

### Does Islam Stand Against Science?

- Steve Paulson

We may think the charged relationship between science and religion is mainly a problem for Christian fundamentalists, but modern science is also under fire in the Muslim world. Islamic creationist movements are gaining momentum, and growing numbers of Muslims now look to the Quran itself for revelations about science.

Science in Muslim societies already lags far behind the scientific achievements of the West, but what adds a fair amount of contemporary angst is that Islamic civilization was once the unrivaled center of science and philosophy. What's more, Islam's "golden age" flourished while Europe was mired in the Dark Ages.

This history raises a troubling question: What caused the decline of science in the Muslim world?

Now, a small but emerging group of scholars is taking a new look at the relationship between Islam and science. Many have personal roots in Muslim or Arab cultures. While some are observant Muslims and others are nonbelievers, they share a commitment to speak out—in books, blogs, and public lectures—in defense of science. If they have a common message, it's the conviction that there's no inherent conflict between Islam and science.

Last month, nearly a dozen scholars gathered at a symposium on Islam and science at the University of Cambridge, sponsored by the Templeton-Cambridge Journalism Programme in Science & Religion. They discussed a wide range of topics: the science-religion dialogue in the Muslim world, the golden age of Islam, comparisons between Islamic and Christian theology, and current threats to science. The Muslim scholars there also spoke of a personal responsibility to foster a culture of science.

One was Rana Dajani, a molecular biologist at Hashemite University, in Jordan. She received her undergraduate and master's degrees in Jordan, then took time off to raise four children before going to the University of Iowa on a Fulbright grant to earn her Ph.D. Now back in Jordan, she is an outspoken advocate of evolution and modern science. She has also set up a network for mentoring women, and she recently started a read-aloud program for young children at mosques around Jordan.

As if that weren't enough, Dajani helped organize a committee to study the ethics of stem-cell research, bringing together Jordanian scientists, physicians, and Islamic scholars. (The traditional Muslim belief is that the spirit does not enter the body until 40 days after conception, which means many human embryonic stem cells can be harvested for research.)

"Being a Muslim, living in a Muslim world, Islam plays a big role in our everyday lives," she says. "We need to understand the relationship between Islam and science in order to live in harmony without any contradictions."

For these scholars, the relationship between science and Islam is not a dry, academic subject. Many of the hottest topics in science—from the origins of the universe and the evolution of humans to the mind/brain problem—challenge traditional Muslims beliefs about the world.

"Remember, these are human issues," says Nidhal Guessoum, an Algerian-born astrophysicist at the American University of Sharjah, in the United Arab Emirates, who was also at the Cambridge symposium. "It's not an experiment in the lab. I'm talking about my students, my family members, the media discourse that I hear every day on TV, the sermons I hear in the mosque every Friday."

With his blend of charisma and keen sense of how to navigate the tricky terrain between modern science and Muslim faith, Guessoum is emerging as one of the key figures in public debates about Islam and science. He has a new book, *Islam's Quantum Question: Reconciling Muslim Tradition and Modern Science* (I.B. Tauris), and this month his university will host an international conference called "Belief in Dialogue: Science, Culture and Modernity."

This new breed of scholars also shares a sense of urgency, which is partly a matter of demographics. Sixty percent of the world's 1.6 billion Muslims are under the age of 30, and there's a major push to educate the next generation. It's certainly a welcome development, but the stakes have never been higher. Religion looms over all of Muslim life, so there could be devastating consequences for the future of science if certain fields of study come to be seen as anti-religious.

"If evolution gets associated with atheism, you could alienate an entire generation of Muslims," says Salman Hameed, a native of Pakistan who directs the new Center for the Study of Science in Muslim Societies, at Hampshire College. Another key player in the Islam-science dialogue (who was not at the Cambridge symposium), Hameed runs the science-and-religion blog *Irtiqa*. He believes that the popular narrative about science and religion is now

being formulated in the Muslim world, and that the verdict could be rendered within the next 15 to 20 years.

