REVIEW ARTICLE

ISLAM AND SCIENCE

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"After all, it was by no means clear that Europe was 'superior' to Islam until the Ottomans were held off from taking Vienna in 1683. This

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was one of the first skirmishes in which the 'scientific' understanding of ballistics revealed its practical benefits". (Steve Fuller, "Does Science Put an End to History or History to Science"? in Ross, Science Wars, 39.) This, in a nutshell, is why the stakes are so high in the debate over the nature and claims of science and in its sub-debates over the relationship between science and Islam. It was the Scientific Revolution in the Christian West and Europe's subsequent harnessing of scientific technology for military and economic use that allowed the West to dominate the world in the twentieth century. Modern Western science is thus the most successful and prestigious intellectual enterprise in the contemporary world. This unquestionably European intellectual triumph raises a whole range of questions about modern and pre-modern Islam: Why a Scientific Revolution did not take place in the Islamic world, what should be the proper attitude of Muslims towards modern science, and how modern science should be treated in contemporary Islamic thought?

In the 1980s science emerged as a major intellectual issue in both Western scholarship — the so-called "science wars" — and the debates among Muslims about the place of Islam in the modern world. In addition, Islam is a major issue in the historiography of the origins of modern science and the Scientific Revolution. The books that I am reviewing here all deal in one way or another with the question of Islam and science. Since the arguments about the origins of modern science provide a background to the more recent debates about the epistemological status of modern science, I will discuss the historical debates first, then discuss the "Science Wars" as they apply to Islam, and finally discuss the Islamic debates about the proper relationship between Islam and science. I will conclude by discussing what I think is the significance of the science debates for contemporary Muslims.

**ISLAM AND THE SCIENTIFIC REVOLUTION**

In the two centuries between 1500 and 1700 science changed fundamentally in Western Europe. After that, science and its sister, technology, made solid and increasingly rapid progress and became the basis of the power of the West. This event is known as the Scientific Revolution, with capital letters. No similar event happened elsewhere. But what was the nature of the change in science and of the Scientific Revolution? And why did this event not happen in the Islamic world, which had an older scientific tradition and greater economic resources at least in the sixteenth century? These turn out to be difficult questions. H. Floris Cohen in *The Scientific Revolution: A Historiographical Inquiry* surveys the answers that have been offered.
Cohen is a historian and museum curator who became interested in the origins of the phenomenon of worldwide westernization and decided that the key element in the triumph of the West was modern science, that is to say, the science that emerged after 1500. When he sought to investigate the matter further, he found that the mainstream historical literature virtually ignored the Scientific Revolution and that the specialized literature on the history of science was full of vigorous and interesting debates, generally conducted in ignorance of each other. So as a conscientious curator he set out to collect and summarize these various debates. The story is fascinating and ought to be known to anyone interested in the history of science and its place in the modern world.

For Cohen the great questions are: first, what was new in the Scientific Revolution; second, how did it happen; third, why did it happen; and, fourth, why did it not happen elsewhere; for our purposes, why did it not happen in Islam? He surveys literature published through 1990. Cohen's account, itself the summary of hundreds of books and articles, is far too complex to summarize here except in the broadest terms. It is most natural to try to explain the Scientific Revolution as a change in the modes and techniques of scientific thought. But what sort of change? The use of mathematics and experiment, we might once have said, and the rejection of the inherited authority of Aristotle and religion and the superstitions of the Middle Ages. Yet more careful studies have shown that the mathematical sciences, physics and astronomy especially did not use experiments in the way we would have expected whereas the early modern sciences that did use experiment extensively, chemistry and medicine, for example, made little use of mathematics. Aristotelian concepts were critical in early modern physics, and Aristotelian concepts linger in some corners of biology to this day. Finally, some of the heroes of early modern science, Bruno and Newton, for example, turn out to have been heavily influenced by the occult sciences.

