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Editorial

This issue brings an article by Jamil Ragep on a topic that provoked debate in the *TLS*. It looks at the prejudices that many have regarding the history of Islamic science, which test both historical and political preconceptions.

BSHS matters are reported on in accounts by those involved in the role-playing exercise on plague in York, brought to the British Association meeting by the BSHS Strolling Players. The Outreach and Education Committee introduce their next competition, as we take a look at the runner-up of last year's image competition.

Being the first issue of the year, our regular list of forthcoming anniveraries (for 2009) is included - a longer list being available on the website. Other regulars include reviews and reports of meetings. In honour of the forthcoming Three Societies Meeting, the subject of The Questionnaire is the HSS's own Jay Malone.

Contributions to the next issue should be sent to newsletter@bshs.org.uk by 14 April 2008.

Rebekah Higgitt, Editor

When did Islamic science die (and who cares)?

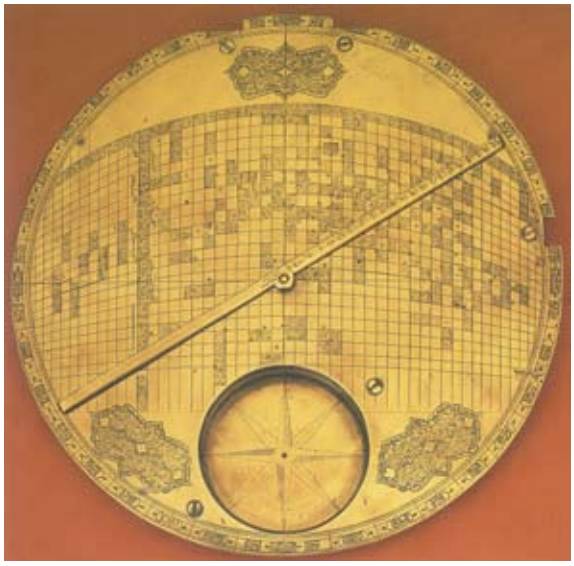
Jamil Ragep on the historical and contemporary significance of Islamic science after the 12th century.

Imagine waking up one day and finding out that a Nobel Laureate has declared that the subject of your life's work doesn't amount to a hill of beans (or in less Bogeyesque terms, isn't worth mentioning). Such was the jolt I received from the hallowed pages of the *Times Literary Supplement,* when I read Steven Weinberg's review of Richard Dawkins's *The God Delusion* (17 Jan 2007). Weinberg had held forth that 'After al-Ghazzali [d. 1111], there was no more science worth mentioning in Islamic countries'. Since my colleagues and I have certainly found a lot to mention, I sent a letter to the editor listing a number of accomplishments by Islamic scientists post-Ghazali (24 Jan 2007).

To my surprise, Professor Weinberg's response conceded little, compounding his earlier statement with long-discredited claims about the lack of influence and significance of late medieval Islamic science (31 Jan 2007). One always finds oneself in an odd position when challenged by someone with no credentials in one's field, and in general the response should be to ignore the uninformed. But because Weinberg's views have larger implications beyond our narrow scholarly concerns, I will attempt to explain in what follows why they are indeed incorrect, why these views have had a remarkable persistence, and why this debate matters in the hypercharged post-9/11 political environment.

First the facts. During the past half century or so, an ever-increasing body of scholarly work has shown that science in Islam not only continued after al-Ghazali but in fact flourished for centuries thereafter. One has the obvious example of what has been called 'Spanish Aristotelianism', which flourished in

Astronomers at work in the Istanbul Observatory (1577-1580). From Shahan-shahi-nama, *Istanbul University Library MS F-1404, f. 57a.(Courtesy of Istanbul University Library.)*



A world-map centred on Mecca. This remarkable brass plate, one of two recently discovered that likely date from 17th-century Safavid Iran, is probably based on a sophisticated projection that preserves both distance and direction. (From David A. King, World-Maps for Finding the Direction and Distance to Mecca: Innovation and Tradition in Islamic Science *(Brill, The Netherlands, 1999), p. 199; courtesy of David A. King.)*

the second half of the 12th century and included such luminaries as Ibn Bajja, Ibn Tufayl, Ibn Rushd (Averroes), Maimonides, and al-Bitruji, all well-known in Europe.

