

WHEN SCIENCE TEACHING BECOMES A SUBVERSIVE ACTIVITY  
by  
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I cannot quite decide which is the more dangerous of the two: George Bush and his obsession with ensuring US global military dominance, or the exploding power of brutal fundamentalist religious forces in countries such as mine. I will deal only with the latter here. Believing only in their own version of divinely revealed truths, fundamentalists everywhere fiercely oppose women rights, controlling the world's exploding population, or personal liberty in matters of what you may wear, eat, or drink. Claiming divine sanction for their mission to reform society, they derive additional succor from academic postmodernists in the West who have pronounced scientific truths to be mere social and linguistic constructs. Left unopposed, fundos will surely take us back to the glorious days when the world was without sin.

Incredibly, 400 years after the scientific revolution, we are still here talking about science as a subversive activity, and a moral force for a better world. One might have thought that the battering ram of science and reason, having ceaselessly hammered away for nearly 400 years, by now would have brought down the castles of Christian orthodoxy. You in the West have a wonderful repertoire of heroes: Bruno, Wycliffe, Galileo, and countless others who stood up against the fanaticism unleashed by the medieval church. Therefore one wishes that with the Enlightenment they helped bring about, all who profit from human fears of the unknown and spread terror with their terrible threats of eternal hell would have gone with the dinosaurs. But alas, as I visit this country once again and tune to any of the Christian radio stations, I can see clearly that this has not happened. Today multiple purveyors of spiritual bliss are in business, preying upon weak minds and spirits, and dwelling upon the fear of death and the unknown. They reject scientifically valid theories such as biological evolution, and battle to limit research and inquiry into nature.

Nevertheless, it is very fortunate that everyone present here lives in the 21st century. I too share this century with you part of the time. But about the rest, I'm not so totally sure. A time-warp puts me, and the people of my country, somewhere between the 7th and 8th centuries. At other times it seems to be around the 15th century or so. Quite definitely, however, it is not the period between the 9th and the 14<sup>th</sup> centuries, when Islamic civilization was in its most intellectually productive and brilliant phase. That was the time when a spirit of relative liberalism and tolerance produced first-rate scientists, philosophers, and scholars such as Al-Kindi, Ibn-Sina, Al-Razi, Ibn-Rushd, Ibn-Khaldun, and many others. They survived persecution by the religious orthodoxy of those times, assisted by their powerful but enlightened patrons, the caliphs and sultans. It was this flowering of the intellect in the lands of Islam that had fuelled the European Renaissance.

Tragically, Islam is in a very different phase today. In countries such as Pakistan, where Islam is the state religion and declared to be above the constitution, religion is considered the source of all wisdom and knowledge, including scientific knowledge. This version of Islam, though impossible to follow in its intricate details, is totalistic. It determines what

you may eat or drink, how you may dress, the relation between men and women, and is the single-most important determinant of political and social life of the country. No Pakistani airline flight takes off without a prayer relayed over the public address system. A ruling by the highest Islamic court in the country, which the government is finding impossible to implement, has banned interest and decreed that the entire banking structure will have to be revamped. Women by law receive half the inheritance of a man. Furthermore in a court of law, the testimony of two women is equal to that of one man. But, a man may marry up to four women at a time.

To protect this way of life the state has at its disposal an enormous amount of power backed by guns, tanks, and now even nuclear weapons. In such a situation, one asks the question, how can there ever be hope for my country, and the many others like it? And how is it possible for us to join the forward march of humanity? To my mind, the answer lies in silent subversion; subversion through the teaching of science.

Subversion comes naturally to science because it is wholly based upon critical enquiry, a fact that automatically makes it unwelcome to all ideologies and faiths. But fortunately science is also a marvelous Trojan Horse with an enormously attractive exterior. It brings with it all the good things of life - cars, planes, computers, refrigerators, life-saving medicines, soft drinks and bubble gum. Even the Taliban carry cell-phones and drive SUVs, although television and the internet are banned (and chewing gum may well make the list one day). But this great horse also hides within it certain germs, the pathogenic substances that soundlessly attack and weaken cherished beliefs from within.

To understand why science has been so destructive of irrational beliefs, let us go back to the epic trial of Galileo. It was not a question of cosmology or physics that worked the papacy into a hangmans frenzy. Whether the sun goes around the earth, or vice-versa, the church couldn't really have cared. Crucially important, however, was that the Word of God stood in danger of being shown up. If, heaven forbid, the earth actually went around the sun then the Bible would be proven wrong, suggesting that its Author would have flunked even freshman physics. This would have placed into jeopardy the entire text of the Bible, including all miracles and all the glorious stories of Joshua, Gideon, and so forth. Science, which nags constantly for empirical proof and obsessively asks for reasons, was just too annoying to be tolerated.

Muslims, who hold that the Bible has suffered distortion in the process of transmission, are quite unfazed by the Galileo episode. But, understandably, there is a deeper level of anxiety among them today than ever before. For Muslims, the Quran is the literal word of God - unchanged, undistorted, and pure. This is believed to be so because the Quran was orally transmitted over the early decades of Islam, and hence not subject to the accuracy of scribes. Even today, in conservative Islamic societies, when a child grows up the first thing he learns to read and memorize is the Quran. In more liberal societies it comes later. The integrity of the Quran cannot be challenged, except upon pain of death.