Islam enters this debate through two other questions: Did the Scientific Revolution really mark a discontinuity in European science, and what were the causes that led to its occurrence? In 1913 Pierre Duhem proposed that early modern science was a natural evolution from the science practiced in the medieval European universities. In his *Planets, Stars, and Orbs*, Edward Grant surveys the thought of more than fifty medieval European philosopher-scientists on the structure of the cosmos, part of the discipline known as natural philosophy. This cosmological speculation was based on Aristotle and was almost entirely theoretical, with little use of mathematics or experiment. Nonetheless, it was a tradition of intense scientific speculation, and it had been taught to European university students for four centuries. Grant's hundreds of pages
of careful summaries of these long forgotten debates on the physical nature of the universe are sufficient evidence that the Scientific Revolution emerged from soil long prepared. In his *Foundations of Modern Science in the Middle Ages* Grant goes on to argue that this tradition of natural philosophy was the essential pre-condition of the emergence of modern science in the sixteenth and seventeenth centuries. In particular, both Grant and Huff, in his *Rise of Early Modern Science*, argue that it was the European university that made modern science possible. Not only was natural philosophy a central part of the university curriculum, but the university also provided an autonomous realm within which scientific issues could be debated and judged by a body of independent experts. Moreover, the institutional structure of the university separated natural philosophy from theology, allowing the young masters of arts who taught most of the courses in natural philosophy to speculate on the nature of the universe with little interference from theologians.

Islamic science is the test of this medievalist theory of the emergence of modern science. Medieval Islam and medieval Europe were nearly identical civilizations, as a comparison with the quite different civilizations of China and India shows. They worshipped the same one God, learned science from the same Greek books, and emerged from the same Graeco-Roman-Semitic world of the Mediterranean. They differed mainly in the fact that the Islamic world was more advanced, richer, and freer. In science Muslims had a four hundred year headstart and remained ahead of Europe in most major disciplines until the end of the Middle Ages. So why did the Scientific Revolution happen in Europe? A number of theories have been proposed to account for this fact. Cohen records three: extensive destruction due to barbarian invasions that sapped the cultural resources of Islam, a general failure of science to engage the interests and commitment of Muslim intellectuals, and a failure to reconcile science and Islam. Huff and Grant argue that a combination of ideological and institutional factors tended to suppress Islamic science. Grant concedes that the rise of modern science was inconceivable without the scientific resources, Greek and Islamic, that passed to medieval Europe through translations from Arabic. Huff, and in less detail Grant, argue that the medieval European university with its corporate status, standardized curriculum, and degree-granting powers provided a unique combination of structure and independence. In Islam, they claim, science had no place in the *madrasah* curriculum, and there were no autonomous corporate bodies to standardize curricula and degree requirements. Most serious of all, they argue that Islam was hostile to science and philosophy in a way that Christianity, which was born and matured within the Graeco-Roman intellectual world, was not.
I have my doubts. The problem with most of the discussions of Islam and the Scientific Revolution is that they have been conducted by historians of medieval European science dependent on a very narrow range of Islamic sources. In this they have not been much aided by historians of Islamic science, who have been overwhelmed by the number of unread and unedited medieval Islamic scientific texts and who have been understandably reluctant to generalize about the larger questions of the role of science in Islamic civilization and the causes of its ultimate failure.

Rashed's *Encyclopedia of the History of Arabic Sciences* provides a good example of the strengths and weaknesses of the current scholarship on Islamic science. ("Arabic sciences", says the editor, refers to "science written in Arabic, in the sense that one speaks of Greek science or Latin science", a usage that is defensible but with which I would differ on the grounds that it downplays the civilizational aspects and tends to encourage an Arab-centred view of Islamic history.) The work is a synthesis of scholarship on Islamic science from about 1950 to 1990. Its goal, as Rashed defines it, is (1a) to give an understanding of the history of classical science as expressed in the Islamic science of the 9th through 16th centuries, and (2a) to contribute to the general understanding of Islamic culture. The larger relevance of the project is (2a) to demonstrate the nature and importance of the links between Islamic science and European science of the 12th through 17th centuries and (2b) to test larger ideas about the history of science, such as that of a seventh century scientific "renaissance". The work consists of thirty-one articles by various authors, most devoted to a particular science. Thus, in contrast to most earlier attempts to write the history of Islamic science, the approach is not biographical but topical and centres on the content of the disciplines. The first volume deals with astronomy, the second with mathematics, including sciences like optics and statics, and the third with technology, alchemy, and life sciences. The coverage is somewhat uneven, as the editor admits, due to the lack of experts in certain areas. Still, the very short place given to medicine and alchemy and the lack of articles on the occult sciences and military technology is startling. In general, treatment of science is stronger than the treatment of technology and applied science.

