out of these stories looking pretty good. He is often set among trusted friends, such as his Persian viziers and hard-drinking poets, including those who represent the state—and others who challenge its norms. The overall suggestion is that he was a beloved character, or at least looked upon fondly by his subjects. Indeed, he is often presented as a sympathetic, thoughtful ruler.

- These stories are known formally as *One Thousand Nights and a Night*—or, in Arabic, as *Alf Layla wa Layla*—and there is no definitive collection of them. In their first centuries of existence, the tales existed solely in the oral tradition of storytelling. The collection grew

over time, with roots in various places, including India, Persia, the Middle East, and even Europe.

- The earliest fragments of the written Arabic texts come from the early 9th century. But even after the stories were written down in Arabic, they weren't set in stone. The tales came West in the early 18th century, and al-Rashid became a man lauded by Western writers and poets.

- Memorialized in poems by Longfellow, Tennyson, and Yeats, in novels from James Joyce's *Ulysses* to Salman Rushdie's *Haroun and the Sea of Stories*, and in films for children and adults alike, al-Rashid's fame has continued to grow.

Al-Rashid's Legacy

- Neither historians nor al-Rashid's contemporaries harbor much sympathy for the Abbasid ruler. Reynold A. Nicholson, the late English scholar of Islamic literature, considered al-Rashid a "perfidious and irascible tyrant, whose fitful amiability and real taste for music and letters hardly entitle him to be described as a great monarch or a good man."

- Throughout al-Rashid's 23-year reign, revolts broke out in several corners of the Abbasid empire, including in Egypt, Syria, and Yemen. The rival Idrisid dynasty established an independent territory in Morocco in the year 789. Another group, the Aghlabids, carved out a semi-independent territory in Tunisia a year later.

- Al-Rashid undermined his own legacy by devising a succession plan that envisioned one of his sons' becoming the caliph, or supreme religious and administrative authority, while another son would command certain provinces and military forces. This ended in disaster.

- Al-Rashid's vizier, Yahya, had two sons—Al-Fadl and Ja'far—the latter of whom was known for his love of parties and good living and was particularly close to al-Rashid. In a dispute the particular details of which are lost to history, al-Rashid ordered his dear friend Ja'far executed in 803, and parts of his body displayed around Baghdad. Ja'far's father and brother—Yahya and Al-Fadl—were both imprisoned, and died there.

- In the fall of 808, Al-Rashid himself fell ill while on his way to put down a revolt in Khorasan, in modern-day Iran. He died shortly after.

- Baghdad would reach arguably the pinnacle of its cultural greatness under Harun's firstborn son and successor, al-Mamun, who reigned for 20 years from 813–833.

- Al-Mamun spent more money on the House of Wisdom than his father had, and he attracted scholars to Baghdad in greater number. Scientific and artistic advances continued apace. But among the black marks on al-Mamun's time in power would be that he secured rule only after a civil war saw him defeat and execute his half-brother, al-Amin, under the ill-advised succession arrangement devised by their father.

- Al-Mamun took to persecuting Muslims whom he feared were disloyal or who didn't share his beliefs. Much of al-Mamun's caliphate would be marked by a protracted civil war and the beginnings of serious financial and political worries for the Abbasids. Local governors periodically challenged the caliph's authority, producing upheaval that would see Baghdad fall into the hands of Shia rivals

a few decades later. Al-Mamun also renewed fighting against the Byzantine Empire.

- It's easy to see why later Muslim historians looked back on Harun al-Rashid's time as caliph as a favorable period, by comparison. Out of all the historical figures in early Islamic history, al-Rashid is probably the best known today to those of us in the West. The fifth Abbasid caliph and founder of the House of Wisdom holds a unique place in the popular imagination.

Suggested Reading

Bobrick, *The Caliph's Splendor*.

Clot, *Harun al-Rashid*.

Hitti, *Capital Cities of Arab Islam*.

Irwin, *The Arabian Nights*.

Kennedy, *When Baghdad Ruled the Muslim World*.

Lyons, Malcolm, trans, *Arabian Nights*.

Questions to Consider

1. To what extent was Harun al-Rashid responsible for promulgating the Islamic Golden Age in the Abbasid caliphate?
2. How important were Persian influences in Harun al-Rashid's Baghdad, and how important were they for determining the character of the royal court and the pursuit of learning?

Lecture 4

The Arab World's Greatest Writer: al-Jahiz

This lecture examines the life and work of golden-age writer Al-Jahiz, who rose from humble origins to become the literary superstar of his day and is considered by many scholars to be the finest writer of Arabic prose who ever lived. This brilliant stylist wrote more than 200 books, mostly fiction, and those that have survived are still widely read today.

Arab Literature in the Islamic Golden Age

- All too often, discussions about the Islamic Golden Age begin and end with science. Perhaps this isn't surprising, given the many significant advances that took place during the period. But it's important not to lose sight of the advances and importance that literature also enjoyed, especially in the century after Baghdad was founded by the caliph al-Mansur in 762.

- The flood of intellectual activity that took place in Baghdad and other cities of the Sunni Muslim caliphate of the Abbasids in the 9th century marks the apogee in the development of literature and science across the 500-year Islamic Golden Age. Written Arabic was still a relatively recent innovation at the time.

- A distinct, recognizable Arabic alphabet first emerged in the first half of the 4th century. Before that, Arab literature relied exclusively

on oral transmission—most obviously in the poetic tradition of recitation. That changed with the dawn of Islam at the beginning of the 7th century.

- The religion of Muhammad, who lived from 570–632, had its roots in the urban centers of western Arabia. Islam was not—as is sometimes thought—born in the Arabian desert, where many believed the purest form of Arabic's oral poetic tradition could be found.

- As the Islamic empire rapidly expanded under Muhammad's successors, it required written records and communications—for business, for governing, and for every kind of legal necessity, from property deeds to tax records. The most obvious and immediate result was that Arabic literary output moved away from a purely oral tradition. At the same time, the Abbasid caliphate in Baghdad, which ruled most of the Middle East and wider Muslim world from 750 onward, was fully aware that literature was one mark of a great and cultured empire and therefore important to cultivate.

- While most Arab literary and cultural greatness at the time rested on the relatively recent projects of the Quran and on the Islamic religion itself, the empire's non-Muslim subjects often came from far older—and more established—artistic and literary cultures. Inevitably, the Arabs and the Arabic language borrowed a great deal of the linguistic power of Aramaic, Persian, and other regional tongues.

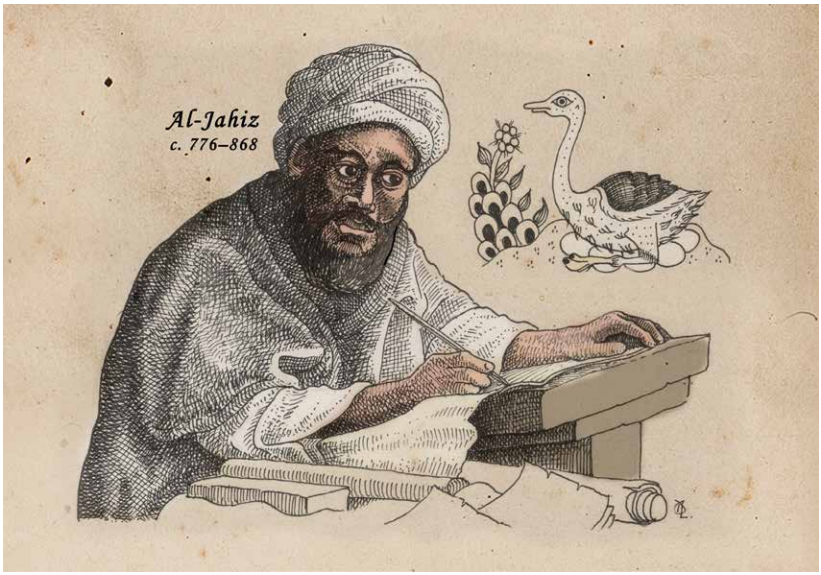
- During the second half of the 8th century, an official effort was organized in Basra, Baghdad, Samarra, and other Arab-majority cities to formalize the Arabic language, capturing the meaning of its lexis, or vocabulary, and solidifying the organization of its grammar. It was into this linguistic tumult that al-Jahiz was born, and it surrounded him as he grew up.

Al-Jahiz's Life

- The author commonly known as al-Jahiz was actually named Abu Uthman Amr ibn Bahr al-Kinani al-Fuqaimi al-Basri. The nickname "al-Jahiz" is a moniker usually translated into English as "boggle-eyed."

- The last part of the author's name, al-Basri, tells us that his immediate origins were the city of Basra in the southern part of modern Iraq. Today, this port and oil-production center is among Iraq's largest cities. Even in al-Jahiz's day, it was an important center of trade—and learning—and supported a cultural life surpassed only by Baghdad and perhaps Samarra, north of Baghdad.

- According to family tradition, one of al-Jahiz's grandfathers was a black African slave who had been freed. Such African roots might explain why al-Jahiz wrote at least one important treatise describing the differences between blacks and whites, as he saw them.



- Al-Jahiz's family was not prosperous, and this financial insecurity became more pronounced after al-Jahiz's father died when al-Jahiz was still an infant. In spite of his family's generally impoverished state, al-Jahiz was proud of the fact that his mother somehow scraped together enough to send him to the local Quranic school, where he received religious instruction and learned to read and write.

- After school, al-Jahiz was in the habit of attending lectures given by some of Basra's best scholars. He quickly became fascinated with discussions of Arabic philology, or the history and development of the language; lexicography, or the compilation of dictionaries and other word lists; and discussions of poetry. These were subjects that would inform the rest of his long life.

- As a young man, al-Jahiz wrote his first treatise on the nature of the caliphate. Al-Jahiz's mother, upon recognizing her son's talents, supposedly handed him a tray full of notebooks and told him that he would make his living from writing books.

- Among al-Jahiz's approximately 200 books and treatises are fables filled with animal characters, satires parodying the rich and famous, and a great deal of scholarly material on everything from the art of rhetoric to zoology. In addition, he wrote political and religious polemics and a number of influential works on the Arabic language in the areas of grammar, linguistics, and etymology.

- With the rise of the Arabic language's new literary traditions, it wasn't long before the practice of literary criticism developed. As in most written forms to which al-Jahiz turned his hand, he excelled at it. Although only 30 of his books survive today, they show his wide range of interests and his skill with the pen.

- Al-Jahiz moved to Baghdad in the year 816 when he was 40. Word about al-Jahiz's talent for learning and writing soon reached the caliph, al-Mamun, who was himself a young man of 30.

- At the time, al-Mamun was developing the great center of books and learning in the Islamic Golden Age known as the House of Wisdom, which his father—the late caliph Harun al-Rashid— had founded a few years earlier. Al-Mamun, like his father, was driven to spend madly on translations of Greek and Persian manuscripts and in hiring the best scholars of the day, and he summoned the young and promising al-Jahiz to the royal court.

- The caliph was keenly interested in interviewing al-Jahiz about becoming personal tutor to his children—an honor and position that no scholar could refuse. Not only would it have provided the seal of approval on al-Jahiz's professional reputation, it would also have been very financially rewarding.

- Unfortunately, while the caliph seems to have been impressed with the learned man from Basra, the caliph's children were scared of al-Jahiz's bulging eyes. Al-Mamun might have been the most powerful man in Arab lands, but his children were the ultimate authority when it

came to hiring the royal tutor. Al-Jahiz did not receive the post. From that point forward, he was stuck with his nickname, "boggle-eyed."

- Nevertheless, al-Jahiz's professional reputation grew stronger with each passing year, earning him enormous fame and fortune. This literary renown made him the most sought-after man of letters of his day.

Al-Jahiz's Work

- The British historian Albert Hourani, who wrote *A History of the Arab Peoples* and other works, once said of al-Jahiz, "His intellectual curiosity was far-reaching, and his works are collections of rare and interesting knowledge concerning the human and natural world… Beneath [which] runs a vein of moral commentary: on friendship and love, envy and pride, avarice, falsity and sincerity."

- Al-Jahiz had a particular talent for a fairly new literary form in Arabic known as the compilation. A compilation is an anthology of texts dealing with a single idea or topic.

- Compilations were supposed to be entertaining, although they might also offer advice to their patron or the wider readership. They also allowed the compiler (or editor) an opportunity to show off a little by displaying how widely read he might be on a particular subject. There were no boundaries to what the subject matter of a compilation could be.

- Al-Jahiz was a master of the compilation. The *Book of Misers*, one of al-Jahiz's most famous books, is a collection of 350 humorous and sometimes scandalous tales that remains popular today, no doubt because he delights in satirizing the rich and powerful.

- Al-Jahiz's other most famous book is *Kitab al-Hayawan*, or *The Book of Animals*. It is a natural history that shows the influence of earlier Greek literature—notably including Aristotle's work of the same title.

At the same time, al-Jahiz's *Book of Animals* is highly original and far more than a mere imitation.

- Drawing from any and every source he could lay his hands on, al-Jahiz in *The Book of Animals* offers jokes, anecdotes, and comments on everything animal-related, including etymology, history, and anthropology. He includes selections from the Quran and pre-Islamic poetry, along with from travelers' tales, popular stories, and personal observations, assimilating Arabic and non-Arabic sources.

- *The Book of Animals*, written centuries before Darwin published *On the Origin of Species*, makes more than one fascinating reference to al-Jahiz's views of evolutionary theory and natural selection. It also considers at length the impact of the environment and climate on plants and animals.

- Al-Jahiz, like all public figures of his day, was also involved in discussions about religion—primarily Islam, which was still developing in certain significant respects during the 8th and 9th centuries. Like his first royal patron, the caliph al-Mamun, al-Jahiz was a supporter of the now-defunct Mu'tazilite school of Islamic theology, which had its origins in al-Jahiz's hometown of Basra.

- Mu'tazilite followers advocated a philosophically rationalist approach to religion, arguing for a greater reliance on reason in matters of theology. Mu'tazilites also believed in the created—as opposed to eternal—nature of the Quran, arguing that if the Quran is the word of God, then logically God must have preceded his words. The opposite opinion—that the Quran is the uncreated, or eternal, word of God—won out over time and is part of modern Islamic orthodoxy.

Al-Jahiz had a particular talent for a fairly new literary form in Arabic known as the compilation.

- Al-Jahiz remained committed to the Mu'tazilite cause and wrote in favor of it, apparently without repercussions, even after one of al-Mamun's successors later abandoned the school.

Suggested Reading

Al-Jahiz, *The Book of Misers*.

Allen, *An Introduction to Arabic Literature*.

Irwin, *Night and Horses and the Desert*.

Montgomery, *Al-Jahiz*.

Questions to Consider

1. What does al-Jahiz's widespread use of satire say about the relationship between rulers and the ruled?
2. Why might it have taken more than 1,000 years after al-Jahiz for Western scientists to develop a similar theory of evolution?

Lecture 5

Algebra, Algorithms, and al-Khwarizmi

This lecture examines the work of two mathematicians of global importance during the Islamic Golden Age: al-Khwarizmi, a 9th-century scholar whose fields of study also included astronomy and geography, and Omar Khayyam, an eminent mathematician better known in the West today for his poetry. The scientific legacies of these two men were foundational to the flowering of mathematical inquiry that took place in Europe centuries later.

Mathematics Prior to the Islamic Golden Age

- The oldest extant mathematical texts come to us from the Babylonians and the Egyptians, and are dated around 1900 B.C. Although textual evidence is incomplete, math appears to have emerged as its own distinct discipline in China during the 11th century B.C.

- Chinese mathematicians appear to have been the first to come up with positional (or place-value) notation using base-10—i.e., assigning a place for the ones, a place for the tens, and so on. The Babylonians also used positional notation, but they employed a more complex, base-60 numerical system.

- By approximately the 6th century B.C., the ancient Greeks had turned mathematics into the subject we recognize today, one

dependent on deductive reasoning and proofs. Greek members of the Pythagorean school coined the term "mathematics" from the Greek word *mathema*, meaning "subject of instruction."

- The Arab world's interest in mathematics was already piqued during the Damascus-based Umayyad caliphate, the second of the four major Arab caliphates that presided over much of the Muslim world just prior to the beginning of the Islamic Golden Age.

- The caliphs—the Muslim world's chief spiritual and administrative leaders—employed Persian, Jewish, and Eastern Christian scholars to work with numbers, from simple arithmetical matters to more esoteric applications, such as astrology. This interest in mathematics expanded under the powerful Abbasid caliphate at the height of the Islamic Golden Age.

Al-Khwarizmi

- Muhammad ibn Musa al-Khwarizmi is a man whose very name is at the heart of algebra and algebraic calculations. The term itself comes from the title of one of his books, *The Compendious Book on Calculation by Completion and Balancing*; the Arabic word for completion (in the sense of restoration or fixing) is *al-gebr*.

- Al-Khwarizmi didn't invent algebra. Babylonian, Greek, and Indian mathematicians were all known to be solving algebraic equations long before he was. But the nature of al-Khwarizmi's book on completions (the *al-gebr*) makes him central to the adoption and application of this discipline.

- *The Compendious Book on Calculation by Completion and Balancing* would be translated from Arabic into Latin twice during the 12th century by two of the most important translators of their day: the Italian Gerard of Cremona and the Englishman Robert of

Muhammad ibn Musa al-Khwarizmi (c. 780–c. 850)

Chester. The book was a revelation to educated Europeans, and every well-stocked library would have had a copy.

- Al-Khwarizmi also wrote an important atlas and gazetteer: a corrected version of Ptolemy's 2nd century work *Geography*, which, among other things, gave locations of cities and other important places in the known world. Al-Khwarizmi's updated version not only corrected errors in Ptolemy's work, but added places not in the original and that were important in the Muslim world.

- Al-Khwarizmi's *Geography* reached Europe around 1400 and, in Latin translation, was of vital importance for European explorers, including Christopher Columbus. As a result, al-Khwarizmi has been called the first Muslim geographer.

- Born in modern-day Uzbekistan around the year 780, al-Khwarizmi was a Persian scholar who did most of his work in Baghdad's House of Wisdom. Like most of his fellow scholars at the time, al-Khwarizmi didn't work exclusively as a mathematician. Indeed, the more formal divisions between academic disciplines with which we're familiar today simply didn't exist in al-Khwarizmi's day.

- In its simplest form, algebra began life in the form of symbols that were employed in place of numbers. By manipulating these symbols, one could make calculations to discover hidden, or unknown, quantities.

- Al-Khwarizmi says in the introduction to his book on algebra that it possesses the mathematical skills "such as men constantly require in cases of inheritance, legacies, partition, lawsuits, and trade, and in all their dealings with each other or where the measurement of land, the digging of canals, geometrical computations and other objects of various sorts are concerned."

- Interestingly, when the word "algebra" first entered English, via Latin, in the 15th century, it was used to describe the medical procedure for setting broken or dislocated bones. Only in the 16th century did the term come to be associated with its own branch of mathematics.

Born in modern-day Uzbekistan around the year 780, al-Khwarizmi was a Persian scholar who did most of his work in Baghdad's House of Wisdom.

- The first part of al-Khwarizmi's seminal work lays out the mathematical procedures required in algebra; that is, the algorithms, or means by which we can solve equations. The second half is full of practical examples dealing with the application of algebra and discussing in detail the sort of everyday problems it can solve.

- Al-Khwarizmi, says the British theoretical physicist and author Jim al-Khalili, was the first to "abandon the practice of solving particular problems." Instead, he provided "a general series of principles and rules for dealing with" mathematical problems, by breaking equations down into "a set of steps" (the algorithm).

- By explaining the procedure in general terms, al-Khwarizmi demonstrated that the method itself could be conceived as general in nature, thereby allowing the reader to approach other algebraic problems by applying the same general procedure. This made it possible for algebra to exist as a subject in its own right, a distinct branch of mathematics, and not just as a technique for manipulating numbers.

Al-Khwarizmi and Arabic Numerals

- Hindu-Arabic numerals were invented in India at some point between the 1st and 4th centuries. At that time, all things Indian in the Middle East were referred to as "Hindu"; the numerals were not intended to represent any particular religious qualities.

- In the year 825, al-Khwarizmi wrote a book explaining the utilitarian advantages of Indian numerals and the decimal numbering system and introducing them into the Middle East. This work was probably called *The Book of Addition and Subtraction According to the Hindu Calculation*.

- This book likely was also the first on the decimal system to be translated into Latin, by the great medieval scholar Adelard of Bath some 300 years later. Adelard's text is untitled, although it's usually referred to by its opening words: "Dixit algorizmi," or "Thus said al-Khwarizmi."

- The Latinized form of al-Khwarizmi's name gives us the term "algorithm." In Europe, Adelard's text would get a more formal title many hundreds of years later, in the 19th century, when it came to be called *Al-Khwarizmi on the Hindu Art of Reckoning*.

- According to Swedish writer Jan Gullberg in *Mathematics from the Birth of Numbers*, Al-Khwarizmi's text is the oldest known writing using a fully developed numeration system. Robert of Chester's 12th-century translation of al-Khwarizmi's work erroneously assumed the numerals to be of Arabic rather than Indian origin. That said, the Arabs developed two versions of numerals based on the Hindu model: East Arabic, which is the dominant form today, and West Arabic, which, although now extinct, closely resembles the prevalent European version of numerals in use today.

- Pope Sylvester II is credited with the introduction of Hindu numerals into Europe. Because he knew the numbering system from Arabic

sources—and because Arab traders working in the Mediterranean brought these numbers into Italian and other ports—they became known as Arabic numerals.

- Apart from the numerals themselves, the most important and enduring innovation that Muslims scholars adopted from Indian mathematicians—again via al-Khwarizmi's writings—was the concept of positional notation. This concept was of enormous importance for later Western mathematical advances.

Omar Khayyam

- Born in Nishapur, Persia, in 1048, Omar Khayyam is best known in the West today for his poetry. During his lifetime, however, there were precious few references to him as a poet. He was regarded almost exclusively in the context of his mathematical and philosophical scholarship.

- Khayyam's "Treatise on Demonstration of Problems of Algebra" was one of the most important contributions to the field of algebra. Among other things, it provided a systematic discussion of the solution of cubic equations using intersecting conic sections. This was the first systematic study and the first exact method of solving cubic equations.

- Victor Katz, in his book *A History of Mathematics*, offers the following observation:

> A complete history of mathematics of medieval Islam cannot yet be written, since so many of these Arabic manuscripts lie unstudied.... Still, the general outline… is known.... Islamic mathematicians fully developed the decimal place-value number system to include decimal fractions, systematised the study of algebra and began

to consider the relationship between algebra and geometry, studied and made advances on the major Greek geometrical treatises of Euclid, Archimedes, and Apollonius, and made significant improvements in plane and spherical geometry.

- Various confessional groups down the millennia may claim otherwise, but science has no religion. When confronted with an equation, there is a right and wrong answer. In and of itself, mathematical and scientific truth is reason, unalterable. At the same time, it's important to set aside prejudice that might deny the scholastic fruits to which scholars working in the Arab and Persian worlds, especially in the 9th and 10th centuries, are fully entitled.

- Math may not have religion, but its study and original research was encouraged and paid for by a succession of Abbasid Muslim caliphs and other regional rulers. Thanks to their enlightened support, the West benefitted from Islamic scholarship in the same way that the Muslim Middle East did from the work of the Egyptians, Babylonians, Greek, Indians, and others before them.

Suggested Reading

Boyer, *A History of Mathematics*.

Al-Hassani, *1001 Inventions*.

Al-Khalili, *Pathfinders*.

Lyons, *The House of Wisdom*.

Morgan, *Lost History*.

Questions to Consider

1. How important were religion and religious observations in the development of mathematics?
2. How might al-Khwarizmi's interest in numerous artistic and scientific disciplines have contributed to his great mathematical achievements?

Lecture 6

Baghdad's House of Wisdom

Baghdad's House of Wisdom was the world's preeminent center for translation and original research during the Islamic Golden Age. In this lecture, you will learn about the translation work undertaken at the House of Wisdom, as well as the impact of the Arabic translation movement on its successor, the Latin translation movement in Western Europe during the 12th century. Along the way, you'll meet al-Kindi and Ibn Ishaq, two of the great figures in Arab translation.

The Translation Movement

- Islam emerged in 622 in a remote and relatively unimportant bit of Arabia. The prophet Muhammad died in 632. One hundred years later, the Umayyads (the predecessors of the Abbasids) found themselves ruling over a tri-continental empire that was the largest the world had seen until that time.

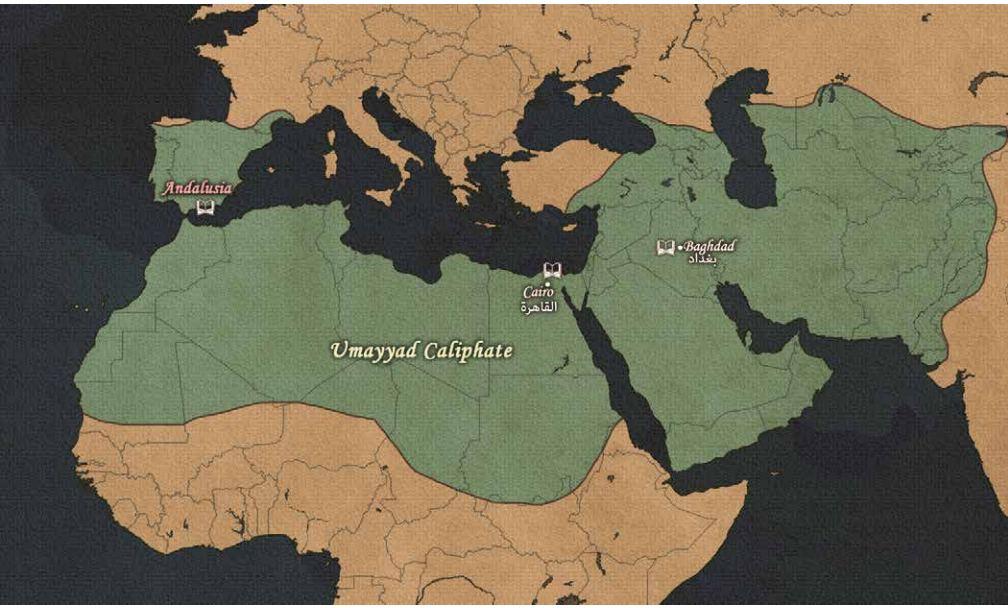
- The newly ascendant Arab Muslims felt their cultural backwardness acutely. The collapse of the Umayyad dynasty in 750 marked the end of an era of political unity that held sway across most of the Muslim world following the death of Muhammad.

- It would be wrong to imagine that the Umayyads in Damascus—who ruled before the Abbasids in Baghdad—had absolutely no interest

in foreign-language texts. We know, for instance, that the Umayyads commissioned translations of several medical and astronomical works. But there was nothing like the scale of the Abbasids.

- The Umayyads didn't translate any Greek philosophical works. They might deliberately have avoided Greek philosophy, focusing instead on more practical works. It's also possible that the Umayyads were wary of the potential that these alien philosophical ideas had to negatively impact Islam, which at the time was still a relatively new and dogmatically flexible faith.

- When the Abbasids came to power, they selected Baghdad as the site of their new capital as much for its geographical advantages—on a fertile plain between two rivers—as for political reasons. It was a clever move, placing them closer to the Persian heartland—befitting the large number of Persian-speakers the administrative apparatus



relied upon—and further from the Umayyad loyalists in the eastern Mediterranean littoral.

- The Abbasids were eager adopters of almost everything Persian, including the Persian tradition of translations. With talented Arabs, Jews, Christians, and non-Arab specialists from the Middle East and beyond all contributing, the quantity and variety of works translated during this period was staggering, including books on algebra, geometry, metaphysics, and logic, and endless treatises on astronomy and astrology.

- Dissatisfied with the rate at which his own translators could convert foreign texts into Arabic, the Abbasid caliph al-Mamun sent diplomatic missions to the Muslim emir of Sicily and the Christian Byzantine emperor in Constantinople requesting that they send him copies of every book in their libraries. Although they were political rivals of al-Mamun, the Muslim emir and the Christian emperor complied with al-Mamun's request. This cooperation belies the enduring myth of the clash of civilizations between the Muslim and Christian worlds.

- Once in Bagdad, texts received from the Abbasids' neighbors would be translated to Arabic and pored over by Baghdadi scholars. In this way, hundreds of years of commentary and revisions were added to the translated texts over the course of the Islamic Golden Age.

The Abbasids were eager adopters of almost everything Persian, including the Persian tradition of translations.

- Successive caliphs paid the translators working in the House of Wisdom handsomely, keeping the scholars happy and tempting more talented scholars to join them from across the Muslim world and beyond. This generosity peaked under al-Mamun, who reigned from

813–833. Scholars could expect to be paid the weight of a text in gold for each work they translated under al-Mamun.

Al-Kindi

- One of the greatest scholars of the Islamic Golden Age was a man named Abu Yasuf Yaqub ibn Ishaq as-Sabbah al-Kindi. Born in the southern Iraqi city of Basra around 801, al-Kindi was the senior scholar and occasional head of translation in the House of Wisdom. He stood out for the breadth and depth of his scholarship in a period before fields of study were rigidly separated.

- At the heart of al-Kindi's studies—and thus his reputation—are his philosophical writings, which drew heavily on ancient Greek learning. Indeed, Al-Kindi's relationship with the philosophical writings of the likes of Plato, Aristotle, and Plotinus was based on his translations of these philosophers. Al-Kindi's own philosophical inquiries emulated those of Aristotle.