Darwinism has already proved controversial. A prominent British imam in East London received death threats this year after delivering a lecture at his mosque about evolution. His offense? Saying there's no conflict between Darwinian theory and Islam. In the uproar that followed, Usama Hasan, a senior lecturer in business-information systems at Middlesex University and a fellow of the Royal Astronomical Society, retracted his comments but also criticized Islamic extremists; he later resigned from Middlesex.

The furor over Hasan's comments reflects not just an argument over science but also the tensions within Muslim immigrant communities in the West. And for scholars who study this subject, it's a lesson in how attacks on science may not really be about science at all, but about the larger conflict between modernity and a conservative brand of Islam.

Islam has a long and tangled history with science, but there's one point that nearly everyone acknowledges: Science in the Muslim world is now in a sorry state. "It's dismal," says Taner Edis, a Turkish-American physicist at Truman State University, in Missouri. "Right now, if all Muslim scientists working in basic science vanished from the face of the earth, the rest of the scientific community would barely notice."

Guessoum agrees: "It's abysmal by all kinds of measures: how many books and publications are written or translated in the Muslim world; how many patents come from Muslim inventors; how Muslim students are performing in the international arena."

Data collected by the World Bank and Unesco confirm this bleak assessment. A study of 20 member states of the Organization of the Islamic Conference found that these countries spent 0.34 percent of their gross domestic product on scientific research from 1996 to 2003, which was just one-seventh of the global average.

Those Muslim countries have fewer than 10 scientists, engineers, and technicians for every 1,000 people, compared with the world average of 40, and 140 for the developed world. And they contribute only about 1 percent of the world's published scientific papers. Another study of OIC nations found that scientists in 17 Arabic-speaking countries produced a total of 13,444 scientific publications in 2005, which was 2,000 fewer than what just Harvard University produced.

Just where religion figures into this scientific black hole is a complicated question, though anti-science pronouncements by Islamic clerics certainly haven't helped. But even conservative Muslims recognize the problem. "If you're a Muslim and you're worried about the military weakness of Muslim countries compared to Western imperialistic powers, you're

going to see that today's warfare depends a lot on high-tech developments," says Edis, of Truman State. Muslims envious of the juggernaut of Western capitalism also know that technology and science fuel the modern economy.

Some of the debates about Islam and science resemble American arguments over science and religion, but there are also specific differences. For one thing, the New Atheist critique of religion is virtually absent in the Muslim world.

And unlike Catholicism, which takes its cues from the Vatican, there is no central church in Islam and thus no "official" position on scientific controversies such as evolution or cloning. With no central authority to challenge, there has been no Islamic equivalent of the Protestant Reformation, which helped undercut the Vatican's authority over all kinds of intellectual inquiry, including science.

Of course, it's risky to make sweeping generalizations about the Muslim world. Turkey, after all, is far more secular than Saudi Arabia, and Qatar is pouring money into new science institutions, while Somalia is just trying to survive a civil war.

But Islamic societies have their distinct challenges. There's no clear separation between church and state in most Muslim countries, so scientists lack the autonomy that they enjoy in the West. Muslim scientists must frequently contend with the scientific pronouncements of religious leaders, and in university classrooms, biology and physics professors often find themselves responding to questions about specific Quranic verses that refer to the natural world.

Despite this minefield, few Muslims regard science itself as dangerous. "There's almost a consensus across the board that science is a good thing," says Ahmad Dallal, a historian who left Georgetown University two years ago to return to his native Lebanon, where he is now provost of the American University of Beirut.

If anything, many Muslims may be too eager to find convergences between religion and science. In the last few years, thousands of Islamic Web sites have popped up claiming that the Quran proves scientific discoveries like the Big Bang, black holes, and quantum mechanics. This new movement is "the entrance gate to the Quran" for many young, educated Muslims, says Bruno Guiderdoni, an astrophysicist and director of the Observatory of Lyon, in France, who converted to Islam nearly 25 years ago. "They are fascinated by science," he says.