The strength of the volumes is in their exposition about what is known about various Islamic sciences. There are summaries of major books, and the mathematical articles bristle with equations. There are many diagrams, though very few reproductions of miniatures or photographs of scientific instruments. Occasionally, articles are little more than lists of books — Georges Anawati's article on alchemy, for example.
— but in general the reader can find a good introduction to what the Muslim practitioners of the various sciences in the Middle Ages knew and could do, with a stress on the things they got right. Articles on the influence of Islamic science on European science are strong and systematic.

The editors have thus fulfilled promises (1a) and (2a) as much as can reasonably be expected, given the state of current scholarship. It is in the other promises — (1b) to contribute to the understanding of Islamic culture and (2b) to test larger ideas about the history of science — that the work is weak. For the most part, the articles do not ask or answer questions about the place of the various sciences in Islamic civilization, and the reader not specifically interested in that science is left to ask: "So they were very clever, but so what?" For example, Rashed's own detailed article on Islamic algebra says only a few words about the practical uses to which algebra was put and says nothing about why the books were written, who used them, who taught them and to whom, and, in general, what the cultural significance of this branch of mathematics was. This weakness is built into the structure of the book. The index contains no entries on patronage, courts, education, or curriculum. The only systematic discussion of the place of science in Islamic civilization comes in the next-to-last chapter, Françoise Micheau, "The Scientific Institutions of the Medieval Near East", which touches on the social role of science. We would like to know much more about who did science, why, who wanted to read about it, who paid for it, how it was taught, and what the scientific institutions were like. The only articles to do systematic justice to the place of their sciences in society are those of André Miquel on geography and Emilie Savage-Smith on medicine.

The intellectual context of Islamic science is also neglected. There is little discussion of the relation between Islamic philosophy and science, or between Islamic philosophers and Islamic scientists, often the same people. There is no discussion of the relation between science and religion — there are no index entries for religion or Islam either — and nothing about religious critiques of science, medieval or modern. Apart from the rather specific articles on the transmission of Islamic science to medieval Europe and its influence on specific scientists, there is little or no discussion of larger issues such as are discussed in the other works reviewed here and seemingly little awareness that the history of Islamic science has any relevance to the great debates about the emergence of modern science — no index entries on the Scientific Revolution or historiography—. The problem is made worse by the fact that the book stops at about the year 1500 (for astronomy, the science studied in most detail; other articles end earlier, and the article on the classification of
sciences traces its subject only as far as Avicenna.) There is no discussion on the arrival of modern science in the Islamic world, which surely would have raised many theoretical questions, nor any discussion on the place of science in the madrasahs in the later centuries, where mathematics and astronomy were routinely taught. Finally, the question of the "decline" of Islamic science is neither raised nor answered. As I said, most of the scholarship on Islamic science is not much help to the students of medieval European science struggling to find out why science in the Islamic world failed to accomplish what European science did. Huff and Grant lay stress on a set of well-known texts, especially Ghazâlî's Deliverer from Error, in which Muslim theologians condemn science and philosophy. It seems to me, however, that there were other factors that encouraged science in Islam: the patronage of science by the Islamic royal courts, the general indifference of Muslims to the kind of doctrinal issues that so disturbed Christendom, the willingness of Muslims to tolerate diversity of various kinds, and the very long period, at least eight centuries, in which science was creatively practiced in Islam. Had the Scientific Revolution occurred in Islam, we would have ample factors to explain it. On the other hand, I think that the growing interest of Islamic philosophers in mysticism after the twelfth century was a factor drawing them away from physical science. While European philosophers decided that the answers to the great questions concerning the nature of the universe were best solved through mathematics and science, their Muslim counterparts looked to mystical intuition. Also, it is clear that printing played a major role in the Scientific Revolution, but printing did not become established in the Islamic world until the nineteenth century. Just as in Europe, there were factors encouraging and discouraging science in the Islamic world.

I think that the explanation of the Scientific Revolution is to be sought in special factors in Europe, particularly the extraordinary prominence of natural philosophy in the curriculum of the late medieval universities, and not in some supposed defects of Islamic civilization, but the matter deserves much more thorough study by scholars of Islamic civilization.

