N. NOURI/AP

An Islamist revolution

Islamist political parties are taking over from secular ones across the Muslim world. What does this mean for science at home and scientific cooperation with the West? **Ehsan Masood** investigates.

At Peshawar University on the Grand Trunk Road linking Pakistan, India and Bangladesh, there is much talk of growth. Its national centre for excellence in geology is to get 11 new labs, a library and a new museum. The provincial government, moreover, has handed the university the job of running a botanical garden and a 40.5-hectare national park.

Peshawar is the capital city of Pakistan's north-west frontier province, the border region with Afghanistan where the Taliban first emerged among the Afghan refugee population in the 1990s. None of the university's activities is unusual for a leading institute in a developing country. But what might seem surprising to outsiders is that, after many years of neglect, the university's expansion comes at a time when local people have elected an alliance of political parties which, like the Taliban, want to base most laws on the Koran. Unusually for Pakistan, the current provincial government has forbidden male doctors from attending to female patients and has banned music on public transport.

The university is run by Haroon Rashid, a professor of chemistry who was appointed vice-chancellor in January 2006. In common with the majority of Pakistanis, Rashid is a Muslim, something that he is proud to make known. Could a university vice-chancellor in Peshawar be of any other faith? In today's Peshawar, a non-Muslim vice-chancellor would be next to impossible.

Pakistan, along with the Islamic Republic of Iran and Sudan, has been run by governments that put Islam at the centre of politics for many years. As more Muslim countries give their citizens the right to vote, Islamist political groupings have taken power, or form the main opposition, in national or regional assemblies in Iraq, Kuwait, the Occupied Palestinian Territory, Bahrain, Egypt, Afghanistan, Jordan, Morocco, Malaysia and Turkey. Islamist is a term used to denote those committed to the application of Islamic principles and Islamic law in politics.

What can Muslim scientists expect from the new Islamist parties that are seeking power across the Muslim world? Will there be more support for science and for research infrastructure, as in Peshawar, but an environment where basic freedoms continue to be denied? The mostly secular, although undemocratic, regimes that have hitherto ruled for decades across the Muslim world have rarely paid more than lip-service to investment in science and technology. Consequently, today's Muslim states barely register on indices of research spending, patents and publications, and only Turkey has universities in the global top 500.

Much of this is candidly documented in the four volumes so far of the *Arab Human Development Report* from the United Nations Development Programme, written entirely by Arabic-speaking social and natural scientists (see page 33), which lays bare how knowledge-based activities such as science, innovation, book publishing, art and literature in Arabic-speaking countries are among the weakest in the world. The report does not consider non-Arab member states of the 57-strong Organization of the Islamic Conference (OIC), such as Indonesia, Pakistan and Turkey. But, as the data on page 26 show, the picture in the broader Muslim world is not much better.

The situation for Muslim science has been bad, and one assumption, based on current trends, is that things can only get worse. One fear is further restrictions on freedom of expression. Political leaders in the Muslim world, even in countries run on strict secular lines, are famously intolerant of dissent, as last year's attempted prosecution in Turkey of Orhan Pamuk, this year's winner of the Nobel prize for literature, demonstrates. Pamuk was accused of

insulting Turkishness. Even today, few universities enjoy much autonomy, and appointments to research posts are opaque and prone to corruption. If secular governments did little for science, can Islamist ones be any worse?

In the search for answers, Egypt's Muslim Brotherhood is a good place to start. The grandparent of Islamists, the brotherhood is a political party founded in Egypt in 1928. Its original aims included taking power, opposing Western influence in Egyptian politics, and governing using the Koran as the basis for lawmaking.

Mixed message

The party's presence and influence has expanded across the Muslim world — from the Middle East to Africa and Asia. In the absence of basic infrastructure in many countries, the brotherhood and its sister organizations run schools and hospitals, and its members include many scientists. But officially it does not exist — it is banned everywhere, and membership can be punishable by long spells in prison. To avoid censure its members stand as independents at election time, or as members of alternative parties. In Egypt, 88 brotherhood members of parliament together form the largest grouping after that of the government.

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"I urge all scientists to read the Koran, from which they will learn much about so many scientific topics."
— Kamal El Helbawi

Kamal El Helbawi, who now lives in London, is a one-time senior official in the Muslim Brotherhood, and its former spokesman in Europe. In common with, arguably, most Muslims, Helbawi sees science and Islam as being in harmony, and he says that any government led by the Muslim Brotherhood will reverse decades of under-investment in R&D. Is this a rose-tinted view or a genuine commitment? The answer may depend on the resonance of science and technology with the wider debates occurring in Muslim society. It may also depend on whether Islamist parties lean towards the Shia or Sunni schools of thinking (see 'A long tradition', page 24).