Of more interest is the 13th-century revival of Islamic scientific and philosophical traditions that took place in eastern Islam in the shadow, and eventually under the umbrella, of the Mongol invaders. For example, the great Maragha observatory, arguably the first large-scale observatory ever built, was commissioned by the Mongol ruler Hulagu Khan and became a model for observatories in East, Central, and South Asia, the Middle East, and Europe over the next several centuries. It was during this time as well that earlier scientific and philosophical texts were 'recovered' through recensions, commentaries, and exegeses. Over the next five centuries or so, one can document the production of thousands of scientific and philosophical texts in both the eastern and western Islamic world that are attested by tens of thousands of extant manuscripts.[1]

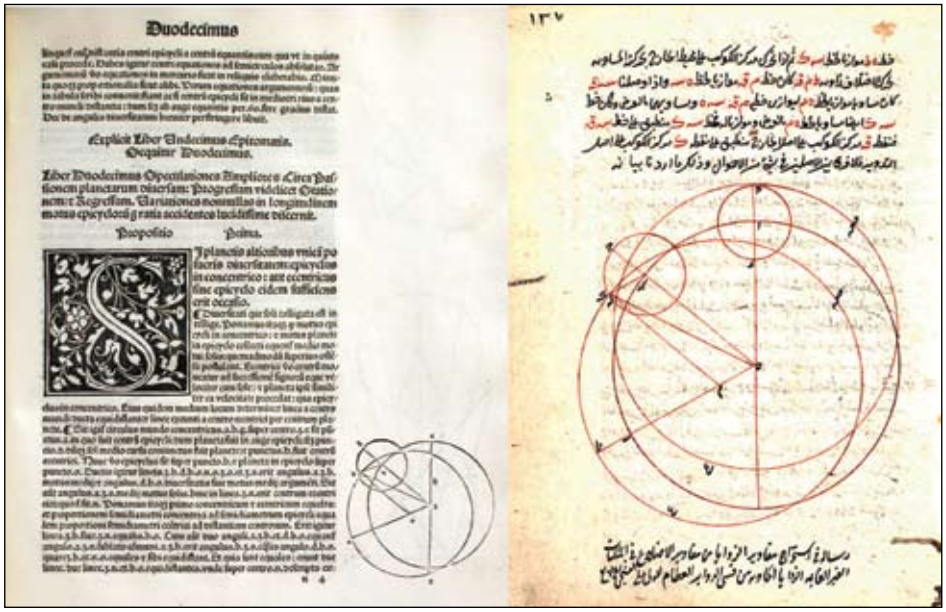
One might contend that most of these works were mere commentaries, with little that was new or original. Or that observatories were built mainly for the purpose of religious ritual, not true science. (Weinberg claims they were 'used largely for predicting prayer times and the Muslim lunar months'.) Research has revealed otherwise. We now know that the great observatories, such as at Maragha and later in Samarqand, were associated with remarkable creative activity in both the theoretical and practical domains. The enormous Samarqand meridian sextant with a radius of some forty meters reveals considerable skill and was used, among other things, for revamping Ptolemy's star catalogue.

These observatories were also associated with libraries and schools that had sizeable numbers of teachers and students who dealt with a range of theoretical matters. The most famous of these is the work done to reform Ptolemy's planetary theories, an effort that resulted in a range of new models. And the overwhelming evidence is that many of these models found their way into the writings of Nicholas Copernicus. (Weinberg, who claims Copernicus got nothing from later Islamic astronomy, would seem to dismiss research by E. S. Kennedy, Otto Neugebauer, Noel Swerdlow, and others.) Even more remarkable than the models, one of Copernicus's arguments for the Earth's motion and the proposition he uses to make the transformation from a geocentric to heliocentric system have Islamic precedents.[2]

