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The Genius Legacy of Ibn Sina and Biruni

The Contemporary Fruits of a Two-Man Renaissance

S. Frederick Starr

Two of the most outstanding thinkers to have lived between ancient Greece and the European Renaissance are Ibn Sina (Avicenna) and Biruni. Both were born in the tenth century within the borders of what is now Uzbekistan and spent the entirety of their lives there and surrounding areas (today's Turkmenistan, Afghanistan, Iran, and Pakistan). Neither ever set foot in Greece, Rome, or even Baghdad.

Neither Ibn Sina nor Biruni were Arabs; both were Central Asians of Persianate stock. This

meant that their native languages were part of the diverse group of languages that dominated Central Asia, Afghanistan, and what is now Iran. Both became known by their Arabic names because they wrote mainly in Arabic, the language of learning in the Muslim world, just as Latin was in the West.

Lastly, both were larger-than-life figures who embodied the highest achievements of a moment when Central Asia and the Middle East were the global epicenter of intellectual achievement—what some have called the Muslim Renaissance.

S. Frederick Starr is Chairman of the Central Asia-Caucasus Institute and Distinguished Fellow for Eurasia at the American Foreign Policy Institute. He co-founded the Kennan Institute of the Woodrow Wilson International Center for Scholars, served for 11 years as President of Oberlin College, and in the early 2000s was pro-tem Rector of the University of Central Asia. He is a trustee of ADA University and a member of the Baku Dialogues Editorial Advisory Council. The views expressed herein are his own. This essay draws from the author's The Genius of Their Age. Copyright © 2023 by S. Frederick Starr and published by Oxford University Press. All rights reserved.

Biruni and Ibn Sina were both products of the same culture of Central Asia and lifelong members of the small elite of highly educated persons who had the means and inclination to pursue knowledge for its own sake. Yet they could not have been more fundamentally dissimilar, which helps to explain how they became lifelong competitors and rivals.

In their twenties they sparred ferociously, and in their thirties, they began avoiding each other. Their temperaments could scarcely have differed more radically. Ibn Sina was a courtier and bon vivant, while Biruni spent much of his life toiling alone, benefiting from official patronage but remaining on the margins of public life. Ibn Sina was a larger-than-life personality who aspired to create a single umbrella under which all knowledge could be organized. Biruni, by contrast, reveled in every discrete phenomenon, and proceeded to generalize only on the basis of what he had observed at the level of specifics.

Ibn Sina epitomized the kind of logical and metaphysical thinking that held sway in

both the Middle East and the West for centuries. Applying them to topics as diverse as theology and medicine, he demonstrated the tools of logic that would help us to establish truth. Biruni, by contrast, was critical of proofs reached by logic alone and instead championed mathematics as the premier tool for establishing truth. At the same time, he believed that both nature and human affairs can be understood by closely examining them over time. Ibn Sina, with his focus on ultimate causes, had little use for such an approach, which he considered a diversion. It is no wonder that they emerged early as competitors.

Though vast differences in temperament, lifestyle, interests, modes of analysis, and styles of expression separated these two innovators, there are striking similarities. In geology, for example, they both held that the earth and human life itself, rather than remaining as they were at the moment of Creation, had undergone profound changes, both evolutionary and cataclysmic, over the course of millennia. They

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agreed that vast deserts had been formed by the retreat of seas, leaving alluvial deposits that dried out over time. That they explored these issues at all—both viewed geology and paleontology as secondary concerns—testifies to the fact that Ibn Sina and Biruni were intellectual omnivores. Their written output spans as many fields and subjects as those offered at a modern university. Biruni once declared that an educated person should learn the essentials of every field of knowledge. Ibn Sina bragged about having actually done so, and then linking them by means of a single philosophical construct.

Both Biruni's and Ibn Sina's lasting contributions to world civilization lay not just in *what* they did but in *how* they did it. Both believed passionately that the most fundamental mark of humanity is its ability to reason. This, they held, reflects mankind's essence and highest manifestation. In an age of profound upheaval, wars, and religious strife, both committed their lives to the exercise of reason, and both suffered

for having done so. At differing times each of them was sentenced to be beheaded. Theirs is a story of breakthroughs and insights, but also of endurance and tenacity.

Indeed, the lives of these two thinkers were packed with drama, crises, and stunning achievements. Separated from their world by a millennium, we have much to gain from reflecting upon their lives and works today. The story of Ibn Sina and Biruni transcends the cen-

turies, offering insights into their tireless efforts to expand the realm of human knowledge, and occurred in a part of the world that today sometimes invites concerns over the role of advanced learning and science.

That these two larger-than-life figures should inform such discussions a full millennium after their deaths is appropriate, for in the end, although they were the geniuses of their age, they rise above time and place, religion, and politics to stand as citizens of the global world of ideas and giants of human achievement.

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Coming Into Their Own

The world viewed Biruni and Ibn Sina over the past thousand years in different ways. Broadly speaking, Ibn Sina's star shone brightly for most of that period, then waned in recent times. This stems from the rise of modern medicine and science, the spread of secularism in the West, and a surge of religious traditionalism in the Muslim world. Biruni, after having been neglected for half a millennium, has only recently come into his own, though mainly among specialists.

Indeed, over the past century and a half, Russian, Central Asian, European, and American scholars brought a high level of skill to the study of Biruni's most abstruse mathematical and astronomical works, and also of Ibn Sina's most impenetrable philosophical writings. Thanks to them, the heritage of both thinkers is slowly being re-integrated with the mainstream of world thought.

Symbolizing the renewed interest in their work globally were the celebrations of the thousandth anniversary of the births of Biruni and Ibn Sina in both India and Pakistan. In neighboring Afghanistan, however, this renewed interest sometimes

took on a darker tone. The Taliban tried to destroy Biruni's tomb in Ghazni in May 2019.