THE SCIENCE WARS

The "Science Wars" are a debate in Western scholarship about the nature and authority of modern science. They are, or ought to be, of interest to Muslim intellectuals because they raise many of the same issues as the debates about the Islamization of knowledge. Conversely, "Islamic science" ought to be of interest to the combatants in the Science Wars because the Islamization of knowledge movement has done what the
practitioners of science studies have often tried to do, i.e. dethrone the absolute authority of modern science. There are cautionary lessons to be learned on both sides.

Science studies, although its practitioners come from a variety of disciplines, is basically a form of the well-established academic discipline of the history and philosophy of science. What sets it apart is that its practitioners come from a wide variety of disciplines — political science, sociology, and literary criticism among others — and that they tend to question the authority of science in a way that more traditional historians of science and scientists themselves consider unacceptable. Politically it is associated with the Left, and it is closely linked with the collection of intellectual movements known as Postmodernism.

Science studies started with two reasonable questions: Why should science be given the epistemological authority that it claims, and how does science actually work in a social context? Both questions were motivated by the obvious fact that science in the post-war period was an important factor in social and political life and therefore the claim of scientists to be working in abstracted isolation from real life could not be accepted. Scientists, in short, had built the atomic bomb and transformed society, and therefore they needed to answer for the consequences to the society as a whole and to other intellectuals. The science studies theorists have argued that science is "socially constructed", a claim that is responsible for most of the opposition to the movement from scientists. At its most extreme the debate is between the "scientific realists", those who hold that science gives us progressive access to the real entities making up nature, and the science studies theorists who hold a strong form of the social construction thesis, asserting that science is no more than the myth of Western rationalist scientists and that other forms of knowledge — the humanities, non-Western traditional sciences, the occult sciences of the New Age movement, and even Christian fundamentalist Creation Science — have an equal claim to be taken seriously.

In their extreme forms both theses are nonsense: certainly there is much human happenstance in how modern science came to be, and there certainly is knowledge not yet incorporated into the body of modern science. Indeed, there probably are forms of knowledge that cannot be made scientific. On the other hand, science is different from other forms of knowledge in the sense that reliable technology can be based on it as Richard Dawkins, an opponent of science studies, put it. "Show me a cultural relativist at thirty thousand feet and I will show you a hypocrite. Airplanes built according to scientific principles work". (Cited in Science Wars, 92.)
While Muslims will find much to sympathize with in the criticisms made by the practitioners of science studies, they should also take warning from a notorious incident associated with Ross' *Science Wars*. The book originated as a special issue of the journal, *Social Text*. One article from that issue does not appear in the book: Alan Sokal on the social construction of quantum gravity. Sokal is a physicist with impeccable leftist credentials who had taken alarm at what he considered poor scholarship in science studies. To show that the field did not have sound intellectual standards, he submitted a nonsense article — gravity is certainly not socially constructed — couched in all the fashionable jargon and citing the fashionable theorists. It was published without question. The day the journal appeared, Sokal held a press conference announcing the hoax, setting off a debate that reached the front pages of American newspapers and did much to damage the credibility of science studies.

**SCIENCE AND THE ISLAMIZATION OF KNOWLEDGE**

The Science Wars have their echoes in Islam. Almost as soon as the Europeans began to assert hegemony over the Islamic world, the Muslims realized that European science was a critical ingredient of Western power. The Middle Eastern reformers of the nineteenth century popularized contemporary Western scientific ideas in their newspapers and magazines. The new educational systems stressed Western science and technology, and French-style polytechnics were the first modern institutions of higher education sponsored by Middle Eastern governments. All the serious debates about the predicament of Islam addressed the question of the attitude of Islam towards Western science and why it was not the Muslims who invented modern science. Grant and Huff have argued that there were things wrong in medieval Islam that prevented modern science from emerging in the Islamic world: unfavourable institutional settings and religious hostility towards independent rational investigation of nature. The two remaining books under review — Hoodbhoy's *Islam and Science* and Stenberg's *Islamization of Knowledge* — provide a variety of responses to the problem of Islam and science.