Guiderdoni and Dallal also criticize an intellectual movement that calls for a specifically "Islamic science." This phrase was coined by the influential philosopher Seyyed Hossein Nasr, a native of Iran who teaches Islamic studies at George Washington University.

His effort to unify science and religion harks back to the philosophers of Islam's golden age, but Nasr also dismisses modern evolutionary theory as both bad science and flawed metaphysics.

The banner for "Islamic science" has also been taken up by the London-based social critic Ziauddin Sardar, though without Nasr's overtly religious emphasis. Western science, Sardar has written, "is inherently destructive, and it does not, and cannot, fulfill the needs of Muslim societies."

While his critique has gained traction among some Muslim intellectuals, it's widely dismissed by the scholars who embrace modern science. "There is nothing inherently Islamic" about Sardar's model of Islamic science, which is based on what Sardar terms basic Islamic values, Dallal writes in his book *Islam, Science, and the Challenge of History* (Yale University Press, 2010). "The 10 values of Sardar's model are completely arbitrary; they derive from his own personal and unhinged understanding of Islam." For Dallal, the basic problem with both Sardar and Nasr is that they use metaphysics to trample over science and history.

Many Muslims are especially bothered by evolution. By and large, Islamic culture is creationist, judging by a 2008 survey about evolution in six Muslim countries: Egypt, Indonesia, Kazakhstan, Malaysia, Pakistan, and Turkey. On average, only about 15 percent of the respondents in five of those countries considered evolution to be "true" or "probably true." In the sixth country, Kazakhstan, roughly one-third of the respondents accepted evolution, but an equal number also said they had "never thought about it."

In some Muslim countries, evolution simply doesn't appear in science textbooks. "Evolution isn't on the top list of priorities," Dajani, of Hashemite University, says. "When people are thinking about what they're going to eat tomorrow, evolution is a luxury."

This rejection of evolution has a lot in common with American creationism, but there are also key differences. Young Earth Creationism, which claims that the earth is 10,000 years old (or younger), is virtually absent in the Islamic world. Muslims generally accept the earth's being 4.5 billion years old.

The Quran does not have a detailed origins story like the six days of creation found in Genesis, so there's no need to fit the entire history of the earth into a few thousand years. Noah's flood is considered the major geological event in world history by American creationists; in contrast, most Muslims regard that flood as a local event. Many Muslims don't even have a problem with the evolution of plants and animals. Human evolution, however, is

an entirely different story. According to the Quran, God created Adam out of clay, so the idea that humans descended from apes is simply beyond the pale for the vast majority of Muslims.

The strongest creationist movement has emerged in Turkey, even though evolution has been taught in high schools for decades - a legacy of Atatürk's campaign to secularize Turkey's public culture. Harun Yahya (the pen name of Adnan Oktar) has built a sophisticated media empire that distributes creationist books, articles, videos and Web sites around the Muslim world.

Edis, the Truman State physicist who grew up in Turkey, has tracked Harun Yahya's group for years, and he's both alarmed and impressed by its reach. "When I walk into an Islamic bookstore in London, it's very easy to find Harun Yahya material because it's right in front of you. I get e-mail from people in Pakistan, Indonesia, and all over the Islamic world pointing out that Harun Yahya material has been used in their classrooms," Edis says. "In fact, it's much more international, much more successful, and has a command of a much larger financial base than any American creationist organization."

Where Yahya's Science Research Foundation gets its money is a mystery, and Oktar himself is a shadowy figure who has faced a string of legal problems, including charges of extortion. His diatribes against modern science can make you wonder how he has managed to gain so much influence. When I interviewed Oktar, in Istanbul in 2008, he claimed that the "Masons manage the world through a scientific dictatorship" and called Darwinism "a Satanic plot" that nurtures terrorism around the world, "like the development of mosquitoes in mud or in ponds."

Harun Yahya seems to tap into the fears and uncertainties of various Muslim communities. But what do educated Muslims think about evolution? That's the question Hampshire College's Hameed is asking in an ambitious three-year study supported by the National Science Foundation. Now halfway through the survey, Hameed is interviewing physicians and medical students in five Muslim countries and three Muslim Diasporas in the West.