On the other hand, a crater on the far side of the moon bears his name, as does an asteroid, "9936-Al-Biruni," and also a university in Istanbul and other learned institutions worldwide. Ibn Sina's gleaming mausoleum dominates a plaza in Hamadan, Iran, and features a pencil-like tower patterned, ironically, after the tomb of Qabus, the ruler to whom Ibn Sina turned for help but who died before providing any. More than a dozen hospitals and medical schools worldwide bear Ibn Sina's name. They also take a joint bow at the UN's Vienna headquarters. At the center of the main courtyard stands the "Scholars' Pavilion," which features large modernistic statues of both Biruni and Ibn Sina, and also of Razi, and Omar Khayyam.

With the passage of time, our two subjects have emerged today as avatars of intellect, remembered only vaguely but blending together as the greatest minds of their region and era. But if we view them on the basis of what we now know of their lives and work, a more complex picture emerges, one that brings each one individually into sharper focus.

After his early encounter with public life, Biruni avoided it. Shortly after arriving in Ghazni, Afghanistan, he wrote, “Here, if I can control myself, I will work [only] on that which is still in my soul, and that is [astronomical] observation and scientific projects.” He succeeded at this, remaining immersed thereafter in solitary research and writing. In arguments, he was relentless but maintained no grudges and hence had no serious enemies. To the very end, he was a loner, a soloist, with few correspondents, fewer friends, and no students to carry on his work after he was gone.

Ibn Sina was born to socialize or, more precisely, to exhibit his many talents in social settings. His boundless ambition and domineering personality left him with few friends and many enemies. At the same time, his manifest skills and ardent temperament also attracted appreciative patrons and admirers.

In intellectual debates, Biruni impatiently dissected arguments he considered flawed and, in most cases, treated the authors with respect. But for those who seemed to be willfully ignoring the dictates of reason, he had an inexhaustible fund of invective. He did not differentiate between fools who were living or long dead, but he did not

nurture grudges. Most contemporaries considered him to be modest and earnest to a fault.

Ibn Sina bowed to no one in his mastery of pungent invective. He was also a self-promoter who bragged about his youthful triumphs over one of the learned scholars his father had hired to teach him—and then went on to pilfer that same scholar’s work for his own writings. Blithely ignoring those who are now known to have been his teachers in medicine, he claimed to have quickly mastered that field on his own, to the point that even as a teenager “distinguished physicians” came to watch as he opened up what he termed “indescribable possibilities of therapy.”

After his brief stint as head of foreign affairs for his native land, Biruni foreswore public service and avoided official duties. Ibn Sina, by contrast, after backing into his first assignment as a prime minister or vizier, gladly continued in that line of work through the rest of his life. And why not? He was obviously good at it and relished the platform and the benefits it afforded him. Thus, Ibn Sina immersed himself in the life of every society in which he lived, while Biruni, after tasting public service and the worldly life, retreated to his

field research, his scientific instruments, and his study.

Early in life both thinkers identified a small number of analytic problems and focused on them throughout their careers. However, Biruni added to his list throughout his life, pursuing new topics as they came to his attention and as he discovered in them a fresh challenge. In this sense, he was an opportunist. Ibn Sina, too, focused on a short list of major issues but expanded their number only when he came to understand how each new issue bore on his original concerns. As a result, his focus was more specific than Biruni’s, and his oeuvre as a whole was far more integrated.

One of the sharpest contrasts between them is reflected in their use of language. Biruni was a mediocre writer whose main interest was in getting his research findings down on paper. His *Chronology of Ancient Nations*, for example, forces the reader to shift frenetically between historical, theological, mathematical, and statistical modes of analysis. Biruni was aware of this problem and even apologetic about it, explaining that “the wish to embrace this whole field compels me to cause trouble both to myself and to the reader.” Half a millennium later Galileo, defending himself against the same

criticism, wrote, “I do not regard it as a fault to talk about many diverse things, even in those treatises which have only a single topic.” Only in his *India* and his penultimate work on mineralogy did Biruni write as if he wanted to reach a non-specialized audience.

Ibn Sina’s writings, on the other hand, were neatly organized, clear, and accessible. If his works on logic and metaphysics seem dense and off-putting, this is because he used a conceptual discourse that is familiar today only to specialists. That Ibn Sina dictated most of his works contributed to their clarity, as did his practice of vetting them orally before audiences of students and critics. For all his professional difficulties, Ibn Sina was fortunate to have as readers an immediate circle of patrons, colleagues, and students who welcomed whatever he wrote. Only during his last decades did he encounter sharp critics, to whom he responded by declaring that his writings were not for the ignorant and other closed-minded “shit-eaters.”

Biruni’s interactions with readers were rare or non-existent. Even had he been capable of writing in an accessible vein, he spent the second half of his writing life under the direct gaze of an ultra-orthodox, narrow-minded, and suspicious

patron, Mahmud of Ghazni (also known as Mahmud Ghaznavi, the Sultan of the Ghaznavid Empire who ruled much of the Silk Road region from 998 until his death in 1030). The last thing Biruni would have wanted was for Mahmud and most members of his circle actually to read his work. Like many writers in repressive societies today, he was content to write “for the drawer.”

Keys to Knowledge

At the heart of the divide between Biruni and Ibn Sina lies their very different methods of exploration. Each was convinced that he had found the key to knowledge. Ibn Sina’s emphasis on logic and the syllogism gave all of his writings, including some of his medical works, an abstract and theoretical quality. This was their fundamental strength. He boasted of having “shown by pure theory the universal traits of the ailments of the human body and the causes which produce them.” He went on to speak of specifics, but always, or so he thought, in the context of abstract theory. At the end of the day, Ibn Sina was

less interested in specifics than in what he called the “first principles” of all knowledge, “access to which can be gained only through the science [of metaphysics].”