Hoodbhoy, a distinguished Pakistani physicist, has written an uneven, angry, and powerful book. His targets for the most part are the crudest contemporary Islamic responses to modern science. He argues that by any concrete measure the level of scientific knowledge and technical achievement in the Islamic world is appallingly low. The Muslims publish few scientific articles. Their countries mostly export raw materials to non-Muslim countries and import machinery and finished products. He cites studies showing that Pakistani 11th class students are inferior to Japanese 6th class students in their understanding of science, and that American
secondary school students had a better understanding of science than Pakistani science teachers. Comparisons with India show that this substandard level of scientific achievements is not simply a matter of underdevelopment. Hoodbhoy's account of how this came to be is not particularly good, a simplistic account of how science thrived in medieval Islam until it was suppressed by the orthodox; but as a Muslim scientist working in a leading Islamic country his view of the state of science among contemporary Muslims ought to give pause to thoughtful Muslim readers. An added poignancy is given by the book's foreword, written by the Nobel Prize winning Pakistani physicist, Abdus Salam.

Hoodbhoy's special scorn is reserved for the notions of "Islamic science" and the "Islamization of knowledge", ideas that he saw applied in Pakistan in the 1980s. After the coup that brought him to power in 1977, General Zia paid off his Islamic political allies by implementing a programme of Islamization of society, and particularly of education. The results in Hoodbhoy's view were disastrous for Pakistani science.

He concludes his book with an hilarious appendix entitled "And They Call It Islamic Science". It is mainly devoted to the doings at the 1987 International Conference on the Scientific Miracles of the Qur'an and Sunnah, co-sponsored by the International Islamic University in Islamabad and the Organization of Scientific Miracles in Makkah. The conference represented the most simplistic attempt to reconcile Islam and modern science, the assertion that the facts and laws of modern science are stated or presumed in the Qur'an and the Hadīth. The results are much like those of the so-called "creation science" expounded by American Christian fundamentalists — and not all that different from Sokal's quantum gravity hoax —. The conference featured papers doing such improbable intellectual exercises as accounting for the Prophet's mi'rāj through Einstein's theory of relativity, determining the chemical composition of the jinn, and calculating the angle of God. Participants calculated the numerical values of the hypocrisy of various Western countries (Western society as a whole has a value of 22, and Spain and Portugal 14) and the reward earned by praying in congregation. A senior director of the Pakistani atomic energy agency accounted for the soul's survival after death by analogy with the passage of electricity through a wire. Hoodbhoy lays the blame for the propagation of this nonsense at the feet of cynical politicians, ambitious charlatans, and — let us be charitable — sincere but credulous believers. This would simply be amusing were it not for the fact that it drained limited resources away from real science and scientific education in countries that are desperately poor and that can hardly afford to waste money and intelligence on barren enterprises.
A less polemical and more scholarly account of contemporary "Islamic science" is Stenberg's *Islamization of Science*. The book deals with four major positions: Ziauddin Sardar and the Ijmalis, Seyyed Hossein Nasr's sacred science, Ismail Raji al-Faruqi and his programme of Islamization of knowledge, and Maurice Bucaille's attempts to find modern science in the Qur'ān. Stenberg has gone through stacks of literature on Islam and science, carefully analyzing these four major positions and their interrelationships. The result is a thorough survey of the most influential attempts to give an Islamic response to the intellectual influence of modern science and to appropriate its prestige for Islam.

The simplest position is that of Bucaille, a French physician who presumably converted to Islam. He argues that the Qur'ān can be shown to reflect an accurate knowledge of scientific facts that were not known in the time of Muhammad, whereas the Bible shows no such awareness. Bucaille's position is not very sophisticated, relying on an out of context and often strained reading of certain Qur'ānic verses. Nonetheless, Bucaille has had considerable influence in the Islamic world since he is an attractive writer and provides an example of a Westerner acknowledging the intellectual pre-eminence of the Qur'ān.

The Ijmalis and the Islamization of knowledge movement are rather similar attempts to reconstruct Islam. Significantly, both movements are based in the West and led by Western educated Muslim intellectuals. In both cases the fundamental premise is that Islam provides the perfect and all-encompassing system for the government of human life and thought. Therefore, science must necessarily be remade within an Islamic system. The textual inspiration for both movements is the Qur'ān itself, read largely without reference to traditional Islamic scholarship. Indeed the `ulamā', and their sciences are much criticized. The life of the West, social and intellectual, is seen as fragmented and degenerating. Life and science must be brought back into wholeness. The historical ideal is either Madinah in the Prophet's time or the high classical age of Islam. (Classical Islamic science of the age of Ibn Sīnā and al-Bīrūnī is cited as an ideal by Nasr, Abdus Salam, and Hoodbhoy, as well.) As Stenberg points out, the pattern in the writings produced in these two movements is to contrast a highly idealized Islam and Islamic science with actual and inevitably imperfect Western life and science — obviously much to the disadvantage of the latter—.

