

MARTIN O'NEILL: IMAGE OF AL-BIRUNI; QINGWA/ISTOCK. ILLUSTRATION OF MOON PHASES BY AL-BIRUNI  
REPRODUCED COURTESY OF SEYED HOSSEIN NASRY WORLD OF ISLAM FESTIVAL PUBLISHING COMPANY



## HISTORY OF SCIENCE

# Science spun on the Silk Road

**Christopher I. Beckwith** assesses a study probing Central Asia's pivotal role in Islam's golden age.

Between Europe, the Near East, South Asia and East Asia lies a shockingly poor and underdeveloped region. But Central Asia — comprised mainly of Afghanistan, Uzbekistan, Turkmenistan, Tajikistan and East Turkistan (now Xinjiang) — was pivotal in pre-modern world history and cultural development, including science. Mathematician and astronomer al-Khwārizmī, for instance, systematized algebra, introduced decimal system mathematics and lent his name to algorithms (his Latinized name is Algorithmus). As Frederick Starr shows in *Lost Enlightenment*, Central Asia was a glittering, populous, wealthy world of advanced urban civilization in the mid-seventh century, when the first Arab armies reached Merv and Balkh, the “mother of cities”, in what are now,

respectively, Turkmenistan and Afghanistan.

Over the following decades, their armies crossed the Amu Darya (Oxus River) to Bukhara, Samarkand and Khwarizm. Less than two centuries later, the scholars of this region were mostly Muslim. They dominated the intellectual life of the entire Islamic world, stretching from Spain to India, and made fundamental contributions to the natural sciences, medicine, philosophy, music and literature. The philosopher al-Fārābī's *Great Book on Music*, for instance, became, as Starr writes, “the foundation stone of Western musicology”. And Western medicine was dominated until a few centuries ago by the works of al-Rāzī (Rhazes), the greatest clinical physician until early modern times, who was the first to precisely describe smallpox.

Starr argues rightly that the region's

brilliant culture rested on a highly cosmopolitan mix of ethnic groups, languages and religions; a long, rich pre-Islamic intellectual tradition (mainly Buddhist); and prosperity. That prosperity was built primarily on high-tech hydraulic engineering: Central Asians developed nine kinds of machinery for irrigation, drinking water and public baths. Soon after 1100 AD, the enlightenment waned under attacks on “reason and logic” led by the Sufi ex-philosopher al-Ghazālī.

At that point, medieval Western Europeans acquired science from the neighbouring Islamic world. They joined science to other Central Asian borrowings that institutionalized it and provided it with a formal scientific method that enabled it to survive and grow in Europe while science was dying in the Islamic world.

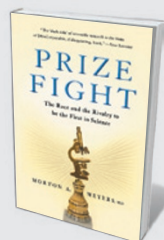
It is increasingly recognized that many of the greatest scientists, philosophers, poets and artists of the Islamic golden age were from Central Asia. A few of their works have been studied or translated, such as al-Birūnī's famous ethnography of India. But Starr's book is the first to identify the leading lights of that age as Central Asians, place them squarely in Central Asia, and detail their accomplishments.

During the region's three centuries of world intellectual leadership, the dominant literary language was classical Arabic (except in East Turkistan, which became Islamic later). However, this was not due to the Arabs destroying Khwarizm's libraries, a claim repeated by Starr but shown by Wilhelm Barthold in 1928 to be folklore.

In most of the world before the seventh century, people simply did not write much. Under the Arabs, the writing bug caught on and books in Arabic, and bookshops, became widespread in Central Asia. Starr relates how in the eleventh century, Ibn Sīnā (Avicenna) was chased down the street by a bookseller in Bukhara, eager to offer a bargain on an insightful ▶

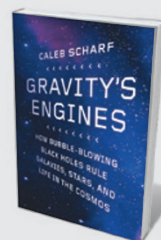


**Lost Enlightenment: Central Asia's Golden Age from the Arab Conquest to Tamerlane**  
S. FREDERICK STARR  
Princeton University Press: 2013.



## Prize Fight: The Race and the Rivalry to be the First in Science

Morton A. Meyers (Palgrave Macmillan, 2013)  
A burning urge for discovery is often allied to a burning ambition for a Nobel. Among the cases here is that of Albert Schatz, who found streptomycin in 1943 but saw the prize go to his supervisor. (See Hidde Ploegh's review: *Nature* **486**, 318–319; 2012.)



## Gravity's Engines

Caleb Scharf (*Scientific American*, 2013)  
Astrobiologist Caleb Scharf investigates black holes — regions of space-time that pull in matter and light. He shows how those in galactic centres gobble stars, belch out plasma, and are the most efficient energy generators in the cosmos. (See Mario Livio's review: *Nature* **488**, 278; 2012.)

► volume about Aristotle's *Metaphysics* by the philosopher al-Fārābī. Ibn Sīnā later wrote many great works, including one of the most influential natural-science texts of the central Middle Ages, *De Visu* (*Optics*). This was translated into Latin in mid-twelfth century Toledo, Spain, by the Jewish philosopher Abraham ibn Daud and Dominicus Gundisalvi.

Linguistic unification by the Arabs meant that the flourishing of science and philosophy under Islam took place almost entirely in Arabic, as Starr suggests. Unfortunately, Starr uses his coinage “Persianate” throughout to refer specifically to the non-Persian peoples of Central Asia, making it sound as if the entire area was somehow “Persian” in language and culture. It was not. Persians, from what is now Iran, were conspicuously absent until the golden age was largely over, as Starr notes.