How profoundly different is this from Biruni. In a process diametrically opposite to Ibn Sina’s, he reveled in the specific and moved from the specific to the general. As he put it in his *Chronology of Ancient Nations*: “Our duty is to proceed from what is near to the more distant, from that which is known to that which is less known, and to gather the traditions from those who have reported them, to correct them as much as possible, and to leave the rest as it is, in order to make our work help him who

seeks truth and loves wisdom in making independent researches on other subjects.”

Biruni was convinced that quantitative measures were the most reliable avenue to

truth. “Counting,” he wrote, “is innate to man.” As to geometry, he called it “the science of dimensions and quantitative relations as they relate to each other.” “Thanks to [geometry],” he proclaimed, “the study of numbers is transformed

from the particular to the general and the study of the sphere from guesses and hypotheses to Truth.” Counting is innate to man because numbers are innate to nature. Who but Biruni would notice that the petals of many flowers form a circle of isosceles triangles, their number always being 3, 4, 5, 6, or 18 but almost never 7 or 9. Such was the mentality that enabled Biruni to achieve his breakthroughs in mathematics, a landmark achievement whose full extent is only now being appreciated.

While suspicious of all windy theorizing, Biruni nonetheless recognized that truth could be attained by various means. Among them, he included the drawing of precise comparisons. “The measure of a thing,” he wrote, “becomes known by its being compared with another thing which belongs to the same species and is assumed as a unit by general consent.” Such a frame of mind left Biruni comfortable with the attainment of knowledge that is solid but partial. He was convinced that science is not a fixed corpus (or canon) but a process of discovery extending from the past indefinitely into the future. Biruni’s view of the world was open-ended and constantly evolving. Also, experience had taught him that observations of nature needed to be repeated again and again to ensure accuracy. He

revisited three times the important body of data he had collected at Nandana, located in the Punjab in today’s Pakistan, to measure the earth. Recognizing the inadequacy of his own instrumentation, he rued that “whole generations wouldn’t suffice to measure precisely the length of the year.” This cast of mind also led him to suggest paths for future researchers and to spell out the instruments and methods they would need to pursue these leads.

Ibn Sina had a passion for certainty. Tortured by his own doubts even on matters he had previously considered settled, he believed that his mission as a thinker was to resolve questions, not leave them open for future researchers to address. His approach was more integrative than analytic, which enabled him to discern relationships between seemingly disparate phenomena and to build whole systems based on them. It was these systems rather than the specifics they embraced that constitute his chief intellectual legacy. From first to last, the binding force that held them together was logic. Biruni, too, sought certainty but was willing to admit when he couldn’t judge between two hypotheses. He, too, sought to uncover relationships between disparate phenomena, but in contrast to Ibn Sina, his principal

tool for doing so was mathematics. His temperament lacked Ibn Sina's passionate unease and enabled him, when necessary, even to admit that "I don't know." Ibn Sina would have considered such a conclusion unthinkable.

All of this helps explain the huge differences between Ibn Sina's two great syntheses, the *Canon of Medicine* and *The Cure*, and Biruni's *Masud's Canon* and his *Determination of the Coordinates of Positions for the Correction of Distances Between Cities*. Ibn Sina offered his works as closed systems, whole and complete, while Biruni issued his landmark studies as reports on an unending process. Nowhere in Ibn Sina's vast writings can one find any statement comparable to Biruni's oft-repeated remark that what is known today is insignificant compared with all that is knowable, and that everything we know today is but partial and unclear.

For half a millennium, thinkers throughout the Muslim, Christian, and Jewish worlds were captivated by the wholeness and completeness of Ibn Sina's *Canon* and *The Cure*. They stood in awe of his claim to have united all knowledge under an all-embracing theory, and were consoled by the possibility that here, finally, all things knowable had been gathered

under a single orderly system. They might vehemently reject his formulations on specific points and instead embrace those of Ibn Rushd or Ibn Sina's Christian critics. But for centuries they all followed Ibn Sina in believing that the core task of human thought was to achieve the kind of comprehensiveness that he had sought in his greatest works.

This process ensured that Ibn Sina's thought, in its original form or as recast by his successors, would become deeply embedded in all three of the so-called Religions of the Book. A similar process took place with respect to the *Canon of Medicine*. Down practically to the discovery of the circulation of blood in the seventeenth century, the *Canon* reigned supreme and continued to dominate medical pedagogy in the East and West for another century.

Biruni never had such good fortune. Because he presented all his findings as open-ended hypotheses, the few of his writings that survived stimulated further research that built on Biruni's achievement and advanced beyond it. It was this open-ended quality of the best science that led Isaac Newton to say that he was merely "standing on the shoulders of giants." By contrast, the comprehensive but closed-ended quality of Ibn

Sina's syntheses shut as many doors as they opened.

The French scholar Roger Arnaldez, in a brilliant comparison of the two thinkers published in 1974, argues that Ibn Sina was the more speculative and systematic, gladly embracing practical evidence but only to the extent that it related to the truths of logic and metaphysics. At bottom, Arnaldez concluded, Ibn Sina was a Neo-Platonist. Biruni, by contrast, engaged passionately with each brute fact in its concrete singularity. Only on this basis, he believed, could one attain verifiable truths. Arnaldez concluded that Biruni was therefore the epitome of the anti-Platonist.

