Sponsored by
Ministry of Education Government of Pakistan
in co-operation with UNESCO
Under the auspices of
Hamdard National Foundation, Pakistan.

# Millenary of
# Abū Raiḥān Muḥammad Ibn Aḥmad Al-Birūni

SCIENCE HISTORY AND RELIGION:
SOME REFLECTIONS ON THE INDIA
OF ABU RAYHAN AL-BIRUNI

by

PROFESSOR F. E. PETERS
Near East Center
New York University.

Presented on the Occasion of

## Al-Biruni International Congress

November 26, 1973 thru December 12, 1973
Pakistan.

# SCIENCE, HISTORY AND RELIGION. SOME REFLECTIONS ON THE INDIA OF ABU RAYHAN AL-BIRUNI

Prof. F.E.Peters
Near East Center
New York University

For all his individual genius, Biruni lived in an age when the intellectual life of Islam was preparing its descent into encyclopedism. By the eleventh century medical encyclopedias were already commonplace, and Biruni's contemporary Ibn Sina had fulfilled the promise, or the threat, implicit in the "divisions of the sciences" tracts in common use in the university classrooms of late antiquity and had produced the first encyclopedia of philosophy and the sciences in his Book of Healing. History too, with Ya'qubi and Mas'udi, had thrown open its doors to allow entrance to world history, a notion that embraced everything from the Creation to the death of the latest Caliph.

To compose an encyclopedia demands either a genuine polymathia, a universal understanding, or the ability to assimilate and organize other people's learning on a wide variety of subjects. Islam was schooled in both those arts almost from the beginning in that its legacy from Hellenism came to it in the form of university learning which was already organized in curricula and distributed across a great variety of textbooks. The very first medical literature

translated into Arabic, for example, were Galenic textbooks and medical encyclopedias currently in use in the medical faculties at Alexandria and Jundishapur. The kunnash, the medical encyclopedia, came into Islam well before the masa'il, the research literature.

Ibn Sina's Book of Healing illustrates another aspect of Islam's Hellenically-inspired polymathia. A Muslim learned in the "foreign sciences" came to those disciplines as they were understood in the philosophy faculty at Alexandria. Medicine apart, one did not train to be a scientist in late antiquity; one studied philosophy, a discipline that was understood to include logic at one end, metaphysics at the other and between them most of what we call the "natural sciences." Ibn Sina's Healing is formally nothing more than that ideal curriculum of the philosophy faculty fleshed out from outline to encyclopedia by the insertion of resumes of the textbooks in their appropriate places. What might have taken eight or ten years to get through by the lecture method at Alexandria in the sixth century was here in the eleventh put between the covers of a single book.

This kind of curricular polymathia, a kind shared by Biruni, was particularly Greek, and its presence in Islam was an inherited good. But Islam rejoiced in another type of polymathia that was unmistakably its own and





that was ecumenical rather than encyclopedic. One has only to open the pages of Ibn al-Nadim's Catalogue and lay them beside the Library of the Byzantine Patriarch Photius to appreciate the enormous breadth of learning in Islam and how little it owed its range to Hellenism. The Library of Photius is a record and a digest of the Patriarch's reading in the first half of the ninth century. It is an impressive collection, the reading of a man of considerable schooling and of catholic tastes. But it is all Greek, the classics of pagan and Christian Hellenism. Through Ibn al-Nadim's tenth century bookstore had passed, on the other hand, not only the books of Islam's home-grown "traditioned sciences" but the learning of the Greeks, Romans and Iranians, the Franks and the Chinese, Jews, Christians, Zoroastrians, Manichaeans and the sects of India.

Though more specialized than Ibn Sina and nowhere so wide-ranging as the author of the Catalogue, Biruni belonged to both traditions of polymathia, the curricular and the ecumenical. He had doubtless studied both the traditional Qur'anic sciences and the staples of the Hellenic philosophical curriculum, but Biruni's specialization lay within the mathematical quadrivium of the "foreign sciences." These latter disciplines, it is well known, were Greek in their theory, their methods and their general outlook, and how well Biruni mastered the Greek textbook style in his

own chosen field is revealed by a simple examination of the first half of his Introduction to the Elements of Astrology which is a model of Hellenic mathematical pedagogy by a man who neither learned nor taught in any educational institution remotely ressembling the pre-Islamic university at Alexandria.