- Al-Kindi, a devout Muslim, apparently never saw any conflict between his religious faith and the central tenets of Greek philosophy: reason and the logic. Incorporating a form of neo-Platonic rationalism, al-Kindi believed that religious books—and even the Quran—could be understood on different levels, without inherent contradiction.

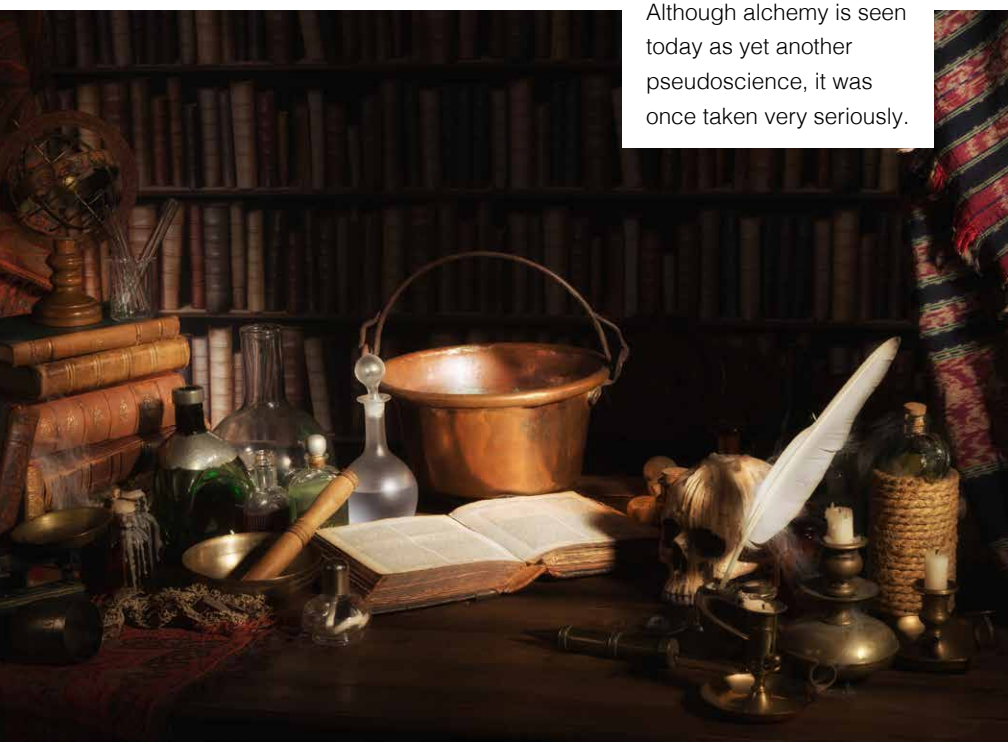
- In addition to his translations of Greek texts, al-Kindi authored some 230 original works, and he was the first Arab to produce a comprehensive ordering of the different branches of science then practiced.

- Al-Kindi's book *On Decrypting Encrypted Correspondence* was the most advanced in history until the Second World War, according to David Khan, a U.S. historian of cryptography. The secret of al-Kindi's success in this field was his original study of frequency analysis, a branch of mathematics originating in the Muslim Middle

East that analyzes the frequency of letters or groups of letters in a text to break a code.

- Al-Kindi was a dedicated believer in astrology, the pseudoscience that imagines the relative position of the stars and planets can somehow impact events on earth. He made a distinction, however, between what he believed was genuine and false astrology.

- Al-Kindi was a fierce critic of alchemy, the medieval predecessor of chemistry whose adherents believed it possible to convert base metals, such as lead, into precious ones, such as gold. Although alchemy is seen today as yet another pseudoscience, it was once taken very seriously. Al-Kindi, to his credit, derided alchemy as a



Although alchemy is seen today as yet another pseudoscience, it was once taken very seriously.

pseudoscientific refuge for those who were more interested in get-rich-quick schemes than they were in science.

Ibn Ishaq

- Hunayn Ibn Ishaq was an Arab Christian—specifically, a Nestorian Christian. Believing that Jesus had distinct (and separate) human and divine natures, Nestorianism emerged from what we now call Eastern Christianity.

- In spite of his religious beliefs, Ibn Ishaq was the caliph's doctor, as well as the head of translation in the newly established House of Wisdom. As such, he's rightly considered the spiritual founder of the translation movement.

- Not only did Ibn Ishaq convert more foreign texts than any other scholar of his time, he also improved translation methods, leaving behind a set of principles and practices that are still widely followed to this day.

- Probably the most important of his translations were the works of the second century philosopher and surgeon Aelius Galenus, or Claudius Galenus, better known as Galen of Pergamon. Galen's surviving work accounts for about half of all extant ancient Greek literature.

- Galen wasn't translated directly from Greek into Latin in the ancient world. It's largely thanks to Ibn Ishaq and his team of translators that we have what we do of Galen's medical works. Even today, much of Galen's work exists only in Arabic, or in later medieval Latin translations of those Arabic texts.

- In addition to the translations of Galen, Ibn Ishaq and his team managed also to translate the complete works of Hippocrates, the Greek physician in the age of Pericles. Like Hippocrates, Ibn

Ishaq believed that diseases had natural rather than divine causes—a departure from prevailing norms.

Ibn Ishaq believed that a translator's job was to understand and convey the meaning of an original work beyond the sum of its individual parts.

- Ibn Ishaq also translated Plato's *Republic*, most of Aristotle, and the entire Greek-language version of the Old Testament. Unfortunately, the latter work has not survived; as one of the earliest translations of the Old Testament, it would have been a singularly important text.

- When Ibn Ishaq started working in the House of Wisdom, the usual practice was to translate a text literally—word for word—regardless of how it might sound in the new, target language. Ibn Ishaq understood that such an approach wasn't suitable if one was interested in conveying the sense, as well as the literal meaning, of a text.

- Fluent in Syriac, Greek, Arabic and Persian, Ibn Ishaq argued that an effective translator must possess not just an impressive degree of language fluency, but also an understanding of idiom, nuance, and possible inferences in every word. He believed that a translator's job was to understand and convey the meaning of an original work beyond the sum of its individual parts.

- Ibn Ishaq's fluency in numerous languages and his professional legacy demonstrate that he was an extremely talented individual. While the Arab Muslim al-Kindi enjoyed the role and status of senior scholar in the House of Wisdom, the caliph al-Mamun was only too happy to appoint Ibn Ishaq—an Arab Nestorian Christian—as head of translation.

An Enduring Legacy

- During the first half of the 8th century, Baghdad emerged as the center of translation and scholarship in the Muslim world, but it

wasn't the only one. Competing centers of learning arose in what is known as Fatimid Cairo, in the 10th century, and in Muslim Andalusia, during the same period.

- In most cases, translators working in the House of Wisdom weren't just translators of knowledge from the Hellenic world, Persia, China, India and elsewhere; a wealth of original scholarship was also undertaken. The era's greatest translators, including al-Kindi and Ibn Ishaq, were responsible for the some of the greatest original scholarship during the Islamic Golden Age.

- The Umayyads and Abbasids alike, as Muslim believers, contented themselves with the idea that they were God's chosen people. But when they saw the cities of Persia and beyond, they knew that they had few of the cultural tools of other great civilizations. To their credit, they did something about it: They inherited the wisdom of Babylon, Egypt, Persia, and Greece. They made it their own, and passed eventually passed on the baton of intellectual progress to Europe.

- Indian numerals and Chinese paper both came to Europe via the Middle East during this period. Together, they helped propel the European Renaissance and modern science and literature. European scholars were dependent on the original scholarship of the Arabs and their partners: Jews, Christians, Zoroastrians, and others.

- The polyglot nature of Umayyad Andalusia from the 9th century onward—where one could expect to hear Arabic, Hebrew, Latin, and the local Romance languages—would, by the 12th century, see the emergence of a new, thriving translation movement that rescued Western Europe from the so-called Dark Ages. Just as Jews and Christians were at the vanguard of Baghdad's 9th-century translation movement, Spain's large Arabic-speaking Christian community led translation efforts there.

- After the 1085 conquest of Toledo, in modern-day Spain, by Christian forces, the new rulers inherited and preserved vast libraries that contained some of the leading scientific and philosophical thought from ancient Greece and Rome—and also from the Muslim Middle East.

Suggested Reading

Adamson, *Great Medieval Thinkers*.

Canfield, *Turko-Persia in Historical Perspective*.

Gutas, *Greek Thought, Arabic Culture*.

Hayes, *The Genius of Arab Civilization*.

Hitti, *History of the Arabs*.

Jackson, *Cambridge History of Iran*.

Questions to Consider

1. The Islamic Golden Age could not have achieved what it did without the translation movement. To what extent were early Persian influences responsible for making the Abbasid caliphs see the importance of early wisdom from Greece, Persia, India, China, and elsewhere?
2. Apart from any natural ability, how important were environmental factors in allowing the likes of al-Kindi and Ibn Ishaq to flourish?

Lecture 7

Muhammad, the Hadith, and Imam Bukhari

Of all the topics to consider when discussing the Islamic Golden Age, the story of the collected hadith focuses most closely on the religion of Islam itself. The hadith (or sayings) of the prophet Muhammad are a vitally important matter in Islamic theology, and they are the principal subject of this lecture. This lecture will also examine the life and work of Imam Bukhari, the man responsible for the first great collection of hadith.

Hadith

- At the most basic level, hadith are the sayings—and actions—of Muhammad. They provide guidance as to how a Muslim should properly lead his or her life. Over time, it was through various collections of hadith that Islam became more formally codified, more structured, and more dogmatic.

- The overwhelming majority of Islamic scholars view Imam Bukhari's book of Muhammad's collected sayings as the most authentic (and the most important) literature in the Islamic faith after Islam's most sacred text, the Quran itself. Akin to the Bible for Christians—or the Torah and other sacred texts for Jews—the Quran is held by

orthodox Muslims to have been revealed by God to Muhammad. But the text itself is believed to be eternal, meaning that it predated the revelation.

- Many early Muslims believed that the Quran held all the answers. In time, however, more and more Muslims felt the need for some additional guidance, especially in matters of daily life. Thus what Muhammad said and did was adopted as an example of the best way to live and behave. Accounts of Muhammad's sayings and actions were passed on through a chain of transmitters, from one generation to the next.

- Each hadith consists of two parts. The first part, the words themselves, presents Muhammad's words or actions. The second part presents the aforementioned chain of transmission—that is, how the words were passed down from Muhammad's day up to the point at which they were written down as hadith.

- According to Muslim tradition, one reason Muhammad's sayings weren't written down while he was alive is because he was worried that people might confuse his words as belonging to the Quran. By al-Bukhari's day, however, tens of thousands of sayings were being attributed to Muhammad. It was believed that many of these were false, forgeries and inventions.

- If one believes the tradition, Muhammad saw the potential problem lying ahead. There is even a hadith attributed to him in which he said, "There will be forgers, liars who will bring you hadith which neither you nor your forefathers have heard. Beware of them so that they may not lead you astray."

Imam Bukhari

- Born in 809 or 810 in the city of Bukhara, in modern-day Uzbekistan, al-Bukhari was the first man to take on the task of compiling and authenticating a hadith collection. In part because his was the very

first collection of hadith, it's still seen as the most important, and the most authentic—at least in Sunni Islam.

According to Muslim tradition, one reason Muhammad's sayings weren't written down while he was alive is because he was worried that people might confuse his words as belonging to the Quran.

- Al-Bukhari's birthplace is one of the most important locations on the ancient Silk Road, the network of trade routes that had, since approximately 100 B.C., connected China (and its export of silk) with India, central Asia, Persia, Arabia, and the eastern Mediterranean. Although the Muslim Arab invasion of Persia started in 633, the year after Muhammad's death, Bukhara was still on the very fringes of the Muslim world in al-Bukhari's day nearly two centuries later.

- Interestingly—and perhaps significantly—most great compilers of the hadith came from the fringes of the caliphate. Perhaps their remoteness from Islam's religious center in Mecca and its political capital in Baghdad made them feel compelled to assert their place in the faith. Or perhaps it was more important to codify the faith at its margins. In either event, they did this through Islamic scholarship that hadn't previously been cornered by Arab scholars.

- Al-Bukhari's father died when he was an infant. Al-Bukhari was a precocious child whose natural intelligence was spotted young. It's said that he started studying the hadith at the age of 10, and he was quickly able to challenge the opinions of older, respected Muslim scholars.

- A turning point in al-Bukhari's life came when he was in his late teens, when he made his pilgrimage, or hajj, to Mecca, along with his mother, brother, and other family members. Having performed the hajj, al-Bukhari decided to stay in Mecca and continue his

Having performed the hajj, al-Bukhari decided to stay in Mecca and continue his hadith studies there.

hadith studies there, no doubt excited to be in the religious heart of Islam.

- Naturally, Mecca attracted learned men from across the Islamic world, which allowed the youth to hear every possible opinion and school of thought then present in the Muslim faith. After some time, however, al-Bukhari decided that meeting only those who made pilgrimages to the city wasn't a thorough enough approach for his studies, so he started traveling throughout the Muslim world.

- For the next 16 years, al-Bukhari journeyed throughout the Arabian Peninsula—which covers modern Yemen, Oman, Saudi Arabia, the United Arab Emirates, Qatar, Kuwait, and southern Iraq and Jordan—as well as Egypt, Syria, Iraq, and his Persian homeland. Everywhere he went, he interviewed every scholar he could, amassing the widest collection of Muhammad's sayings that anyone had ever attempted to assemble.

- During his 16 years on the road, al-Bukhari is said to have interviewed 1,080 leading Muslim scholars. Between them, these men provided him with something on the order of 600,000 hadith for his collection. For the book that al-Bukhari eventually produced, he selected approximately 7,500 hadith that he decided could be considered genuine.

- To determine which hadith were genuine, al-Bukhari and his fellow hadith collectors traveled the Muslim world, speaking to scholars who could provide demonstrable, unbroken, and reliable lines of transmission for the utterances of Muhammad, from his time to their own.

- The full title of al-Bukhari's hadith is: *The Abridged Collection of Sound Reports with Chains of Narration Going Back all the Way to the Prophet Regarding Matters Pertaining to the Prophet, His Practices and His Times for Muslims*. The book is more typically referred to as *Sahih al-Bukhari*, or *The Authentic al-Bukhari*.

- Al-Bukhari's hadith is a book that is very much meant to be consulted. To make reference easier, the approximately 7,500 hadith are arranged into roughly 90 broadly thematic chapters covering a bewildering array of subjects, both religious and temporal.

- In al-Bukhari's hadith, one can find everything from Muhammad's ostensible opinion or revelations about the creation of the universe to instructions regarding how, when, and where to pray. The book covers topics such as marriage guidance, funeral arrangements,

and what to do and not do while making the hajj. Also in this collection are rules for conducting so-called holy war, or the lesser jihad—the greater, or more important, jihad being the nonviolent and never-ending struggle to be a better person.

- Alongside more obvious religious injunctions, the hadith provide advice on freeing one's slaves, what to do if one finds lost property, the importance of private property and good manners, restrictions on loans and repayments, and how to control one's temper.

The Question of Authenticity

- The most important question about Imam Bukhari's collection of hadith—a question to which we likely will never have an entirely satisfactory answer—is the question of authenticity. Are these hadith what they claim to be? Are they Muhammad's authentic words and actions? Western scholars, primarily non-Muslim, find it impossible to say either way. The hadith might be authentic, but they might not be.

During his 16 years on the road, al-Bukhari is said to have interviewed 1,080 leading Muslim scholars.

- Al-Bukhari's collection certainly contains some hadith that hold more appeal than others, at least from the perspective of 21st-century non-Muslims. Many hadith express kindness, compassion, and love for others. But there are any number of hadith that communicate a more violent message—including hadith that may be objectionable or simply wrong—as well as some that come across as nonsensical.

- The burden of evidence required to demonstrate that something is true beyond all reasonable doubt was far less rigorous in the 9th century, when al-Bukhari was traveling around the Middle East, than it is in the modern era. If we care about employing today's scholarly standards, there's not a great deal that one can add at this time.

- What we can discern with much greater certainty is the importance and impact that al-Bukhari—and the other hadith collections considered to be authentic—had for Islam down through the centuries. The late historian of the Arab world, Professor Albert Hourani of St. Antony's College, Oxford, once wrote of the hadith:

> No less important than the question of their origins is that of the way in which they have been used. At moments of political tension, when the enemy was at the gates, the ruler might ask the [religious scholars] to read selections from Bukhari in the great mosque, as a kind of assurance of what God had done for his people.

- Another important point about the hadith that remains relevant to Islam in the present day is the fact that Sunni and Shia Muslims continue to follow different hadith traditions. Sunni and Shia hadith collections differ because these two distinct traditions do not agree about the reliability of the narrators, or the transmitters, of the hadith.

- For example, there are those narrators who from the very beginning of Islamic history sided with the right of Abu Bakr and Umar to be the first and second caliphs, or successors, to Muhammad after his death. On the other hand, there were those who supported Ali, Muhammad's cousin and son-in-law, as the rightful first caliph. Ali would become the third caliph following the death of Muhammad, but this leadership dispute remains at the heart of the enduring Sunni-Shia split.

- Hadith critics—and hadith rejecters, as they're sometimes called—exist not only outside of Islam but within the faith itself. Believing that the Quran alone is sufficient, these Muslim Quranists, as they're also known, show complete disregard for any text beyond or outside of Islam's central statement of faith, including the hadith that came afterward.

Suggested Reading

Al-Bukhari, *Sahih al-Bukhari*.

Crone, *God's Caliph*.

Esposito, *The Oxford History of Islam*.

Janin and Kahlmeyer, *Islamic Law*.

Lapidus, *A History of Islamic Societies*.

Robinson, *The New Cambridge History of Islam*.

Questions to Consider

1. How reliable can an eyewitness account be after a 200-year transmission period?
2. How realistic is it to expect the complete sayings of any individual from the 7th century to have universal application or appeal after 1,400 years?

Lecture 8

Interpreting and Defending the Quran

An exegesis is a commentary that provides scholars with an academically sound introduction to the most important elements in a text. Scriptural exegeses serve another important purpose, however, which is to help create religious orthodoxy. In this lecture, you will learn about Quranic exegesis during the Islamic Golden Age. You will also examine the life and work of Muhammad ibn Jarir al-Tabari, one of the most important commentators in Islamic history.

The Importance of Exegesis

- According to the official accounts of the Muslim prophet Muhammad's life story, the Quran was revealed to him in the early 7th century over a period of 22 years. Muhammad, apart from being the conduit for these revelations—and for reciting them to his followers—was also responsible for explaining the revelations to the Muslim faithful. Muhammad should therefore be considered the first Quranic exegete, meaning someone who offers exegesis.

- After Muhammad's death in 632, the task of offering commentary fell to his companions, people who knew him personally. We can think of these companions as being the second phase of Islamic exegesis. However, because Muhammad's companions typically only commented on the revelation of the Quran as recited by the

prophet, rather than giving their own interpretations, they're not exegetes in the traditional sense of the word.

- It was in the generations that followed—when there was no longer anyone alive who'd known Muhammad personally—that Islamic exegesis really developed. During this third phase of *tafsir* (the Arabic word for exegesis), the Quran was fully interpreted, and more personal opinions were recorded on everything from points of Arabic grammar to personal names, family ties, and places.

- Alongside the Quran and *tafsir*, Islamic scholars and the Muslim faithful have two additional important literary sources at their disposal: the hadith, or sayings and actions of Muhammad, as heard or seen by companions and written down in the generation or two after his death; and the *akhbar*, or news, which refers to the accounts of the early community of Muslims—Muhammad's companions and others. Of these, the Quran has always had primacy. But after the Quran, it might be useful to think of *tafsir* as the most scholarly of the other Muslim sources.

- The primary purpose of exegesis is to explain and make clear the meaning of a text. But such an apparently simple definition conveys only a part of what exegesis involves. Among other things, there is the need to understand the historical setting in which particular words were set down—i.e., what the words meant to the first readers, in the particular historical context in which they lived.

- Exegesis also includes, but isn't limited to, providing definitions of unknown or uncommon words, explaining the meaning of particular verses—both the words on the page and any underlying or hidden meaning that may exist—and reconciling any verses that appear contradictory.

- The most important role of exegesis is to help establish religious orthodoxy. Orthodoxy not only brings a semblance of order to

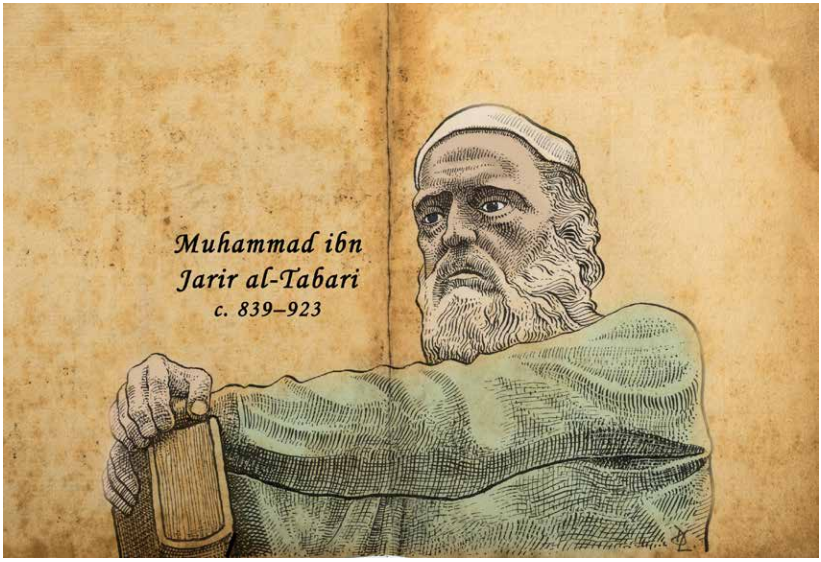
The Quran, Islam's most sacred text

religious belief, but also confers more than a little power on those who agree with, and strive to uphold, that orthodoxy. For this reason, it's easy to see just how important textual interpretation is for Islamic orthodoxy, as it is in Judaism and Christianity.

Al-Tabari

- Muhammad ibn Jarir al-Tabari was born in 839, some 200 years after the life of Muhammad. This was one of the most important eras for *tafsir*, when much of the most important work of writing and compiling commentaries took place. Al-Tabari proved to be one of the most important and enduring names in the field.

- Al-Tabari was Persian, not an Arab. He came from a province in northern Persia that borders the southern shores of the Caspian Sea.



His family name, al-Tabari, comes from the province of his birth, Tabaristan.

- Al-Tabari's being Persian is important because, quite frankly, the Persian civilization was far superior to anything the recently arrived Arabs had to offer, in many respects—though not in all. The Arab trump card was Islam, and the language of the Quran and Islamic revelation was Arabic. Often, in the face of all evidence to the contrary, Arabic speakers saw themselves as natural superiors to non-Arabic speakers.

- One result of this was that any smart young man of al-Tabari's generation knew that to get by he'd have to learn Arabic, and not just a little of it. To succeed in a world where Arabic tribal identity was, in many cases, crucial to advancement, al-Tabari set out to be better at Arabic than the Arabs. The evidence tells us that he was ultimately successful.

- The challenge of memorizing the Quran remains a popular one even today among young Muslims. The Quran contains more than 77,000 Arabic words, roughly the length of a short novel. Al-Tabari managed to memorize it by the age of seven. He was a prayer leader a year later. At the age of 12, he left home to pursue more formal studies.

- Al-Tabari was lucky that his family was a wealthy one, with money flowing from rents on family landholdings at home in Tabaristan. This allowed him to be a gentleman scholar, devoting all of his time to learning. It meant that he never had to rely on patronage or mind what he said to keep a patron happy.

- As a teenager, al-Tabari traveled to Baghdad, the capital of the Abbasid caliphate and, at that time, still the most important center of learning in the Islamic world. Al-Tabari went there to study under Ahmad ibn Hanbal, one of the most famous and highly regarded of all Sunni Muslim jurists, who had established a school of Islamic jurisprudence. Al-Tabari was too late, however, as ibn Hanbal had died shortly before the young man's arrival.

- Al-Tabari continued to travel widely, including to Syria and Egypt, meeting with local scholars wherever he went. This broadened his mind and gave him a wealth of material for the books he settled into writing.

- Al-Tabari was not only an intellectually curious man, he was also a born collector who accumulated mountains of written material during the course of his travels. He would devote most of the rest his life to distilling and publishing his thoughts on this material so that other scholars could make use of it before it was lost forever.

- One of the beauties of al-Tabari's scholarship is his honesty. Al-Tabari comes across as a much more scrupulous author and compiler than some of his contemporaries. Of course, he had an

agenda to produce Islamic exegesis. But he wasn't prepared to sacrifice this goal by indiscriminately leaving out opinions that didn't agree with his own.

- Perhaps it's because of al-Tabari's intellectual honesty that his became the standard work of *tafsir* by which all subsequent works were judged. Had he been a polemicist instead of an exegete, his words might have been popular in their day, but they wouldn't have survived as works of scholarship. Instead, al-Tabari's exegesis remains a central and standard text of Islamic commentary more than 1,100 years after it was written.

The *History of the Prophet and the Kings*

- The *History of the Prophet and the Kings* is a compilation of other people's writings that was compiled and edited by al-Tabari. Known in Arabic as *Tarikh al-Rasul wa al-Mulk*, this compilation is widely considered by scholars to be al-Tabari's most important work. It was completed in 915 and is remarkable for a number of reasons, in particular for its scope and length.

Al-Tabari's exegesis remains a central and standard text of Islamic commentary more than 1,100 years after it was written.

- Al-Tabari's intention in compiling the *History of the Prophet and the Kings* was to produce a history of the world from its creation, through the Old Testament prophets and the Persian empires, through Muhammad's lifetime, and up to al-Tabari's own day—and life in the Abbasid caliphate.

- Drawing on as many sources as were available to him, al-Tabari worked chronologically and virtually without comment, allowing the words of the original authors to speak for themselves. Where he

does comment, it's typically to raise a grammatical matter: to clarify the use of a particular word or phrase.

- From a Western perspective, it's interesting to note that al-Tabari barely mentioned the Greeks and Romans whom we typically place at the very heart of our historical past. But al-Tabari is right that it's the Persians who are the more important force in the region, and it's their children—including al-Tabari himself—who continued, in al-Tabari's lifetime, to exert an important influence on the cultural, and even religious, life of the Middle East.

- By and large, al-Tabari is the model of an unbiased scholar in allowing the texts to speak for themselves. His task, as he saw it, was to make historical texts available to other educated readers while he remained scrupulously neutral.

- The *History of the Prophet and the Kings* retains a great deal of value in part because al-Tabari was so conscientious in listing his sources—many of which no longer exist, unfortunately, making his work the sole extant authority.

- Apart from allowing modern historians to look back at texts that are no longer available, al-Tabari's *History of the Prophet and the Kings* forms a central component of how Muslim historians see the origins of their religious history.

- Al-Tabari died in Baghdad in the year 923. His work, both the *History of the Prophet and the Kings* and his *tafsir*, represents a prodigious feat of scholarship during his 86 years of life.

Exegetical Controversy

- Al-Tabari, as a learned man, was not afraid to criticize others whose scholarship he found wanting. In al-Tabari's view, opinion could never replace knowledge. As he grew older, one of those he became increasingly critical of was Ahmed ibn Hanbal, the

man under whom he'd hoped to study when he first traveled to Baghdad.

- The Hanbali school of Islamic law that ibn Hanbal established after 800 is the one followed today by the Wahhabis—the branch of Sunni Islam prevalent in Saudi Arabia and Qatar—and which outsiders sometimes categorize as ultraorthodox and among the most uncompromising branches of Islam.

- In ibn Hanbal's view, the Quran—along with the sayings and early traditions of Muhammad—formed a sufficient basis of Islamic law. Al-Tabari disagreed, and he held that ibn Hanbal wasn't truly able to make such a claim. For one thing, al-Tabari didn't consider ibn Hanbal sufficiently well versed in Islamic law or exegesis, two fields of scholarship in which al-Tabari excelled.

- It is important to remember that ibn Hanbal was dead by this time. It was his supporters who were responsible for defending him and making regular warnings to al-Tabari. With a lynching threatened on more than one occasion, the authorities in Baghdad arranged a public debate so the two sides could argue their points of view.

- Al-Tabari accepted the challenge, but the Hanbali refused, preferring instead to attack al-Tabari's house. This particular clash highlighted the limits of religious tolerance on the part of certain Hanbali during the 9th century and speaks to the importance of *tafsir*—and who defines the limits of its usefulness.

- The vast majority of Muslims today accept the Quran as a divinely revealed and uncreated (i.e., eternal) text, not a created work that came into existence at a point in history. But debates about the meaning of the Quran are ongoing and vigorous. Although thousands of volumes of *tafsir* have been written since al-Tabari's day, his work is still considered the exemplar and is consulted daily by Islamic scholars and scholars of Islam alike.

Suggested Reading

Al-Tabari, *The History of al-Tabari*.

Bloom and Blair, *Islam*.

Esposito, *The Oxford History of Islam*.

Hodgson, *The Venture of Islam*.

Robinson, *The New Cambridge History of Islam*.

Questions to Consider

1. Is there, or should there be, an endpoint after which commentary on any religious text is no longer possible?
2. What significance might we attach to the fact that at the start of the Islamic Golden Age, circa 750, Islamic doctrine was still in the process of being developed?