Another way of expressing the difference would be to name Biruni the positivist and Ibn Sina, in spite of his tidy system of logic, more the idealist. As a positivist, Biruni turned his back on metaphysical explanations and embraced only what he could confirm by observation, computation, or experimentation. Ibn Sina also had phenomenal powers of observation. But from his youngest days his mind inclined

toward the general rather than the specific, the abstract but logically verifiable rather than the concrete and quantifiable.

Ibn Sina and Biruni may have both striven for unity, but their paths for achieving it differed radically. Ibn Sina, proceeding from the general to the specific, stumbled over unexplained differences, while Biruni had no difficulty in acknowledging them and found in them a challenge. Where Ibn Sina tended to brush aside the diversity to which geography, culture, and the passage of time give rise, Biruni reveled in it and devised innovative methods for studying it. More than anyone before him, he also grasped the profound differences between high and popular cultures and sought the factors that shape such differences.

Stated differently, Ibn Sina gloried in the sublime unity of Creation, while Biruni, while also conceiving Creation as unified and complete, reveled in its endless diversity. This opened his mind to explorations that vastly expanded the borders of the known world. Such reasoning enabled him even to hypothesize

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the existence of unknown but inhabitable continents where North and South America were later discovered.

Similar Ends?

Having dwelled on the differences between our two thinkers, we should also ask whether those differences ever led to similar ends. A definitive answer to this question would require exploring the daunting number of fields in which Ibn Sani and Biruni both worked, including geology, paleontology, mineralogy, geometry, and pharmacopeia.

Short of this, however, we know that they had a great deal in common. They were both Central Asians and contemporaries, born under what was arguably the world's most intellectually advanced regime at the time, the Samani empire. As such, they both spoke Persianate languages or dialects of Persian and both expected to make their way into the sophisticated Samani centers of learning. This did not happen, for just as they entered manhood, the last Samani rulers were swept from power. This geopolitical event condemned both of these rising geniuses to lives of wandering and improvisation.

Born to privilege, they received private instruction from the most knowledgeable teachers available. They received orthodox training on the Quran. By their time, readers of Arabic also had access to a wealth of translated works of ancient Greek philosophers and scientists. This prompted them not only to master what the ancient Greeks had to say but also to delve into the structure of their arguments in order to identify flaws and correct them. Not until the European Renaissance did anyone in the West subject the classical heritage to such rigorous scrutiny.

They pursued their goals through thick and thin. Neither enjoyed the collegial support that Newton found in the Royal Society. Indeed, the absence of institutions where thinkers like Ibn Sina and Biruni could be encouraged and challenged is a major failure of early Muslim intellectual life and a cause of its eventual decline. Their persistence is all the more notable in that both men suffered from the vengeful avarice of their lifelong common enemy, Mahmud of Ghazni.

It was because he judged Ibn Sina and Biruni to be the two greatest living geniuses that Mahmud ordered them both to his court in Afghanistan. Mahmud

succeeded in snaring Biruni, of course; Ibn Sina managed just barely to escape. At no point did either Biruni or Ibn Sina enjoy anything approaching normal support for their work. What a contrast with the many modern scientists who enjoy tenured research posts and secure funding. Biruni and Ibn Sina had neither; over the course of his career Ibn Sina labored under seven fickle rulers and Biruni under six. Yet they carried on.

Biruni and Ibn Sina were what we now call workaholics. Biruni is known to have worked every day of the year, taking breaks only for the winter and summer solstices. Ibn Sina's lifestyle was expansive, yet he never paused in his dictating. For both men, this was possible because neither married and neither had a family. Biruni declared that "my books are my children."

That these innovators were extremely competitive goes without saying. This became evident during their choleric exchange of letters and then continued through their dueling *Canons* and down to their final, if unacknowledged, clash over the nature of medicinal plants. It was manifest in Ibn Sina's rare but pointed ventures into mathematics and in Biruni's

equally rare but well-informed venture into medical matters.

Finally, as is inevitable in science, Ibn Sina and Biruni equally made serious mistakes in their work. Later astronomers faulted Biruni for failing to understand the cause of the steady decline of the obliquity of the sun's ecliptic that he himself had measured so precisely. Critics also took him to task for errors in computing. As to Ibn Sina, later scientists in the Middle East and Europe pointed out the instances in which loyalty to his ancient mentors led him into error. Ferreting out flaws in the *Canon of Medicine* became a cottage industry.

Political Philosophies

There are two other key areas on which their thought should be evaluated both individually and collectively—two touchstones that crystallize their outlooks on their world: one is their views on the good society; the second concerns religious faith.

To start with politics and society, the challenge is that neither developed his views in great depth. Ibn Sina said that he intended to write a book on political philosophy while Biruni claimed to have similar plans for a book on ethics. Neither

book was ever written. Despite this, numerous passages provide revealing insights into their political philosophies. Their positions reveal serious differences between them but also striking similarities.

Ibn Sina draws on Plato's *Republic*, some of the later writings of the Neoplatonists, on Farabi, and on the Baghdad philosopher Kindi to set forth his morality-based concept of the good society or, as he put it, the "good city." At the core of his concept stands his conviction that the goal of every human being is to live the contemplative life and to fulfill the immaterial and unworldly aspirations that are its essence. With Plato, he affirms, in the words of Jon McGinnis, that "one lives the virtuous or moderate life as a practice for death and dying, where 'death' is understood as the separation of the soul from the body."

Ibn Sina holds that the growth of specialization meant that early humans had to band together in communities. In that condition, they required laws that must conform to the broader scheme of things that God revealed through His prophets. The purpose of such laws was to constrain physical desires and worldly passions. Such vices are evil in themselves but also because they distract people from their true mission, which is

to perfect themselves as human beings.