For Helbawi, science has three functions in society. First, it is a set of tools to help humankind enjoy a higher quality of life through new technologies or by solving problems that afflict the poor. Second, science and technology can be used to deter aggression, a justification, Helbawi believes, for developing a nuclear deterrent. And third, Helbawi believes that science has a role in strengthening religious belief. In his view, the Koran, in addition to being the word of God, was designed by God to convince doubters of the truth of Islam and of creation. "I urge all scientists to read the Koran, from which they will learn much about so many scientific topics," he says.

Like many Islamists, Helbawi peppers his explanations with quotes from the Koran. He does so to underline that these are not his opinions — they have divine endorsement. For example, in explaining support for a nuclear deterrent he quotes chapter 8, verse 60. "Hence make ready against them whatever force and war mounts you are able to muster, so that you might deter thereby the enemies of God."

Listening to Helbawi, it seems that although science investment may go up, the space to disagree with the official line will go down. Yet within the brotherhood itself, there is much debate on literalism, reason and rationality, suggesting that totalitarianism is not the only option. Among the rationalists, for example, is Tariq Ramadan, a philosopher of religion at the University of Oxford and the maternal grandson of Hassan Al Banna, the Muslim Brotherhood's founder. Ramadan says that the Koran should not be quoted outside of its religious and historical context. He also worries that Helbawi's literalism amounts to an invitation not to think, and to assume, for example, that if all science is contained in the Koran, there is no place in society for new knowledge.

For Muslim societies, a literal interpretation of the Koran would present as many barriers to science and to freedom of thought as did the secular governments of the past. But the picture becomes more nuanced the closer one looks at Islamist governments once they are in power. Using Sudan, Pakistan and Iran as examples of countries where Islam is prominent in politics and which may foreshadow what may follow elsewhere, certain trends are clear.

In the case of Iran and Pakistan, there has been a substantial expansion in higher education and more spending on research, measures to improve scientific quality, and some opening up of labs to scientists from overseas. Iran's university population has swelled from 100,000 in 1979 to 2 million today. Pakistan's university population has increased from 276,000 in 2001 to 423,000 in 2004. Sudan's public-sector universities, too, increased from 5 in 1989 to 26 in 1996. In each country, there are equal numbers of women and men entering many

ISLAMIC ERA SCIENCE

750–1258 ABBASID ERA

The Abbasids overthrew the Umayyad caliphate, which had spread Islam through Asia, the Middle East, north Africa and the Iberian peninsula. The Abbasids moved the caliphate's capital from Damascus to Baghdad. This was a particularly productive period for science in Islamic history.

c.721–c.813 Jabir ibn Hayyan
Works attributed to this alchemist had lasting influence in Europe until the sixteenth century. Many words in chemistry have Arabic roots including alkali (*al-qaliy*) and alcohol (*al-kohl*).

c.830–1258 House of Wisdom, Baghdad
Activities at this library and research centre included translation of Greek works into Arabic by both Muslim and non-Muslim scholars. Free public libraries later spread to other cities.

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c.780–c.840 Al-Khwarizmi
Mathematician who gave his name to 'algorithm'. Latin translations of his books introduced algebra (derived from *al-jabr*) to Europe.

c.865–c.926 Al-Razi (Rhazes)
Persian who contributed to medicine, alchemy and philosophy. He formulated the first known description of smallpox, which the Ancient Greeks had confused with measles.

c.965–c.1039 Ibn al-Haytham (Alhazen)

SCIENCE MUSEUM, SCIENCE & SOCIETY PICTURE LIB.

Basra-born researcher in astronomy, mathematics and optics who helped to develop the camera obscura. He refuted Greek models of vision, arguing instead that vision is the result of images being formed, and provided better descriptions of the eye.

980–1037 Ibn Sina (Avicenna)
Persian physician and philosopher from Bukhara. The Latin translation of his *Al-Qanun fi al-Tibb* (*The Canon of Medicine*) was a highly regarded medical text in Europe until the sixteenth century.

faculties. Indeed, in Iran some 70% of science and engineering students are women. This university expansion is, however, creating its own tensions as the economies are not large enough to absorb so many new graduates, particularly women.