The passage of cultural goods across linguistic and religious frontiers was, then, nothing extraordinary in Islam, and wonder at Biruni's interest in India should be tempered somewhat by the realization that his own formation was the result of just such another borrowing. The wonder-workers of that earlier cultural encounter were the pioneer scholars of the late eighth and ninth centuries who also had to master difficult scientific texts with little or no background and in a language other than their own. Biruni had the luxury, as they did not, of thinking Greek mathematics in his own native idiom. Indeed, thanks to generations of earlier scholars, Greek mathematics was Biruni's native idiom.

Through Ibn al-Nadim and others we have a fairly detailed picture of Islam's earlier discovery and expropriation of the scientific treasures of Greece. Harun al-Rashid and particularly his son Ma'mun had sent teams of scholars across the political frontier with Byzantium to search out Greek manuscripts. Once returned to Baghdad these same scholars





turned to collating their finds and rendering them into Arabic. This early generation of translators was followed in turn by schools of editors and exegetes who glossed the new texts. By the time that Greek philosophy passed to Ibn Sina and Greek mathematics to Biruni they had been worked over by many learned hands. Such were the texts and other resources available in Arabic in the eleventh century that it was no longer necessary to know Greek to appreciate the subtleties of Greek science.

On the testimony of the India Biruni was proposing to perform a somehat similar task with respect to Islam's eastern neighbor. What leap to view are not, however, the similarities of the efforts but their differences. The earlier discovery of Greece was a true discovery for the Muslim, a landfall of a new cultural continent. There had been scouts, to be sure, in the person of the Syrian Christians who knew and savored Hellenism, but Islam knew nothing of such things. Biruni, on the other hand, was returning to a familiar terrain; though he is not always generous in his estimate of his predecessors, they did exist. His Chronology of Ancient Nations long antedated his study of Sanskrit and his own personal research on India; it contains, nonetheless, signs of the familiarity with Indian science that any Muslim mathematician might be expected to possess.

There is no mystery as to whence such familiarity derived. Three and a half centuries before Mahmud's arms carried Biruni to India there were Muslim scholars in Baghdad who knew both Indian science and the basic tenets of Hinduism. And yet the tradition so auspiciously begun was not a continuous one, as it was in the case of Greek learning. What started with Mansur likely ended with Harun; Ibn al-Nadim, at any rate, writing two centuries after that first dawn of interest in India, had only the vaguest idea about the earlier translation activity from Sanskrit into Arabic. Thus Biruni had predecessors in his interest in the body of science in Sanskrit but no on-going and continuous tradition to which he could connect himself.

Nor did he succeed in creating such. Though he clearly addressed himself to the original Sanskrit texts, Biruni's efforts did not issue in the production of Arabic versions of those texts but rather in considerably truncated resumes of their contents. As he himself says (I,8),* he had once translated some Sanskrit tracts into Arabic--curiously they were religious and philosophical rather than scientific texts--but he hoped that this present work, the India, would enable the reader to dispense with those translations.

It is instructive to compare Biruni with Hunayn ibn Ishaq in this regard. Hunayn was a translator as well as a

* Unless otherwise specified, this and all subsequent citations are from Edward C. Sachau's Alberuni's India, London, 1910.





scientist. He produced finished Arabic versions of Galen among others and thus, at a stroke, Galen became in effect a naturalized Arab author. The Arabic language was enlarged by the creation of a new technical vocabulary to accomodate the recently arrived "Jalinus." Biruni's translations, on the other hand, were for his own personal enlightenment and use. They never became public property in the way Hunayn's had, and the authors thus translated never ceased being alien presences that could now indeed be inspected, but only through the eyes and intelligence of Biruni. Hunayn, once he had translated, stood aside; Biruni's authorities remain embalmed in the India.