It is no surprise, argues Ibn Sina, that ordinary people are incapable of formulating such laws on their own, nor are they able to do so through collective processes. Law, which is the essence of human society, can therefore arise only from God, his prophets, and those rare human beings whose wisdom enables them to fulfill this supreme function. Thus, Plato's Philosopher King reemerges in Ibn Sina's *Metaphysics* as the Philosopher Prophet, through whose wisdom alone the good society becomes possible. Besides laying down the essential laws and regulations, the all-wise ruler also sets down the obligations of members of society and assures compliance with them. Prayer is first among these duties, for good deeds are as nothing until they are sanctified by worship.

Because mankind lives not for the here and now but for eternity, Ibn Sina considers the good city to be a moral community. This called for powerful and moral leadership, the Philosopher Prophet, whose task is to prepare the community of mortals for their future by establishing firm laws against immorality. So focused is Ibn Sina on this moral agenda that he all but ignores the vast realm of economic, legal,

social, and political interactions.

Biruni based his political philosophy on the practical need for human beings to protect themselves

and their property against external threats. Not once did he suggest that the social enterprise had any purpose beyond its own welfare and betterment. Biruni believed that a good society depends on the moral qualities of its leader.

Like Ibn Sina's, his state is a top-down system, devoid of traces of what we would today call liberal democracy. Yet he acknowledged that leaders of the sort he calls for rarely appear. In all times and places, from Tibet to the Turks, leaders build fortresses to protect their wealth, become self-indulgent, make vulgar displays of vanity such as drinking water out of golden cups, and engage in all sorts of "mischief." Through their greed and hoarding, leaders lose sight of the sources of their wealth, causing all their gold and jewels "to vanish like smoke."

For all the differences between their political philosophies, however, the systems of government they espoused turned out to be strikingly similar. Ibn Sina's and

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Biruni's visions closely resemble what had long been accepted as the ideal of good governance in Central Asia and the Persianate world. This called

for a powerful and wise leader, preferably but not necessarily with inherited power, who governs in accordance with divine law and exercises wisdom and firmness for the benefit of society at large. Ibn Sina and Biruni shuddered at the prospect of men and women managing their own communities. Instead, they placed their faith in the wise leaders who inspire both awe and fear. Explicit in Biruni and implicit in Ibn Sina is the assumption that respect and fear must go together. When either is lost, the economy collapses, people are unable to pay taxes, the poor die, and the good society is no more.

How utterly different all this was from what either experienced in his own lifetime. Experience had taught them that actual governments are based instead on vanity, avarice, insecurity, and greed. Under such conditions, the idea of the good society and its government was for both of them as remote a concept as Heaven itself. Could either have survived in the "good city" each

envisioned? It is quite possible that the stolid and private Biruni could have managed to do so, although his impatience with fools and his sharp tongue likely would have done him in. Ibn Sina, by contrast, would surely have been censored by the Philosopher Prophet for his dissolute and seemingly impious style of life.

Faith and Reason

No aspect of Biruni's and Ibn Sina's thought has been more persistently debated over the millennium since their death than that regarding God and religion. For their contemporaries, their intellectual heirs and enemies, and for those in the modern era who seek to gain a rounded picture of them, the question of their faith, or absence of faith, assumes great importance. Was either of them a Muslim or at least a believer, and if so of what sort? Or, alternatively, was either of them agnostic or even an atheist? Finally, did their views of religion unite or divide them?

On one point there is no dispute: neither is known to have been particularly attentive to the canonic duties of their religion. Neither made the pilgrimage to Mecca nor is known to have fasted. It is unknown whether they donated 2.5

percent of their income to charity, as is required of all Muslims, although it seems likely they did. Regarding the five-times-daily prayers, Biruni was silent. And while Ibn Sina spoke of praying at several critical junctions of his life, and while his amanuensis Juzjani refers once to his observing evening prayers, his critics lambasted him for not doing so. They also denied that a person who lived so dissolute a life as did Ibn Sina could be considered pious. This leaves the Declaration of Faith ("There is no God but Allah and Muhammad is His Messenger"). Whatever their degree of piety or impiety, for either Ibn Sina or Biruni to have provided even the slightest evidence that he questioned this central article of faith would have been unthinkable.

More than one writer makes the case that for all his writings about God, Ibn Sina was actually indifferent to religion, or at best a deist. This was the firmly stated view not only of some orthodox Muslims but also, in the modern era, of the East German scholar Ernst Bloch, who, in his 1949 volume *Avicenna and the Aristotelian Left*, argues that Ibn Sina's system was "above faith." The case for Ibn Sina's supposed indifference turns on the fact that his principal tool for establishing truth—logic—was free of theology.

This led Bloch to argue that the line of descent from Ibn Sina leads not to Islamic theology, as Muslims maintain, or to St. Thomas Aquinas, as Christians argue, but to Giordano Bruno, the sixteenth-century pantheist monk who became an early disciple of Copernicus and who was martyred for denying core doctrines of his faith.

Even during Ibn Sina's lifetime, fundamentalist Muslim theologians cited the independence of his logic from theology as proof that he was irreligious. Ibn Sina was well aware of such criticism and wrote tracts and even a poem to deny it. At one point he became so exasperated by these attacks that he lashed out. "If I am a heretic, then there is not a single Muslim anywhere in the world." Not everyone was convinced. But the fact remains that for Ibn Sina the fundamental source of religious truth is revelation, and he embraced religious prophets as philosophers par excellence.