Call to arms

Second, each country has directed funds towards military R&D, money that could, for example, have been spent on R&D towards alleviating poverty. Why the neglect of the poor? For many Islamists, achieving independence from Western nations, defence and national security are higher priorities than the Islamic duty to care for society's poorest. Iran, like Pakistan, insists on maintaining a capability to enrich uranium to weapons grade. Egypt and Turkey also both recently announced plans to develop nuclear power. Abdul Qadeer Khan, former director of Pakistan's nuclear programme, was a keen proponent of spreading nuclear technology to other Muslim nations. He is now under house arrest in Islamabad for selling uranium-enrichment technology to Iran, Libya and North Korea,

A third trend suggests that Islamist governments are likely to restrict academic freedoms as much (if not more) than the secular regimes they want to replace. Saudi Arabia, Sudan, Iran and Pakistan are very restrictive environments for certain kinds of researchers, especially social scientists, to work in. Research into the role of government in public life, for example, requires governments to open up to the research community — something that these countries do not do. Because of this, the field of science and technology policy in all four countries is weak or non-existent.

Although academic freedom continues to be limited in Muslim countries, the field of Islamic theology is rife with debate and disagreement on many science-related topics. Moreover, thanks to cable television (in particular the Al Jazeera channel based in Qatar) and the Internet, this debate is beginning to be seen in public as never before. One keenly contested area for theologians is that of the ethics of new technologies. Another is evolution. Islamic opinion on bioethics varies widely, and different countries regulate in different ways. But on this issue, as others, public debate is not as free as it is in more open societies. Although theologians and scholars of religion debate among themselves, it needs a brave lay person or scientist (who is also conversant with theology) to challenge them in public.

M. NIKOUBAZL PH/THI/REUTERS

In Iran, and elsewhere, equal numbers of men and women are studying science and engineering.

Where do the differences in opinion lie? Saudi Arabia (an Islamic monarchy) and Iran, for example, have very different ideas on medical ethics. Saudi Arabia bans third-party *in vitro* fertilization on the grounds that sex and procreation is limited to husbands and wives. But third-party sperm donors are allowed in Iran because the alternative (a couple splitting up if they cannot have children) is considered worse for society. Similarly, Pakistan is practically alone in the Muslim world in banning organ donations from cadavers. This is because the country's Islamic authorities view the human body as being on loan from God, and when a person dies, the body needs to be returned to its creator close to its original state. But this view is not shared by other Muslim states.

Freedom to think

How literally they interpret the Koran will clearly influence how the new Islamist governments regulate science and technology. One of the Muslim Brotherhood's leading thinkers, the Egyptian scholar Yusuf Al-Qaradawi, who now lives in Qatar, is controversial in the West, but has mass support in the Arabic-speaking world, as well as among Muslims in Europe and North America. His book *Priorities of the Islamic Movement in the Coming Phase* (Awakening Publications, Birmingham, Alabama, 2002) is in effect a manifesto for the next wave of Islamist governments.

At one level, Qaradawi is a literalist in that he regards every word of the Koran as the word of God, which he sees as applicable for all times to come. But he also understands that an environment that supports critical thinking was one hallmark of Islam's golden age of scientific development (see 'Islamic era science'). Significantly, he has recently moved closer to philosopher Ramadan in his belief that Islamist governments should encourage self-criticism, that they should learn from failure, and that they have a duty to protect freedoms, including academic freedom and the freedom of any citizen to disagree with the state. "We want scientific thinking and the scientific spirit to guide our life in every way," he says. "It is against the scientific way of thinking to oversimplify complicated issues, or to view difficult problems with an alarming superficiality. Belief to us Muslims is not against reason or intellect."

Qaradawi is concerned that Islamist opposition movements are too literalist and are not doing enough to encourage independent thinking using reason, known in Arabic as *ijtihad*. "My worst fear for the Islamic movement is that it opposes free thinking for its followers and closes the door to *ijtihad*," he says. "If my fear turns into reality, then capable minds that can renew and innovate will escape from our

A long tradition

Seen in its historical context, the return of Islam to politics in countries with large Muslim populations is not surprising. It is a form of government that many experienced with few interruptions for nearly 1,400 years. Until the end of the First World War, most countries in the Middle East were provinces in the Ottoman Empire, and provincial governors applied variants of laws based on the Koran and on the life of the Prophet Muhammad.

The Ottoman Empire was the most recent incarnation of the Islamic caliphate, whose rule began shortly after Muhammad's death in the seventh century, spreading Islam and Islamic government into Africa, Asia, the Middle East, and eastern and southern Europe.