There is something of a paradox here. Biruni is admired precisely because he was not a translator, that he was not engaged in the business of assimilating things Indian into the intellectual tradition of Islam but in trying to understand them in their original contect, that he was functioning in short, as a historian. But here too Biruni's treatment of India differs markedly from what had been done to the Greeks by his predecessors. "Jalinus" had indeed become a naturalized Arab author, but there was little or no understanding of Galen as a physician of the Roman Empire or of Plato as a philosopher in fourth century Athens. Islam produced many successful translations of Greek authors but no real history of Greek civilization.

Although historians like Mas'udi did have some vague and unrealized sense of the general political structure of the Greco-Roman oikoumene, and perhaps even a greater sense of it than Biruni had of Indian political history, what they lacked and what Biruni possessed was a knowledge of the rich religious and cultural background against which both the deeds of the rulers and the work of the scientists and philosophers could be read. For all their immense learning in Aristotle, for example, the Muslim philosophers stood disarmed before the mysteries of his Poetics, the one work of his that demanded some understanding of the Hellenic paideia. Their ignorance of Homer and Sophocles simply defeated them; Biruni suffered no such defeats.

If it is the glory of Biruni that he approached India with the sensibilities of the historian, the work before us gives no sign of having been conceived in accordance with what his contemporaries understood as history. In its narrow sense ta'rikh is an era-work, and earlier in his career Biruni had given obvious evidence that he could deal with history in the sense of "eras" (tawarikh). His Chronology of Ancient Nations, as the work is called in its familiar English translation, is in fact the most sophisticated work of its kind in Arabic. Biruni had no peer in this critical investigation of widely varying





traditions against a complex mathematical and astronomical background that rendered them all comparable.

Ta'rikh meant more than the study of eras, of course; it was also used of works that took an established chronological line and arranged along it the historical narratives (akhbar) of a people, a dynasty or a ruler. Biruni wrote two such (ta'rikh)
works, the annals of Mahmud and his father* and a book of "conversation" on the history (akhbar) of his native Khwarazm.** Neither work has survived, but nothing we know about them suggests an affiliation with the India. Nor is there much visible ressemblance between the India and the classical "annals" of Islam, the ta'rikh of Tabari, for example. Biruni neither belonged to nor aspired to belong to the muhaddith tradition in history; the world of isnads, where authority rested upon names rather than upon demonstrative proofs, was alien to him.

It is perhaps more pertinent to compare Biruni with Mas'udi. The Golden Meadows, an encyclopedic world history whose seventh chapter is given over to India, was written some twenty years before Biruni's birth, and despite its obviously wider scope, it was set down in somewhat the same spirit as the India. Mas'udi had been to Sind, where he must have collected historical information, knew the earlier Arabic translations of some Sanskrit works, and had the help of Muslim predecessors like the geographer-

* No. 150 of Dr. Ahmed Saeed Khan's bibliography.

** Ibid. No. 160.

historian Ya'qubi, the travel editor Abu Zayd al-Sirafi and two early heresiographers, the Mu'tazilite Abu al-Qasim al-Balkhi* and the Shi'ite al-Hasan ibn Musa al-Nawbakhti,** who supplied him with information on the sects of India.

In his seventh chapter Mas'udi does attempt to follow a rough chronological line, as he does in the Meadows as a whole, and weaves into it information on geography, political history and institutions, manners and religious customs, religious and philosophical theories. But here as elsewhere it is often impossible to tell where Mas'udi is giving oral traditions and where he is simply incorporating large blocks of material from his Muslim authorities.

Even if expanded to the scale of Biruni's work, Chapter Seven of the Golden Meadows is not the prototype of the India. Biruni obviously cared a great deal about chronology, but he was not very concerned to organize his material along a chronological line in the India. He too could write summaries of Indian political history (II,10-14), and in a clearer and more interesting way than Mas'udi. But that is not his method, which is to quote from the Sanskrit material itself. The quotes are not verbatim,to be sure, since many of the originals were in verse (as his own translations of Euclid and Ptolemy into Sanskrit had to be!), and Biruni complains more than once how difficult this rendered their understanding (I, 37). The reader is

* Sezgin, GAS I, 622-623.