When confronted with a world that has been created by the extraordinary successes of modern science, some who hold the Quran to be the literal word of God have felt

compelled to come up with explanations for holy verses pertaining specifically to physical phenomena - the rising and setting of the sun, meteorites streaking across the sky, rain and drought, earthquakes, the human embryo and reproduction, and so forth. Thus, scientific proofs of the Quran are anxiously awaited and eagerly seized upon. One indication is the immense popularity across the Muslim world of a book authored by a Frenchman, Maurice Bucaille, entitled *The Quran, the Bible, and Science*. It has sold millions of copies and been translated into several languages. The reason for this popularity is not hard to understand the author has proved, to his full satisfaction, that the Bible is wrong and the Quran right in every scientific matter.

While such attempts give some comfort to literalists, it is not enough. Science is still considered dangerous. Indeed, Islamic orthodoxy has indeed come to recognize science as an invasive foreign body and developed a range of distinct immune responses. These fall into three principal categories.

At one level, there is outright rejection of scientific explanations and material causes. Cause and effect must be divorced from each other lest the universe appear to run like a mechanical system. A guide to teaching chemistry in the Islamic way, published in Islamabad, decries the usual way in which the formation of water from hydrogen and oxygen is taught. No, says the book, the teacher must say that when hydrogen and oxygen combine then, by the Will of Allah, they turn into water.

The same logic applies to calamities. So, for example, something like AIDS occurs because it is divine retribution for immoral behavior, and searching for a cure is both impossible and sinful. Earthquakes too happen because you've been bad. I had a very direct personal experience with this in 1974 when there was a major earthquake in Pakistan that killed nearly 10,000 people. Together with a few of my university colleagues in Islamabad, I had gone for relief work in the distant mountains beneath which lay the quake epicenter. Our work was derided and ridiculed as useless and counterproductive by a co-traveling team of proselytizing men with beards belonging to the Tableeghi Jamaat because, in their opinion, the calamity was purely on account of the affected peoples immoral behavior. They had come to preach piety as the sole defense against a heaving, bucking earth.

A second response has been to create a mutated species, but belonging to the same genotype. The new Islamic Science, propagated by the orthodox and liberally dosed with post-modernist jargon, is the fundo reply to Western Science. Like in the Creationist Science you are familiar with, causality, logic, and the usual burdensome proofs required by science are happily dispensed with. The practitioners of Islamic Science are primarily Ph.D.s who have retired, or are inactive, in the scientific fields they were originally trained in. Hundreds of articles have been published in "scientific" journals and presented in dozens of Islam and Science conferences. So, for example, the former head of my department combined Einsteins theory of relativity with a verse from the Quran, and thereby established that heaven is running away from earth at one centimeter per second less than the speed of light. Others have used Coulombs law to calculate the degree of

hypocrisy (munafiqat) in a society, estimated the temperature of Hell, and calculated the chemical composition of djinnis (a certain class of fiery spiritual beings).

Perhaps more commonplace than either of the above two kinds of responses, is to claim ownership of all scientific discoveries made up to the present as well as those that will be made in the future. The view that these were anticipated in the Quran some 1400 years ago is widely propagated on state television, and (I suspect) held to be true by many, if not most people, including my students in the university. Provided one learns ones Arabic properly, and does a correct exegesis of the Quran, then out will pop the Big Bang Theory, black holes, quantum mechanics, DNA, cloning, chaos, and whatever your heart desires. Dozens of conferences have had this message as their basic theme, but perhaps none can rival the grand First International Conference On Scientific Miracles Of The Holy Quran and Sunnah, organized by the Organization Of Scientific Miracles Of The Holy Quran And Sunnah. Held in Islamabad in 1987, and funded by the Pakistani state to the tune of a couple of million dollars, it brought together 200 Muslim delegates from all over the world. A second conference organized by the same organization is now being scheduled elsewhere.

The problem with such claims to ownership is that they lack an explanation for why quantum mechanics, molecular genetics, etc had to await discovery elsewhere first. Nor is any kind of testable prediction ever made. The same problem lies with technology and inventions: no reason is offered as to why antibiotics, aspirin, steam engines, electricity, aircraft, or computers were not first invented by Muslims. But then, even to ask such questions is considered offensive.

The increasing strength of Islamic movements today, which are largely orthodox and anti-science, has definite material roots. These can be traced to the brutal colonization of Muslim lands from the 18th century onwards by the imperial powers, their continued domination and humiliation by the West and Israel, and the failure of secular governments in Muslim countries during the latter half of the previous century. Tragically, such reactionary movements can only take Muslims further backwards.

In the decades and centuries to come, real science will come into ever sharper confrontation with every kind of pseudo-science, not just in Muslim countries but everywhere. As the pace of scientific discovery accelerates, even college-educated individuals will find it harder to deal with a bewilderingly complex environment. The temptation to opt for the simplistic solutions offered by various faiths will grow.

True, science by itself is not enough to liberate humankind and create a better world. But without science there is little chance of this. For it to be socially progressive, it must not be reduced to a mere functional and utilitarian tool, or to a set of arbitrary rules and an endless number of facts. Science teaching should inspire reflection and enhance our capacity to wonder. I suspect that much of the post-modernist drivel on science, brilliantly exposed by the physicist Alan Sokal, owes to the unfortunate circumstances in which the authors encountered science in their high schools. This is truly sad because there are profound truths that can be discovered only by using the methods of science:

how the universe began, why stars shine, whether other planetary civilizations exist, the mysterious world inside an atom, the marvelous molecular arrangements that make DNA and life, and much more. In truth, science is what makes us truly human; without it there could be little but the simple life of the rainforest and the prairie, and no common language shared by different members of the human family.

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