Lecture 9

The Arab Herodotus: al-Masudi

A host of travelers crossed the Middle East during the Islamic Golden Age. Among these was al-Masudi, a 10th-century writer who is often referred to as the Arab Herodotus, after the ancient Greek historian and wayfarer. Al-Masudi traveled further than any of his near contemporaries, and—like Herodotus—he broke the mold in terms of how he wrote about the world, its peoples, and its past.

The Life and Times of al-Masudi

- Al-Masudi's travels took him beyond the Abbasid heartland into Persia, Armenia, Azerbaijan, and other lands around the Caspian Sea. He saw parts of northern and western India, traveled extensively in and around the Arabian Peninsula and eastern Africa—including Madagascar—and to Syria and Egypt.

- Al-Masudi also writes about Sri Lanka, Sumatra in modern-day Indonesia, Malacca in Malaysia, and China. Scholars are divided on whether or not he actually visited these last few countries, or whether perhaps he relied on the descriptions of fellow travelers.

- Born in Baghdad in 896, Abu al-Hassan Ali ibn al-Husayn al-Masudi set off on his travels in approximately 916, when he would have been just 20 years old. He would be on the road for the next 30 years of his life.

- By the time al-Masudi began his travels, the ruling Muslim dynasty of Sunni Abbasids, which was based in Baghdad, had lost great chunks of its empire to various competing powers. The idea of a united caliphate—one religious and temporal power to rule the entire Muslim world—was by this time a vanishing dream.

- One practical result of these developments was the rise of rival centers of intellectual and cultural development—and commercial trade—beyond Baghdad, in emerging centers such as Cairo, Cordoba, and elsewhere. This may have prompted the young al-Masudi to think that he would have to travel outside of Baghdad to realize his ambitions.

- In al-Masudi's day, reliable knowledge about these independent and semi-independent outlying lands was harder to get than it had been in the now-distant days of the united Umayyad caliphate, before the Abbasids overthrew their predecessors in 750. If you really wanted to understand the world beyond your homeland, you had to go there yourself—and acquire accurate, firsthand information through personal encounters.

- Geography was particularly important in the Muslim Middle East of al-Masudi's day. There exists in the Islamic faith an obligation to perform the hajj, a pilgrimage to Mecca, at least once in one's lifetime—that is, if one is healthy enough and has the financial means to undertake the journey.

- This religious duty—along with the expanding Muslim empire—meant that as the empire grew through the 7th and 8th centuries, a need also grew at the center for more information about these recently conquered lands. The Baghdad-based empire's administrators and the large merchant class—which was as keen as ever to find and open new markets in which they could trade—relied on such knowledge to meet their professional needs.

- The growth and enduring popularity of adventure and travel literature in the Middle East is one indicator of the significance of

Umayyad Palace at the Amman Citadel

geography during the Islamic Golden Age. The tales of Sinbad the Sailor, complete with shipwrecks, encounters with genies, and other dangerous adventures, are but one example in the Arabic literary tradition that many readers in the West are familiar with.

- In early Muslim times, history played two roles: The first was to share the story of Muhammad's revelations, including the formation of the Muslim community and its territorial conquests. The second, far less important, was to relate the genealogical history of tribes and tribal administration.

- Tribal histories consisted in large part of genealogies, long lists of names that could be used as evidence of what tribe had land or inheritance rights. These lists of who begat whom are obviously

very important for the tribes concerned, but they don't make very dynamic history. The typically heroic deeds of great men who form a tribe's past are, on the other hand, extremely dynamic, if not always historically accurate—or at least not verifiable.

- In early Islamic history, the story of Muhammad—his revelations and the spread of Islam during his lifetime and in the years immediately after his death in 632—was by far the most important form of history. It was important for the religious legitimacy that Islam claimed for itself, and it was important for the legitimacy of the caliphs, Muhammad's earthly successors, whose personal claims to imperial legitimacy depended on being in line with the religious claims.

Al-Masudi's Writings

- Like other medieval historians before him, al-Masudi offered a history of the world from its creation to his own day. But unlike virtually all of those who came before him, he made this history come alive with a glorious array of entertaining stories. He included asides and anecdotes galore, some more gossipy than others.

- Al-Masudi presented a record of Muhammad's life—as well as some aspects of Christianity and the pre-Muslim era in Arab lands—as part of his writings. While all the evidence suggests that he was a devout Muslim, he did not see it as necessary to condemn different faiths out of hand.

- In his writings, al-Masudi comes across, even today, as confident, not conceited. He writes for factual accuracy, not polemics. And he was honest when writing about places that he hadn't visited—i.e., when he cited other sources that he considered reliable.

- Among al-Masudi's many interests were geography, geology, and mineralogy. He wrote a great deal about precious and semiprecious stones, a fact that has led some to speculate—not unreasonably—

that perhaps buying and selling minerals was one way in which he made a living as he traveled. Knowledge of such matters would have been useful to an individual looking to make money from trading precious stones.

- Al-Masudi also provides a natural history of the elephant, a description of a royal feast, and any number of tragic love stories, including a description of Cleopatra's death.

- Many Islamic scholars working in the exciting days immediately after the rise of the new Muslim world power saw little of importance in earlier, now-defunct cultures. Al-Masudi, however, was quite interested in seven ancient pre-Islamic cultures that he saw as having important histories to tell. These were the Persians, Chaldeans, Greeks, Egyptians, Turks, Chinese, and Indians.

- Al-Masudi's account of his travels in the world are largely free of the more fantastic observations and stories with which Herodotus, the Greek historian known as the father of history, regales his readers. For the most part, al-Masudi leaves fantasies and fables to other writers. He is a searcher after cold, hard facts—which isn't to say that he doesn't make educated guesses from time to time.

Al-Masudi's Legacy

- Even in his own day, al-Masudi was important for the shift he brought about in how history was—or could be—written. Gone were the slavish lists of names and the unexamined tales of mythical beasts and faraway lands. Here, instead, was a firsthand account of the world as seen through the eyes of a reliable and trustworthy chronicler.

- This intellectual innovation was largely responsible for the reinvention of the historical method in the Muslim world. Now, rather than a historian of Islam, al-Masudi is a Muslim historian.

- It would be interesting to know exactly how al-Masudi financed his long years of globetrotting. But we don't. Although it's possible he's more personal in other works that haven't survived, we wouldn't be stretching the bounds of reason to hazard a guess that al-Masudi was an enterprising merchant as well as an interested and scholarly traveler. That would certainly offer a practical explanation for his travels. It would also explain how he could afford his sojourns, and perhaps why he seems more interested in so many matters that previous Muslim historians neglected.

- Al-Masudi ended up spending about a decade in Cairo until his death in 956 at the age of 60. It was during these years that he wrote the 30 volumes that make up his masterpiece, *The Meadows of Gold*. Near the end of his magnum opus, al-Masudi writes:

> The information gathered here is the fruit of long years of research and painful efforts of voyages and journeys across the East and the West, and of the various nations that lie beyond the regions of Islam. The author of this work compares himself to a man, who having found pearls of all kinds and colours and gathers them together into a necklace of and makes them into an ornament that its possessor guards with great care. My aim has been to trace the lands and the histories of many peoples, and I have no other.

- The importance of al-Masudi's new approach to writing history was still in evidence in the Muslim Middle East 400 years after his lifetime, when he was cited by one of the greatest historians of any age: Ibn Khaldun, the 14th-century Tunisian. In many ways, Ibn Khaldun was al-Masudi's natural successor, in terms of his approach to writing history.

- In his own masterpiece, *The Muqaddimah*, Ibn Khaldun acknowledged the debt he owed to al-Masudi:

> History consists of the recording of the particular events of an era or a generation. The general conditions of faraway places, generations and eras constitute a basis for the historian on which most of his objectives are built and according to which his reports are classified.... [Al-Masudi] explained the conditions of nations and faraway places, both East and West, down to his own days.... He mentioned their creeds and customs, described countries, mountains, seas, kingdoms and states, and distinguished Arab from non-Arab nations. He thus became an imam [a model] for historians who refer to him, and a source upon which they depend to verify many of their reports.

Suggested Reading

Al-Masudi, *Meadows of Gold*.

Kennedy, *When Baghdad Ruled the Muslim World*.

Lindsay, *Daily Life in the Medieval Islamic World*.

White, *Medieval Technology and Social Change*.

Questions to Consider

1. How reliable do you think history is with regard to those stories that are central to the foundational myths of most nations and religions?
2. Rather than a historian of Islam, al-Masudi should be seen as a Muslim historian. How important is this distinction regarding al-Masudi? How important is it for any historian of any faith?

Lecture 10

Cairo, al-Haytham, and the *Book of Optics*

Al-Haytham was a 10th- and 11th-century scholar whose seven-volume *Book of Optics* changed human understanding of how light and vision interact. This lecture will begin with an examination of Cairo, the city where al-Haytham spent most of his professional life. The material will then turn to al-Haytham's life and work, including his focus on optics and his influence on its study during the Islamic Golden Age and in later European scholarship.

Fatimid Cairo

- Egypt is an ancient civilization. In al-Haytham's day, however, the city of Cairo was relatively new. The city was established in 969, just four years after al-Haytham's birth. The Fatimids conquered Egypt that same year, and they established Cairo as their new imperial capital.

- Cairo was just a few miles downstream from Fustat, the country's first capital, which had been built some two centuries earlier following the Muslim conquest of Egypt. Prior to that, the country had been a province of the Byzantine Empire.

- Fustat was still a large and important city, but the Fatimids were determined to make their new capital even larger and grander. Today, Fustat is known as Old Cairo, and it's contiguous with Cairo proper.

- Life in Cairo and the rival Abbasid seat of power in Baghdad shared a great deal in common. To begin with, daily activities revolved around the market and the mosque. Markets supplied food, jobs, and trade. The mosque was generally built next door to the market and was the center of religious and political life in the city. But eating and making a living were of primary, daily concern.

- The agricultural wealth generated in the Nile valley and delta—and trade revenues earned across the realm—helped the Fatimid empire grow rich from taxes. In turn, prosperity and political stability brought investment to the imperial capital, and Fatimid caliphs spent freely to compete with Abbasid Baghdad.

- In time, Cairo rose to become a new center of intellectual endeavor in the Muslim Middle East. One of the first objectives the Fatimids pursued in this regard was to establish a religious and educational center that would promote their own brand of Islam: Isma'ili Shia Islam.

- The university-mosque complex of al-Azhar, founded in Cairo in 970, soon established a preeminent position in the word of Islamic scholarship—a position which it maintains to this day. Rather than a center of Shia learning, however, al-Azhar today is the world's leading center of Sunni learning.

- The Fatimids also established a palace with a grand library in Cairo. According to some sources, this royal library encompassed 40 halls, stocked with more than 200,000 volumes. Some 18,000 of these were said to be translations of ancient Greek texts, mainly dealing with scientific inquiry—from mathematics and physics to chemistry, medicine, and astronomy.

- In 1005, the sixth Fatimid caliph, al-Hakim, established his own House of Wisdom to challenge Baghdad's more famous center of the same name. A mercurial and possibly cold-blooded ruler, al-Hakim nevertheless admired learning and was happy to spend freely to acquire the best minds money could buy.

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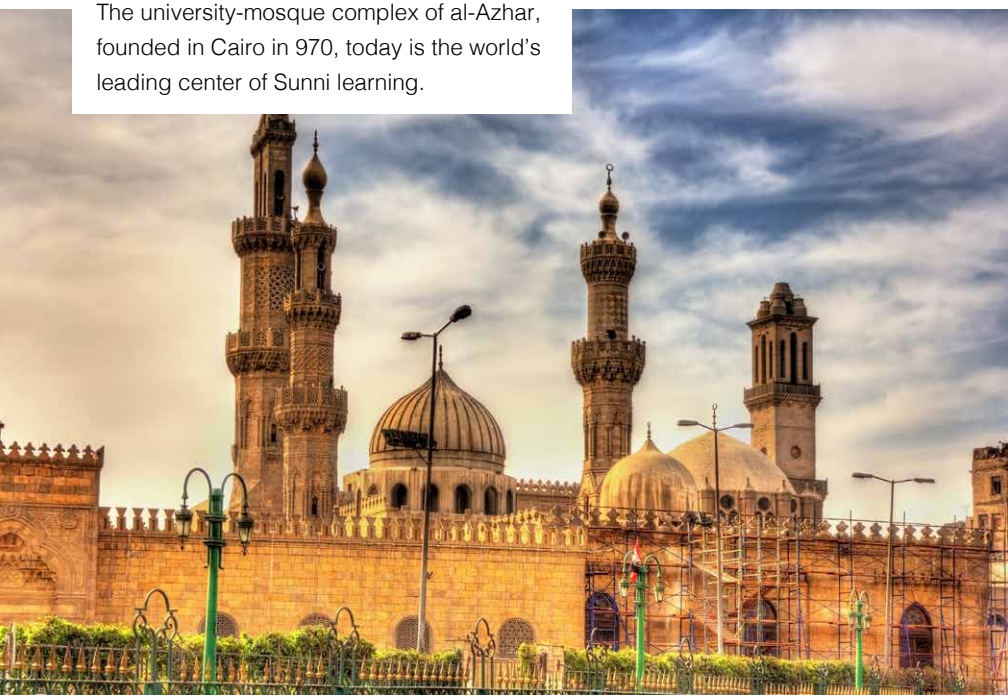


- Seen as heretical in the eyes of the Muslim world's Sunni majority, the Shia Fatimids struggled to attract the best Sunni scholarship until they started offering ever-larger financial incentives.

The Life of al-Haytham

- Abu Ali Hassan ibn al-Haytham was born in 965 in the port city of Basra, in modern-day Iraq. In medieval Europe, al-Haytham was often referred to as Alhazen, after his given name Hassan. Medieval European scholars also granted him the honorific Ptolemaeus Secundus, or "the Second Ptolemy."

- Much of the lands we know of today as Iraq and Iran were ruled then by the Buyids, a regional Shia Muslim dynasty. Unlike the Arab Fatimids, however, the Buyids were Persians. Because the Buyids and other Persian dynasties dominated much of the broader Middle East at this time, the period from the mid-9th century to the mid-10th century is sometimes referred to as the Persian intermezzo.

- Al-Haytham's family must have been relatively prosperous—and well connected—because he received a first-class education. Like many learned men associated with the Islamic Golden Age, al-Haytham was a polymath, an expert in many different fields of study.

Much of the lands we know of today as Iraq and Iran were ruled then by the Buyids, a regional Shia Muslim dynasty.

- Al-Haytham was noted for his skills in mathematics (especially geometry), astronomy, meteorology, and optics. Among his works are such colorful titles as "On the Nature of Shadows," "Horizontal Sundials," "On Rainbows and Halos," "On Squaring the Circle," and "On the Light on the Moon," in which he proposed that the Moon took its light from the Sun.

- There is much that we don't know about al-Haytham, including whether he was a Shia or Sunni. As a young man, al-Haytham himself once observed that being confronted by so many different faiths had led him to doubt them all, and that he would rather see truth as indivisible. Later in life, he moderated this view somewhat, stating that "truth could only be reached through opinions whose matter was sensible and whose form was rational."

- After moving to Egypt in his twenties, al-Haytham occasionally supported himself by translating Greek works into Arabic. One result of this was that he read and reread numerous texts that were central to ancient Greek mathematics, including Euclid's *Elements* and Ptolemy's almost canonical work of astronomy, the *Almagest*.

- Familiarity with Greek learning no doubt aided al-Haytham's own research. However, while even the greatest of the ancient Greek scholars understood the role of experimentation and empirical data, they often ignored it in practice. All too often, the Greeks overlooked the central importance of empirical evidence when advancing a scientific argument, frequently offering a theory as proof.

- Al-Haytham tested—and retested—each and every idea. He would announce a successful result only after he believed that sufficient measurement and tests showed something to be demonstrably true, not just theoretically true. As a result, he is rightly regarded today as the father of scientific inquiry.

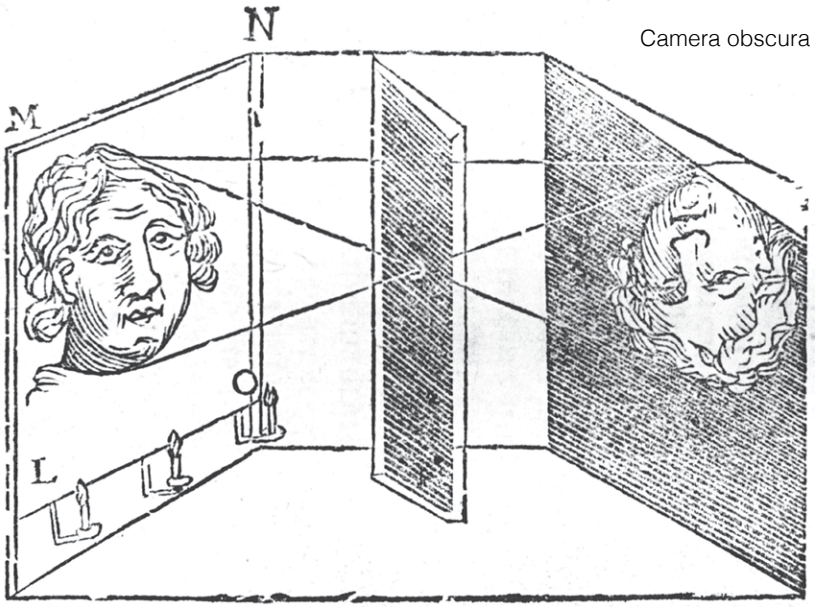
Al-Haytham's Work

- In al-Haytham's day, there existed essentially two theories about light and vision. These two theories had competed with one another since they were first posited in ancient Greece.
  - The first theory was the emission theory, which held that vision functioned because the eye emitted, or sent out, rays of light. This view was supported by Euclid and Ptolemy.

  - The second theory, that of intromission, argued that observed physical forms somehow entered the eye. Aristotle, who died in 322 B.C., was one famous advocate of this perspective. And while Aristotle was essentially correct, al-Haytham's research into the issue went much further.

- In addition to building on Aristotle, al-Haytham advanced the work of the great Greek physician and surgeon Galen of Pergamon, who died around A.D. 200. Specifically, al-Haytham developed Galen's work on the anatomy and physiology of the eye and its workings, presenting practical demonstrations as proof.

- Al-Haytham was also a medical practitioner who took a special interest in diseases of the eye. He was an early adopter of a



Camera obscura

technique for removing soft cataracts by means of suction and a hollow needle. This technique would later be taken up in France—but not until the 1840s, some 800 years later.

- Al-Haytham's most enduring work, his *Book of Optics—Kitab al-Manazir* in Arabic—was written during a decade of blessedly peaceful house arrest between 1011 and 1021. This seven-volume study deals variously with color, light, vision, and visual theory.

- The ideas in the *Book of Optics* address errors in visual perception, including optical illusions. One entire volume considers the concept of refractions. Two volumes provide al-Haytham's experimental evidence. Complete with theories, experiments, and proofs, the *Book of Optics* was a real science textbook in a way that earlier books dealing with similar matters simply weren't.

- Al-Haytham's experiments tested how light passed through various media, from paper and glass to water and smoke. His observations led to a lifetime fascination with refraction, or how light bends. By experimenting with mirrors and lenses—and a construction that would later become known as the camera obscura—al-Haytham also became the first person to demonstrate that light travels in straight lines.

- Interested also in meteorology, al-Haytham started observing the Sun and the Moon and the stars in a whole new light. His observations again led him to question Ptolemy, whose theory of planetary movement wrongly posited that the Sun and stars all revolve around the Earth.

Al-Haytham's Influence

- Even though al-Haytham wasn't personally able to answer all the questions he set out for himself, he was at least asking the right questions—and writing them down. In this way, his surviving writings sent generations of scientists in the right direction.

- Al-Haytham's *Book of Optics* was translated into Latin by an unknown scholar at the end of the 12th century or the beginning of the 13th century. From that point forward, he was remembered in medieval Europe as Alhazen, rather than al-Haytham.

- No printed Latin edition of the *Book of Optics* actually appeared until 1572. But the great English scholar Roger Bacon wrote his own summary of it before the end of the 13th century. Soon it had been transported to all the major centers of learning in Britain and continental Europe.

- Basing his design on his own anatomical investigations of the human eye, al-Haytham was able to produce a fully functioning camera obscura—a box that allows light in through a pinhole aperture, thereby displaying on the wall of the box an inverted image of what's

outside—about 500 years before Leonardo da Vinci is credited with its use in Renaissance Europe.

- The late 13th–century Polish friar, theologian, scientist, and mathematician Witelo relied heavily on Alhazen for his own 10-volume work *Perspectiva*—or *Perspective*—which, in turn, was widely used by later European scholars. After Witelo, for example, there were the 17th-century German astronomer, astrologer, and mathematician Johannes Kepler; the English physicist and mathematician Isaac Newton; and the Italian Galileo Galilei.

Suggested Reading

Guthrie, *Arab Social Life in the Middle Ages*.

Hayes, *The Genius of Arab Civilization*.

Pormann and Savage-Smith, *Medieval Islamic Medicine*.

Rageb, *The Medieval Islamic Hospital*.

Ullmann, *Islamic Medicine*.

Questions to Consider

1. How important for Cairo's growth as a city of culture and learning was the rivalry between the Shia Fatimids and the Baghdad-based Sunni Abbasids?
2. An early proponent of what we now call the scientific method, al-Haytham was able to use experimentation to challenge certain erroneous theories of Euclid and Ptolemy. What prevented more scholars from challenging the authority of those earlier, great intellects?

Lecture 11

Master Muslim Scholar: al-Biruni

In this lecture, you will learn about the life and times of renowned polymath al-Biruni. One of the greatest intellects of his time, al-Biruni left his mark on numerous academic fields, including physics, math, astronomy, geography, anthropology, and history. You will also learn about one of al-Biruni's most important works, the *History of India*.

Al-Biruni's Life

- One feature that marked most of al-Biruni's life and times was the political uncertainty that existed in the eastern Persian empire—modern Afghanistan, Pakistan, and India. This context is important for understanding al-Biruni's worldview and how it related to his monumental study of India.

- Abu Rayhan Muhammad ibn Ahmed al-Biruni was born in the city of Khwarezm, in modern-day Uzbekistan. Al-Biruni admitted—in a poem he wrote—that he didn't know who his father was, much less anything about his family tree.

- In his formative years, al-Biruni was schooled in Islamic subjects, such as theology and jurisprudence, and non-Islamic subjects, including astronomy, medicine, and mathematics (known then as the Greek sciences). From the start of his life, it was evident that al-Biruni was exceptionally gifted.

- Peace and stability could not be taken for granted in the central Asia of al-Biruni's day. As a result, a scholar such as al-Biruni might be feted in a royal court one day and unemployed, imprisoned, or on the run the next.

- In his lifetime, al-Biruni served six different princes. All of them were known for their unpredictable and violent tempers, and most died violent deaths. Nevertheless, al-Biruni managed to emerge as one of the world's greatest and most original thinkers.

- By his midtwenties, al-Biruni had already established a reputation as an important thinker. In his midforties, he found himself employed at the court of the newly independent Ghaznavid empire.

- The Ghaznavids, although culturally and linguistically Persian, had emerged from what originally was a central Asian Turkic tribe. Although they paid lip service to the Abbasid Muslim caliph in distant Baghdad, the Ghaznavids were, for all intents and purposes, fully independent.

- Al-Biruni seems to have been a somewhat unwilling employee of the Ghaznavids, in spite of the fact that he served as court astrologer for the rest of his career. In this role, he was a privileged member of the royal court but was under a form of house arrest that didn't allow much freedom of movement.

Al-Biruni's Scholarly Output

- A bibliography of al-Biruni's writings that he prepared when he was 63 years old consists of no fewer than 113 titles. By the time he died more than a decade later, the number was closer to 150. More than half of these works are mathematical or scientific in nature. Unfortunately, only 22 of al-Biruni's writings survive.

- Al-Biruni's first major work—*The Remaining Traces of Past Centuries*, also known as *The Chronology of Ancient Nations*—remains a

fascinating read. In it, al-Biruni presents a comparative study of all of the calendars that were available to him, including those from ancient civilizations and contemporary cultures.

- Al-Biruni had a lifelong obsession with measuring time and space. This drive found an outlet in geodesy, the branch of applied mathematics concerned with measuring the Earth. Al-Biruni's calculation of the Earth's circumference produced a result with an error of less than 1 percent, or about 200 miles. A similar degree of accuracy wouldn't be achieved in Europe until the 16th century.

- As a court astrologer, al-Biruni had to produce regular readings for his paymasters, even as he ridiculed the unscientific pursuit of interpreting star charts. He was much happier, and on stronger ground, when writing about astronomy.

- Although al-Biruni accepted—as it was written in the Quran—that the Earth lay at the center

Al-Biruni (973–104)

of the universe, his observations led him to postulate that we might actually live in a heliocentric world, with the Sun, not the Earth, at the center of things.

- Al-Biruni also wrote "A Treatise on How to Recognize Gems," which, for many scholars, remains the best monograph on mineralogy by a Muslim scholar. Perhaps the most important aspect of this work is al-Biruni's calculation and listing of the specific gravity of more than 100 stones and metals relative to the density of gold. These calculations wouldn't be bettered for 700 years.

- Al-Biruni's last written work was a book of pharmacology. Because of old age and failing eyesight, he employed an assistant to help him write. Nevertheless, the book is a remarkable, 800-page work outlining the uses of more than 1,000 drugs, listed in five different languages. Al-Biruni drew on almost 100 sources and relied on 20 languages and dialects.

The *History of India*

- *Tarikh al-Hind*, or the *History of India*, is one of al-Biruni's most important works. It was the first book about India written by a Muslim scholar. It is a history of India as a Hindu state, including the philosophical and religious beliefs of the people and a description of what he calls Hindu math, science, and astrology.

- At the time, many Muslim rulers—and no doubt most clerics—saw Hinduism as misguided paganism at best, and idol worship (an unforgivable sin in Islam) at worst. And even today, al-Biruni has many critics in the Muslim world. What al-Biruni himself wrote about his *History of India* was the following:

> This is not a book of controversy and debate, putting forward the arguments of an opponent and distinguishing what is false in them from what is true. It is a straightforward account, giving the statements of the

> Hindus and adding to them what the Greeks have said on similar subjects, so as to make a comparison between them.

- Al-Biruni didn't seem to care what his less-intelligent critics said about him. He remained a devout Muslim all his life, and he held firm to the idea that God gives people minds to search for the truth. This is how al-Biruni saw his life's work: the pursuit of pure knowledge.

- While often very critical of Hindu religious and philosophical ideas—seeing them as flawed logically and ideologically—al-Biruni was never polemical in his criticisms. Rather, he simply stated the facts as presented by the Hindus and offered a reasoned response. Although al-Biruni's responses are always those of a good Muslim, he also promoted the idea that every religion he encountered shared core values and thus held a degree of validity that should be respected.

- The prophet Muhammad referred to Jews and Christians as People of the Book, alluding to the common Abrahamic roots between Judaism, Christianity, and Islam. As such, Jews and Christians were entitled to a degree of protection by Muslim authorities that was not extended to followers of pagan or idolatrous faiths, with Hindus included in the latter group. Al-Biruni, however, seems to have argued that Hinduism and other non-monotheistic religions were entitled to equivalent respect.

- Interestingly, most contemporary scholars question whether al-Biruni ever actually set foot in India. They note that he never made any explicit claims about traveling to India in his biographical writings, and that his geographical descriptions are rather vague.

- It is possible that al-Biruni wrote his detailed and objective account of the cultural, intellectual, and religious life of India without traveling there himself by interviewing Indians who had been brought back to the Ghaznavid emperor Mahmud's court as prisoners of war.

This approach was not an uncommon way of writing history in al-Biruni's day.

- Al-Biruni was neglected for centuries in the West, in part because he was never translated into Latin. His work therefore remained beyond the grasp of generations of European scholars, including during much of the Middle Ages and throughout both the Renaissance and the Enlightenment.

- After his death, Al-Biruni's reputation suffered in the Muslim world also, partly because Islamic theology took an increasingly antirationalist standpoint, favoring revelation over reason. Amid the British imperial administration in India, however, Europeans developed a growing interest in al-Biruni, ostensibly because he could tell them something about India.

Suggested Reading

Bearman, *Encyclopaedia of Islam*.

Al-Biruni, *Al-Biruni's India*

Koertge, *New Dictionary of Scientific Biography*.

Questions to Consider

1. The promotion of reason above ideology and the use of verifiable data to support his arguments allow us to see al-Biruni as an exemplary scholar. What does the fact al-Biruni lived and worked beyond the Abbasid heartland say about the geographical extent and reach of Muslim scholarship at that time?
2. Al-Biruni's *History of India* remains a paragon of a balanced, premodern anthropological study of a foreign culture. What factors might allow or prevent similarly balanced studies of foreign cultures in our day?

Lecture 12

Astronomy in the Islamic Golden Age

The Islamic Golden Age was a fruitful period for astronomy. This lecture focuses on the work of three Islamic astronomers—al-Khwarizmi, al-Haytham, and al-Tusi—who made important contributions during this period.

Astronomy vs. Astrology

- Given the technological limitations of astronomy prior to the invention of the telescope in the Netherlands in 1608, it's important to be clear about the difference between astronomy and astrology, though both were quite important during the Islamic Golden Age and to every civilization that predated Islam.

- Astronomy is a branch of natural science that looks at celestial bodies beyond the Earth's atmosphere, including galaxies, stars, planets, moons, asteroids, and comets. As a branch of natural science, it relies on observations and other empirical evidence to establish facts about the natural world.