** Ibid. I, 539-540.





brought, in any event, face to face with the Hindu scholars and theolgians themselves, something that never occurs in the Golden Meadows.

In his introduction (1, 5-8) Biruni explains the genesis of the India. It arose from a complaint about the Muslim heresiographies that purported to give an exact description of creeds and sects but fell far short of that ideal. The information available on Hinduism was a case in point; reports on it were generally uncritical and so unreliable. Biruni mentions the example of Iranshahri, an author who has excellent material on the Jews, Christians and particularly the Manichaeans but who, when he came to speak of Hinduism and Buddhism, relied on an inferior source. The outcome of this discussion was that Biruni was himself prevailed upon "to write down what I know about the Hindus as a help to those who want to discuss religious questions with them and as a repertory of information for those who want to associate with them."

We know little of what to make of this enigmatic reference to Iranshahri. Biruni wrote the India sometime about 1032, nearly half a century after the Catalogue of Ibn al-Nadim, seventy-five years after the Golden Meadows and considerably later than the sources of those two works. Both works, and the sources upon which they rested, Abu al-Qasim and Nawbakhti for Mas'udi and an anonymous author of the time of Harun in the case of Ibn al-Nadim, provided material

on the beliefs and practices of the Hindus, all of which Biruni either did not know or ignored in favor of Iranshahri, an author who, like another of Biruni's favorite authorities, Muhammad ibn Zakariya al-Razi, was scarcely a Muslim at all.

The India appears, in any event, to have a dual purpose, to provide an appropriate and accurate description of Hinduism for those who wished to engage in religious discussions as well as some broader information for those Muslims who were going to "associate" with them in some not very specific context. It is difficult to think of the India as a handbook for Ghaznavid administratoss. It does discuss Hindu marriage customs for example (I, 107-110), though hardly for disinterested motives. They have been set down, Biruni explains at their conclusion, so that the reader may learn "how much superior are the institutions of Islam and how much more plainly this contrast brings out all their customs and usages, differing from those of Islam, in their essential foulness."

A glance at the contents of the India suggests that Biruni had a quite different audience in mind, men who would read what he had written in libraries and majalis, scholars rather than adminstrators or tourists. What elements of Indian culture had been or likely would be of interest to the scholar rested with Biruni of course, and not unnaturally





he chose to focus the India at the center of his own interest, the mathematical quadrivium and particularly the astronomical sciences.

The India is to be then, if we have understood Biruni's purpose correctly, part heresiography and part scientific handbook. And it is to be written, Biruni continues (I,7), not from a polemical point of view but as a "simple historical record of facts." The only embellishment he will permit himself is a comparison with similar theories of the Greeks or with those of the Sufis or one another of the Christian sects that bear a marked ressemblance to Hinduism.

At first sight this appears strange, that he should compare Hinduism with Greek culture rather than with his own creed of Islam. But given Biruni's view of truth and falsehood, no other course is possible. Hinduism and Hellenism are comparable not because they borrowed from each other, as is true in the case of Manichaeism (I, 54, 381), but because heathenism does not suffer essential distinctions: it is one with itself in its deviation from the truth (I, 24). And that is also the reason that Islam and Hinduism are not, strictly speaking, comparable: the first is the truth of monotheism and the latter is the falsehood of idolotry.

If the Greeks and the Hindus are comparable in their errors, they are by no means identical. They differ along another line of tension that Biruni can trace in the history of culture and religion, that between the enlightened elite and the cruelly ignorant masses. Biruni underlines that distinction more than once in the India, but he does not dwell upon its logical consequence: truth, or monotheism, is also one and it can be achieved not only by revelation, as it was in Islam and originally in Judaism and Christianity, but also by the intellectual mujtahid already familiar from the writings of Razi, the philosopher. The Greeks provide the critical example (I, 24-25). There arose among them a class of enlightened philosophers who fought free from the innate idolotry of the masses to an understanding of the truth. Witness Socrates who attempted to educate the Athenian masses away from idolotry and was put to death by them for his pains.