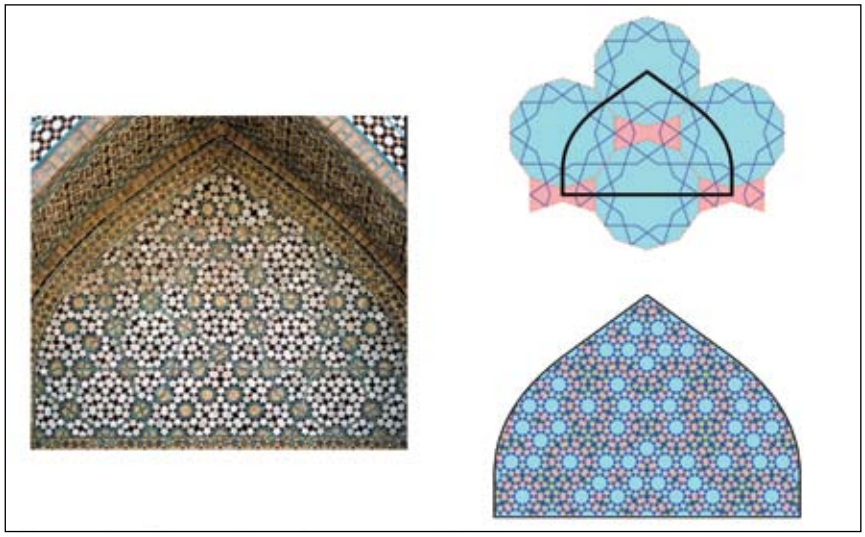
Despite an appalling lack of research, we know of other noteworthy advances during this post-Ghazali period, including the discovery of the pulmonary transit (of blood from the heart to the lungs and back), precise determinations (up to fifteen decimal places) for Π and sin 1°, and map-projection techniques of remarkable accuracy and sophistication. And just this past year, it has been shown that the Darb-i Imam shrine in Isfahan exhibits quasi-crystalline Penrose patterns, five centuries before their discovery in the West. Given that less than 5% of the available material has been studied, it would seem that future research will bring to light many other discoveries.

It is often maintained (as also by Weinberg) that these discoveries are simply by a few talented individuals who somehow stand outside the repressive environment of Islamic civilization. But this is difficult to square with the reports of hundreds of students at madrasas such as at Samarqand or the thousands of extant manuscripts of scientific textbooks (many copiously annotated) that date from this late period or the often sophisticated discussion of scientific matters in religious texts.

If one accepts my argument regarding the significance and dimensions of this scientific tradition, one is faced with the inevitable question: How did it escape the keen eye of orientalists and historians of science for almost 200 years? And despite considerable research over the past fifty years that has falsified the view that there was no science after Ghazali, why has it continued to be so persistent, in the scholarly secondary literature of both Islamic studies and history of science as



Figures used by Regiomontanus and Ali Qushji illustrating how to convert the epicyclic models of Venus and Mercury into eccentric ones. The underlying proposition, a key element in the mathematical transformation from a geocentric to heliocentric cosmology, was probably first developed in Samarqand around 1430 and then made its way to Constantinople and central Europe. (Courtesy of the University of Oklahoma Libraries, Norman, and the Süleymaniye Library, Istanbul.)



Tiling at the Darb-i Imam Shrine at Isfahan, Iran, showing what the authors argue is 'nearly perfect quasi-crystalline tiling', first described in modern times by Roger Penrose in the 1970s. (P.J. Lu and P.J. Steinhardt, 'Decagonal and Quasicrystalline Tilings in Medieval Islamic Architecture,' Science *315, no. 5815 (23 Feb 2007), pp. 1106-10. Photograph by K. Dudley and M. Elliff; reconstructions by Peter J. Lu; courtesy of Peter J. Lu.)*

well as in popular accounts?

Here one sees the remarkable effects of received 'wisdom', preconceived views, and political spin. If one is told that something does not exist, it takes a foolhardy, not to say reckless, graduate student (or textbook writer or journalist) to go in search of it. And no view has been more entrenched in western thinking than the idea that Islam long ago turned its back on rationality and science, the prerequisites for modernity. This was codified with particular force by Ernst Renan in his famous lecture, 'L'Islamism and la science', delivered at the Sorbonne on the 29th of March, 1883. While grudgingly acknowledging that there was outstanding philosophy and science for at least 500 years ('cette supériorité momentanée'), this occurred in spite of Islam. Just as we should not claim Galileo for Catholicism, we should not claim Avicenna, Averroes et al. for Islam.