- Astrology, on the other hand, is what we think of today as a pseudoscience. The adherents of astrology claim to be able to divine anything from an individual's personality to future events by studying the movement and relative position of the planets and other celestial bodies.

- With a history stretching back to Mesopotamia around the year 2000 B.C., and perhaps even earlier, astrology has an ancient pedigree in human history. It was important to premodern societies as a means of explaining—or attempting to explain—events on the celestial level.

- For most of human history, astrology was considered a serious scientific pursuit, and it often went hand in glove with astronomy, medicine, and meteorology. Some of history's greatest minds—when not discussing interplanetary movement—were busy drawing up star charts for their employers, even though some of these wise and venerated men recognized that astrology was nonsense.

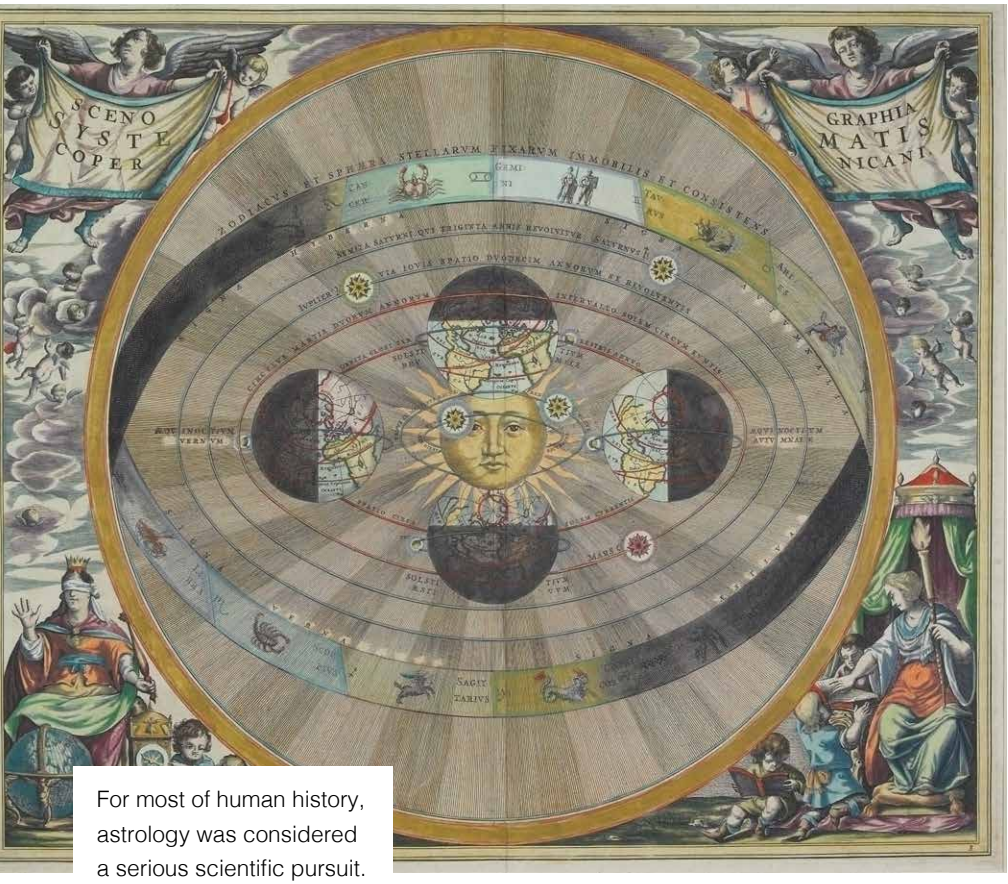
- Today, astrology is largely confined to the horoscopes one finds alongside crossword puzzles, comic strips, and other forms of essentially harmless entertainment.

Astronomy and Astrology during the Islamic Golden Age

- The Arab conquest of Persia from 633–651 was the most important early driver of astronomy and astrology in the Muslim world. Muslim caliphates—beginning with the Umayyads in Damascus, who were followed by the Baghdad-based Abbasids—began to adopt certain Persian practices.

- One Persian practice adopted by Muslim caliphates was the use of astrologers to determine the most auspicious date for important undertakings. This could be anything from the best date for a caliph's wedding to the start of a military campaign. It could also be a determination of when to break ground on the construction of a new city, as with Baghdad in 762 or in Cairo in 969.

- For Islam's first 200 years, the Muslim world was busy assimilating astronomical and astrological data and customs from three distinct cultural arenas—namely, Persia, India, and the Hellenic world. At this stage, there was little or no original work done by Muslim scholars.



For most of human history, astrology was considered a serious scientific pursuit.

Rather, there was a slow movement toward translating earlier ideas and learning how other civilizations had used astronomical observations for religious and political purposes.

- During these early years, a court astronomer typically was responsible for drawing up star charts for the caliph and sometimes other high officials. As a result, the court astronomer was a figure of enormous importance—and sometimes influence.

- Beginning with the founding of the House of Wisdom in Baghdad, Muslim astronomers—Persians and Arabs alike—began to produce original scholarship to advance the field.

Al-Khwarizmi

- Al-Khwarizmi is best known for his original contributions in the field of mathematics—notably algebra, a word that comes from the title of one of his books, and algorithms, an algebraic process taken from the Latinized version of his name.

- In 830, al-Khwarizmi published a book called *Zij al-Sindhind*, or *Astronomical Tables from India*. This was the first original work of Muslim astronomy, and it was a turning point. Until then, Muslim astronomers had merely adopted the work of others via translation. Now, thanks to al-Khwarizmi's inquiring mind, new research and celestial observation—along with calculations using new mathematical principles—led to original findings.

- While no original Arabic edition exists, we do have a Latin translation of *Zij al-Sindhind* thanks to Adelard of Bath, the great 12th-century scholar whose travels in the Near East brought him into contact with Arabic science.

Al-Haytham

- More than 800 miles west of Baghdad—and nearly 200 years after al-Khwarizmi's death—another important astronomical text was written in Cairo by the father of modern optics. Its author was Ibn al-Haytham, known in the West as Alhazen.

- In al-Haytham's day, Cairo was ruled by a Shia Muslim entity that had risen as political rivals to the Baghdad-based Sunni Muslim Abbasids. Known as the Fatimid empire, it originated in North Africa and is often referred to as a shadow caliphate for the period of its reign from 909–1171.

- Al-Haytham, born around 965 in the Iraqi city of Basra, moved to Cairo sometime around the year 1000. It was there that he did most of his important work. In all, he would author some 200 scholastic treatises, of which some 25 dealt specifically with astronomy.

- Like al-Khwarizmi, al-Haytham is arguably better known for his work on theoretical physics and optics, although light and seeing are also central to observing the planets and other celestial spheres.

- Al-Haytham made a revolutionary break from earlier traditions by positing the idea that to have any value, scientific hypotheses must be provable and must rely on mathematical and/or experimental evidence. As a result, he is widely considered to be the one of the first theoretical physicists.

- By the 13th century, al-Haytham was widely known in medieval Europe as the Second Ptolemy. This isn't without a tinge of irony, however, as al-Haytham's most famous astronomical work is a treatise called "Doubts Concerning Ptolemy." He began by highlighting the contradictions inherent in Ptolemy's three great astronomical works: *Almagest*, *Planetary Hypothesis*, and *Optics*.

Al-Khwarizmi and al-Haytham are arguably better known for their work on theoretical physics and optics.

- Of course, challenging the work of others is not the same as having all the answers. Like Ptolemy, al-Haytham was wrong in placing the Earth at the center of the solar system. And both men were wrong in assuming that the planets moved in perfect circles around whatever body they orbited.

- Some might minimize al-Haytham's importance because he set out to correct Ptolemy's errors but ultimately failed to do so. This would be to miss the more important point: Al-Haytham was honest about the difficulty in gaining scientific knowledge while

also being clear about the importance of challenging the masters in trying to do so.

Al-Tusi

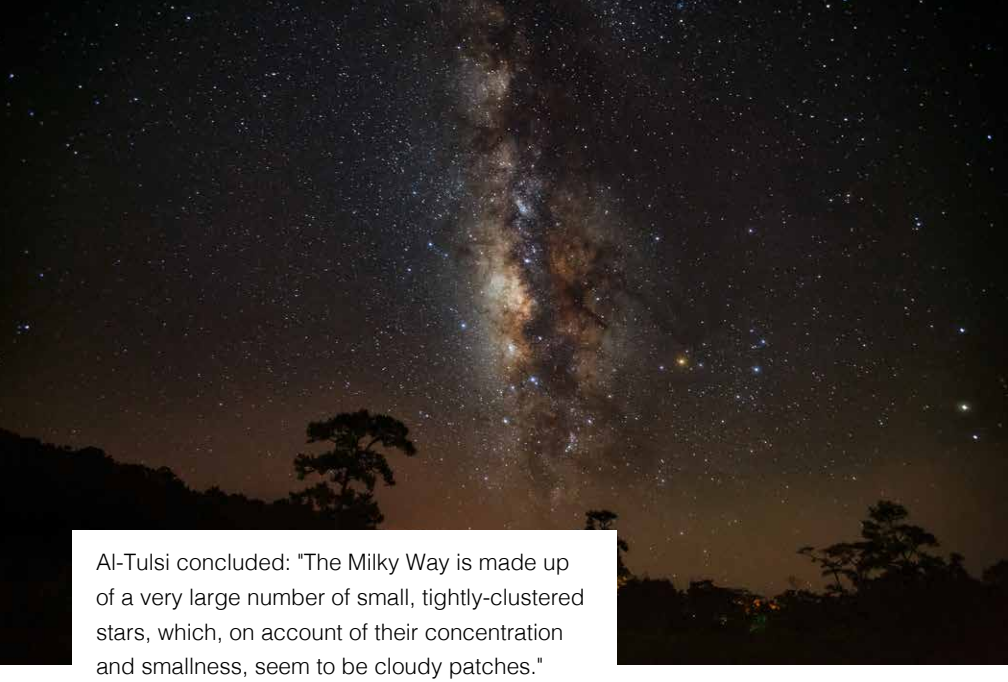
- Muhammad ibn Muhammad ibn Hasan al-Tusi is better known as Nasir al-Din al-Tusi, an honorific that can be translated as "the one who gives victory to religion." This is a mark of his importance among scientists from this period, as well as a clear sign that there was no inherent contradiction between religion and science in al-Tusi's day.

- As for his family name, Al-Tusi simply means someone from the ancient city of Tus, in modern-day Iran toward the borders of Turkmenistan and Afghanistan.

- Al-Tusi was born into a Shia Muslim family in 1201. His father died while he was still young. Fulfilling his father's wish for him to get a good education, al-Tusi didn't interrupt his studies. Instead, he traveled widely to learn from the best teachers in greater Persia. By the time he was a teenager, al-Tusi's skill in the study of the Quran, mathematics, and philosophy had been noted.

- Al-Tusi authored more than 160 titles, with 25 written in the Persian language and the remainder in Arabic. Not all of these books survive, but their titles show us that he wrote about the Quran, hadith studies, and Islamic law, as well as on the so-called ancient sciences, which incorporated Greek philosophy, mathematics, and astronomy. Al-Tusi was also known as a brilliant translator, who personally produced definitive Arabic-language versions of the works of Euclid, Archimedes, and Ptolemy, among others.

- Al-Tusi is considered by many to be the greatest astronomer in the roughly 1,300-year span between the death of Ptolemy in the 2nd century and the birth of Copernicus in the late 15th century.



Al-Tulsi concluded: "The Milky Way is made up of a very large number of small, tightly-clustered stars, which, on account of their concentration and smallness, seem to be cloudy patches."

- Astronomical observations led al-Tusi, for instance, to reach the following, original conclusion about the Milky Way—the galaxy that contains our solar system: “The Milky Way is made up of a very large number of small, tightly-clustered stars, which, on account of their concentration and smallness, seem to be cloudy patches. Because of this, it was likened to milk in colour.” It would be another 300 years before Galileo Galilei, using a telescope, eventually proved this cloudy-patch theory in 1610.

- Like his predecessor al-Haytham, al-Tusi was indebted to, yet critical of, Ptolemy’s astronomical work. Al-Tusi was especially unhappy with Ptolemy’s suggestion that regular planetary movement could be explained only if one accepted that planets sped up and slowed down at different stages in what he said was their circular orbit of the Earth.

- Al-Tusi also challenged Ptolemy's logic in arguing that the Earth must be static just because it appeared to be so. Al-Tusi wasn't able to prove Ptolemy wrong on this point, and he may in fact have agreed with him. What al-Tusi objected to was Ptolemy's lack of evidence for his supposedly scientific conclusion.

- Al-Tusi's challenge of Ptolemy—and his desire to produce a better explanation for planetary movement—resulted in one of his more enduring contributions to mathematics: the Tusi couple.

- The Tusi couple is a device in which a smaller circle rotates inside a larger circle, one with a diameter twice that of the smaller one. The smaller circle also moves in the opposite direction, and at twice the speed, of the larger circle that contains it. The rotations of the smaller circle inside the larger one cause a point on the smaller circle's circumference to oscillate in a linear motion along the diameter of the larger circle.

- The Tusi couple seemed to allow for the explanation of the motion of the planets as circular and regular. Alas, this model didn't explain the movement of the planet Mercury as al-Tusi observed it. In this, al-Tusi was led astray because, like his predecessors, he believed in a geocentric view of our solar system.

- Despite the fact that he possessed one of the best minds of his day, the path of al-Tusi's research didn't always run smoothly. On more than one occasion, it seems that he promised to provide his royal patrons with a quick answer to some mathematical challenge, only to find that the problem was not as straightforward to solve as he had claimed. For example, it took him more than a decade to deliver the Tusi couple to his patron.

- The Mongols sacked Baghdad in 1258, marking the end of the Islamic Golden Age. The very next year, however, Hulagu Khan—the leader of the Mongols and the destroyer of Baghdad—built a

grand observatory in Maragheh, in modern-day Iran, after al-Tusi complained that his astronomical charts weren't accurate enough.

Suggested Reading

Bosworth and Schacht, *The Legacy of Islam*.

Al-Hassani, *1001 Inventions*.

Hayes, *The Genius of Arab Civilization*.

Hodgson, *The Venture of Islam*.

Al-Khalili, *Pathfinders*.

Saliba, *A History of Arabic Astronomy*.

Questions to Consider

1. Why were astronomy and astrology so important in the medieval Middle East?
2. Why did so many highly intelligent individuals during the Islamic Golden Age and other periods of history hold the pseudoscience of astrology in such high esteem?

Lecture 13

Medieval Muslim Medicine and Hospitals

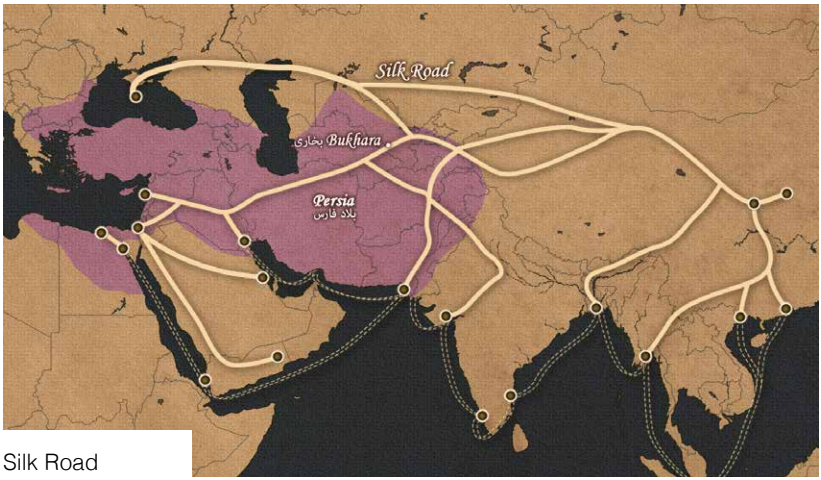
Al-Razi, known as the father of Islamic medicine, was the greatest medical scholar and practitioner of his day. In fact, many of his medical texts became classics that were still consulted in the Middle East and Europe hundreds of years after his death. This lecture examines the life and work of al-Razi, explores the development of hospitals across the Greater Middle East, and reviews the contributions of another great medical mind, Ibn Sina.

Al-Razi

- Muhammad ibn Zakariya al-Razi—better known to us in English as Rhazes—was born in 854 in the Persian city of Rey. Rey is one of modern Iran's oldest cities, with a history of settlement dating back to approximately 6000 B.C. Situated on the ancient Silk Road, it was an important center of trade and scholarship. Today it is part of greater Tehran, the nation's capital.

- Verifiable facts about al-Razi's life are scant, as is the case with most people from this period. That said, all sources agree that he developed a talent for music early in life, becoming an accomplished oud player. An oud is a stringed instrument similar to a lute.

- When he reached adulthood, al-Razi put music aside and took up alchemy, mathematics, philosophy, and literature. By turns



Silk Road

he excelled at—and then tired of—these subjects before taking up medicine around the age of 30. It is this subject to which he dedicated the rest of his life.

- Al-Razi left Persia to study medicine in the greatest city in the Islamic world at the time: Baghdad. In Baghdad, he had access to Arabic translations of the most important medical men from the ancient world. Of these, the earliest was Hippocrates, the Greek physician of the 4th century B.C. considered the father of Western medicine. The second was Galen, a Greek doctor who worked in the Roman Empire during the 2nd century A.D.

- Like any good scholar, al-Razi acknowledged the brilliance of these ancient Greeks and the enormous debt that scholarship owed them and others of their day. However, like any great scholar, he built on their foundational texts. When he surpassed them, he said so.

- In his book *Doubts about Galen*, al-Razi challenged the theory of the four humors, which was thought to explain most human sickness.

Al-Razi suggested that there were a number of other elements that Galen failed to consider, such as oiliness, saltiness, inflammability, and sulfurousness. He also attacked the writings of Hippocrates for being disorganized and too brief, and he then wrote a lengthier, corrective text.

- Al-Razi wrote extensively about medical ethics, and—in a book called *Medical Ethics*—he talks about the importance of morality in medicine. For al-Razi, it wasn't enough for the physician to be good at his job; he should also be a role model for his patients.

- Al-Razi was convinced of the mind-body connection in the pursuit of good health, as well as the importance of exercise and a healthy diet. Other important factors in general good health were good doctor-patient relations and having a family doctor who would understand the patient's body over time.

- Al-Razi has been acknowledged as the first person to fully and accurately describe smallpox and measles, noting the important differences between the two and offering possible remedies. His book *The Diseases of Children* was also the first to deal with pediatrics as an independent field of medicine.

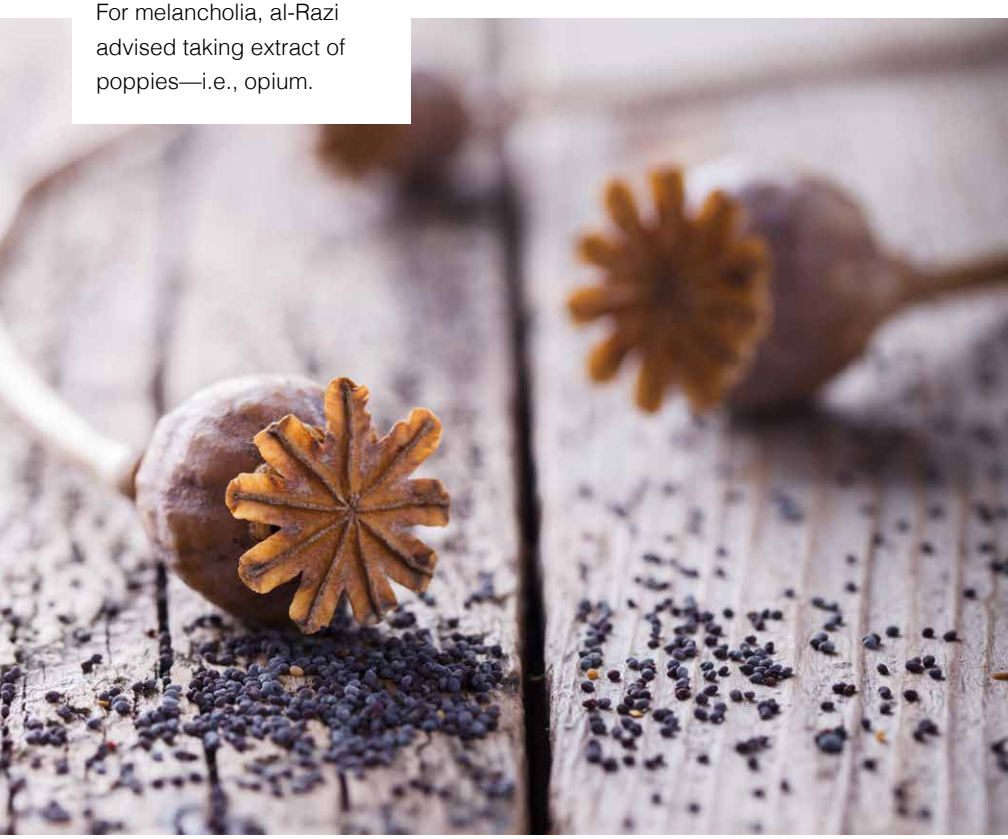
- Al-Razi's medical notes and surgical observations—along with numerous new diagnoses and suggested treatments—were compiled after his death in what's now known as the *Comprehensive Book of Medicine*. This book was not just a tribute to al-Razi's brilliance; it also presents a complete catalogue of all existing medical scholarship then available. In this way, it was one of the earliest medical encyclopedias. So vast and detailed was this text that European medical students were still using Latin translations 700 years after al-Razi's death.

- Under al-Razi's strictly rationalist, scientific approach, every disease was thought to have a cause or origin that could ultimately be understood through research. Sickness, he held, was not—as some

men of religion claimed—a punishment from God. He encouraged doctors to read the latest medical treatises to keep up with developments that they might otherwise be ignorant of.

- Al-Razi wrote the first medical manual for home use, titled *Medical Advisor for the General Public*. This helpful compendium would remain a popular reference for many in the West until the early 20th century. The manual included treatments for everyday complaints, such as headaches, coughs, colds, and indigestion, as well as for more serious ailments. For melancholia, he advised taking extract of poppies—i.e., opium—for its euphoric qualities.

For melancholia, al-Razi advised taking extract of poppies—i.e., opium.



- Unfortunately, for all of his medical knowledge and insight, al-Razi was unable to do anything to correct his own failing eyesight. Toward the end of his life, when al-Razi was fully blind, a trusted surgeon offered to operate to try to restore his eyesight. Al-Razi replied, "I've seen enough of this old world, and I do not cherish the idea of suffering the ordeal of an operation for the hope of seeing more of it."

The Development of Hospitals

- One of the most famous hospitals in the pre-Islamic world was in Gundeshapur, Persia. Founded in the late 3rd century, Gundeshapur was similar to a modern teaching hospital, a place both for treating the sick and training the next generation of medical practitioners.

- In the Byzantine Empire, a decree was issued in A.D. 325 at the Council of Nicaea that a hospital should be established in every cathedral town of the empire.

- Following the early Muslim conquests, the conquering Arabs found themselves ruling over large territories with non-Muslim majorities. They also found themselves exposed to far more sophisticated cultures, particularly in the major cities of the Byzantine Empire and Persia.

> Al-Razi encouraged doctors to read the latest medical treatises to keep up with developments that they might otherwise be ignorant of.

- The first doctors under Muslim rule were mostly Jews, Christians, and Zoroastrians. Only later would Muslims produce their own medical practitioners, who worked alongside and learned from their peers from other cultures.

- The first notable medical facility in the new Muslim Middle East was founded in Damascus around 707. Established with help

Ruins of Byzantine hospital

from Jewish and Christian doctors, this was less a hospital than a *leperosia*—a place to isolate those suffering from leprosy.

- The first proper hospitals in the Islamic world were built in Baghdad during the reign of Harun al-Rashid from 786–809. These hospitals were known by the Persian word *bimaristan*. By the year 1000, there were at least 30 hospitals across the Islamic world.

- The development of hospitals was necessitated by the growth of ever-larger cities. More people living in closer proximity meant that diseases spread more rapidly through urban populations.

- To maintain healthy subjects, the government paid for the building and maintenance of hospitals. At the same time, government services were unable to keep up with demand, so private donors also funded the establishment of medical centers that were open to the general public.

- The provision of health care was seen in part as a religious duty, and all treatment was free. Nevertheless, hospitals remained essentially secular institutions, in that they were obliged to treat patients regardless of religion, race, citizenship, or gender. There was no limit to how long a patient could stay admitted; hospitals were required to keep patients until they were fully recovered.

- Hospitals were required to have separate but equally equipped wards for men and women, with patients attended to by gender-segregated nurses and staff. Patients were kept in wards for either the contagious or noncontagious, and there were separate wards for mental health, eye diseases, and surgery.

Ibn Sina

- Born around 980 in modern-day Uzbekistan, Ibn Sina—or Avicenna, as he's better known in the West—wrote approximately 450 titles in his lifetime, of which more than half survive. Around 40 of these titles deal with medicine, including the five-volume *The Canon of Medicine*, completed around the year 1025.

- Ibn Sina was widely described in medieval Europe as the father of early modern medicine, though his work as a philosopher was even more important. He began studying medicine at the tender age of 13, and he was practicing by the age 16. When he was still a teenager, his medical knowledge saved the life of the local Samanid ruler.

- *The Canon of Medicine* was arguably the greatest medical text in history at the time it was written. Inspired by Galen and originally compiled to be used as a textbook for students under Ibn Sina's tutelage, the text would go on to be translated and studied by generations of scholars for centuries to come.

- Ibn Sina is credited with advancing medical knowledge through original discoveries and with improvements to the existing

body of knowledge. One of his most important discoveries was the recognition of the potential for the airborne transmission of disease. He was also the first to correctly identify the distinction between central and peripheral facial paralysis, and he conducted groundbreaking research on psychiatric conditions.

- Other of Ibn Sina's writings cover the treatment of kidney diseases, the production and use of heart medicines, and a series of experiments that demonstrated the connection between word association and heart rate. Ibn Sina's experiments with word association prefigured by some 900 years the experiments Carl Jung would become famous for in the 20th century.

Suggested Reading

Bosworth and Schacht, *The Legacy of Islam*.

Lindsay, *Daily Life in the Medieval Islamic World*.

Pormann and Savage-Smith, *Medieval Islamic Medicine*.

Rageb, *The Medieval Islamic Hospital*.

Ullmann, *Islamic Medicine*.

Questions to Consider

1. What can modern medicine learn from the writings of medical men from the Islamic Golden Age, such as al-Razi and Ibn Sina?
2. Medical advances made during the Islamic Golden Age benefited from numerous other traditions. Do you think such open-mindedness is typical today, either in the Middle East or elsewhere?

Lecture 14

Alchemistry and Chemistry in Early Baghdad

In this lecture, you will learn about alchemy and chemistry during the Islamic Golden Age, including the process of experimentation in pursuit of knowledge. To help you grasp these ideas on a more human level, you will meet some great scientists who worked during the Islamic Golden Age and learn about their impact and legacy in the West.

Jabir

- Abu Musa Jabir ibn Hayyan was born in the Persian city of Tus in approximately 720. He is typically referred to today simply as Jabir, a part of his surname that is Arabic for "the comforter."

- Jabir worked in Persia and Yemen in the last years of the Umayyad caliphate. Although it's impossible to be certain, it appears that Jabir moved to Kufa, in modern-day Iraq, sometime after the rise of the Abbasids.

- Following the rise of the Abbasid caliphate, Jabir became an alchemist in the court of the caliph Harun al-Rashid. He wrote *The Book of Venus* for al-Rashid—a book, as he saw it, about "the noble

art of alchemy." Jabir was also a philosopher, physicist, astronomer, engineer, physician, and pharmacist.

- The vast body of work variously attributed to Jabir amounts to more than 3,000 treatises. While he could not possibly have produced all of this, he did write much of it, and his name became synonymous with alchemy from his time to our own.

- One of Jabir's most famous works is an Arabic version of *The Emerald Stone*. Originally thought to have been a Greek text, more recent scholarship suggests that it is an Arabic original and was written, if not by Jabir, then perhaps by a near predecessor from the 7th or 8th centuries.

- *The Emerald Stone* was first translated into Latin in the 12th century, and it became one of the foundational texts of alchemy and other magical pursuits in medieval and premodern Europe. Jabir's use of strange and deliberately mysterious language in the text is a strong contender for the origin of the English word "gibberish," meaning something nonsensical.

- Much of Jabir's alchemical studies were dedicated to pursuing the possibility of *takwin*, the artificial creation of life. His *Book of Stones* contains recipes purportedly capable of creating scorpions, snakes, and even humans in the right laboratory environment. According to Jabir, the animals would then be at the disposal of the alchemist who created them.

- Jabir recognized the central importance of experimentation. As he himself wrote, "The first essential in chemistry is that one must perform practical work and conduct experiments, for he who does not perform practical work, or does not conduct experiments will never attain any degree of mastery."