Seyyed Hossein Nasr is engaged in a rather different enterprise, an Islamic version of the perennialist philosophy. Unlike the other three groups, Nasr is a traditional Islamic philosopher, a Shiʿite, and a Sufi. Like the Ijmalis and the Islamization of knowledge proponents, Nasr sees modern intellectual life as fragmented, but he seeks to reunite it under a
"traditionalist" philosophy, really a form of the Islamic neoplatonism of Suhrāwardī, Mullā Ṣadrā, and other Iranian philosophers. His commitment is as much to the Greek tradition as it is to Islam, and thus he has sometimes been criticized as un-Islamic and "gnostic" by others writing on Islam and science. His Sufism and Shi’ism also come in for criticism by other writers on Islam and science. Whereas the other authors discussed by Stenberg tend to resemble the fundamentalist Protestant critics of science, Nasr more closely resembles certain Catholic thinkers.

All of the writers discussed by Stenberg are attempting to break the monopoly of the ‘ulamā’ on the interpretation of Islam; Nasr by asserting the primacy of philosophy and mysticism and the rest by a decidedly Protestant appeal to the direct and unmediated authority of the Holy Book. Almost all of these writers live in the West, and the rest were educated there or live in areas like Malaysia on the fringes of the Islamic world.

What then are we to make of these attempts to deal with modern Western science from an Islamic point of view? The most striking common feature is the extraordinary deference given to science, and by extension to the West. After all, there is no particular reason why science should be an Islamic problem or of any particular relevance to religion. Hoodbhoy and Abdus Salam think that science and religion are independent enterprises, an opinion implicitly shared by the traditional ‘ulamā’, who mostly ignore science. Obviously, the motive for bringing science within the realm of Islam is to appropriate the enormous prestige of science, whether in the simplistic way of Bucaille and the participants in the Scientific Miracles of the Qurān and Sunnah conferences or in the more sophisticated philosophy of Nasr and the cultural critiques of the Ijmalis and the Islamization of knowledge movement. While all these writers have gained some support in the Islamic world, they have had no success in convincing the West that Islam has some unique connection to science. The only exception has been Nasr, who has had some philosophical influence in the West as an articulate spokesman for a philosophical mysticism whose appeal and influence transcends Islam.

Intellectually, the biggest problem with all of the proposals for the Islamization of science is ignorance of the nature of modern science as it is actually practiced, ignorance or idealization of the facts of Islamic history, and indifference to the Islamic intellectual tradition. Obviously, Muslims can do science and have done so successfully in many times and places, but they have done so as part of a super-religious scientific tradition. A perfectly reasonable Islamic theological argument can be made that Islam encourages the pursuit of science; Ibn Rushd made this argument eight hundred years ago and many contemporary writers on Islam and science have repeated it. Obviously also, a Muslim scientist can
be guided in part by Islamic ethics; immoral applications of science pose ethical challenges to scientists of any or no religion. But can there be an Islamic science, a science whose essence is distinctively Islamic rather than a science merely carried on by Muslims or decorated with Islamic symbols and language? Stenberg has summarized a great many proposals for Islamic science, but except for some tentative attempts in the social sciences these remain highly abstract proposals that have firmly resisted any attempt to turn them into living and successful sciences. The influence of "Islamic science" in modern times on science in other parts of the world has been negligible. There is no reason so far to disagree with Hoodbhoy; there is and can be no such thing as an Islamic science, and attempts to make science Islamic will simply doom the Islamic world to backwardness.

Almost all of the Islamic writers on Islam and science, even Hoodbhoy, make reference to an idealized Islamic golden age in the past when Islam and science were in proper relation. The historians of medieval European science, despite the limitations of their knowledge of Islamic culture, could have warned them. The relationship between science and Islam was always complex and problematical. In fact, Islamic history tends to be cited by these writers in a very ad hoc way. They are usually not exploring the past to find out what lessons it might really offer but are using it for proof texts to justify their various positions. There are really lessons in the past for those concerned about the challenge of science and the West to Islamic culture — the history of the transmission of Greek thought to the Islamic world is particularly instructive — but the lessons are nuanced and ambiguous, as the lessons of the past always are.