The efforts of the Greek philosophers were only partially successful (I, 8), but they accomplished far more than their fellows in India. Here too there were philosopher-scientists, and if one looks into their theological writings, one can detect there the truth of monotheism (I, 27). But as soon as one turns from the to the beliefs of the common people, one is confronted once again with the same "hideous fictions" (I, 32) that one can see in the popular mythology of the Greeks, in the perversions that have





taken over in Judaism, Christianity, Manichaeism (I,111) and even, Biruni concedes, in Islam itself which is not immune to ignorance and distortion (I, 32).

The distinction between the enlightened elite and the ignorant masses is common to all cultures (I, 27). The first are the men of science who are characterized by their understanding of the truth in terms of general principles, while the "wisdom" of the masses is expressed in derived, secondary forms, mythology and anthropomorphism. This was, of course, a commonplace in the Greek philosophical tradition which in its later stages was densely populated by Platonizing mathematicians, and when Biruni takes up the question in extenso in Chapter Three of the India, the Platonic testimonia are put on full and obvious display. But even though the distinction is a universal one and there were examples in abundance that could be drawn from among the falasifah and Sufis in Islam, India presents a special case in Biruni's eyes. India too had its philosopher-scientists and had made, in addition, large drafts upon the Greek scientific tradition. Why then were their efforts less successful than those of the Greeks?

Biruni was a believer in the contagious quality of the truth. As one who had learned his own science from the Greeks, he could hardly have been otherwise. And why else would he have translated Euclid and Ptolemy into Sanskrit (I, 137)? Some at least of the Brahmins were privy to the

truth, whether through their own efforts or because they learned it from the Greeks. But it could not be sustained, and what one observes in India is often the very reverse of Biruni's most convenient and visible criterion of the truth, the customs and practices current in Islam (I, 17).

One of Biruni's distant Greek predecessors, Herodotus, was likewise troubled by the disparity of customs between the Egyptians and his Greek countrymen (Histories II, 35-36). But Herodotus had neither monotheism nor Platonism to serve as his guide to the truth. He was, rather, a naturalist (physikos) who conducted his "inquiries" (historiai) out of the conviction that nature, the internal principle of things, could be made to yield an understanding of cultural differences between peoples. For Herodotus nature governed the growth not only of inanimate things but of the deeds of men, their history and customs. The Nile behaves differently from all other rivers and so, in consequence, do the Egyptians vis à vis other peoples. To find the key to an understanding of the Nile in the workings of nature is to unlock the mysteries of the Egyptians' behavior.

Biruni too believed in nature as a force with power and purpose, and in the Chronology he invokes it to explain what might appear to be physical prodigies, animals with supernumerary or defective organs (Chronology, 92-93). But nature is not used in the India as an analytical tool for





the understanding of Indian customs or why they differ in such an obvious fashion from the Muslims' (I, 179-185). Nor does he invoke another explanation that lay ready to hand. At least since the time of Ptolemy's Tetrabiblos some astrologers had sought to explain regional and ethnic differences by resort to the astral influences predominant over the various climata of the earth. Book Two of the Tetrabiblos is filled with such ethnographic astrology, and Biruni, who knew and cited the Arabic Tetrabiblos, set out in the Elements of Astrology his own detailed version of the association of the planets and zodiacal signs with the various climes (Elements, 242), moral behavior (ibid.,251) and even religions (ibid. 253), though Hinduism does not appear in this latter distribution. In the India, however, which must have been composed about the same time as the Elements, Biruni is silent on this possibility.

In setting aside the planetary explanation of cultural differences Biruni may have been expressing his well known reserve on the efficacy and limits of astrology (Elements, 210, 332). But his motive in not seeking for a natural explanation in the manner of Herodotus may have been the result of a deeper scientific agnosticism. Natural peculiarities doubtless rest in the essential elements of things, but to trace their causes is to return to the very act

of creation, a patent impossibility (Chronology, 235). In an experiment that once again reminds one of Herodotus (cf. Histories II, 2-3), Biruni proved to his own satisfaction that Hindu behavioral patterns are not acquired but innate: Hindu boy slaves, who are captured before they can be taught to act in a certain fashion, inevitably do things in a manner almost exactly opposite to the ways of the Muslims (I, 185).