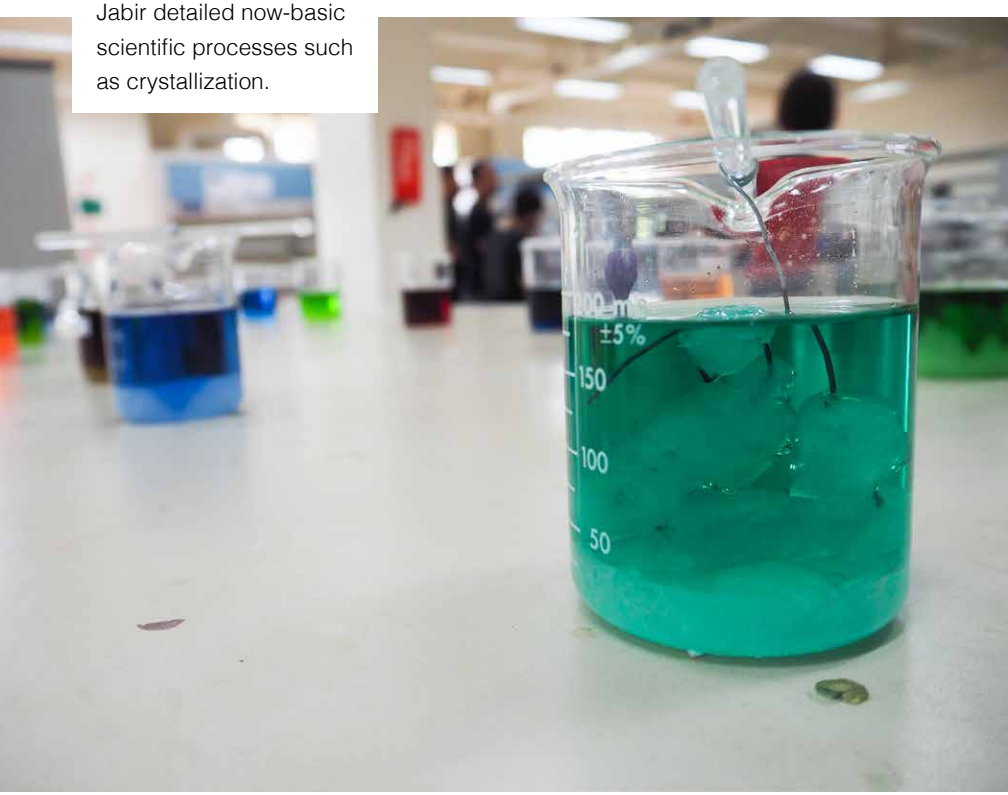
- Following Aristotle's theory of the elements—which held that everything consists of some combination of earth, air, fire, and

Jabir Ibn Hayyan
(c. 721–c. 815)

water—Jabir reasoned that by mixing elements one could create new elements. His work initially led him to classify the elements around him into metals and nonmetals. From there, he subdivided these into three categories: spirits that produced vapor when heated; metals; and nonmalleable substances, or stones.

- In addition to discovering sulfuric and nitric acids, Jabir was the first scientist to offer descriptions of citric, acetic, and tartaric acids. He also detailed now-basic scientific processes such as distillation and crystallization. His pioneering work further included extensive experimentation with, and description of, basic chemical components such as arsenic, antimony, sulfur, and mercury.

Jabir detailed now-basic scientific processes such as crystallization.



- Jabir was said to have invented a paper that wouldn't burn, an ink that glowed in the dark, and a mixture that halted rusting when applied to iron. He's also credited with the invention of more than 20 now-standard pieces of laboratory equipment that he used in his alchemical experiments.

Al-Razi, al-Kindi, and al-Haytham

- The physician Muhammad ibn Zakariya al-Razi, known in the West as Rhazes, was born in 864 in the Persian city of Rey. He moved to Baghdad as a young man and spent most of his working life there.

- So dedicated was al-Razi to his work as a doctor that he is said to have refused payment for many treatments. In addition to his work in medicine, al-Razi wrote extensively on philosophy and alchemy. His most famous volume, *The Book of Secrets*, became standard on the shelves of medieval European alchemists after it was translated into Latin.

- Al-Razi was an early proponent of experimental medicine and the ceaseless pursuit of new medicines. His interest in alchemy was a search not only for the philosopher's stone—the imaginary element that supposedly made possible the conversion of base metals, like lead, into precious metals, like silver and gold—but also for more effective medicines. To al-Razi, both of these were serious, scientific pursuits, not magic.

- Al-Razi's practice of forgiving or forgetting many payments for his medical practice led some critics to suggest that he was so generous with his time and knowledge because he had already discovered how to make gold.

- Al-Razi advanced the work started by Jabir of categorizing and classifying observable and verifiable facts about chemical substances (including their reaction under experimentation), along with the apparatus used in this process. He developed a

classification of minerals into six groups: spirits, bodies, stones, vitriols, borates, and salts.

- Not everyone believed that the search for the philosopher's stone was a practical pursuit. One important critic was the 9th-century mathematician Abu Yusuf Yaqub al-Kindi, known as "the philosopher of the Arabs." Although al-Kindi considered himself a keen alchemist, he was skeptical of the pursuit of converting base metals into gold, seeing it as impossible and thus a waste of time.

Jabir, al-Razi, and al-Kindi all pursued some degree of scientific experimentation in pursuit of knowledge.

- Al-Kindi is credited with being the first man of science to distill alcohol. His book *The Alchemy of Perfume and Distillation* describes how to use his Alkindus distiller and contains recipes for more than 100 perfumes. Al-Kindi's experiments saw him deriving spirits through the distillation of wine, thereby creating an early form of brandy.

- Jabir, al-Razi, and al-Kindi all pursued some degree of scientific experimentation in pursuit of knowledge. However, historians of science and of the Islamic Golden Age often bestow the laurels for developing the scientific method on a man named Abu Ali Hassan ibn al-Haytham (known in Europe as Alhazen).

- Al-Haytham spent most of his working life in Cairo, where he died in 1040. Like the other great scientists discussed in this lecture, al-Haytham was a polymath, an individual with expertise in many different fields of study.

- Al-Haytham was one of the first scientists to insist on proving theories through experimentation. He was also the first to systematically introduce the control element that is fundamental in modern scientific inquiry. The control, also known as the scientific constant, is the element in an experiment that remains the same,

and around which the state of changes in other parts of the experiment are thus measured.

Alchemy in Europe

- Precise details about the transmission of knowledge from one place to another aren't always easy to spot. In the case of alchemy, however, we have an exact date: February 11, 1144. On that day, Robert of Chester—a noted 12th-century translator from England—recorded in his diary that he had just finished translating an Arabic book into Latin. The English title of the book was *The Book of the Composition of Alchemy*.

- Robert notes in his introduction to the book on alchemy that this was a new science in the West. As such, he was also responsible for the introduction of numerous Arabic words into Latin—words without any earlier Latin equivalent—and, from there, into English and other European languages. Among the most obvious is the word "alchemy" itself.

- Sir Isaac Newton, one of the most influential scientists in history, spent far more time working on and writing about alchemical experiments than he did on physics or optics, subjects for which he's far better known. After reading Newton's 17th- and 18th-century writings on alchemy, 20th-century economist John Maynard Keynes offered the opinion that "Newton was not the first of the age of reason, he was the last of the magicians."

- During Newton's lifetime, certain alchemical practices were banned in England because of fraudsters and some successful attempts to defraud wealthy investors. The British Parliament was worried enough about the devaluation of gold—should the secret of the philosopher's stone be found—that unsanctioned alchemy could be punished by public hanging.

- During the Islamic Golden Age and for centuries afterward, it would have been impossible to make any meaningful distinction between the labels "alchemist" and "chemist." It wasn't until approximately 1720, toward the end of Newton's lifetime, that a more rigid distinction between alchemy and chemistry was drawn. Within a few decades, the word "alchemy" came to refer only to the attempt to make gold from base metals. From that point forward, alchemists were seen as charlatans or fools.

Suggested Reading

Bosworth and Schacht, *The Legacy of Islam*.

Hayes, *The Genius of Arab Civilization*.

Jackson, *Cambridge History of Iran*.

Al-Khalili, *Pathfinders*.

Koertge, *New Dictionary of Scientific Biography*.

Questions to Consider

1. Why were scholars during the Islamic Golden Age able to pursue so many different disciplines, scientific and otherwise?
2. What would modern science look like without the application of the scientific method?

Lecture 15

The Fertile Crescent, Water, and al-Jazari

The peoples of the Middle East—an area where water scarcity is a daily reality for many—have long been experts in water management. In this lecture, you will learn about developments in water management during the Islamic Golden Age. You will also examine the development of two intimately related pursuits: agriculture and gardening.

Water Management

- Some of the greatest tools for water extraction and storage long predate the dawn of Islam in 622. From 500 B.C. to A.D. 700, for example, a people known as the Garamantes ruled a Saharan kingdom that relied on slave labor to dig tunnels deep into the desert to access underground water reserves. The empire crumbled as centuries of extraction saw water levels drop, and the Garamantes never developed the technology necessary to dig ever deeper.

- Another desert culture known for expertise with water was the Nabataeans. The Nabataean empire covered northern Arabia and the southern Levant before it was conquered and incorporated into the Roman Empire in the 1st century A.D. The Nabataean capital of Petra is an amazing site, not least for the miles of tile-lined water channels that made use of gravity to move water around the city.

- In modern-day Yemen, one can see the remains of a number of ancient dams, the most famous of which is the Great Dam of Ma'rib. The Great Dam of Ma'rib was built in the 8th century, near the beginning of the Islamic Golden Age. However, there is archaeological evidence of earlier dams on the same site dating back to 2000 B.C.

- Dams were built across the Muslim world, from Persia to Andalusia. While many of these were impressive in their own way, they often showed only minor improvements on earlier technologies.

- The Abbasid caliphate that ruled over much of the region during the Islamic Golden Age thus had plenty of examples to inspire its own developments in water management.

- One of the first large-scale water projects undertaken by the Abbasids was the construction of a series of canals into Baghdad

Ruins of a historic dam in Marib, Yemen

after the new capital was established in 762. Although the first canals had been dug in the area centuries earlier, the Abbasids' extensive work created a much wider network. This created a ready water supply that was a boon to the demands of the fast-growing city. There were even canals connecting the Tigris and Euphrates rivers.

- These large-scale civil works weren't cheap, however, and they required regular maintenance. When they were challenged by rising powers in the region—beginning in the first half of the 10th century—the Abbasids were forced to spend more money on fighting than building. This resulted in the silting-up of portions of the canal system.

- The canal was breached in 938 during a period of internal fighting at the highest levels of Abbasid leadership. Although this damage was fixed some years later, the canal never regained its former greatness or utility. Short-term flooding was bad enough; the long-term decline in agricultural production proved devastating.

- Water-raising machines were the most impressive new water-related technology during the Islamic Golden Age. An important part of this story involves a man named al-Jazari, who even in his own day was famous for constructing machines of moving parts. He would later become known as the father of robotics.

- Al-Jazari worked on a number of practical inventions, including several ingenious water-powered clocks. But it was his water-raising devices that were especially revolutionary.

- Al-Jazari worked in southeastern Anatolia (modern Turkey) toward the end of the Islamic Golden Age. His first water-raising machines modified existing *shaduf* technology.

- A *shaduf* is essentially a bucket attached to a lever that moves up and down around a fulcrum fixed to the ground. It is one of the most basic and ancient means of raising water. More advanced is

the *saqia*, which lifts water using buckets fixed to a vertical wheel. The wheel was generally moved by an animal, such as an ox or a donkey.

- Al-Jazari did away with the need for an animal to power the *saqia*. Instead, he introduced a mechanism of interconnected perpendicular gears that used the water to power itself.

- Not satisfied with this, al-Jazari invented a far more complex device that used animal power and connecting gears with a crank to move water. This machine is the first evidence of crank-machine technology. In Europe, by comparison, the use of such technology wasn't recorded until the 15th century.

Al-Jazari invented a complex device that used animal power and connecting gears with a crank to move water.

- On a roll—and apparently obsessed with producing ever better water-raising devices—al-Jazari invented a hydro-powered pump. This device employed a water wheel to rotate a vertical cogwheel that, in turn, propelled a horizontal wheel. The horizontal wheel moved a pair of copper pistons back and forth. The pistons were attached to pipes that used suction to draw water up to a height of 12 meters. This was one of the first working examples of a double-action piston motion, an achievement that earns al-Jazari a special place in the history of technology.

Agriculture

- A period of relative stability began after the emergence and initial rapid growth of the Abbasid caliphate. A period of conquest was followed by one of settlement, trade, and economic prosperity. The number and size of major cities grew, as did the need for food and farming.

- As the Abbasid caliphate spread into new territories—many of which were more fertile than the western Arabian heartland had been—the caliphate's leaders and administrators were happy to learn about different agricultural techniques.

- In the early days of the Muslim conquests—before the beginning of the Islamic Golden Age—the caliphs expressly forbade their armies from seizing agricultural land, arguing that any such land grabs would breed discontent. As a result, the occupiers had to build their own settlements on the edge of existing towns and cultivate new land. Muslim conquerors became introduced to new forms of farming, including viniculture by the Persians.

- Regardless of what the Quran says about not drinking wine—and it's specifically wine that is mentioned by name, not other forms of alcohol—many of the Abbasid caliphs and the court were huge fans of the fruit of the vine, in both solid and liquid forms.

- One of the most important of the new farming techniques the Arab Muslims became exposed to was the introduction of irrigation methods that allowed for more harvests than usual. In the eastern Mediterranean, for example, instead of winter crops that might produce one harvest every two years, some new crops could produce as many as four harvests a year.

- The Arabs also picked up new concepts in crop rotation from Andalusian farmers who worked the land of the Iberian Peninsula. Other developments in Middle Eastern agriculture at this time were advances in grafting different crop strains, creating new, hardier—or more fruitful—crop species. There was an attendant increase in the use of fertilizers to increase yields and the application of pest control to protect crops before they could be harvested.

- Farming manuals flourished during the Islamic Golden Age. The Abbasids again initially relied on the insights of older civilizations.

By the 10th century, however, Muslim farmers were producing their own manuals in the Abbasid east and in Andalusia to the far west.

- Ancient farming manuals covered everything from animal husbandry to the benefits of certain plant species to advice on tilling and harvesting. These manuals remain a useful source of information, as they give us an idea of what crops were introduced, where, and when.

- The Abbasid caliphate enjoyed a massive transcontinental reach, stretching across North Africa and Arabia, through Persia to central Asia, and into modern Afghanistan and Pakistan. As a result, the caliphate became an important channel through which new foods were imported for cultivation in the Middle East or exported to other parts of the world.

- In the 10th century, the Andalusian traveler and historian al-Masudi wrote about the introduction of oranges and lemons that were "brought from India around 900 AD and were first planted in Oman. From here they were carried via Basra into Mesopotamia and Syria.... Very quickly these trees were sprouting all over Antioch, Palestine, and Egypt where but a short time ago they were completely unknown."

The Abbasid caliphate enjoyed a massive transcontinental reach, stretching across North Africa and Arabia, through Persia to central Asia, and into modern Afghanistan and Pakistan.

- The full range of new crops brought into the Abbasid heartland—both foods and cash crops—was quite astonishing. Sugarcane, indigenous to the Indian subcontinent and parts of southeast Asia, was brought by the Arabs to the Middle East, North Africa, and Andalusia. Rice joined wheat as a new regional staple, while mangoes, peaches, plums,

artichokes, aubergines, and cotton arrived in the Arab heartland from points east.

- Abdul Rahman, the first emir of Cordoba, is one of those responsible for the early transmigration of native plants in the Muslim Middle East. Forced to flee his home city of Damascus in 750 after his family and the Umayyad caliphate were overthrown by the rival Abbasids, Abdul Rahman evaded his pursuers and eventually arrived in the southern part of modern Spain.

- Once he had established a base of power, Abdul Rahman is said to have sent a number of his men back to his Syrian homeland with instructions to harvest and bring to Andalusia date palms and pomegranates to be planted around his palace to remind him of home. The seedlings took, as modern visitors to Spain and Portugal can see.

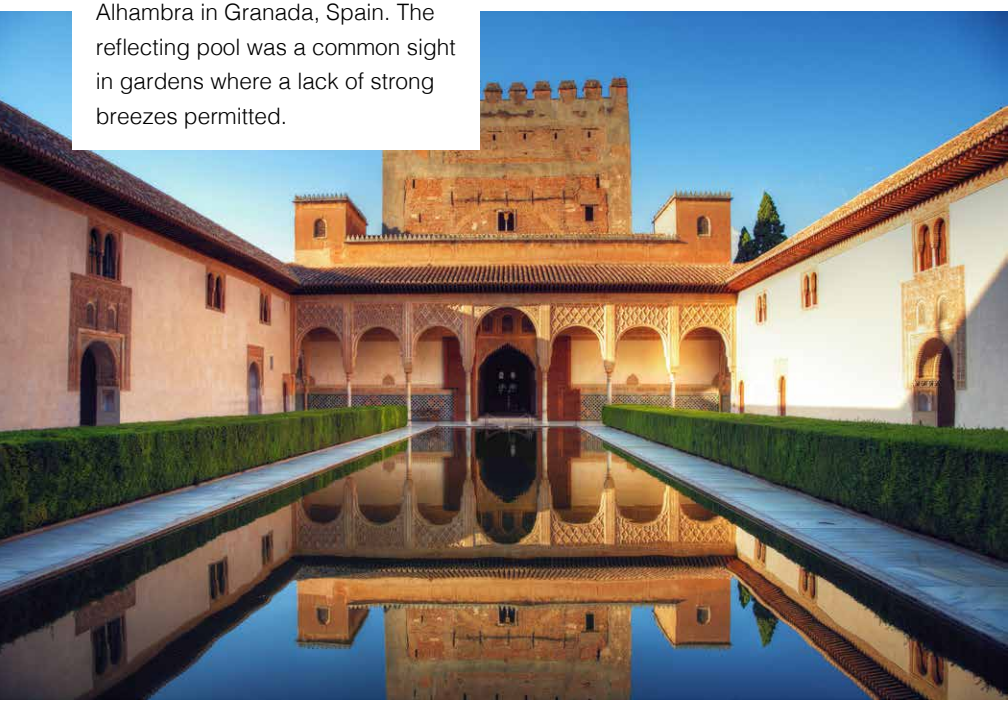
Gardening

- At first, early Muslim conquerors seemed happy to reproduce foreign designs for their gardens in places such as Persia, North Africa, and Andalusia. By the 9th-century, however, a distinctive Islamic-style garden emerged.

- Among the innovations the Abbasids brought to garden design were strict geometric patterns. Everything from flowerbeds to tile work was arranged to show off intricate, mathematical, interlocking patterns to great effect.

- There were typically areas set aside in formal Islamic gardens for contemplation or napping. In the hot climates of the Middle East and Andalusia, there was a greater emphasis on resting than on movement.

- Islamic garden design made great use of water features, both still and moving. The reflecting pool was a common sight in gardens



Alhambra in Granada, Spain. The reflecting pool was a common sight in gardens where a lack of strong breezes permitted.

where a lack of strong breezes permitted. Here the colors of the flowers planted around the water were reflected to great effect.

- Among the greatest inventors of water-powered technology during this period were the Banu Musa brothers, who lived in Baghdad during the 9th century. Working for several caliphs in succession, they invented a series of fountain designs, including shapes they called the lily, spear, and shield.

- Two of the most famous formal Islamic gardens can be enjoyed even today. They are the Alhambra in Granada, Spain, and the gardens of the Taj Mahal in Agra, India.

Suggested Reading

Al-Hassani, *1001 Inventions*.

Lapidus, *A History of Islamic Societies*.

Lindsay, *Daily Life in the Medieval Islamic World*.

Ochsenwald and Fisher, *The Middle East*.

Ruggles, *Islamic Gardens and Landscapes*.

White, *Medieval Technology and Social Change*.

Questions to Consider

1. To what extent was the development of water management techniques during the Islamic Golden Age driven by the Middle East's prevailing arid climate?
2. From the Garden of Eden to the palace gardens of the Alhambra, why are gardens in the Middle Eastern tradition so often seen as mirrors of paradise?

Lecture 16

Jewish Scholar in Cairo: Moses Maimonides

Moses Maimonides, who lived and worked in 12th-century Muslim Europe and North Africa, has been called the greatest philosopher and scholar of Jewish law and scripture that ever lived. The fact that a Jewish scholar achieved such greatness against the backdrop of the Islamic Golden Age and the Crusades makes his story all the more interesting. This lecture examines the life and work of Maimonides, beginning with the circumstances that forced him into exile when he was only 13 years old.

Muslim Iberia

- The initial Muslim invasion of the Iberian Peninsula took place in the year 711. Before that, the territory had belonged to the Germanic Visigoth kingdom.

- By the time of Maimonides birth in 1135, the high point of Muslim Iberian culture achievement was behind it. Christian kingdoms in the north were growing stronger, and Muslim political entities in the south were becoming weaker. This lack of strong government in the south allowed new, more radical Muslim invaders to come from North Africa.

- The city of Cordoba was the capital of a regional territory also known as Cordoba. Under Muslim rule, this territory was initially accorded the status of an emirate, a territory ruled by an emir. The emirs of Cordoba would later declare themselves caliphs, making their realm a caliphate.

- Cordoba enjoyed commercial ties to virtually the entire Mediterranean basin, trading with Muslim and Christian kingdoms alike. By the year 1000, the city's population was around 500,000, and it was one of the most advanced and glittering metropolitan areas in the world.

- The caliphate of Cordoba ended in 1031, when internal divisions and rivalries saw it fracture into a number of small principalities. The city of Cordoba, however, continued to prosper both culturally and economically. It remained for some time the acme of medieval civilization.

- In addition to world-class centers of research and education, Cordoba boasted free public facilities, such as bathhouses. The large number of inns gives one a sense of how many visitors regularly came to the city. As far away as Christian Saxony, in modern Germany, Cordoba was celebrated as "the ornament of the world."

- Jews and Christians lived and worked openly in Cordoba. They enjoyed legal protection from the Muslim authorities, having been accorded dhimmi status under Islamic law.

- The dhimmi (or protected ones) is an idea that came about in the earliest days of Islam. Initially, it applied only to Jews and Christians—the so-called People of the Book—who were, like Muslims, Abrahamic monotheists. It was eventually extended more broadly to apply to Persian Zoroastrians, for example, and Indian Hindus and Buddhists.

Cordoba enjoyed commercial ties to virtually the entire Mediterranean basin, trading with Muslim and Christian kingdoms alike.

- In many cases, the benefits of dhimmi status went further than providing legal protections to non-Muslim subjects. Jews and Christians were sometimes allowed to establish their own courts to settle religious disputes and certain other matters.

- The protected status of the dhimmi was central to Cordoba's ability to flourish. And the benefits worked both ways, because the conquerors gained the talents of qualified and capable non-Muslim subjects. If Muslim settlers had lived in fear of their lives in occupied lands, or if merchants had been worried that their property and goods could be seized, they would have left. If foreign traders hadn't been able to trust that bills of sale would be honored, they would have stopped coming to the city.

- Cordoba was not a wholly egalitarian religious utopia, however. Today we would characterize Cordoban Jews and Christians as

second-class citizens, although this label would also apply to the majority of Muslims from Cordoba.

- Christians and Jews typically fared better under Muslim political rule than Muslims and Jews did in Christendom. But there is an ebb and flow of political stability and religious tolerance in world history, and it did not bypass Andalusia.

- In the decade before Moses Maimonides was born, a new political force emerged in Morocco, in the southern Atlas Mountains: the Almohads, a native Berber dynasty. In 1147, after overthrowing the existing powers in Morocco and southern Iberia, the Almohads conquered other parts of North Africa before crossing the Strait of Gibraltar and swiftly taking much of Andalusia.

- The Almohads were intolerant toward Jews and Christians, in stark contrast to the open-handed dealing that had previously been the norm in Cordoba. Under the Almohads, Jews were offered the choice between conversion, exile, or death. Clearly, this was not a promising development for Moses Maimonides and his Jewish family in Cordoba.

- The Almohad domination of Andalusia lasted less than 70 years, but the damage was done. The Almohads moved their capital in Andalusia from Cordoba to Seville, diminishing Cordoba's political stature. But it was the loss of security and the exile of so many Jews and Christians that ultimately ended Cordoba's greatness. Many Muslims also ran afoul of the Almohads and fled or were put to the sword.

Maimonides the Man

- Moses Maimonides was forced into exile at the age of 13. He spent years with his family as a refugee, first in other parts of Andalusia and Morocco. Nevertheless, Maimonides grew up in a learned family, and he studied subjects one would expect for an educated boy of his time. His primary teacher was his father.

Moses Maimonides
(1135–1204)

- Maimonides spoke Arabic as a child, and he would later write all but one of his books in something called Judeo-Arabic—essentially classical Arabic written using the Hebrew script. He studied Jewish and Islamic religious teachings, as well as astronomy, mathematics, and biology. Eventually, he became a doctor and a rabbi.

- Married and with at least two sons, the young rabbi migrated east to Cairo, the Fatimid capital of Egypt. In 1171, however, the Fatimid dynasty was overthrown by a new dynasty under the control of a man named Salah ad-Din—or, as he's better known in the West, Saladin.

- Fatimid Cairo had maintained broad tolerance for the Jews, and this enlightened accommodation continued under Saladin. Life for Cairo's approximately 7,000 Jews proceeded calmly, as before.

- Tragedy struck Maimonides when his youngest brother, David, capsized at sea along with the family fortune. Maimonides was now saddled with family debts and the care of his brother's widow and daughter, not to mention his grief from the loss of his brother. Needing to make a better living than he could as a scholar of Jewish law—albeit the most celebrated Jewish scholar of his day—Maimonides gained appointment as one of Saladin's court physicians.

- Sarah Stroumsa, an eminent scholar at the Hebrew University in Jerusalem, argues that had Maimonides not been forced to travel so widely and for so many years in exile, he wouldn't have had such a rich understanding of the wider Mediterranean world. Nor would he have been exposed to as much Muslim and Jewish scholarship as he was.

- Further, had Maimonides not been forced to make a living in Saladin's court, he almost certainly wouldn't have grown into a more public intellectual—one who engaged more with his wider society, as opposed to simply the Jewish community.

- Maimonides also began to engage more directly with Muslim scholars, debating theological and legal matters. And his scholarship certainly must have benefited from his contacts with Muslim and other non-Jewish scholars. As he wrote, "One should accept the truth from whatever source it proceeds."

Much of our knowledge about Maimonides's work comes from a remarkable trove of approximately 300,000 documents called the Cairo Geniza.

Maimonides's Writings

- Much of our knowledge about Maimonides's work comes from a remarkable trove of approximately 300,000 documents called the Cairo Geniza. Discovered in the Ben Ezra Synagogue in Fusat in the 19th century, these records are a peerless collection of original material that includes official documents, bills, details of religious disputes, legal opinions, and letters full of gossip and news—including some material written in Maimonides' own hand.

- Maimonides wrote scores of books and treatises on everything from Jewish law and Talmudic commentary to philosophy, logic, and medicine. The three that have been arguably the most influential and lasting of Maimonides's works are *Commentary on the Mishnah*, the *Mishnah Torah*, and *The Guide for the Perplexed*.
  - *Commentary on the Mishnah* is the first major work of Rabbinic literature. It's almost impossible to overstate the importance of this text. Published in 1168 immediately before Maimonides moved to Cairo, this was the first complete commentary on the entire Mishnah. As the first attempt to provide a complete commentary on material that deals with the oral tradition of Jewish law, its reputation was ensured.

  - The *Mishnah Torah* was written between 1170 and 1180 after Maimonides moved to Cairo. Considered Maimonides's magnum opus, the *Mishnah Torah* is also his only major

work originally written in Hebrew. The book was a massive undertaking intended to discuss, distill, and make more accessible every aspect of Jewish law. It is renowned for cutting through mountains of previous judgements and offering commonsense answers to otherwise complex questions.

- *The Guide for the Perplexed* is Maimonides's most important philosophical work. Intended for educated rather than general readers, it is a largely successful attempt to harmonize the rationalism of Aristotle's philosophical system with the central importance of revelation inherent in Judaism.

- *The Guide for the Perplexed* was a popular work of philosophy for all medieval thinkers after Maimonides. Thomas Aquinas, the 13th-century Dominican friar, theologian, and philosopher, referred to Maimonides as Rabbi Moses, and he was clearly influenced by Maimonides's concept of negative theology—the idea that the only way one can understand God is to describe that which God is not. Other Christian scholars influenced by Maimonides include the great Scottish philosopher-theologian Duns Scotus and the leading German mystic and theologian Meister Eckhart, both of whom were born in the 1260s.

- Maimonides upset some readers by making it clear in *The Guide for the Perplexed* that he saw much of scripture as allegorical, referential explanations for things that ordinary people would otherwise find impossible to understand. Controversy over the book led to its being banned—and even burnt, at times—by some Jewish scholars and critics.

- Like many great thinkers, Maimonides was keen to encourage others to think for themselves and to be on their guard against being misled. He wrote, "Do not consider it proof just because it is written in books, for a liar who will deceive with his tongue will not hesitate to do the same with his pen."

- Maimonides died in 1204. He is generally regarded as among the most important of all Jewish thinkers. As they say, "From Moses to Moses, there was none like Moses."

Suggested Reading

Cooperman and Zohar, *Jews and Muslims in the Islamic World*.

Kennedy, *Muslim Spain and Portugal*.

Lewis, *The Jews of Islam*.

Rubin and Wasserstein, *Dhimmis and Others*.

Questions to Consider

1. What social and economic conditions made it possible for Jewish scholarship to flourish in Muslim polities?
2. Maimonides wrote, "Teach your tongue to say 'I do not know,' and you will make progress." What does such a tenet tell us about the man?

Lecture 17

The Banu Musa's Inventions and Automatons

Automata—clocks and other mechanical devices—are some of the Islamic Golden Age's most playful inventions. The period saw a proliferation of automata of all kinds, including games, self-playing musical instruments, and machines designed to pour drinks. Creation of all sorts of inventive machines flourished. Inventors made use of the scholarly legacy of earlier civilizations, and they left behind a legacy of academic and practical achievement that would assist future scientific and cultural advances.