Finally, almost all the Muslim writers on Islam and science, with the partial exception of Nasr, are indifferent or hostile to traditional Islamic religious scholarship. Most of these writers go directly to the Qur'ān. They have little use for the Hadīth or for the rich and complex tradition of interpretation created by medieval Islamic scholars. Verses are quoted out of context, terms are reinterpreted to meet modern needs, and the materials of classical Islam are selectively mined to support positions formulated in response to contemporary debates. The motive for doing so is to break the stranglehold of the old learned tradition so as to make innovation possible, but without the learned tradition — which though narrow was nuanced, responsible, and deep — the interpretation of Islam degenerates into a welter of individual opinion justified in the name of an ijtihād uncontrolled by traditional canons of interpretation and legal and theological inference.

**SUMMARY**
Like their ancestors a thousand years ago, contemporary Muslims face a dilemma posed by foreign sciences. On the one hand, practical reasons made it necessary to adopt these sciences — whether the Greek medicine of Galen or the computer science of the Americans — but as medieval scholars like Ghazālī and Ibn Taymiyyah clearly saw, the practice of foreign sciences requires the adoption of foreign attitudes. The challenge of modern science to Islam is fundamental, for while Muslims have traditionally cared less about dogma than Christians have, Islam claims to be an all-embracing system. The issue is the more urgent for the modern Islamic world since it is linked to the survival of the Islamic world in the face of very dangerous economic, political, military, social, and intellectual challenges from the West. Science is at the heart of this challenge.

Muslims, of course, are not the only people to feel threatened by science. In the Christian West religious authorities several times attempted to bring science under religious authority — in twelfth century Paris in response to Aristotle, in renaissance Italy in response to early modern physics and astronomy, and in modern America in response to Darwin's biology — but these attempts always failed. The Science Wars are motivated in large part by a desire to limit the scope of science in order to defend the autonomy of other intellectual disciplines. But the critics of science in the Science Wars have also had little success in reining the pretensions of science. Science has gone on largely indifferent to its critics.

Likewise, the critics of science — Muslim, Christian, and Postmodern — have had little success in erecting plausible rivals to science. The "creation science" of fundamentalist Christians has won few supporters outside fundamentalist circles (although it has some influence on Muslim critics of evolution). The Postmodern critiques of science have not resulted in successful models of reformed science. Likewise, "Islamic science" has remained abstract and unrealized. The "scientific miracles of the Qurʾān and Sunnah" are unconvincing to those not already convinced of the truth of Islam and, in any case, imply the validity of modern science. And we should remember that medieval Muslims found the quite different "truths" of medieval science in the Qurʾān. The efforts to Islamize knowledge have remained proposals and have not resulted in living, successful sciences. Only Nasr's traditionalist philosophy is a fully realized position, but it largely ignores modern science, staking out a position that is metaphysical rather than scientific. There is thus no reason to suppose that a distinctively Islamic science is possible.

It is the historians of medieval and early modern science who have the most useful lessons to offer. They tell us that the Scientific Revolution
and all the resulting wonders of modern science and technology originated in the small but free intellectual spaces of the faculties of arts of the medieval European universities. Since then science has prospered when it is free from intellectual interference and enjoys consistent intellectual and material support. Abdus Salam tells us that this remains true: "Religious orthodoxy and the spirit of intolerance are two of the major factors responsible for killing the once flourishing enterprise of science in Islam. Science prospers provided there are sufficient practitioners to constitute a community which can work with serenity, with fullest support in terms of the necessary experimental and library infrastructure, and with the ability to openly criticize each other's work. These conditions are not satisfied in contemporary Islam. . . Nasr and Sardar are doing a great disservice to science in Muslim countries if they are calling for a religiously and not culturally motivated 'Islamic science', whatever that means. There is only one universal science. . . There is no such thing as Islamic science just as there is no Hindu science, no Jewish science, no Confucian science, nor Christian science" (Hoodbhoy, ix). Muslims who wish to see a free, prosperous, and intellectually developed Islamic world would do well to listen to him.