He has found that attitudes about evolution vary greatly from country to country. For instance, most Pakistani doctors accepted evolution, even human evolution. "But in Malaysia, we were really surprised to find a major rejection of not only human evolution but evolution in general," he says.

Hameed expected to find more acceptance of modern science because Malaysia has a sophisticated high-tech industry. He and his colleagues now speculate that Muslims are trying to carve out a cultural niche that's distinct from the more educated Indians and Chinese in

Malaysia. "We think the rejection of evolution has become part of their Muslim identity," he says.

Hameed was also surprised by another finding. One-third of the respondents in Pakistan and Turkey said, "I accept evolution scientifically but reject it religiously." Apparently, even educated Muslims still struggle to reconcile their faith with their knowledge of science.

For all the hand-wringing over evolution, it's not a taboo subject for academic study. The historicity of the Quran itself is "a far more explosive topic than evolution," says Hameed. It takes a courageous or perhaps foolish Muslim scholar to examine the specific historical circumstances in which the Quran was written, or to criticize the Prophet Muhammad.

"For Muslims, this is the word of God," Guessoum says. "The Quran is the revelation. It was written down as revealed to Muhammad. This is dogma, so it's harder to claim that everything is open for interpretation."

Not surprisingly, the Quran frequently spills over into the professional lives of Muslim scientists. Professors who teach in the Middle East may find themselves dealing with questions that almost never come up in a science class at a major American university. Dajani, the molecular biologist in Jordan, is often asked about specific Quranic verses when she teaches a course on evolution, and she points to other verses which she interprets as supporting natural selection. She also emphasizes that the Quran is a guide for how to live, not a book of science, so certain passages like the story of Adam and Eve must be read metaphorically. "Religion plays a big role in our lives," says Dajani, who wears a hijab. "So talking about scripture in the classroom is very normal. We're not a secular state. We talk about religion all the time."

She says the biggest challenge for Arab professors is to get their students to think critically. "I challenge my students to rethink their opinions, to challenge their preconceived opinions, to be in their uncomfortable zone. To me, that's the objective of education."

Some Muslim scientists also devote a significant amount of their scholarly work to questions that concern only the Islamic world. "Science, and astronomy in particular, intervenes on a daily basis in the lives of Muslims," says Guessoum. Determining how and when to pray, what day Ramadan starts, and the beginning of Haj (the pilgrimage to Mecca) are all based on astronomical observations or mathematical calculations.

For instance, Muslims are expected to face Mecca during their five daily prayers, and all mosques are supposed to be oriented toward Mecca. Figuring out the qiblah, the direction

of Mecca, was one reason medieval Muslim astronomers did such groundbreaking work, as it forced them to develop spherical trigonometry and complex mathematics.

Today the direction of Mecca isn't a big problem for Muslims, unless you're an astronaut spinning around in a spaceship. But working out the precise time for each prayer and for fasting times is more complicated. Take the first prayer, which is supposed to begin when the night turns to dawn, when fasting also starts. Astronomers say this happens when the center of the sun is some 18 degrees below the horizon. This wasn't hard to determine when the Muslim population was concentrated in the Middle East, but where does that leave the growing numbers of Muslims now living in Sweden or Canada, where the sun may never set during the summer?

As Guessoum points out, only half-joking, some Muslims are panicking about when to pray and fast. Now, he and other astronomers are proposing a science-based method of calculating prayer times. When Guessoum was asked at the Cambridge symposium if all this wasn't slightly ridiculous wouldn't his time be better spent on basic research? he responded by saying 99 percent of the Muslims you ask would say it's more important to study prayer times than dark matter.

Muslim faith has probably always been bound up with science. In fact, many Muslims point to Islam's golden age which lasted roughly 500 years as proof that there's no conflict between Islam and science. What started as a movement to translate the scientific and philosophical texts of ancient Greece and India led to a remarkable flowering of science, philosophy, and theology. The golden age emerged in Baghdad in the 8th century, spread to Cairo, Damascus, and other Middle Eastern cities, and later flourished in Andalusian Spain.