N. ISHTAYEH/AP/EMPICS

Islamic law (sometimes called *sharia* law) is based on two principal sources: the Koran and a record of Muhammad's daily life known as *hadith*. These are complemented by consensus among religious scholars, and independent reasoning by analogy. Among the Sunni and Shia schools of Islam, the latter gives more weight to reasoning and critical thinking, which goes some way to explain the differences between Shia Iran and Sunni Saudi Arabia in bioethics, for example. **E.M.**

S. ADIL/AP

Support for nuclear physicist Abdul Qadeer Khan, under house arrest for selling nuclear technology.

ranks, leaving behind those conservatives who can only imitate and who would like everything to stay as it is, regardless of how ancient it is." *Ijtihad* is sometimes called Islam's forgotten pillar. To others, it poses a threat to Islam by weakening its teachings.

Islamists have a reputation for looking inwards and shutting out the outside world, but they can look west when they need to, says Abdelwahab El Affendi of the University of Westminster's Centre for the Study of Democracy, in London, and chronicler of the rise of Islam in Sudanese politics. "Islamists that come to power on the back of 'we-don't-need-the-West' rhetoric end up becoming more pragmatic," he says.

Some Islamic thinkers are reaching out to the West in surprising ways. The prominent Turkish writer and columnist Mustafa Aykol has creationist views and publishes translations of US proponents of intelligent design. He has been building alliances with US faith-based groups such as the Discovery Institute in Seattle, Washington state. In an article for the US *National Review* last year he wrote: "Intelligent Design can be a bridge between these two civilizations. Muslims are discovering that they share a common cause with believers in the West."

In the late nineteenth century, Darwin's *On the Origin of Species* had a favourable reception in Muslim countries. But that is history, as books, pamphlets and films on creationism are now more popular in Muslim countries, and pro-evolution scientists are afraid to speak out. Adults in Turkey, for example, are even less accepting of evolution than are those in the United States.

Nick Matzke of the National Center for Science Education, a not-for-profit organization based in Oakland, California, has debated intelligent design with Aykol in a Muslim online forum — a first for all concerned — but he thinks that Aykol's enthusiasm for the United States is unlikely to be reciprocated. American conservatives, he says, are not about to reconsider their views on Islam any time soon. "I find it peculiar that Muslims are adopting a doctrine from US groups that regularly bash Islam in a fairly vicious way," he says.

"It is against the scientific way of thinking to oversimplify. Belief to us Muslims is not against reason or intellect."
— Yusuf Al-Qaradawi

At Peshawar University, meanwhile, vice-chancellor Rashid is looking to increase direct links with foreign universities, having concluded an agreement to carry out teaching and research jointly with the University of Leicester, UK; the city of Leicester has a large British Asian population. Excellence in teaching, research and creative endeavour are the highest priority, Rashid says. But for him, Peshawar University's ultimate aim has to be a higher one. This is: "to love and serve the entire creation of the creator". ■

Ehsan Masood writes about science in developing countries.

See Editorial, page 1.

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1126–1198 Ibn Rushd (Averroës)

Spanish-born Islamic philosopher who tried to reconcile the contradictions between aristotelian ideas of studying nature through observation and reason, and religious truth. His writings and translations had considerable influence in Europe.

c.1259–c.1304 Maragha Observatory

One of the top three observatories in the Islamic world, this was built in Maragha in modern-day Iran. Astronomy was highly valued, partly for accurately predicting prayer-times and the Islamic lunar month. Maragha had a library of 400,000 books and a school of astronomy.

1201–1274 Nasir al-Din al-Tusi

Persian astronomer, mathematician and astrologer who worked at the Maragha Observatory. He introduced the 'Tusi couple', allowing Islamic scholars to greatly improve ptolomeic models of planetary motion.

1213–1288 Ibn al-Nafis

Damascus-born physician who worked in Cairo hospitals and produced the first recorded explanation of pulmonary circulation. But the mechanism remained largely unknown until William Harvey's work in the early 1600s.

1281–1923 OTTOMAN ERA

The Ottoman Empire spread from Anatolia into north Africa, Asia, the Middle East, and eastern and southern Europe.

1284 Al-Mansuri/Qalawun hospital, Cairo

Specialized institutions that treated disease for free and conducted research took root under Islamic rule, building on Roman efforts. The hospitals in Cairo and in Baghdad had wards for different illnesses. Clinicians took detailed case notes, which were collated into teaching manuals.

c.1304–1375 Ibn al-Shatir

Damascus-born astronomer and mathematician who developed new models of the Moon and planetary motion that eliminated problems with Greek models. Aspects of his work are identical to that produced by Copernicus.

1332–1406 Ibn Khaldun

Tunisian-born historian regarded as one of the first sociologists. His book, *Muqaddimah*, which is still in print, tries to explain why societies and economies change.

Ayla Arslan