By calling his book *Lost Enlightenment*, Starr courageously rejects claims that there was no decline of Islamic civilization. He does, however, ignore recent work that explodes myths about Eurasian steppe peoples being aggressors, and even obliquely suggests that Chinggis Khan “attempted genocide” of Central Asians. Nevertheless, Starr firmly rejects the theory that the Mongols triggered the intellectual collapse. That, he writes, had happened a century before the Mongol conquest; at that time, taxes and trade were still “pouring gold into the coffers” of Central Asian rulers, who simply stopped using the money to support intellectual life. And after losing a great war — the Mongol ‘invasion’ (which historical sources agree the Khwarizmians started) — they failed to completely rebuild.

Starr shines in his core chapters, where he presents the great achievements of the Central Asian philosopher–scientists at a time when their homeland was the creative intellectual capital of the world. ■

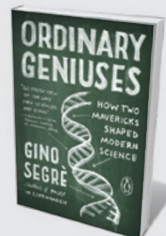
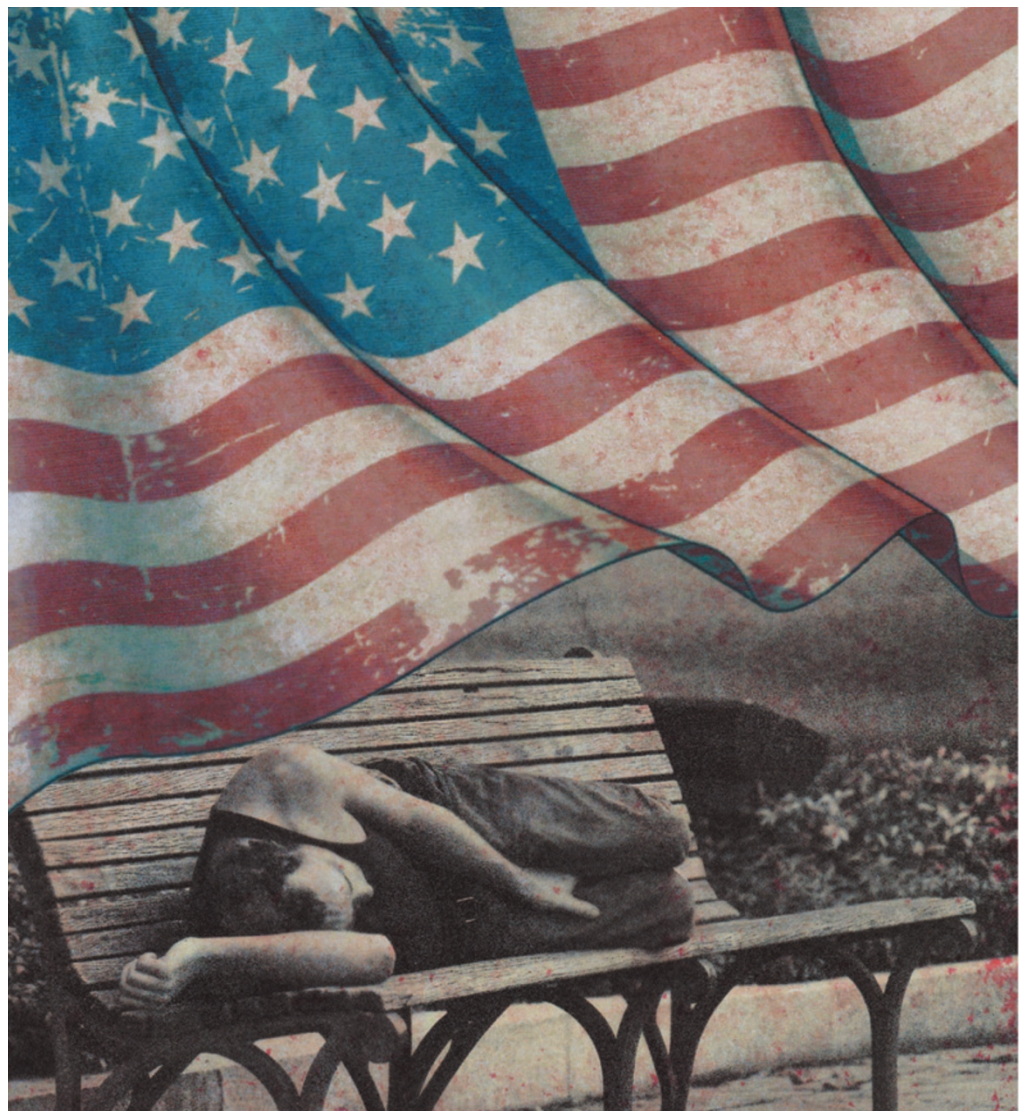
**Christopher I. Beckwith** is professor of Central Eurasian studies at Indiana University, Bloomington, and author of *Warriors of the Cloisters: The Central Asian Origins of Science in the Medieval World*.

e-mail: [beckwith@indiana.edu](mailto:beckwith@indiana.edu)

## PSYCHIATRY

# America the traumatized

**Andrea Tone** assesses a history of the mass release of US psychiatric patients into an uncertain future.



## Ordinary Geniuses: How Two Mavericks Shaped Modern Science

Gino Segre (Penguin, 2013)

In these intertwined stories of cosmologist George Gamow and biologist Max Delbrück, we see how Gamow explained the creation of hydrogen and helium in the Big Bang, and Delbrück's study of bacterial viruses opened a new approach to genetics.



## Memory: Fragments of a Modern History

Alison Winter (University of Chicago Press, 2013)

A subtly nuanced cultural and scientific history of our ‘recording mechanism’. Alison Winter reveals how memory has been tested variously in ‘labs’ like the courtroom, where phenomena such as false-memory syndrome have emerged. (See Barbara Kiser’s review: *Nature* **479**, 475; 2011.)