The case for Biruni's indifference to religion was made with even greater vehemence. Such arguments turn on specific statements, such as his criticism of those "who ascribe to divine wisdom whatever they cannot verify in the physical sciences. They justify their ignorant claims by declaring that 'God is all-powerful.'" A generation

of Soviet scholars, parroting their government's official atheism, touted Biruni as a secularist. Yes, they admitted, he made occasional bows to religion, but most of these were merely tactical moves to escape the wrath of his ultra-orthodox patron in Ghazni. There is truth in this, for Biruni sometimes stooped to using religious arguments for purely instrumental purposes. He would accuse astrologers of irreligion on the grounds that they placed a causal force—astrology—between God and man. In an opposite spirit, he sometimes launched his attacks as a materialist and religious skeptic. Needless to say, ideological zealots in Soviet times revealed in every such comment.

If a passionate concern over the existence and nature of the human soul is a test of faith, then Biruni fails. The most direct statement of his own views could not have been more perfunctory, to wit, than "there are living beings in the existing world. Therefore, we must assume the existence of the soul." Period. In *India*, he quotes without criticism the Hindu view of the soul as merely "the will that directs the feelings," which it accomplishes "by gaining a physical body and acting through it." In the same vein, he cites without criticism another Indian thinker who proclaimed that "matter is the core, and everything

else is subservient to it and only helps it to consummate actions.”

Finally, those who see Biruni as essentially secular make much of the fact that in his *Chronology of Ancient Nations*, he directly criticizes the prophet Muhammad for rejecting intercalation in favor of a system that caused all dates, including religious holidays, to shift throughout the year. In the same vein, in his book on geodesy, Biruni points out contradictions between widely differing statements in the Quran concerning the length of a day. Several passages in his later writings are similarly harsh on religious practice. Typical is his observation that “to bow to a divinity is like flinging oneself into deception, since divinity takes so many forms around the world.”

Summing up, those who champion Biruni’s secularism declare that Biruni was at best a deist by convenience and a Muslim by necessity. When one recent scholar, F. Jamil Ragep of Canada’s McGill University, praised Biruni for freeing astronomy from the shackles of philosophy he meant, by implication, of religion as well. On only one point do defenders of Biruni’s secularism and of his piety agree: that he was relentlessly critical of

all religions as practiced by the ignorant masses. In his *Mineralogy*, Biruni sharply ridicules “primitive worship,” which he saw as pervading all societies, including the Muslim world. Such elemental belief, he argues, is based on “no knowledge” and is on the same level as unbelief.

These arguments about their religious view cannot be denied, but by no means do they tell the whole story. For Ibn Sina, the counter-argument typically starts with his confession that even as a boy he would often retire to the mosque when stumped by a problem of logic. It might more convincingly begin with the fact that his earliest exposure to “philosophy” was to the doctrines of deeply pious but independent-minded Muslim thinkers who advanced the doctrine that “intellect” is not merely a quality of the human mind but the work of the Supreme Being—in other words, that there can be no conflict between reason and faith.

Like Biruni, Ibn Sina was a relentless critic of religious ignorance and bigotry. However, it would be a mistake to take his attacks as evidence of unbelief. Rather, they attest to his conviction that such attitudes drag true faith down to the level of superstition.

Ibn Sina offers a rational alternative to the primitive faith of the masses, and devoted a lifetime to refining it. From first to last, he focused on the human soul and its relation to God. It is revealing that his last works, *Fair Judgment* and *Pointers and Reminders*, were both saturated with his concern for mankind’s relationship to divinity and that Ibn Sina himself considered his writings on theology and cosmology to be his most consequential works. Given this, it is the more regrettable that the text of *Fair Judgment* was lost during a military rout and that the dense and complex *Pointers and Reminders* has yet to appear in an authoritative edition or translation. However, we might note that it was in this spirit of piety that during his last years he penned detailed exegeses of several Suras from the Quran, and that his surviving poetry is suffused with an ecstatic religious spirit which some consider akin to Sufism.

Biruni, like Ibn Sina, rejected the Greeks’ notion of the eternity of the world and the “foolish persuasion” that time has no terminus. Instead, he affirmed the concept of God’s mastery over the whole universe. Like Ibn Sina, too, he stood completely apart from the Sunni-Shia controversy. Rising above sectarianism,

he declares in his masterwork on geodesy that Islam as a whole had “united all the different nations in one bond of love.”

Biruni was indeed a religious believer who conceived God as the Prime Mover and whose works are largely accessible to human reason. This did not mean that he accepted the syllogistic logic of Aristotle and Ibn Sina as a tool for understanding God’s Creation. Nor did he accept the text-bound dogmas of Muslim traditionalists, even though Mahmud and his state were staunchly committed to upholding them. Nor, to repeat, did he align himself with either the Sunni or Shia Muslims: Biruni himself records that he wore a ring with two stones, one of them venerated by Sunnis and the other by Shiites.

Biruni traced the observable order and symmetry of creation to God. But what happens when things go wrong? He saw the possibility of a future crisis of overpopulation, which could cause famine and misery. He acknowledged that this could indeed occur. But were it to happen, he declared that God would send a “messenger for the purpose of reducing the too great number.” He thus affirmed God’s continuing and benign presence in human affairs and,

incidentally, anticipated Malthus's thesis on overpopulation by eight centuries. Other such observations by Biruni are too numerous to enumerate.

While Biruni respected how every religion seeks answers to the great questions of existence, he affirmed Islam because of what he considered its rationality. When he criticized the prophet Muhammad's rejection of intercalation he did so on purely rational grounds, and without expanding his critique to Islam as a whole or to religion as such. He acknowledges God as the Prime Mover and sees God as a beneficent presence in human affairs. Concluding his discussion of the danger of overpopulation, he stresses that the "messenger" of correction would be sent by God, whose "all-embracing care is apparent in every single particle on earth."