The Banu Musa

- In the 9th century, Baghdad was the capital of the vast and wealthy Abbasid caliphate, the Muslim power that ruled over much of the Middle East. The city was enjoying an explosion of intellectual and cultural activity under the Sunni Muslim caliph, a man named al-Mamun. Al-Mamun was building on the foundations laid by his father, Harun al-Rashid, who had founded the House of Wisdom in Baghdad as a center of knowledge and learning.

- During this time of peace and prosperity, al-Mamun was free to indulge his tastes for learning and extravagance, spending freely on

whatever caught his fancy. In addition to commissioning palaces, he ordered the building of new libraries, hospitals, market squares, and public baths. He was also a patron of higher learning, spending generously to sponsor the greatest talents the world had to offer.

- Architects, scholars, and engineers flocked to his expanding city, bringing with them wisdom from every corner of the caliphate and beyond. Three of these men were the Banu Musa, brothers whose name means "Sons of Musa." Their father, Musa ibn Shakir, had been employed as an astrologer and astronomer by al-Mamun when al-Mamun was the governor of the Khorasan province.

- Al-Mamun took the brothers—Muhammad, Ahmed, and al-Hassan—under his wing after their father died, settling them in Baghdad where they pursued a life of scholarship and invention. Each had a broad Islamic and scientific education, and each came to specialize and excel in a particular field: one in astronomy, another in mathematics, and the third in engineering. When they brought their heads together, the collective expertise of the Banu Musa was quite formidable.

- As the dynasty continued to enjoy a period of stability and prosperity, Al-Mamun and three of his successors gave free rein to the brothers' creative talents. The Banu Musa were employed at the royal court for decades, working on engineering projects, astronomical projections, and scores of complex toys and other automatic devices to entertain the caliphs and members of the royal household.

The Book of Tricks

- The Banu Musa wrote approximately 20 books, most of which no longer exist. Their most innovative work survived, however. Written around 858, *Kitab al-Hiyal*—which translates literally as *The Book of Tricks*—was begun as a project to preserve the knowledge of mechanical devices from earlier empires, such as Greece and Rome. The brothers' research wasn't limited to Mediterranean empires; they also drew on manuscripts from Persia, China, and India.

- One of the Banu Musa's greatest heroes was, oddly enough, a man named Hero. Hero of Alexandria was a 1st-century Greek mathematician and inventor from Alexandria, Egypt. Among his most inventive works was the earliest practical design for a steam-powered engine. He is also credited with the first example of a vending machine—a coin-operated device that dispensed a measure of holy water. Although none of his original Greek writings survive, we still have the Banu Musa's Arabic translations of his work.

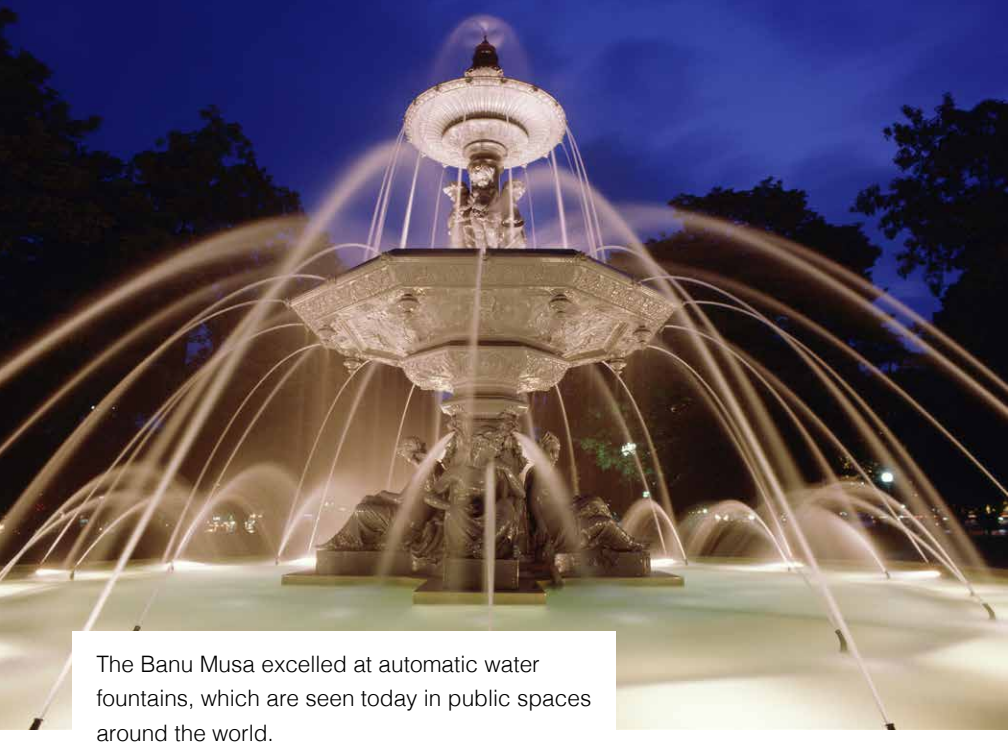
- The Banu Musa created scores of new devices, a fact that comes across on every page of *The Book of Tricks*. Also known as *The Book of Ingenious Devices*, this amazing work contains designs for more than 100 ingenious contraptions, including details of how they were built and how to operate them.

- Automatic water fountains are one area in which the Banu Musa excelled. These playful fountains are exactly the sort of thing one sees today in public spaces around the world. By installing different nozzles, the Banu Musa's fountains allowed different patterns of water jets to shoot into the air.

The Banu Musa created scores of new devices, a fact that comes across on every page of *The Book of Tricks*.

- Another of the brothers' inventions was the hydro-powered mechanical organ, one of the earliest recorded mechanical musical instruments. They also invented a steam-powered automatic flute—designed to resemble a man playing the flute—that could be adjusted to play different tunes. Some have called it the first programmable machine ever created.

- Among the Banu Musa's more practical inventions was an industrial device we now call a clamshell grabber. Typically used to dredge silted water, the clamshell grabber removes muddy deposits from



The Banu Musa excelled at automatic water fountains, which are seen today in public spaces around the world.

the bottoms of rivers, bays, and other bodies of water that must be kept clear for purposes of navigation.

- Also of practical use, the brothers created a gas mask (for civilian rather than military purposes). Worn by men responsible for clearing out polluted wells, the mask allowed a worker to "descend into any well he wishes," according to the manual, "and he will not fear it, nor will it harm him —Insha'Allah—God willing."

- The Banu Musa are sometimes criticized for not making better use of their talents by doing more sensible or practical work. This is an unfair criticism, and it misses an important point. Although many of the Banu Musa's devices were designed to amuse, they employed practical mechanics and innovative engineering technology. The line between sensible and playful was constantly blurred.

- It's not always possible to say which of the Banu Musa was responsible for individual designs, nor perhaps is it that important. The middle brother, Ahmed, was the most interested and skilled when it came to mechanics. But it was a combination of the three brothers' individual skills—and perhaps a healthy dose of sibling rivalry—that was responsible for spurring their creativity.

Al-Jazari

- Ismail al-Jazari was born in 1136 and spent most of his working life employed in the royal court of the Turkic Artuqids. Like the Banu Musa, this talented mathematician, mechanical engineer, and inventor was fortunate enough to work in a realm that was relatively stable and prosperous and to have paymasters who were intellectually curious enough to employ and encourage him.

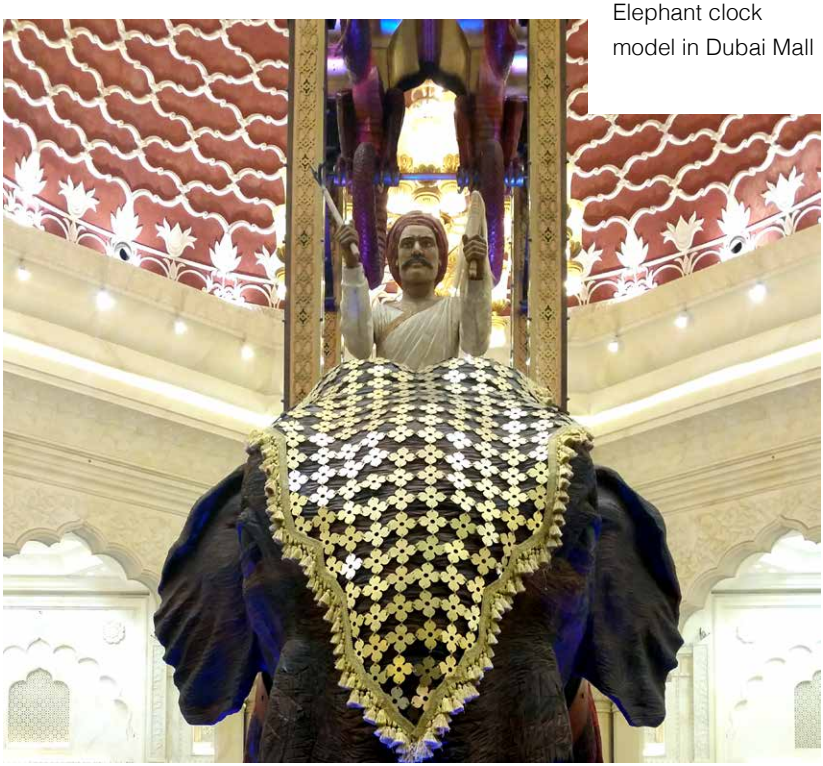
- We know very little about al-Jazari's life, other than that his father had also been the Artuqids' chief engineer. We do know, however, that al-Jazari made a number of advanced humanoid automatons. These models have led scientists in the field today to refer to al-Jazari as the father of robotics.

- Inventors aren't always authors. But in the example of al-Jazari, we're lucky that the king who was his employer ordered him to write a book. Taking a leaf from the Banu Musa, whose work al-Jazari knew and admired, al-Jazari entitled his work *The Book of Knowledge of Ingenious Mechanical Devices*.

- Al-Jazari's book contains detailed written descriptions of his inventions, including how they were built and operated. He produced a collection of exquisite illustrations to accompany the text, making the book a really beautiful object. These pictures provide us with a deeper, more precise understanding of the machines than we might have retained otherwise.

- A great number of al-Jazari's automatic machines feature human and animal figures. For example, one resembles a waitress serving drinks from a tray. In another, a hydro-powered peacock serves water for washing one's hands. Like the Banu Musa, al-Jazari was fascinated by water and its utility in getting things to move.

- Al-Jazari's real specialty was clocks of all shapes and sizes, including clocks powered by water and candles. These clocks were simultaneously works of art and craft. The most famous of al-Jazari's clocks—and certainly the largest—is the elephant clock. A massive piece, the elephant clock has been replicated many times for science around the world. There's even a model in a Dubai shopping mall, complete with the elephant's automaton rider.



Elephant clock model in Dubai Mall

- Donald Hill, the English authority on the history of Islamic mechanics and engineering, states that al-Jazari "not only assimilate[d] the techniques of his non-Arab and Arab predecessors, he was also creative. He added several mechanical and hydraulic devices. The impact of these inventions can be seen in the later designing of steam engines and internal combustion engines, paving the way for automatic control and other modern machinery."

- Comparing al-Jazari's work to similar inventions in medieval Europe, Lynn White, the late professor of medieval history at Princeton and Stanford, noted that segmental gears appeared in al-Jazari's writings before 1200, but did not appear in the West until 1364. They didn't enter the general vocabulary of European machine design until after 1501—300 years after al-Jazari.

Suggested Reading

Banu Musa, *The Book of Ingenious Devices*.

Al-Hassani, *1001 Inventions*.

Al-Jazari, *The Book of Knowledge of Ingenious Mechanical Devices*.

Al-Khalili, *Pathfinders*.

White, *Medieval Technology and Social Change*.

Questions to Consider

1. To what extent did the more playful inventions of the Banu Musa and al-Jazari inform and lead to their more practical engineering work?
2. How might the lack of ideology that typically accompanies engineering encourage creativity and the exchange of new technology between different cultures?

Lecture 18

Mosques, Architecture, and Gothic Revival

These days, we take for granted the architectural influences of the Islamic Golden Age. These influences dominated and defined the look of medieval Europe from the 12th century to the 16th century, and they reemerged in the 18th century with the rise of Gothic architecture. In this lecture, you will learn about the history of Muslim architecture, as well as two broad architectural types—religious and military—that signify the Islamic Golden Age.

Background

- In the first 100 years after Muhammad rose to power, his military strength and religious influence spread so swiftly across the Arabian Peninsula that the new Islamic empire had little time to establish a distinctive architectural look. After this century of conquests, however, a period of relative calm took hold.

- During this period of peace and prosperity, there was an effort to establish an Islamic identity in the royal courts, provincial capitals, and cities that now spread across the Greater Middle East.

- The Umayyads had erected monumental buildings, including palaces and mosques, in their capital of Damascus and elsewhere. These buildings displayed numerous Hellenic and Byzantine features, both inside and out. But these influences would fade

following the ascendancy of the Abbasids, who emphasized Persian rather than Greek roots.

- The Abbasid empire was the largest in the world at the time. It was bordered to the east by China and India and to the west by the Byzantine Empire. During the second half of the 8th century and much of the 9th century, the caliphate included the Middle East, most of North Africa, Persia, and parts of central Asia. As a result, architectural styles varied enormously.

- Muslim architects produced highly distinctive styles in the different Muslim political realms, as evident in the unique Abbasid, Fatimid, Moorish, and Mamluk styles.

- The term "Islamic architecture" should perhaps be extended only to mosques and other buildings that have a specifically religious purpose. After all, there's nothing inescapably Islamic about a market, castle, or palace. "Muslim architecture" might be a more accurate term to describe structures designed and constructed for Muslim clients, regardless of the faith of the architect or builder.

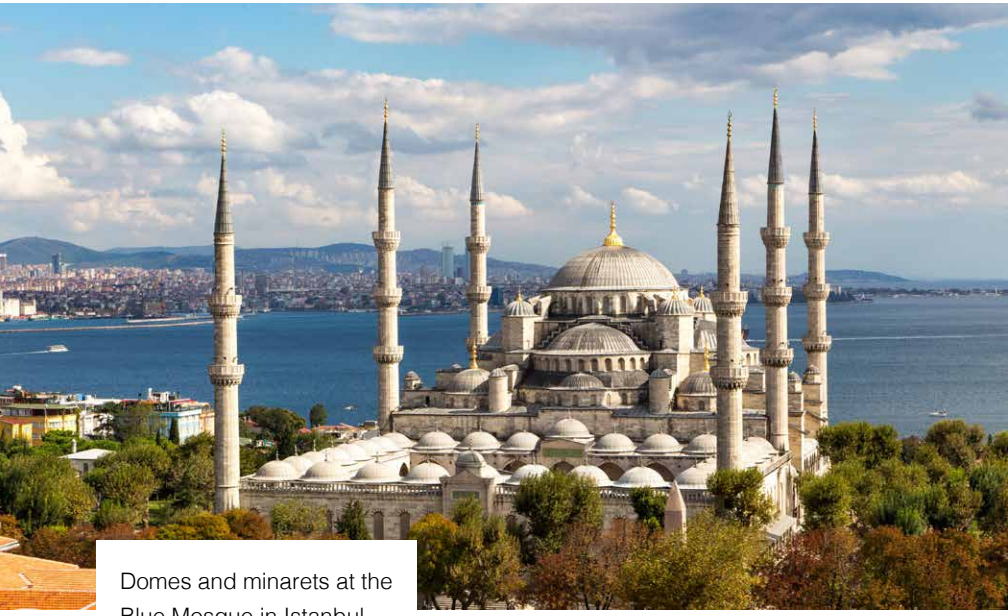
Religious Architecture

- Every city and town in the Islamic Middle East has a central mosque. In Arabic, it's called the *jama masjid*—"the Friday mosque." The name refers to Islam's holy day, when people come together for weekly, communal prayers. Sometimes also called the congregational mosque, a *jama masjid* is akin to a cathedral in terms of its role and importance as a city's most important place of worship.

- The Great Mosque of Samarra, in modern-day Iraq, once functioned as the city of Samarra's *jama masjid*. Its courtyard was meant to be big enough to hold the community's entire adult male population. Built from 848–861, the Great Mosque of Samarra was the largest mosque in the world at the time. It exemplifies mosque and minaret architecture from the early Abbasid period.

Minaret at the Great Mosque of Samarra

- Virtually all mosques share certain common features. The four most important are the mihrab, the minbar, the qubba, and the minaret. The first two of these are interior elements. The last two, the qubba and the minaret, are essentially external features and therefore architecturally more obvious.
  - The mihrab is an alcove, often elaborately decorated, signaling to the public the direction of Mecca—the direction in which Muslims are taught to pray.
  - The minbar is a short set of steps, generally adjacent to the mihrab, from which the imam delivers the lesson. The minbar thus serves the same purpose as a church pulpit, the raised platform from which a preacher gives the sermon.
  - The word "qubba" literally means a tomb (or shrine), but the term is usually used to denote a dome, one of the most prominent features in mosque architecture. Domes are meant to represent the vault of heaven.
  - The minaret is the Muslim religious expression of the tower. It is the most Islamic of all architectural forms.
- Although a mosque must contain a mihrab, there's no requirement that a mosque have a qubba. Nevertheless, domes have been a prominent feature of mosque architecture since the earliest days of Islam. Perhaps the most famous early example is the Dome of the Rock in Jerusalem, built by the Umayyads in 691.
- Grander mosques began to feature two or more domes, although it was not until the rise of the Ottoman Empire that the proliferation of domes reached its peak. The Sultan Ahmed Mosque in Istanbul—better known as the Blue Mosque—has 13 domes and six minarets. In Bangladesh, the Sixty Dome Mosque has not 60 domes, but 77 of them.



Domes and minarets at the Blue Mosque in Istanbul

- The dome as an architectural feature wasn't a Muslim invention. The Ottomans learned a great deal from their Byzantine predecessors, as even a glance at the Istanbul skyline makes clear. As a feature of mosque architecture, however, the dome is surpassed only by the loftier presence of the minaret.

- The first minarets appeared around 710, some 80 years after the death of Muhammad. The minaret's dual purpose was to serve as a useful visual cue, alerting the faithful to the presence of a house of worship, and to provide a prominent signaling point from which the muezzin would call the faithful to prayer.

- Minarets in North Africa beyond Egypt were typically square, unlike the circular minarets characteristic of Arabia and the Levant. The Great Mosque of Kairouan in Tunisia is a brilliant example of the

square minaret style. Completed in 836, this brick mosque features the world's oldest standing minaret.

- Another form of mosque architecture arose in Andalusia: distinctive outdoor passageways featuring two-tiered arches, one on top of the other. A high point in Andalusian mosque architecture is the former Grand Mosque at Cordoba, which featured hundreds of crowned columns.

- Multicolored arches are among the most recognizable features of Andalusian mosque and palace architecture. The form is variously referred to as a horseshoe arch, a Moorish arch, and a keyhole arch.

Military Architecture

- It was only after the rise of the Abbasids in 750 that the caliphate found it necessary to defend its borders. Until then, when the need arose, local rulers were often able to take over structures constructed by earlier Byzantine and Sassanid Persian builders.

- At first, the Abbasids' primary concern was defending themselves against Muslim political rivals, beginning with the exiled Umayyads in Andalusia. Non-Muslim challengers would arise later in the form of the Byzantine Empire and, most famously, the European Crusaders.

- From the beginning of the First Crusade in 1096 until the Siege of Acre in 1291, the presence of Crusader armies and camp followers in the region meant that there would be multiple contacts between European and Arab troops—and architects. Many architectural features of Arabic castles came to be adopted in Western defensive structures (and subsequently in non-military buildings).

- The most important Arab architectural feature that European architects seized upon was the arch. The first attested arches come from Mesopotamia, in modern Iraq, around 2000 B.C. and from

Ashkelon, in modern Israel, around 1850 B.C. These arches were crude in nature and were greatly improved upon by the ancient Romans, who had inherited the arch from their predecessors, the mysterious Etruscans.

- Architects working for the Abbasid rulers during the Islamic Golden Age—Armenian and Syrian Christians, Zoroastrian Persians, and Muslim and non-Muslim Arabs among them—receive credit for developing the arch into an art form.

- Translated texts from older civilizations aided the development of certain architectural forms during the Islamic Golden Age. Among the most important works for architecture were ancient Greek, Persian, and Indian mathematical texts. A glance at any large medieval building—whether castle, mosque, or cathedral—conveys the importance of geometry and trigonometry.

- None of the architectural forms mentioned in this lecture stayed solely in the Middle East. There were numerous points of multicultural contact around the Mediterranean basin throughout the Islamic Golden Age. A door for the exchange of ideas between the Muslim world and the Christian states of Europe was always open somewhere.

Gothic Architecture

- According to many scholars, Gothic architecture was born in France around 1140. At this time, the construction of several cathedrals with lancet (or pointed) arches signaled a shift away from the earlier, Romanesque style.

- Gothic architecture dominated grand European building projects from its inception until the early 1500s. The late medieval Gothic style is easy to spot, characterized as it is by lancet arches, rib vaults, towers, spires, and supportive buttresses.

- Nobody who ever designed or built in the Gothic style called it "Gothic," because the term didn't exist until the 16th century. Coined by the Italian painter and writer Georgio Vasari, the term was originally meant as a pejorative. Vasari held the northern European Gothic tribes—including the Ostrogoths, Visigoths, and Vandals—responsible for the destruction of classical Roman architecture.

- The Gothic Revival movement that emerged in England during the 19th century was driven in part by an awakening of High Church Anglicanism, or Anglo-Catholicism. Among the most instantly recognizable Gothic Revival buildings are the Houses of Parliament and the clock tower that holds Big Ben, designed by Augustus Pugin.

- Augustus Pugin celebrated Gothic architecture in his book *The True Principles of Pointed or Christian Architecture*. Pugin saw the Gothic Revival as a return to what he called true Christian architecture. He even went so far as to claim that "the pointed arch [referring to the lancet arch] was produced by the Catholic faith."

Translated texts from older civilizations aided the development of certain architectural forms during the Islamic Golden Age.

- Given the association of Gothic architecture with pre-Reformation cathedrals, it is somewhat ironic that the roots of this so-called Christian architecture of the Catholic faith are actually grounded in the Abbasid caliphate and the Islamic Golden Age.

Suggested Reading

Bosworth and Schacht, *The Legacy of Islam*.

Al-Hassani, *1001 Inventions*.

Hayes, *The Genius of Arab Civilization*.

Hillenbrand, *Islamic Architecture*.

Questions to Consider

1. Sir Christopher Wren wrote, "This we now call the Gothic manner of architecture…I think it should with more reason be called the Saracen style." Was he right?
2. Compare the principle that "form follows function," as espoused by modernist architects, with examples of mosque and military architecture from the Islamic Golden Age.

Lecture 19

Arabic Verse, Love Poetry, and Wine Songs

In this lecture, you will learn about poetry during the Islamic Golden Age. In particular, you will consider the work of three poets who exemplify the poetic art during this period: Abu Nuwas, Abu Tammam, and al-Mutanabbi. The 200-year span covered by these three men's lives represents a period of great importance not only for Arabic verse, but for wider cultural shifts at the heart of the Abbasid caliphate.

Arabic Poetry in the Pre-Islamic Era

- Prior to the dawn of Islam, there was no written tradition for poetry in the Arabic language. This meant that poems were recited from memory. Prodigious feats of memory were not unusual in preliterate societies. Nevertheless, praise was lavished on those poets who were able to recite scores of verses on demand.

- The ability to speak well was itself considered an important aspect of one's deportment and social status. As such, poetry enjoyed an elevated position in society, above all other cultural and artistic endeavors.

- During the Islamic Golden Age, educated people were expected to be able to versify what they wanted to write, even when they were not specifically engaged in composing a poem. The great polymath

Ibn Sina, for example, wrote approximately half of his books on medicine in verse form, both in Arabic and Persian.

- Because of their acute memories and powerful recall, poets were tribes' de facto historians, journalists, and propagandists all rolled into one. They were celebrated for telling tales of the great leaders of the past and for singing the praises of the current leadership.

- Poems of praise were one of the most common themes at this time. Other common themes were love poems, poems about war, poems in praise of wine, insult poems, and laments.

- The purpose of insult poems was to ridicule rival tribes and their leaders. The rival tribe would generate a response, offering fresh insults from its own poet. The original tribe would then have to respond, and so forth.

- Laments were composed to memorialize the dead, typically those who had died in battle. Because it was considered unmanly to cry, laments were often written and recited by women.

Islam and Poetry

- The Quran contains a number of references to poets and poetry. Most of these are negative, but not all of them. Muhammad himself seems to have had something of a love-hate relationship with the art form. When one reads, for example, that Muhammad considered many poets ungodly, deceitful, and dishonest, one can't help but wonder if perhaps he had been on the receiving end of an insult poem at some point.

- There are hadith—sayings of Muhammad—that permit the use of poetry under particular circumstances. These include poetry in praise of God,

The great polymath Ibn Sina wrote approximately half of his books on medicine in verse form, both in Arabic and Persian.

poetry that contains wisdom, and poetry written specifically to rebut poetry attacking Islam.

- However uncomfortable the relationship between early Islam and poetry might have been, there is something that brings the two together: Muslims believe that the Quran was revealed to Muhammad through the angel Gabriel, and that the first word spoken to Muhammad was "Iqra!"—a command to recite, or read.

- The fact that the Quran was not written down during Muhammad's lifetime, but was instead memorized and transmitted orally, is also noteworthy. Clearly, the preexisting poetic tradition shows a direct connection between the importance of memorization and the spread of Muhammad's prophetic message.

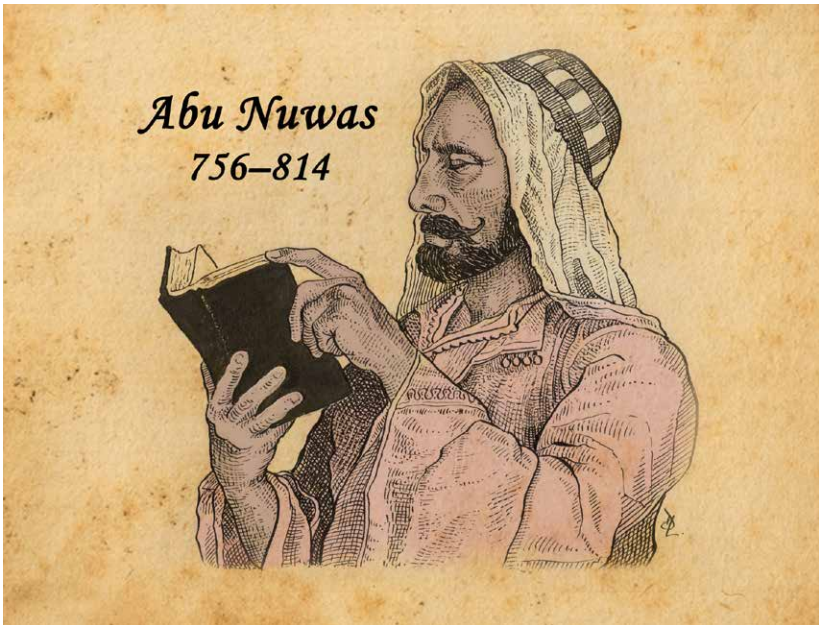
- Another reason why Muhammad might not have been overly impressed with pre-Islamic poetry is because many of the things that the poets spoke about ran afoul of his message—not least their verses in praise of wine.

Abu Nuwas

- Abu Nuwas is considered by many to be the greatest poet of the Islamic Golden Age, and by some to be the best poet ever to write in Arabic. He was also a controversial—even notorious—figure.

- Abu Nuwas was born to mixed Arab-Persian parents. We don't know where he was born, but we do know that he moved to Baghdad soon after it was founded in 762. "Abu Nuwas" is actually a nickname that means "father of curls, an apparent reference to the poet's hair, which was described as long, beautiful, and curly.

- Abu Nuwas wrote many verses in praise of wine and drunkenness. His other favorite theme was love in all its forms. He wrote some rather tame poems about chaste and courtly love, but some if his work is very frank about lust and love between men and women. He



also wrote verses celebrating masturbation, homosexuality, and sex with young men. With respect to the latter practice, it seems obvious Abu Nuwas was drawing on personal experience.

- Abu Nuwas's disdain for societal conventions and his unorthodox lifestyle saw him periodically provoke both religious and secular authorities. He poked fun at misers, liars, cheats, and hypocrites. A religious skeptic (to put it mildly), Abu Nuwas was delighted to offend more religious citizens. Referring to the Quran, he wrote the following:

> *Always I have and always I will*
> *Scatter God and gold into thin air.*
> *When we meet, I love whatever the Book forbids.*
> *And run from whatever it allows.*

- Abu Nuwas was a personal friend of caliph Harun al-Rashid, the Abbasid empire's chief civil and religious leader. And like the caliph, Abu Nuwas makes a number of appearances in the collection of Middle Eastern and South Asian stories known as *The Thousand and One Nights*.

- As an official poet—and something akin to the caliph's court jester—Abu Nuwas's wild behavior included public drunkenness and debauchery. And there's no doubt he enjoyed courting controversy.

> Abu Nuwas's disdain for societal conventions and his unorthodox lifestyle saw him periodically provoke both religious and secular authorities.