Reading this work today, one is struck by the almost humorous ignorance displayed by Renan, who among other things claims that the early Abbasid caliphs, some of whom supported science and philosophy, were hardly Muslims ('à peine musulmans', p. 7). In the 19th and early 20th centuries, these views were often combined with racial considerations. Pierre Duhem, for example, claimed that Semites, and Arabs in particular, were incapable of abstract thought not tied to physical reality, i.e. instrumentalism, which was a crucial component of his Christian positivism.

After World War II, the racial dichotomization of Semites and Indo-Europeans went out of fashion, but what remained, as far as Islamic science was concerned, were the beliefs that its decline after 1200 was precipitous and could be attributed to religious fanaticism and a lack of social and institutional support. This conveniently absolved a generation or two of European medievalists and early modernists from dealing with Islamic science except in its earlier manifestation, which had to some degree been Europeanized as a result of the 12th-century translation movement from Arabic into Latin. Ironically, the interest in Islamic science manifested by such figures as George Sarton and Marshall Clagett, both of whom felt the need to learn Arabic, has been much less manifest in their students and grand-students, who have tended to promote a more Eurocentric history of science.

One might attribute such tendencies not so much to ill-will toward non-Europeans but rather to the increasing specialization, and consequent compartmentalization, of knowledge that has overtaken many historians in the recent past. (There are only so many hours in the day, we are often heard to lament.) The situation as exemplified by Weinberg seems to me somewhat different. Rather than benign neglect, what we have instead is an active antipathy toward Islam and its civilizational manifestation that is couched in blatantly political terms. Weinberg in his review of Dawkins makes an explicit point that Dawkins and others are spending too much time worrying about a few ineffectual Christian fundamentalists who try to ban Darwin; the real danger is Islam, and not only its more fundamentalist version.

This, I think, helps us understand all the commotion about Ghazali. For if a single individual could stop Islamic science in its tracks, then the problem must ultimately be somehow inherent in Islam itself. An alternative view would hold that Islamic science, like all scientific traditions, made its accommodations with the social, political, and religious contexts in which it found itself, and continued on long after Ghazali. In fact, one might contend, as I have, that Ghazali's arguments against Aristotelian natural philosophy that Weinberg finds so appalling (one might ask what he thinks of the anti-Aristotelianism of Galileo, Descartes, and Hume) were an important factor in stimulating alternative cosmologies explored by various Islamic scientists. This includes Ali Qushji (15th c.), who seems to have had a decisive impact on Copernicus and other early modern Europeans. Exactly why these alternative cosmologies took off in Europe and not in the Islamic world is an interesting question and certainly open to numerous interpretations. But possible factors, such as European exceptionalism, imperialism, economic demise, institutional disarray, or the inherent conservativism of entrenched scientific traditions, are clearly contingent.

An essentialist explanation, drawing upon Islam's inherent antipathy toward rational thought, would need to explain how rational traditions in science, philosophy, theology, and law lasted well into modern times. Here, I think, the strident insistence that Islam turned away from science a millennium ago, thus closing the door on any hope of 'modernism', becomes more comprehensible. For then the prospects for internal reform become bleak at best, and one is free to propose radical transformation (say, in the Ataturk mould) or outside intervention (in the Bush-Cheney mould). Perhaps these are viable alternatives. But basing oneself on this imagined history leaves out the possibility that Muslims might, as they have so often in the past, draw upon their own traditions to transform what is admittedly a depressing situation at present. But however one comes down politically in this or other matters, intellectuals risk much more than losing an argument by distorting history for a political agenda; they risk devaluing knowledge itself.

Notes

1. For recent listings, see B. A. Rosenfeld and E. Ihsanoglu. *Mathematicians, Astronomers, and Other Scholars of Islamic Civilization and Their Works (7th–19th c.)* (Istanbul, 2003) and the various works on Ottoman science produced by E. Ihsanoglu and his colleagues.
2. For recent summaries of the literature and new evidence, see F. Jamil Ragep, 'Copernicus and His Islamic Predecessors: Some Historical Remarks', *History of Science* 45 (2007): 65–81 and George Saliba, *Islamic Science and the Making of the European Renaissance* (Cambridge MA, 2007).

Jamil Ragep
McGill University
jamil.ragep@mcgill.ca