It is perhaps an exaggeration to say, as Seyyed Hossein Nasr does in *Introduction to Islamic Cosmological Doctrines* (1964), that Biruni "can be considered among the most Muslim of those in Islamic civilization who devoted themselves to the study of the intellectual sciences and who synthesized the achievement of pre-Islamic cultures and developed them in the spirit of Islam." Yet to ignore his abiding

religiosity would be to deny his own words, his personality, and his times.

Ibn Sina and Biruni considered themselves Muslims whose identities were inseparable from their faith. At the same time, they relied on reason to ferret out the truths of human existence and the universe. On this point Biruni was adamant, declaring that the Quran itself is totally accessible through reason, for it "speaks in terms that do not require an allegorical commentary." Here, of course, Biruni was at odds with Ibn Sina in his later years.

Whatever the differences between their faiths, neither Ibn Sina nor Biruni felt compelled to soft-pedal his findings so as not to offend mainstream preachers and scholars from the *ulema*, the body of clerics who considered themselves the guardians of the faith. They stood shoulder to shoulder in their disdain for Muslim theologians who, in their practice of *kalam*, evaluated all thought solely in terms of their narrow definition of Muslim orthodoxy. But this did not qualify the fundamental faith of either man. They saw reason not as an alternative to religious faith but as its fulfillment. Both could have agreed with Isaac Newton's declaration that God "is supreme, or supremely

perfect. He is eternal and infinite, omnipotent, and omniscient. That is, he endures from eternity to eternity; and he is present from infinity to infinity; he rules all things, and he knows all things that happen or can happen." And both would also have concurred with Newton when he said, "As a blind man has no idea of colors, so we have no idea of the manner by which the all-wise God perceives and understands all things."

No issue has more consistently challenged the faithful than the presence of evil in the affairs of mankind. The Old Testament, the New Testament, and the Quran all dwell on it. Thinkers of all three faiths have devoted seemingly endless exegesis and tracts to it. The lives of both Biruni and Ibn Sina were marked by evil. They endured under leaders who were certifiably malevolent. Yet in the end, neither viewed it as an inevitable driving force in human affairs and neither dwelled on it extensively in any of their writings. They agreed on the need for governments to exercise a strong hand to prevent crime and protect the civic order against malefactors. But beyond this, it is striking to see how dismissive both of them were of the problem of evil as such.

As Muslims, they had been taught that evil arose when Satan (Shaytan)

refused God's order to bow down to Adam, and then spent eternity seeking to lead humans astray. Evil thus became an unavoidable presence in human affairs. Yet neither Biruni nor Ibn Sina accepted this. Evil may be everywhere, but not once did Biruni mention Satan or conditions arising from the days of Adam. Rather, in his *Determination, India*, and his book on mineralogy he argued that evil arises not from our inner nature but from ignorance. Ignorance is the sole cause of evil, and knowledge is its cure. Knowledge—not piety. Indeed, Biruni often attributed the most evil of deeds to those of all cultures who were pious but ignorant.

Ibn Sina equally refused to accept evil as part of the divine order of human nature. Ignoring the Quranic account, he defined evil simply as "the absence of perfection." Evil may infect individuals, but it isn't inherent to the species. And in a final strike against the pessimists, he argues that whatever evil exists is confined to earthly life and is therefore temporary, and that in the grand balance is far outweighed by the good.

Ibn Sina and Biruni based their arguments on different premises, but both denied that evil is part of the divine order of things, and both pointed out the path by which

individuals could overcome it. They knew from bitter experience that rulers and individuals perpetrate evil deeds, but that society can survive if it is ruled by a wise but forceful leader. Despite their own bitter experience, they were, at bottom, optimists. Neither believed that people can achieve perfection, and neither anticipated Rousseau's chilling assertion that "man is born free but is everywhere in chains." Yet they held that individuals could lead good and moral lives and, through enlightenment and divine providence, avoid evil.

Contemporary Significance

All of this seems to call out for some kind of bottom-line assessment of Ibn Sani and Biruni. Yet how impossible this seems. Every age has viewed them and their work differently, confounding any attempt to offer a truly objective balance sheet of their lives and work. We might ask instead what relevance their lives have for us today.

But such an evaluation cannot be made on the basis of their direct impact on our times, for the passage of centuries obliterated the memory of Biruni until quite recently and caused the memory of Ibn Sina to be preserved mainly among a small

band of highly specialized philosophers, theologians, and historians of medicine. The best alternative, then, is to narrow the question still further by enquiring about the significance of the two lives and their written legacy.

A place to start is by exploring their respective roles in the history of science and knowledge generally. The framework proposed by Thomas S. Kuhn in *The Structure of Scientific Revolutions* (1962) holds much promise. Reduced to telegraphic form, Kuhn proposed that most scientists practice what he called "normal science," in which the main parameters are set and accepted but which leaves open many unresolved questions. In the course of addressing these, researchers encounter "anomalies" for which the main thesis or "paradigm" cannot account. Eventually, these anomalies mount up to create perplexity, confusion, and eventually a crisis. The crisis is resolved only when a new framework or paradigm is put forward and accepted. This, Kuhn argued, is how scientific revolutions come about.

Viewed in this light, Biruni and Ibn Sina both identified anomalies, though each of the two men addressed the anomalies he uncovered in his own manner. Ibn Sina began as a respectful disciple

of Aristotle, correcting and refining the master's thoughts on specific points. Only later did he break free of the old paradigm and emerge as an Aristotle for a new age. By contrast, Biruni valued the work of his predecessors, yet only as a starting point. He declared his independence from the outset, and also his neutrality. He recognized many striking anomalies, explored them, and was definitely open to considering new paradigms, but only to the extent that they could be confirmed by solid evidence.