"If you talk to Muslims today, very often they will bring up history," says Guessoum. "We are fascinated and to some degree obsessed about the history of science. One reason is that most Muslims feel that Islamic civilization was not given its due." This collective chip on the shoulder may be a response to what Dallal calls the Orientalist views of previous generations of scholars. In this older narrative, according to Dallal, the scientific advances of the golden age were credited to outside influences rather than Muslim culture itself.

Then rigid Islamic thinkers took hold, culminating with the 11th-century theologian al-Ghazali, whose orthodox views sent science tumbling into a downward spiral from which it has never recovered. "But historians of science realize this theory makes no sense," says Dallal. "It might sound logical, but the actual historical record shows there's no decline of science. The actual golden age of the sciences in the Muslim world is somewhere in the 13th and 14th centuries."

By now a new generation of scholars has concluded that the Muslim world did more than simply save and transmit Greek knowledge to the Europeans who later launched the Scientific Revolution. "Whole fields needed to be invented from scratch, such as algebra and the science of optics," says Guessoum. "Medicine and astronomy were also greatly pushed forward."

Edis, author of *An Illusion of Harmony: Science and Religion in Islam* (Prometheus Books, 2007), agrees that Muslim thinkers did more than just preserve Greek science, but he calls their work "proto-scientific."

"It's a mistake to think of this as analogous to modern science," he says. "What Muslims were doing back then was still a medieval, prescientific intellectual enterprise. They never quite made the breakthrough, the Scientific Revolution, that took place in Europe." Edis believes the Muslim world's continuing obsession with its fabled past gets in the way of developing a living scientific culture.

Why, then, did the Scientific Revolution break out in Europe and not the Islamic world? Or, to put it another way, what caused the decline of science in the Muslim world? For the scholars who study Islam and science, it's the one question that often elicits a sigh, then a long pause and a weary look, as if to say, Do I really need to answer that?

There's no simple answer, though there are myriad explanations: the absence of universities in the Muslim world, the slow adoption of the printing press, the relative poverty of Muslims compared with Europeans, increasing deference to religious leaders, and more recently, the legacy of colonialism and the squelching of democracy.

Today's scholars don't blame Islam itself for the decline of science, but point instead to the culture of authority that pervades all aspects of the Muslim world, including science and religion. They suggest that the real story may be less about Islamic decline than about the rise of a newly prosperous and capitalist Europe. As Guessoum says, "Money always plays a role in science."

Now, the deeper question may be whether science can ever flourish in Muslim countries without complete independence from religion. Edis, who is an atheist, considers this the defining quality of Europe's Scientific Revolution, what allowed science to develop without constraints. Other scholars agree that scientific autonomy is needed, even though an entirely naturalistic understanding of the world cuts deeply against the grain of Muslim culture.

Some scientists who are practicing Muslims have adopted intellectual positions similar to those of prominent Christian scientists in the United States, such as Francis S. Collins and

Kenneth R. Miller. They say science has its own rigorous methodology, but they still find intellectual space to believe in revelation and perhaps even miracles.

The French astrophysicist Guiderdoni, who studies galaxy formation, talks about finding meaning and beauty in the world of stars and planets, which he considers a manifestation of God's will. Guessoum jokes about being one of the few Muslims who does not believe in miracles, and he invokes his own hero, the 12th-century philosopher Ibn Rushd (who became known in the West as Averroës): "He developed a model of harmony between philosophy and religion, which I have adopted for my own views on science and Islam."

It's quite possible that the Muslim world will still carve out a scientific domain that is completely separate from religion. "The category of science is a product of modernity," says Hameed. And Muslim religious authorities, who for so long were the most educated people in their communities and thus the scientific authorities as well, are now playing catch-up with a new generation of technocrats and doctors. "That is the tension today as Muslims are getting educated," says Hameed. "They are trying to understand where they fit in. What does it mean to be a Muslim?"

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