- Even the caliph grew tired of his friend's behavior and disrespect for authority, and he had Abu Nuwas thrown in jail on more than one occasion. It seems almost to have worked as a drying-out period for the dissolute poet. Each time he was in prison, he would write poems about how sorry he was, and he would promise to reform his ways.

> *Do you want to see a miracle?*
> *Then set me free, and see how often I flatter God.*
> *Oh! I've been in jail too long*
> *And happiness can only come from your generosity.*

- Abu Nuwas was eventually forced into exile in Egypt. He returned to Baghdad only after Harun al-Rashid died, when al-Rashid's son and successor—the caliph al-Amin—invited him to rejoin the royal court.

- Abu Nuwas had once been a tutor to the young al-Amin, who became caliph at the age of 22. According to stories swirling around Baghdad, al-Amin shared his former tutor's love of drinking and causing scandal—taking one of his eunuchs as a lover, for example.

- Many prominent Muslims throughout history were known for drinking alcohol, including the caliph Harun al-Rashid, and the attitude

toward alcohol during Abu Nuwas' lifetime was relatively relaxed. Today, the prevailing cultural and religious mood in much of the Middle East is more conservative than it was during the Islamic Golden Age. This is partly because religious orthodoxy was not yet firmly established.

Neoclassical Arabic Poetry

- After Abu Nuwas, a movement took hold that some have called neoclassical Arabic poetry. One of this movement's leading proponents was a Syrian-born poet named Abu Tammam.

- Born into a Christian family, Abu Tammam converted to Islam before rising to become a court poet and historian for the caliph Mu'tasim. Reacting in part to what was seen as the modernism of Abu Nuwas and others, Abu Tammam's original poetry revisited traditional forms and successfully recaptured the resonance of early Arabic poetry.

- Neoclassical works didn't overturn or rid the scene of more modern poetry. They did, however, reestablish a place for the traditional among the modern. The traditionalists were in thrall to Abu Nuwas, but they weren't merely replicating or copying earlier works. Instead, they made use of Arabic as it had emerged in the 200 years since the birth of Islam, with all its various influences.

- Abu Tammam's continuing importance relies as much on his work as a compiler of earlier Arabic verse as it does on his original contributions to the field. His 10-volume *Kitab al-Hamasah*, or *Book of Exhortations*, is epic both in scale and importance. This encyclopedic collection is arguably among the most important sources of early Arabic poetry. Were it not for Abu Tammam's efforts, we would have only a very patchy picture of this early verse and how it developed.

- The most common form of Arabic verse in the pre-Islamic era and during the Islamic Golden Age was the qasida, a form of

ode. Qasida verses typically run between 70 and 100 lines, and they are usually monorhymes—poems where the last sound in each line is the same.

Born into a Christian family, Abu Tammam converted to Islam before rising to become a court poet and historian for the caliph Mu'tasim.

- One of Abu Tammam's fellow neoclassical poets was a man named al-Mutanabbi. Born in 915 in the city of Kufa, in modern-day Iraq, al-Mutanabbi was a master of qasida. He made his living writing panegyric, a formal poetic form that eulogizes or praises its subject. In keeping with earlier Arab poets, al-Mutanabbi celebrated traditional themes such as honor, courage, loyalty, friendship, and chivalry.

- Al-Mutanabbi's work demonstrates that he was witty, honest, lyrically beautiful, and also proud and arrogant—sometimes to a shocking extent. Consider the following lines:

> *I am the one whose writings even the blind can see,*
> *And whose words even the deaf can hear.*
> *The stallion, the night and the desert all know me,*
> *And so too do the sword, the spear, the paper, and the pen.*

- Al-Mutanabbi was murdered at the age of 50 for having insulted someone in one of his poems. It's perhaps less shocking that he was murdered than that he lived so long before one of the many enemies he made caught up with him. His motto was an uncompromising clarion call, "Live honorably or die heroically."

- Some of the Arabic language's greatest and most enduring literary output revolved around love, lust, and alcohol. It was a reflection of human society as seen or experienced by the poets themselves. And it is a measure of their skill that the best of these poets are still read and admired—or hated—today.

- In 2013, a statue in northern Syria of the 11th-century poet and philosopher al-Ma'arri was beheaded by terrorists from an al-Qaeda affiliate called the an-Nusra Front. Al-Ma'arri—an antiestablishment, intellectual freethinker and religious skeptic—was controversial even in his own day. He was also recognized as the greatest poet of his generation.

- It's easy to see why terrorists who kill in the name of faith might take umbrage at al-Ma'arri when we consider some of what he wrote:

> *The world is divided into two types of men:*
> *Those who have intelligence and no religion;*
> *And those who have religion and no intelligence.*

Suggested Reading

Ahmed, *What Is Islam?*

Arberry, *Arabic Poetry*.

Lindsay, *Daily Life in the Medieval Islamic World*.

Irwin, *Night and Horses and the Desert*.

Nicholson, *A Literary History of the Arabs*.

Questions to Consider

1. Can poetry celebrating wine drinking and homoerotic love be considered Islamic even though it was written by poets who considered themselves "good" Muslims?
2. What importance might be attached to poets and the recitation of poetry in a preliterate society?

Lecture 20

Medieval Mastermind: Avicenna (Ibn Sina)

Regarded by many as the most important philosopher in Islamic history, Ibn Sina—known in the West as Avicenna—is also reckoned to be one of the most influential thinkers of all time. His philosophical ideas influenced generations of Muslim scholars, and they were important for hundreds of years for philosophers working in the Jewish and Christian traditions. In this lecture, you will learn about the life, work, and legacy of Ibn Sina.

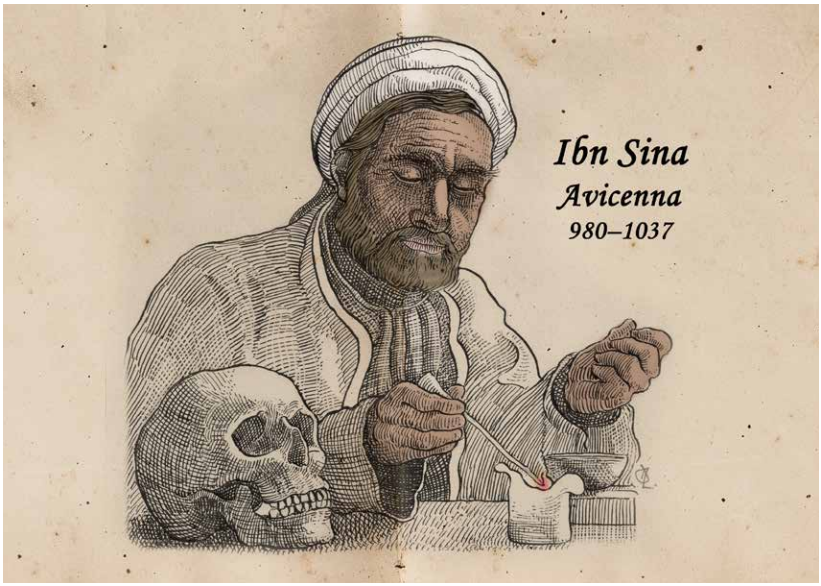
The Life of Ibn Sina

- Ibn Sina's full name was Abu Ali al-Husayn ibn Abd Allah ibn al-Hassan ibn Ali ibn Sina. He was born in about the year 980, in Bukhara, which then was known as Persia, and is now part of modern-day Uzbekistan. Bukhara was the capital of the ruling Samanid dynasty. And Ibn Sina's father was a provincial governor for the Samanids. Ibn Sina's upbringing was a privileged one.

- Ibn Sina wrote an autobiography that positively sparkles with arrogance and self-praise. He wrote that even when he was a young boy his tutor was "astonished at my brilliance." He adds that "whatever problem he set for me, I was able to conceptualise much better than he."

- Ibn Sina's written output lends credence to these claims. He was the author of around 450 titles—a formidable total, especially considering that he died at the age of just 57. He writes quite plausibly that he'd memorized the Quran by the age of 10, before moving on to study the natural sciences and metaphysics. Having cracked that, he began to study medicine at the age of 13. Consider the following entry from his autobiography:

> Next I sought to know medicine, and so read the books written on it. Medicine is not one of the difficult sciences, and therefore, I excelled in it in a very short time, to the point that distinguished physicians began to read the science of medicine under me. I cared for the sick and there opened to me some of the doors of medical treatment that are indescribable and can be learned only from practice. In addition I devoted myself to jurisprudence and used to engage in legal disputations, at that time being sixteen years old.



- Ibn Sina's book *The Canon of Medicine* was still being used as the standard medical textbook in European universities as late as the 17th century—600 years after it was written. When he was a teenager, his medical expertise saved the life of a local ruler who rewarded young Ibn Sina with access to the palace library.

- This palace library that Ibn Sina gained access to contained a treasure trove of knowledge from across the Muslim world and beyond. It included thousands of translated texts from ancient Greece, Babylonia, India, and other great pre-Islamic civilizations. It also included many of the most important works written since the dawn of the Islamic era and almost 200 years' worth of commentary on Islamic and pre-Islamic texts.

- Not long after the Abbasid caliphate rose to power in the year 750, rival claimants began to appear in other parts of the Muslim world, from Andalusia to Persia. While upsetting for the Abbasids, the end of the unified caliphate proved to be a boon to learning. Rivals invested heavily in scholarship, each one trying to prove their worth as a great power and attract the best scholars across the Muslim world. In this way, Ibn Sina gained access to numerous great libraries during his lifetime as he moved from one kingdom to another.

- Ibn Sina died at the age of 57 in the Iranian city of Hamadan. Falling ill with some combination of exhaustion and severe stomach pain—possibly the result of poisoning—he ultimately proved that while he may have been a great physician, he was a terrible patient. He failed to heed his own medical advice, quickly growing sicker and weaker. From his sick bed, he freed his slaves, gave most of his possessions and money to the poor, and comforted himself by reading and rereading the Quran.

The *Book of Healing*

- There is no question that Ibn Sina drew on at least two rich veins of thought: ancient Greek philosophy, primarily from the 5th century

B.C., and Islamic philosophy and theology, which had been evolving since the beginning of the 7th century A.D. But it is also true that Ibn Sina was a uniquely original thinker.

- In his autobiography, Ibn Sina says that he had arrived at most of his important philosophical and religious ideas by the age of 18, and that the rest of his life was spent defining and refining these ideas. This brings us to one of his greatest works, the *Book of Healing*.

- Written in the first decades of the 11th century, the *Book of Healing* is concerned with philosophy and scientific inquiry. It is divided into four sections dealing with, logic, natural sciences, mathematics (including music theory), and metaphysics.

- Metaphysics is a branch of philosophy concerned with explaining the fundamental nature of existence or being, both of the self and those things beyond the self of which the world is made up. Ibn Sina tried to prove the existence of God, and he attempted to do this through the application of logic.

- Ibn Sina acknowledges his debt to Aristotle's *Metaphysics* and the commentary on it by al-Farabi, a major Muslim philosopher who died 30 years before Ibn Sina was born. In supporting his ideas about God, however, Ibn Sina went further than Aristotle to undertake a deeper, more complete investigation into the question of being and the difference between essence and existence. (Here, essence refers to the set of attributes that make a thing what it is, while existence refers to that which objectively exists or persists independent of oneself.)

- A central theological concept in Islam, Judaism, and Christianity is the idea of the divine essence, incorporating such values as the unity, transcendence, and immutability of the divine. For Ibn Sina, existence could not be inferred from essence. Several steps beyond this starting point, he concludes that existence must be due to a first cause, which he calls God. According to Ibn Sina, it is God who is responsible for giving existence to essence.

- In Ibn Sina's words, "God, the Supreme Being, is neither circumscribed by space, nor touched by time; he cannot be found in a particular direction, and his essence cannot change. The secret conversation is thus entirely spiritual; it is a direct encounter between God and the soul, abstracted from all material constraints."

- In spite of some of his critics' misguided accusations—including the claim that Ibn Sina unduly favored human reasoning over divine revelation—Ibn Sina was a devout Muslim, and a prayerful one. He saw no contradiction between his religious faith and deductive reasoning. Rather, he saw them as complementing one another.

> Ibn Sina tried to prove the existence of God, and he attempted to do this through the application of logic.

- Despite his belief in the afterlife, Ibn Sina clearly enjoyed much of what is available here on earth. He never married, but he was quite open about the frequency with which he enjoyed intimate relations with women. Perhaps surprisingly for a philosopher of Islam, he regularly drank wine, which he said helped him to stay awake and work late into the night.

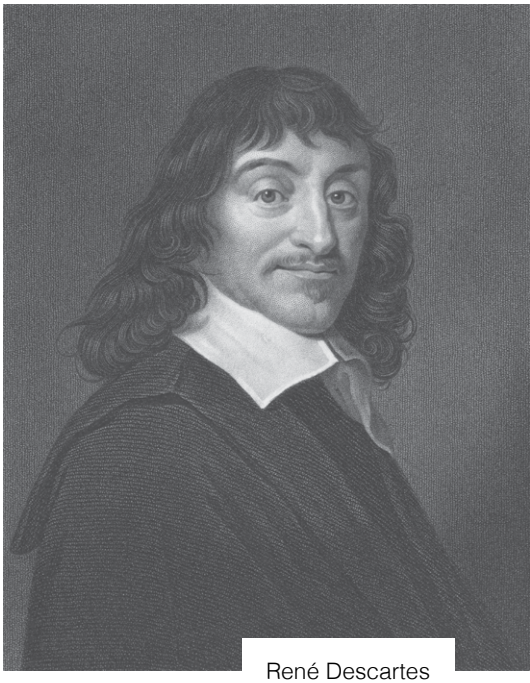
- Ibn Sina's most famous thought experiment concerns the nature of the human soul. Like much of his work, the floating man—sometimes called the flying man—is highly original and enduring. He lays out the basic premise in the psychology section of the *Book of Healing*:

> Imagine a human is created at an instant, with his limbs separated and he does not see them, he cannot touch them, and they do not touch each other, and he hears no sound, he would be ignorant of the existence of the whole of his organs, but he would know the existence of his individual being as one thing, while being ignorant of all the former things.

- Ibn Sina is asking us to contemplate the possibility of an individual floating in space without any knowledge of his physical presence, no memory of having come into being, no sensory data to draw on, and no other life with which to compare his current, floating existence. With these criteria in place, he argues that—thanks to the power of reasoning inherent in humankind—the individual would, at some level, still understand that he or she existed.

- If the logic behind the floating man sounds familiar, it might be because René Descartes, the father of modern Western philosophy, offered a startlingly similar argument 600 years later in his most famous philosophical statement: cogito, ergo sum—I think, therefore I am.

- Like Ibn Sina, Descartes relied on *a priori* reasoning, going back to the beginning of things until, logically and deductively, there was nowhere further back to reach. Reproaching critics who denied these principles, Ibn Sina offered the following retort: "Those who deny the first principle should be flogged or burned until they admit that it is not the same thing to be burned and not burned, or whipped and not whipped."



René Descartes
(1596–1650)

The Legacy of Ibn Sina

- If Aristotle is considered the acme of philosophy in the ancient world, it is entirely reasonable to see that baton being handed over to Avicenna in the medieval world. He was a tremendously original thinker whose massive impact on Middle Eastern and European philosophy reverberated for centuries. Within a century of his death, Ibn Sina became known in the Middle East as the Master, toppling Aristotle from a position he had held for centuries.

- Peter Adamson, a professor of ancient and medieval philosophy at Kings College, London, says that there are essentially two phases in Islamic philosophy: before Ibn Sina and after Ibn Sina. All philosophers who followed Ibn Sina had to respond to his body of work. And instead of offering commentaries on Aristotle, they were now writing commentaries on the Ibn Sina.

- Such was the power of Ibn Sina's influence that some have argued that his dominance had a negative impact on learning in the Muslim world. This line of thinking holds that Ibn Sina's impact was such that his work suppressed further, original investigation among the scholars who followed him.

- Ibn Sina was the most self-consciously original of all medieval thinkers, and his name produced its own school of thought in the Latin West: Avicennism, sometimes called Latin Avicennism. Ibn Sina's philosophical arguments for the existence of God quickly won him many fans among the Latin schoolmen of medieval Europe. Latin translations of his works became required reading in universities in Oxford and Paris.

- Among the most important of the European scholars influenced by Ibn Sina were Roger Bacon, Don Scotus, and Thomas Aquinas. Each of these men accepted Ibn Sina's philosophical arguments that one could arrive at the knowledge of God's existence through logic alone.

Suggested Reading

Hodgson, *The Venture of Islam*.

Janin and Kahlmeyer, *Islamic Law*.

Kennedy, *The Prophet and the Age of the Caliphates*.

Robinson, *The New Cambridge History of Islam*.

Questions to Consider

1. Does Ibn Sina's floating man thought experiment succeed in using a priori reasoning to prove one's existence?
2. How important was Ibn Sina for Islamic philosophy?

Lecture 21

Entertaining in the Time of the Abbasids

Instead of diving into a discussion of philosophy, mathematics, or science, in this lecture you'll enjoy some time off to take a look at leisure during the Islamic Golden Age. Following the progress of a typical night out from this period, you'll start with food. After dinner, you'll take in some musical entertainment. And when the musicians have gone home, it will be time for storytelling.

Golden-Age Food

- During the Islamic Golden Age, the poorest subjects in medieval Baghdad ate whatever they could beg from their wealthier neighbors. On high days and holidays, the bottom rungs of society could depend on the largesse of their ruler, who would provide a beggars' banquet, feeding thousands of the city's poor and needy at his own expense. Those lucky enough to be connected to the caliph's household or the royal court would be able to get their hands on whatever their hearts desired.

- Once upon a time, the Abbasids had criticized their predecessors, the Umayyads, for their displays of excessive wealth. Having clearly overcome such qualms, the Abbasids spent lavishly on entertainment and any other possible display of excessive wealth.

- The few Baghdadi cookbooks that survive from this period provide a tantalizing insight into both the everyday and extraordinary culinary habits of the time. These medieval cookbooks contained recipes from soup to nuts, along with notes about wine pairings and suggestions regarding what poems were appropriate for a dinner party.

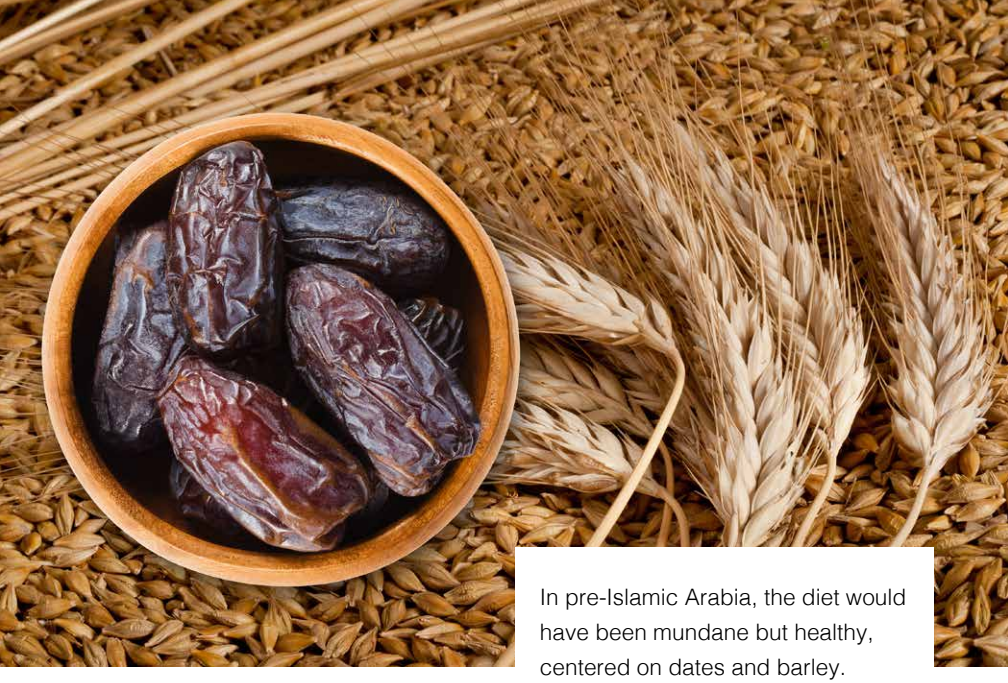
- The cookbooks also contain extensive discussions of manners and etiquette, covering everything from a reminder to thank God for the food before starting to eat to the importance of personal hygiene. There is even an admonition to wash and perfume one's hands before eating from a common platter.

- It's interesting to pay attention to who wrote these cookbooks. They include high court officials, generals, poets, the noted historian al-Masudi, and even caliph Harun al-Rashid's half-brother. There are also books written by doctors, warning about the dangers of overindulgence and advocating for restraint in eating.

- In pre-Islamic Arabia, the diet would have been mundane but healthy, centered on dates, barley, and dairy, as well as meat for those who could afford it. Baghdad's chefs eagerly picked up lessons from earlier royal courts of Persia. With luxury and lavish spending in vogue, new cooking techniques, styles, and ingredients abounded as the vast, transcontinental Islamic empire introduced the Arabs to a world of food.

- One of the main reasons for a caliph to throw a party was to demonstrate his wealth. At grander events, guests could expect to see 300 dishes served during a single course. And as the caliph lead, so his courtiers followed, each according to—if not well beyond—their means.

- Typical dishes could be simple, such as grilled chicken served in bread. They could also be far more intricate and complex, like stews flavored with half a dozen spices, including caraway, mint, basil,



In pre-Islamic Arabia, the diet would have been mundane but healthy, centered on dates and barley.

parsley, ginger, tarragon, thyme, and coriander. Pickled produce and chutneys were common condiments.

- Meat was cooked every possible way. Small pieces of meat were fried, while pigeons, game birds, and lamb might be boiled in a stew with lentils, grilled over coal or charcoal, or cooked in a tandoor oven, perhaps flavored with pomegranate juice or vinegar.

- Rice, wheat, and noodles all feature prominently in Baghdadi recipes from this period. Noodles were often added to soups, and cheese was added to stews. Vegetable dishes are also present, although they're often described as fasting dishes, after the Nestorian Christian tradition of meatless fast days. Asparagus was featured when it was in season, along with cucumbers and aubergines.

- For dessert, there were rice puddings, milk puddings, pancakes and crepes. There were also dates, lemon sorbets, desserts flavored

with dried fruit and chopped nuts, fruit soaked in syrup, pastries soaked in honey, and biscuits dipped in syrup or honey.

Golden-Age Music

- The Abbasid caliphs in Baghdad were known for their love of musical performances and singing. Court musicians typically were paid a monthly salary and performance bonuses, and many musicians from this time grew to be very rich.

- In terms of numbers, an evening's entertainment might involve a single singer who would be adept at several instruments, playing each in turn. On other occasions, there are records of the caliph entertaining his guests with as many as 100 singers and musicians, performing in a single evening.

- One of the most important Muslim theologians from this period was a man named al-Ghazali. Often cited as being responsible for ending an era of greater rationalism in Islamic philosophy, even al-Ghazali recognized and appreciated the power of music. As he wrote, "Ecstasy means the state that comes from listening to music."

- New instruments were created during this period, and the first serious studies of music theory were produced. The philosopher al-Kindi was one of the first scholars to write books on music theory, including on the therapeutic benefits of music and his belief that beautiful music could enhance human understanding of God.

- The Arabs took their inspiration for a scholarly approach to music from ancient Greek texts. As far as we can tell, al-Kindi was the first to use the word *musiqa* in Arabic, taking it from the Greek *mousike*, "the art of the Muses."

- There was also a strong and ancient musical tradition throughout the Middle East that predated the rise of the Greek city-states. For example, one of the most common instruments from the Middle East

One of the most common instruments from the Middle East is the oud.

is the oud, a stringed instrument with a neck and a body that looks like a pear-shaped guitar with a rounded back. The earliest pictorial record of an oud is on a clay cylinder in the British Museum that dates to between 3500 and 3200 B.C.

- The first European troubadours—or poet-musicians—emerge onto the pages of history from Muslim Andalusia around A.D. 1100. This was shortly after William VIII, Duke of Aquitaine, went to war against a Muslim-ruled city in modern-day northern Spain. Among the booty William took home were hundreds of prisoners, including a number of Andalusian musicians and their instruments.

Golden-Age Storytelling

- In the Western imagination, the most famous collection of stories ever to have emerged from the Middle East is *The Thousand and One Nights*, better known to us as *The Arabian Nights.* In Arabic, the collection is called *Alf Layla wa Layla*, which translates literally to "A Thousand Nights and a Night."

- Arabic-language literary critics look down on the stories in *The Thousand and One Nights* as rather lowbrow entertainment. But their ability to entertain and startle have ensured their centuries-long survival. Some of the best-known characters include the storyteller Scheherazade, Sinbad the Sailor, and Ali Baba and the Forty Thieves.

- Many of the tales in *The Thousand and One Nights* originated in Persia and India. Others come out of Abbasid Baghdad during the Islamic Golden Age. And some were much later additions from Cairo during the 13th and 14th centuries. They first appeared in Europe in 1704, in a French-language translation. Some stories in the collection even have their origins in 18th-century Europe, as translators slipped in their own creations.

- The size of *The Thousand and One Nights* comes as a great surprise to many people. A recent paperback edition published by Penguin books is roughly 2,500 pages long and is divided into three volumes.

- British historian Robert Irwin wrote that "while it is true that there are items in the *Nights* which might pass as fairy tales, the collection's compass is much wider than this. It also includes long heroic epics, wisdom literature, fables, cosmological fantasy, pornography, scatological jokes, mystical devotional tales, chronicles of low life, rhetorical debates and masses of poetry. A few tales are hundreds of pages long; others amount to no more than a short paragraph."

Ziryab

- Ziryab was a 9th-century musician, cook, and all-around trendsetter. Although for a man who would ultimately exercise a lasting influence, Ziryab didn't have a promising start in life. Born around 789, Ziryab was a slave in his early life. He was fortunate in other ways, however, not least because he was able to study music with the best teachers in Baghdad.

- A talented musician, Ziryab soon got work in the caliph's court as a teacher, composer, and performer. Although details are uncertain, he left Baghdad in or around 813, possibly because of a civil war that had broken out. Whatever the cause, he moved to Cordoba in Muslim Spain to the court of the Umayyads in exile.

- In Cordoba, Ziryab received adulation in the royal court and the enormous salary of 200 gold dinars per month, equivalent in today's currency to around $33,000 U.S. dollars per month. He

earned an additional stipend in an amount equivalent to $6.5 million over his 30 years in Cordoba. This walking-around money no doubt contributed to his ability to become the style icon and trendsetter that he was, influencing every aspect of high culture and fine living in the emir's court.

- Ziryab was instrumental in establishing a palace orchestra that combined up to 100 flute and oud players with a chorus providing vocals. He also established an early music school where many of his own sons and daughters studied and later taught.

- With plenty of money, talent, assistants, and leisure time, Ziryab was soon turning his hand to other cultural pursuits, such as cooking and fashion design. In fact, it's largely thanks to Ziryab that the desired norm became to have different wardrobes for winter and summer. Not only did he introduce the seemingly obvious idea of lighter fabrics in the summer, he also advocated for different colors and clothes depending on the season.

- Ziryab was also responsible for introducing toothpaste and deodorant into Europe, an achievement for which we all owe him a debt of thanks. In addition, he introduced crystal glasses and tablecloths to the court at Cordoba, a fashion soon copied by anyone who could afford to. It didn't take long for the same table fashions to spread north into the non-Muslim parts of western and central Europe.

- Ziryab also influenced how we eat. In particular, he established the three-course meal, a routine that is still followed to this day. Soup was the first course, followed by a main course of meat or fish with vegetable side dishes. For dessert, Ziryab recommended something sweet to cleanse the palate, typically fruit or something richer. After dinner, coffee and nuts were to be served.

Suggested Reading

Al-Hassani, *1001 Inventions*.

Irwin, *The Arabian Nights*.

Ibn Warraq, *Annals of the Caliphs' Kitchens*.

Lindsay, *Daily Life in the Medieval Islamic World*.

Nasrallah, *Delights from the Garden of Eden*.

Questions to Consider

1. Why are the stories that make up *The Thousand and One Nights* still read and admired more than 1,000 years after they were created?
2. Consider Ziryab's role as a trendsetter in terms of cuisine, the dining experience, music, fashion, and matters of personal hygiene.

Lecture 22

Calligraphy, Carpets, and the Arabic Arts

This lecture is focused on the visual arts during the Islamic Golden Age. Of course, it's impossible to do justice in a single lecture to a subject as vast as Islamic art, a shorthand term used by art historians to encompass the arts as they existed and developed in Muslim states. Instead, this lecture will provide you with an overview of the most important areas of Islamic art, including calligraphy, vegetal designs, geometric patterns, and figurative art.

Calligraphy

- Whether written or carved, Arabic calligraphy is the predominant Islamic art form. In light of what many believe to be a general prohibition in Islam against portrayals of people and animals, artistic self-expression—by necessity—looked for other outlets.

- Arabic belongs to the Afro-Asiatic group of languages known as Semitic, which also includes Hebrew and Amharic. Spelled out from right to left, Arabic script consists of 28 letters, two more than English. There's no distinction between uppercase and lowercase letters in Arabic, and because they are cursive in form, any letters that can be joined together must be written as such.

- One fascinating aspect of the Arabic language is that its written form emerged late, in the 6th century A.D. Hamid Safadi argues in his

book *Islamic Calligraphy* that "[t]he reason for this late development was that the Arabs were mainly a nomadic people and mistrustful of the written word." While there might be many other reasons, it's true that Arabs relied very heavily on oral tradition for keeping records of the past and communicating in the present.