The Hindus could perhaps have cured their perversity and ignorance by contact with the science of Greece or the revealed truth of Islam, but their pride and xenophobia hampered their understanding of the first (I,23, where Biruni cites his own experience as evidence), while political hostility had damaged relations with the latter (I, 21-22). The price was a considerable one. The Hindu scholar had to conspire in error and conceal from the masses his own discovery of the truth; he told them what they wanted to hear (I, 264-5, 273, 393). And the results were plain to see. Greek learning was based upon independent research and the strict deductive method that is the hallmark of true science (Chronology, 61), while the Brahmins' version relied upon tradition and taqlid or else resorted to divine inspiration. Hindu science was filled with silly and erroneous notions, a mixture of pearls and dung, as Biruni calls it (I, 25).

Biruni was not unsympathetic with the problems posed by





the conflict between religious beliefs, which in the Hindu case were dictated by popular ignorance, and the findings of science. He muses long over the case of Brahmagupta (II, 110-113) who opened his discussion of eclipses in his Brahmasiddhanta with an affirmation of the Brahmins' mythological explanation of the phenomenon. It must be thus, says Brahmagupta, because the Veda, which is the word of God from the mouth of Brahman, says so, and the generality of people agree. To deny it, as some Indian scholars had done, and to suggest that eclipses have natural astronomical causes is the rankest heresy. In Biruni's view Brahmagupta knew perfectly well the causes of eclipses, just as Varamihira did; but while the latter scholar rejected the mythological account in the name of science, Brahmagupta preferred the Vedas and rejected the naturalistic account as heresy. The reason, Biruni suggests, was fear: it is not everyone who has the courage of a Socrates.

Biruni himself may well be acquitted of the scientific sins of Brahmagupta; if he has failings, they fall elsewhere. Biruni was perhaps too engaged a scientist to be a totally satisfactory historian. As history the India sinks beneath the combined weight of the Hellenic quadrivium and the author's avowed intent of writing a kind of Hindu heresiography. We are given a full and graphic account of Hindu beliefs and practices, and in

the Hindus' own terms. It is an extraordinary achievement, this scientific heresiography, but the price was exacted from India's other sects and creeds. Biruni argued cogently and well for the important connection between Hindu religious beliefs and the surrounding body of Indian science. But once having brought us to this path, he gives free rein to his own interests. A few pages on the Vedas (I,125-130) is followed by a detailed chapter on Sanskrit metrics (I, 135-151). It is difficult to argue that for Biruni metrics revealed more of the essence of Indian culture than did the Vedas; what is far more likely is that the metrical problems interested and challenged him while the Vedas did not.

Biruni is unmistakably a literary historian, that is, he got his considerable knowledge of India from literary sources. His grappling with the sacred and profane scriptures in Sanskrit is remarkable and an obvious advance over Mas'ud's and Ibn al-Nadim's reliance on secondary authorities. But Biruni's concentration on texts effectively excluded the oral traditions where, presumably, the akhbar of India's political history were transmitted. And though there are some perceptive remarks on descriptive geography in the India (I, 196-212), Biruni took his principal pleasure in mathematical geography in the manner of his master Ptolemy. The wild variety of Indian ethnography, which demanded a Herodotus or a Tacitus, is passed over in silence. Biruni was obviously more concerned with establishing the coordinates of Indian cities than in describing the life that went on within them.

"It is man's nature to count," says Biruni in the India ( I, 160), and the central core of that work, Chapters XIV-LXII, testify to how well Biruni could do his sums and emend the counting of others. But fortunately for us he regarded himself as something more than a zoon mathematicum, and the India verifies another wiser aphorism from one of Biruni's authorities. Aristotle in his Metaphysics had remarked that "all men by nature desire to know," and it was in the grip of that truth that Biruni not only counted but learned Sanskrit, read the Puranas and labored to interpret the culture of India to the world of Islam.

---