Ibn Sina may have offered new paradigms in the realm of logic, philosophy, and cosmology, but at bottom he was a conservative reformer, leaving intact and esteeming all that he didn't reformulate. Whether he was more than this in the field of medicine is at best doubtful. While he is rightly credited with many specific innovations, he left intact the Aristotle/Galen paradigm. Until specialists compare his treatment of scores of different medical issues with specific texts by his Greek and Muslim predecessors (Razi notable among them), it will be impossible to know the extent to which he was more than a diligent compiler and occasional corrector. Nonetheless, he refined the preexisting "normal" with such thoroughness and success

that his system remained largely intact for centuries.

Ibn Sina's focus was above all on identifying the overarching frameworks that linked and explained all phenomena and knowledge. Only by such a process could he have arrived at writing the *Canon of Medicine* or *The Cure*. So broad was his vision that it comprehended such starkly different areas as philosophy, medicine, geology, and music. From first to last his goal was to lay bare first principles on which each is based and to identify the manner in which those principles lead upward to God.

Biruni always began with a specific problem, cataloguing and evaluating all prior efforts to address it, and then offering his own solution. When he failed to resolve the issue, he would sketch out what had yet to be learned in order to solve the problem, thus mapping the way for future researchers. This process enabled Biruni to achieve incremental but important advances in a wide range of areas. And he achieved major breakthroughs on several issues. Thus, he proposed the first global system for measuring time, advanced a bold new way to study other societies, and introduced the transformative concept of specific gravity. Beyond all this stand his signal contributions

to mathematics, geometry, trigonometry, cartography, geography, botany, and several other fields.

Finally, Biruni's treatment of the problem of a heliocentric universe deserves special note, not merely because he accepted the theoretical possibility that the earth rotated around the sun, but for the method he employed to evaluate this hypothesis. He did not respond to some widespread discontent with the old paradigm, as Kuhn would have it, but to his own recognition of an anomaly.

Using data that he himself generated, and employing mathematical tools that he himself had refined, he proved that a heliocentric universe was entirely possible, that is, an acceptable paradigm. In the end, Biruni stopped short of embracing his own paradigm because he could not confirm it by observation. He left it to Galileo and his telescope to clinch the argument and validate the paradigm that he, as a mathematician, had defended. In this context, the recent discovery of the so-called God particle in particle physics seems relevant. Known as the "Higgs Boson," it accounts for the fact that elementary particles

have mass. The "God-particle" was confirmed by observation only in 2012. However, a group of five physicists had earlier hypothesized its existence purely on the basis of mathematics. For this achievement, two members of that earlier group were awarded the Nobel Prize in 2012.

Even had most of Biruni's works been miraculously preserved, their impact might have been limited to that small group of scholars whose competence was on a par

with his own. By the same token, the very comprehensiveness of Ibn Sina's systems in both medicine and metaphysics assured for him an audience of both specialists and generalists who

would either reject them, as did some of his Muslim and Christian critics, or seek to refine and adjust them as a new round of "normal science." What is in the end most striking about both men is their readiness, when necessary, to take scientific, philosophical, or religious orthodoxies head-on. While not themselves full-blown revolutionaries, they were harbingers of the revolutions that gave rise to the modern mind.

The lives and work of Biruni and Ibn Sina challenge us to reconsider several of the comfortable dichotomies with which we describe our world today.

The lives and work of Biruni and Ibn Sina challenge us to reconsider several of the comfortable dichotomies with which we describe our world today. By simultaneously

embracing the past and breaking from it, they challenged the notion of Ancients versus Moderns that arose in the sixteenth-century West and persists in many forms today. By simultaneously embracing science (in the broadest sense) and religion, they confound those who see the world in terms of an eternal struggle between science and faith. Instead, they recast these and other dichotomies in terms of knowledge versus dogma, both religious and scientific, and dedicated their lives to knowledge.

Biruni and Ibn Sina were, as noted, above avowed Muslims, yet their works rose above sectarianism. As a consequence, anyone could take intellectual sustenance from them. In both philosophy and science, they ameliorated the juxtaposition of Muslim, Christian, and Jew, not by denying or avoiding differences but by engaging constructively with them. In the same spirit, while they were men of their place and time, their work came to

Biruni and Ibn Sina were undeniably both virtuosos of the mind, standing at the very peak of human achievement. Between them, they created a two-man Renaissance.

be studied in both the East and West, again dissolving what many still consider a global clash of cultures. They rejected all forms of stodgy orthodoxy. By so doing, they ended up transforming the received intellectual heritage. In this they were not alone; others had already begun moving along this path, albeit more tentatively than either Biruni or Ibn Sina. At the same time, opponents of their project were also mobilizing and would score tactical victories over the coming centuries.

Biruni and Ibn Sina were undeniably both virtuosos of the mind, standing at the very peak of human achievement. The differences between them were profound. Yet these very differences attest to the breadth and depth of the Central Asian and Persianate culture from which both sprang.

The sharp distinctions between them—in character, interests, and modes of thought—bear witness to the importance of individuals in human history. Particular nations, regions, and religious factions deserve to claim each as one of their own. But in the end, Ibn Sani and Biruni stand forth as individuals,

unique and incomparable. Their lives remind us that while advancements in knowledge can result from the progress of society as a whole, they can take place even in periods of regression and chaos.

Between them, Biruni and Ibn Sina created a two-man Renaissance. For all their manifest differences, they shared the conviction that God's Creation is orderly

and in conformity with natural laws that are accessible to human reason. This was no mere working hypothesis but a ground truth. With Virgil, they affirmed, "Happy is the man who has learned the causes of things, and who trampled beneath his feet all fears, inexorable fate, and the roar of devouring hell" (Verg. G. II.490-492). By that standard, Biruni and Ibn Sina had every right to be happy. ^{BD}

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