- The 6th century—before the rise of Islam—is seen as the classical period for poetry in Arabic. The masterpieces of this era were a collection of seven lengthy odes composed by seven poets and known collectively as *al-Muallaqat* ("the suspended" or "the hanging"). They're known as The Hanging Odes because they were thought to be so incredible that they were written down in gold ink on linen and suspended from the walls of the Kaaba in Mecca, which at that time was an important site of pre-Islamic idol worship.

- With the emergence of Islam in the 7th century, and with the Quran written down in Arabic, the language and its written form took on an altogether more important role than mere poetry. Arabic calligraphy came to provide the Abbasid caliphate other Muslim-ruled lands with a common face, something that united the empire's believers with a single visual reference regardless of their ethnicity or former religion.

- One brilliant example of what calligraphy as art looks like is an incredibly ornate Quran that was produced in North Africa in the late 9th century. It was produced on pages of vellum, or calfskin. The pages were then dyed with indigo, which is why it's known today as the Blue Quran. The calligraphy itself is done completely in gold, with additional decoration in silver. In 2013, Sotheby's of London offered a single page of the Blue Quran at auction; it sold for $800,000.

- Other abundant examples of calligraphy as decoration include carvings around doorways and stucco work on walls. Calligraphy also features on more portable objects such as metal water jugs and porcelain bowls.

Arabic calligraphy

- During the Islamic Golden Age, great calligraphers were more famous and more richly rewarded than any other type of artist. Numerous calligraphers from the period are still celebrated by name, even though we don't know the names of many great artists of the Islamic Golden Age who worked in other media.

Vegetal Designs and Geometric Patterns

- Vegetal designs—that is, plant designs—and geometric patterns were adaptations of preexisting styles borrowed from Persia and the Byzantine Empire, respectively. Although vegetal designs and geometric patterns can be found in isolation, they so often appear together that it makes sense to consider them at the same time.

- Both vegetal designs and geometric patterns often accompany calligraphy. Together, they create a splendid mixture of different artistic forms that gel nicely in the hands of a skilled artist, leaving the viewer gazing in wonder and admiration of the design and workmanship. These patterns would later become known in the West as arabesque, a term that is suggestive of intricate, interwoven, and ornate (even florid) designs.

- The term "arabesque" wasn't coined until after Napoleon's 1798 invasion of Egypt, but the style itself was known and admired in Europe and North America even earlier. During the Islamic Golden Age, arabesque designs were used in virtually all media, including plaster wall decoration, woodwork, metalwork, pottery, and glass.

- As the Islam Golden Age progressed, the development of vegetal patterns led to the adoption of distinct regional styles. These regional styles revealed the appeal of different types of plants (both real and imagined) in Persia, Arabia, the Levant, North Africa, and Andalusia.

- In the Islamic tradition, gardens are often associated with paradise. The Garden of Eden features as a strong motif, just as it does in Jewish and Christian traditions. Apart from the obvious connection of gardens to paradise, plant designs in Islamic art tend not to have any symbolic meaning. Instead, they are simply beautiful objects.

- The use of geometric patterns by artists during the Islamic Golden Age had more earthly connections. As a purely aniconic art form—meaning that they were not intended to present the likeness of a living thing—the nonrepresentational nature of geometric patterns make them the least controversial of all components in Islamic art. As a result, they were widely used—alongside calligraphy—in adorning mosques and religious texts.

- Purely abstract, geometric patterns were not an Islamic invention. Like vegetal designs, they drew on earlier traditions of intricate geometric designs from ancient Greece, Rome, and Persia. They

were subsequently employed by the Abbasids in the heart of the Middle East, the exiled Umayyads in Andalusia, and the Fatimids of North Africa.

- The intricacies of geometric patterns reached something of a high point during the Islamic Golden Age. Geometric patterns of this period employed squares, circles, stars, and other multisided shapes, growing ever more elaborate and complex. The advances being made in mathematics and other sciences at this time were partially responsible for driving the growth of geometric decoration.

- Abbasid potters working in Baghdad and Samarra were introducing new techniques during the Islamic Golden Age, including a proliferation of colors and the development of lusterware.

Vegetal designs and geometric patterns often accompany calligraphy.

- Lusterware is a technique allowing a luster glaze to be painted onto an already decorated ceramic surface before being fired in a kiln for a second time. Using this technique, otherwise dull objects take on a brilliant, glittering appearance suggestive of precious metals like silver and gold. The technique became highly prized, spreading across the Muslim world before eventually being discovered and copied by Western potters.

Figurative Art

- Figural representations are the most contentious of the four major components of Islamic art. More than a few Muslims—and many non-Muslims—believe that Islam has an absolute ban on figurative art. The idea goes that God alone is responsible for creation in the world, so any attempt to imitate God's work is akin to blasphemy. This view is demonstrably false.

- No mainstream branch of Islam has ever insisted on—or imposed—a blanket ban on figurative art. There have existed extremist, fringe movements from time to time, and some of these have said that all figurative art is wrong. But this is not the case, typically, in mainstream forms of Islam.

- People and animals were a regular—and prominent—feature on wall paintings of Abbasid palaces, as contemporaneous descriptions make clear. People and animals also made regular appearances in books produced during the Islamic Golden Age.

- The major exception where figurative art was not permitted was in the religious field—i.e., in mosques or copies of the Quran. For religious art and architecture, the opposition to figurative art has always been much stronger. As a result, mosques and copies of the Quran relied on calligraphy and geometric shapes for ornamentation, never pictures.

- Nevertheless, figurative representations of people and animals existed in in secular works of art and decoration in the vast majority of Islamic societies during the whole of the Islamic Golden Age. For example, numerous beautiful examples of pottery, glass, and metalwork jugs feature fish, birds, mammals, or hunting scenes. Figurative motifs are also found in scraps of carpet, and fantastic beasts such as harpies, griffons, and dragons feature in some of the most stunning works of art from the period.

Suggested Reading

Ahmed, *What Is Islam?*

Ekhtiar, *Masterpieces from the Department of Islamic Art*.

Hayes, *The Genius of Arab Civilization*.

Hodgson, *The Venture of Islam*.

Ruggles, *Islamic Art and Visual Culture*.

Questions to Consider

1. What is meant by Islamic art? Is the term an appropriate one?
2. Why is calligraphy so central to Islamic illustrative and decorative arts?

Lecture 23

When Did the Islamic Golden Age End?

In 1258, a Mongol army invaded the Middle East and laid waste to Baghdad. A milestone in world history, the destruction of the Abbasid caliphate brought the Islamic Golden Age to a shuddering halt. In addition to the invading Mongol hordes, however, there are other issues that must be considered to adequately explain the end of this extraordinary period in Middle Eastern history.

Foreign Influences

- Since the Arab-Berber invasion of Andalusia in 711, much of the Iberian Peninsula had been part of the Umayyads' broader Islamic empire. The start of the so-called Reconquista by Christian forces—who ultimately would lay claim to Iberia, and disperse Muslim centers of power—is often dated to 718 or 722, when a Muslim army suffered a major defeat at the Battle of Covadonga.

- For all practical purposes, advances by foreign powers had little impact on the Iberian Peninsula over the next 300 years. But by the end of the 11th century—the dawn of the Crusades—various Christian powers ruled the northern half of the peninsula.

- When the caliphate of Cordoba in Andalusia came to an end in 1031, its territory was divided between more than 30 smaller Muslim powers, known in Arabic as *taifas*, or factions. But it wasn't

European Christians who were largely responsible for ending the Islamic Golden Age in Andalusia. Rather, it was the indigenous North African Berbers of the Almoravid dynasty.

- Around 1086, the Almoravids were invited by the Muslim *taifa* princes to help fight back against Christian kingdoms in northern Iberia. At that time, the Christians were making military advances into more southerly portions of the peninsula that were controlled by Muslims. The Almoravids succeeded in blocking the Christians. But they also took advantage of the weak and divided Muslim factions in the south, and by 1097 they ruled all of southern Iberia.

- The next wave of conquerors in Iberia, the Almohads, were also native North African Berbers. The Almohads displaced the Almoravids in 1147. Like the Almoravids before them, however, the Almohads were intolerant of non-Muslim subjects. The result was the persecution, murder, forced conversion, or expulsion of practically the entire Jewish population of Andalusia.

- In Cairo, the ruling Fatimid caliphate was overthrown in 1171 by Saladin, the legendary Kurdish-Arab general. And with Saladin, the story moves on into the Crusades and another wave of foreign invaders entering the Middle East. The various European crusader armies wrought yet more havoc among existing power structures across the region.

- The crusading armies enjoyed varying degrees of success in conquering and holding land in the region, starting with the appropriately named First Crusade, which lasted from 1096–1099. There were numerous massacres of local populations—Muslim and Jewish alike—with a number of coastal settlements, in particular, being resettled by European soldiers, merchants, and others.

- As important as the invading crusader armies were, they weren't the only ascendant foreign powers. East of Baghdad, there was also the Song Dynasty of China. In power from 960–1271, the Song Dynasty

was the first government in the world to issue paper money on a national scale. It was also the first to record the use of gunpowder in warfare. Like the Abbasids, the Song Dynasty enjoyed its own golden age of science and technology before it, too, was vanquished by the Mongols.

Shifting Finances

- Beginning in the 11th century, foreign invasions of Muslim territories from Iberia to Jerusalem—and the growth in Muslim states breaking away from the Abbasid caliphate—led to years of conquest warfare. The widespread instability this caused had a massive destabilizing impact on local and regional economies.

- The atmosphere of uncertainty and instability that prevailed across the Greater Middle East during this period was not conducive to trade or investment in the region, not to mention the material destruction that is an inevitable outcome of any conflict.

- In Baghdad, alongside the slaughter of the city's population and the destruction of countless grand buildings, the Mongols demolished much of the surrounding infrastructure. Most devastating of all were the destruction of the local canal network and the salting of the earth. Overnight, Baghdad lost most of its agricultural land and the canals that had been used to irrigate crops.

Around 1086, the Almoravids were invited by the Muslim *taifa* princes to help fight back against Christian kingdoms in northern Iberia.

- With a population already radically reduced by war, disease, and famine, Baghdad was now unable to rebuild or trade on its former scale. A downward cycle began. It must have felt like the unleashing of the four horsemen of the Apocalypse, with pestilence, war, famine, and death all stalking the land.

- Soon, the major centers of trade in the Middle East, with their grand municipal building projects and demands for luxury goods, were each reduced to a shadow of their former glories. Some never again enjoyed their former glory. Others fared better.

- In the late 14th century, Timur—also known as Tamerlane—made Samarqand the capital of his Timurid empire, and he rebuilt and repopulated the city. By 1340, Cairo had similarly reestablished itself as a center of trade. With a population of 500,000, it was the largest city in the world west of China.

Timur, also known as Tamerlane (1336–1405)

Challenges of Faith

- Another factor often cited as contributing to the end of the Islamic Golden Age is faith. The argument goes that by the start of the 12th century, mainstream Islamic orthodoxy had closed the door on freethinking philosophy. In other words, faith had defeated reason, resulting in the end of rationalism and scientific inquiry.

- This argument first surfaced in the 19th century, 700 years after the sack of Baghdad. And at the center of the argument is the 11th-century theologian al-Ghazali. Critics often go so far as to refer to al-Ghazali as the one man responsible for the downfall of the Islamic Golden Age.

- The case against al-Ghazali states that his most famous work, *The Incoherence of the Philosophers*, is an attack against philosophy and reason per se. What al-Ghazali actually said, however, was that he believed that there are limits to that which philosophy and reason alone can tell us. In these circumstance—when Aristotelian rationalism is found wanting—al-Ghazali believed that faith must fill the gap.

- Any claim that al-Ghazali is unequivocally against the use of reason is easily dismissed. Al-Ghazali states that he is not against the use of reason; rather, he stands firm against philosophers who employ faulty logic in attempting to prove an argument. A criticism of faulty logic is not exactly a damning indictment against the power of reason.

- Al-Ghazali goes further by stating that when a scientific demonstration contradicts one of the sayings or actions of Muhammad, known as the hadith, then one should reject the hadith because it has probably been, as al-Ghazali puts it, "unsoundly transmitted." In other words, al-Ghazali argued the very opposite of what his critics charge: He argued for the primacy of reason over received wisdom.

- Another argument that puts the blame for the Islamic Golden Age's demise on the faith of Islam is that the process of adopting a more literal interpretation of the Quran and hadith supposedly shut the door on scientific inquiry. But the solidification of Islamic orthodoxy under the Abbasids began with al-Mutawakkil, a caliph who reigned some 400 years before the sack of Baghdad and the end of the Islamic Golden Age.

Human Folly

- When the Abbasids rose to power in 750, military force led to regional stability. With this stability in place, international trade increased and economic prosperity followed. The conditions were ripe for the beginning of the Islamic Golden Age.

- Halfway through the 13th century, however, this was no longer the case. Perhaps it's inevitable in any major civilization, but the failure to learn from history is often at the heart of any number of wrongheaded decisions. Time and again, we see entrenched leadership—often aging and sclerotic—lurch from one bad decision to another.

- Hubris quite often leads to political mismanagement. Patronage leads to the employment of flunkies unwilling or unable to offer fresh ideas. And nepotism keeps the most talented individuals at arm's length, as despots and dictators seem to prefer the opinions of their nearest and dearest, regardless of competence. Political mismanagement inevitably leads to political ineffectiveness, which in turn results in a weakened economy and reduced investment in everything from education to the armed forces.

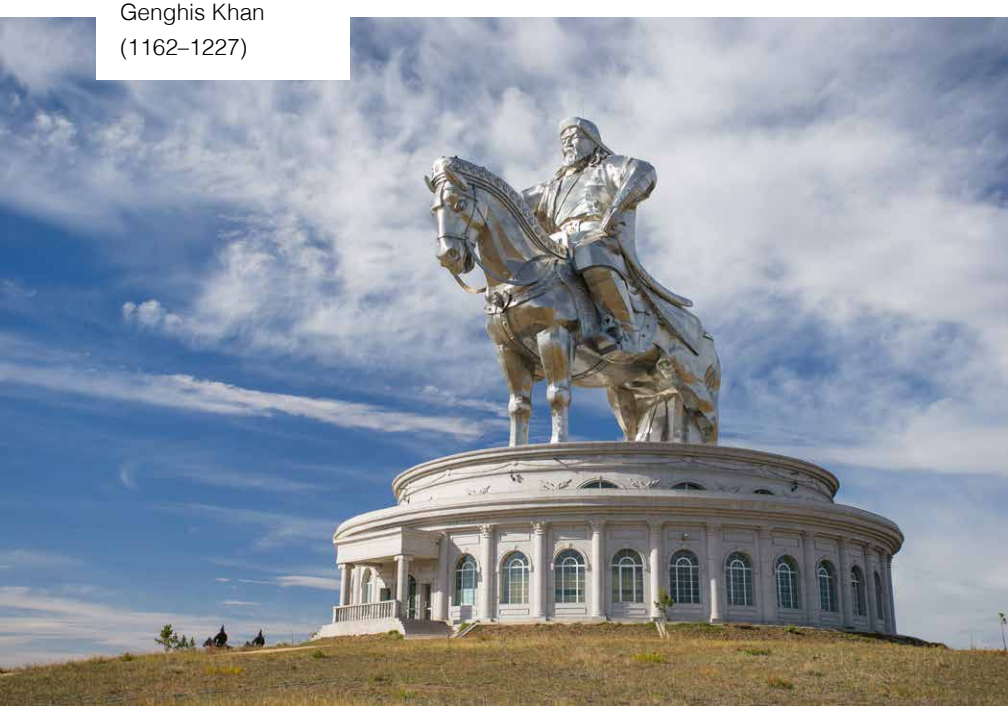
- With respect to the Abbasids, the inglorious combination of all of these factors was further coupled with the rise of new external threats, including imperial and economic powers in Europe, China, and—most importantly for Baghdad—central Asia, the Mongol homeland.

- Originating from the steppes of central Asia, the Mongol empire was born out of a union of numerous nomadic tribes who, in 1206, accepted the leadership of their legendary founder, Genghis Khan. The Mongol empire grew rapidly through a series of conquests that spread in every direction from its central Asian homeland.

- At its peak, the Mongol empire was the largest contiguous land empire the world has ever seen, reaching the Sea of Japan in the east; central Europe, the eastern Mediterranean, and Arabia in the west; Indochina, the Indian subcontinent, and Persia in the south; and Siberia in the north.

- When the Abbasids found the Mongols outside the gates of Baghdad, their own empire was so far along the path of terminal decline that few among them were ready, willing, or able to put up

Genghis Khan
(1162–1227)



any serious defense. The Mongols destroyed Baghdad, the city that had given birth to the Islamic Golden Age 500 years earlier.

- In due course, Baghdad was rebuilt and resettled. However, it would never enjoy the same political or economic prominence as it had during its glory days, much less anything like the cultural importance it had enjoyed under Harun al-Rashid, al-Mamun, and later caliphs.

Suggested Reading

Esposito, *The Oxford History of Islam*.

Hitti, *Capital Cities of Arab Islam*.

Lapidus, *A History of Islamic Societies*.

Lewis, *What Went Wrong?*

Questions to Consider

1. Was the sack of Baghdad in 1258 the only thing that brought the Islamic Golden Age to an end? If not, what other factors were involved?
2. Which were more important in bringing about the end of the Islamic Golden Age, internal or external factors?

Lecture 24

Ibn Khaldun on the Rise and Fall of Empire

This lecture examines what happened after the Islamic Golden Age came to an end. Topics of particular interest include the state of political and intellectual life following the Islamic Golden Age and the continuing impact of the Islamic Golden Age in lands beyond the Muslim world. Each of these topics answers part of the broader question, what happened next?

Political Life after the Islamic Golden Age

- When the Abbasid empire overthrew the Umayyad empire at the beginning of the Islamic Golden Age, the Abbasids lost Andalusia to the Umayyads in exile. Otherwise, their domains remained intact. They eventually lost other pieces of their empire to new powers, such as the Fatimids—a rival caliphate that came to rule most of North Africa from its capital in Cairo.

- Nevertheless, the Muslim world was still controlled by a few large empires, such as the Almohads in North Africa and the Baghdad-based Abbasids. These big powers typically made use of local governors to maintain order. In time, a number of these governors broke away from their masters, establishing small independent fiefdoms.

- Egypt offers an example of this move to independence with the rise of the Mamluks in 1250. They spent more than 250 years in power. For the next 300 years, smaller political entities were the norm in North Africa, until most of the region beyond Morocco came under Ottoman control.

- A similar situation was playing out in the rest of the Muslim world. Modern Oman was ruled by the indigenous Nabhani dynasty, Yemen was under the control of the Turkic Rasulids, and the Hejaz—the region that covers the western Arabian Peninsula—was ruled by the sharifs of Mecca. Meanwhile, the massive Ilkhanate, established by Hulagu Khan in the wake of his conquest, formed the southwestern part of the larger Mongol empire.

- The arrival of the Black Death changed everything. In 1330, the plague killed the ruler of the Ilkhanate and his sons. With no heir apparent, the Ilkhanate was torn apart by a multitude of ambitious men—Mongols, Turks, and Persians—who established a host of petty states where there had previously been only one. As in Europe, the loss of so many lives upset social order and political life all across the Middle East.

- The political upheaval caused by the collapse of the region's large empires and the additional turmoil caused by the arrival of the Black Death made the continuation of the Islamic Golden Age—as it had existed in Baghdad, Cairo, Cordoba, and elsewhere—impossible.

- Gunpowder was another element that contributed to political uncertainty in the 150 years following the end of the Islamic Golden Age. Discovered and developed in China, gunpowder arrived in the Middle East either just before or concurrent with the arrival of the Mongols, who would introduce it to Europe. The conquering Mongol armies that were the first to employ this dynamic—even revolutionary—new addition to their armaments did so to devastating effect.

- The arrival of gunpowder was a powerful variable that was capable of facilitating sudden and unexpected shifts in power. The political power that was able to master the production and use of gunpowder in battle would establish an unassailable regional dominance that could last for centuries. In the case of the Middle East, that power was the Ottomans.

- Although the Ottoman Empire was founded in 1299, its armies didn't use gunpowder until 1399. After that, the Ottomans went on a conquering spree from the Caspian Sea to the Mediterranean Sea, and from the Black Sea to the Red Sea and the Persian Gulf.

Intellectual Life after the Islamic Golden Age

- The end of the Abbasid caliphate resulted in a period of regional instability that saw the emergence of multiple new powers and the loss of financial security and investment on an imperial scale. Nevertheless, intellectual advances continued in numerous fields. Even amid the turmoil of the Mongol invasions, research continued in those lands the Mongols failed to conquer.

- The physician Ibn al-Nafis, who was born in Damascus and worked in Cairo until his death in 1288, made astonishing advancements in the medical sciences. For example, he was the first person to accurately describe the pulmonary circulation of blood, which he accomplished 400 years before English physician William Harvey (who is typically credited with the discovery) published his own account in 1628.

- The great traveler Ibn Battuta was also an important scholar in the years following the Islamic Golden Age. The full account of his more than 30 years on the road, a volume widely known as the *Rihla*, is one of the most important documents in the field of medieval history, often offering the only firsthand account of distant places.

- Another great scholar—and a contemporary of Ibn Battuta—was the astronomer Ibn al-Shatir, who spent his working life in Damascus. His most famous astronomical text is known in English as *The Final Quest Concerning the Rectification of Principles*. In this work, Ibn al-Shatir overturned Ptolemy's model of the movements of the Sun, Moon, and planets, a theoretical model that had held sway for 1,200 years.

Although the Ottoman Empire was founded in 1299, its armies didn't use gunpowder until 1399.

- Another contemporaneous scholar of note was the anatomist and physician Mansur ibn Ilyas, who was born around 1350 in the Persian city of Shiraz. Although he is virtually unknown in the West today, his most famous work is housed in the world's largest medical library: the U.S. National Library of Medicine in Bethesda, Maryland.

- Another noteworthy scholar from this period is Ulegh Beg, who was born in 1394 in the Persian city of Soltaniyeh. Ulegh Beg was a grandson of Timur—known in the West as Tamerlane—the fierce and ruthless founder of the eponymous Timurid Empire. Ulegh Beg himself was both a Timurid sultan and a noted mathematician and astronomer. In the 1420s, he built an enormous observatory in Samarqand, in modern-day Uzbekistan, with walls of polished marble.

- A passionate and dedicated scholar, Ulegh Beg also produced the *Zij-i Sultani*, or the *Sultan's Starchart*, in collaboration with others. This astronomical catalog notes the position of some 994 stars. Not only was this the largest such collection since Ptolemy's in the 1st century A.D., it also corrected numerous errors made by that great scholar of the ancient world.

The Legacy of the Islamic Golden Age

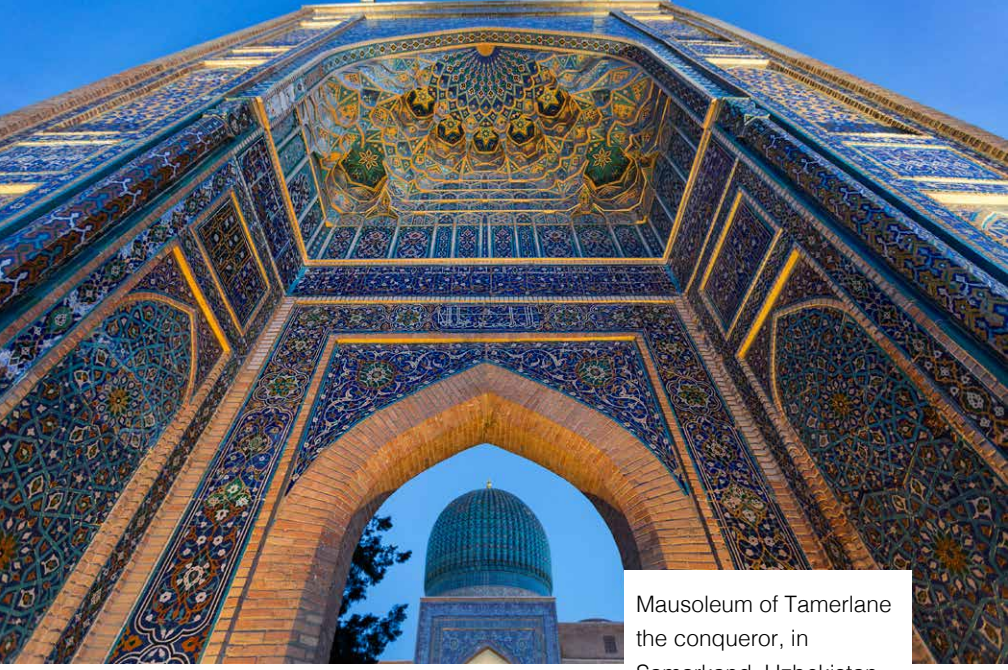
- The Islamic Golden Age's scholarly influence on subsequent Western learning is one of the most exciting of all its legacies. From Andalusia to Persia—in everything from fashions to foodstuffs and the three-course meal; and from toothpaste to architecture, algebra, algorithms, astronomy, medicine, and mechanical devices—the wealth of this cultural legacy and scholarship is staggering.

- Pinpointing every piece of the puzzle that informed the European Renaissance would be a virtually endless task. But the Islamic Golden Age was not a mere intellectual conduit, funneling wisdom from Greece and Rome into Western Europe. Rather, in the words of historian Bernard Lewis, the Abbasid caliphate and its predecessors, the Umayyads, were the richest and most diverse of all premodern empires.

- Lewis notes that before the rise of these Islamic empires, "virtually all civilisations—in China, India, Europe, the Americas—were limited to one region, one culture [and] usually one race." Continuing, he says, "The Islamic culture of the Middle East was the first that was truly international, intercultural, interracial, in a sense, even intercontinental, and its contribution—both direct and indirect—to the modern world is immense."

- The achievements of this remarkable era would not have been possible had it not relied on—and benefited from—the work of earlier and contemporaneous scholars from numerous ethnic, religious, and cultural backgrounds, including Arab, Berber, Persian, Turk, Iberian, and Chinese; and Muslim, Jew, Christian, Hindu, and Zoroastrian.

- Authors from ancient Greece and Rome had grasped the essential truths about the rise and fall of civilizations. But it was Ibn Khaldun—the brilliant medieval thinker from Tangier—who was the first to provide a disinterested, comprehensive, and myth-free theory of how and why this seems to take place. In his magnum opus, the



Mausoleum of Tamerlane the conqueror, in Samarkand, Uzbekistan

Muqaddimah, Ibn Khaldun wrote the following concerning the caliph al-Nasir, who ruled from 1180–1225:

> From [this] time…the caliphs were in control of an area smaller than the ring around the moon…the dynasty continued in that manner, until the power of the caliphs was destroyed by Hulagu Khan, ruler of the…Mongols [who]…took possession of the part of the Muslim empire that had been theirs.
>
> Thus…the authority of the dynasty becomes successively narrower than it had been at the beginning. [This process] continues…until the dynasty is destroyed. [This fact] can be demonstrated by examining…any dynasty, large or small.

Suggested Reading

Ibn Khaldun, *The Muqaddimah*.

Issawi, *An Arab Philosophy of History*.

Lapidus, *A History of Islamic Societies*.

Lewis, *What Went Wrong?*

Questions to Consider

1. Consider the abiding influence of Ibn Khaldun and his most famous book, the *Muqaddimah*, on such fields of scholarship as political theory, economics, and historiography.
2. Instead of asking what went wrong, isn't it more instructive to ask what changed?

List of Arabic Places and People

Places

Baghdad	بغداد
Cairo	القاهرة
Cordoba	قرطبة

People

Lecture 1: no central character	
Lecture 2: Ibn Battuta	بن بطوطة
Lecture 3: Harun al-Rashid	هَارُون الرَشِيد
Lecture 4: al-Jahiz	الجاحظ
Lecture 5: al-Khwarizmi	الخوارزمى
Lecture 6: al-Kindi	الكندي
Lecture 7: Imam Bukhari	إمام البخاري
Lecture 8: al-Tabari	الطبري
Lecture 9: al-Masudi	المسعودي
Lecture 10: Ibn al-Haytham	بن الهيثم
Lecture 11: al-Biruni	البيروني
Lecture 12: al-Tusi	الطوسى
Lecture 13: al-Razi	الرازى
Lecture 14: Jabbir Ibn Hayyan	جابر بن حيان
Lecture 15: no central character	
Lecture 16: Moses Maimonides (Hebrew: משה בן מימון – Musa ibn Maymun)	موسى بن ميمون
Lecture 17: al-Jazari	الجزري

Lecture 18: no central character	
Lecture 19: Abu Nuwas	ابو نواس
Lecture 20: Ibn Sina	بن سينا
Lecture 21: Ziryab	زرياب
Lecture 22: no central character	
Lecture 23: Ibn Battuta and Ibn Khaldun	
Lecture 24: Ibn Khaldun	بن خلدون

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covering Mecca, Medina, Damascus, Baghdad, Cairo, and Cordova during their periods of rule.

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1996. A useful reference work that is both scholarly and accessible, covering both medieval and modern subjects.

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manages to synthesize this obviously important subject in an accessible yet scholarly work in less than 200 pages.

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Wallace-Murphy, Tim. *What Islam Did for Us: Understanding Islam's Contribution to Western Civilization*. London: Watkins Publishing, 2006.

An easy-to-read account of the Islamic Golden Age and a good starting point after finishing these lectures.

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