

Teaching Evolution in Muslim States: Iran and Saudi Arabia Compared

Elise K Burton

For the past forty years in the United States, courts have consistently blocked the intrusion of sectarian religious doctrine, such as creationism, into science classrooms. Therefore, it might be expected that science education in general, and treatment of evolution in particular, would be severely undermined in countries that have an official religion or whose governments are subordinate to religious authorities. However, reviewing science textbook and curriculum content for public schools in the Islamic Republic of Iran and the Kingdom of Saudi Arabia reveals several flaws in this presumption. In the West both the Iranian and Saudi governments are often lumped together under as "Islamist states" supposedly sharing anti-modern ideals, but the two countries are quite different in their official attitudes toward the topic of evolution in science education.

THE EDUCATIONAL SYSTEMS

In both Iran and Saudi Arabia, public education is highly centralized: a national ministry of education is responsible for developing the curriculum and textbooks for all schools in the country (UNESCO International Bureau of Education 2006). Use of state-generated text-

books, which are updated and redistributed annually, is mandatory — even in private schools (Saudi Arabian Cultural Mission 2006; Godazgar 2009). The structure of school levels differs only slightly between the two countries (Table 1). Compulsory education extends only to primary school in Saudi Arabia and to intermediary school in Iran (UNESCO Institute of Statistics 2009).

SCIENCE AND EVOLUTION IN SAUDI ARABIA

The Kingdom of Saudi Arabia, as its name indicates, is an absolute monarchy, and King Abdullah himself heads the committee that

determines education policy (Kingdom of Saudi Arabia Ministry of Education 2008). The preamble of the education policy document outlined by the Ministry of Education (Kingdom of Saudi Arabia Ministry of Education 2006) contains the following statement: "Educational policy in the Kingdom of Saudi Arabia is derived from Islam." The sections that follow affirm belief in Islam and "the complete Islamic conception of the universe, humanity, and life" as a general principle of education, with two specific references to the Qur'an. The stated objectives of science education include highlighting the contributions of the Islamic

Table 1.
STRUCTURE OF EDUCATION IN IRAN AND SAUDI ARABIA

		PRIMARY	INTERMEDIARY	SECONDARY
IRAN	<i>School Level</i>	Ebtedayi	Rahnemayi	Motavaset
	<i>(Duration)</i>	(5 years)	(3 years)	(3 years) Pish Daneshgahi (1 year)
	<i>Equivalent</i>			
	<i>Grade Range</i>	1-5	6-8	Motavaset: 9-11 Pish Daneshgahi: 12
	<i>Intended</i>			
	<i>Age Range</i>	6-10	11-13	Motavaset: 14-16 Pish Daneshgahi: 17
SAUDI ARABIA	<i>School Level</i>	Ibtida'i	Mutawasat	Thanawi
	<i>(Duration)</i>	(6 years)	(3 years)	(3 years)
	<i>Equivalent</i>			
	<i>Grade Range</i>	1-6	7-9	10-12
	<i>Intended</i>			
	<i>Age Range</i>	6-11	12-14	15-17

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world to science and showing the "perfect harmony between science and religion in Islam." The appearance of Qur'an verses here fore-shadows many others that follows in Saudi science textbooks at all levels of education.

In the 6th-grade general science textbook, three of the four Qur'an verses that are cited deal directly with creation. For example, a unit on the human body (al-Thuwaini and others 2007: 11) opens with "We have indeed created man in the best of moulds" (Qur'an 95:45). Chapter 51 (al-Dhariyat), verse 49, precedes a unit on plant and animal reproduction (33): "And of everything we have created pairs" (somewhat paradoxically, the unit includes asexual reproduction). On page 61, the importance of water is attributed to al-Anbiya' 30: "And we made from water every living thing." Keeping in mind that this is the last science book any Saudi student is required to read, primary school graduates may end their education with their sole experience of scientific knowledge being irrevocably tied to the concept of divine creation.

The vast majority of Saudi students is able to continue on to intermediary school (UNESCO Institute of Statistics 2009); however, the general science curriculum does not improve at this level. Of course, some topics merit more religious attention than others; biology, astronomy, geology, and climatology sections contain far more Qur'anic references compared to those on physics, chemistry, and technology. This is no doubt due to a greater amount of relevant verses. The verses are presented as authoritative explanations or evidence of various phenomena and are "isolated" from the surrounding text in the sense that the meaning of the verse is not interpreted in any way. Clearly, all verses are intended to be accepted on their face by the students. There is little in the textbooks that alludes to biological evolution or related topics in other fields, such as the origin of life and the universe.

Students who enter the first year of secondary school are required to take a biology course, and the 10th-grade textbook intro-

duces the concept of adaptations in a glossary of biological terms (al-Aqiyal and others 2007). However, the definition for "adaptation" is not given within the context of evolution or natural selection, but as evidence for divine creation:

There exist structural, functional and behavioral characteristics in organisms that help them to survive in their environment. Allah, glory to him, created for organisms those characteristics and structures that enable them to live in their different environments. (38)

No Qur'anic evidence is given for this particular assertion; it is merely a continuation of the creationist theme that guides all Saudi science education.

The 12th-grade textbook contains the first and only mention of evolution by name; following a chapter on organismal classification (al-Habib and others 2006), there are two pages discussing "The Origin of Humanity" (106-7). The section first reiterates the direct creation of humanity as described in the Qur'an, and mentions the similar creation account "in the Torah and the Gospels" (106). It then continues:

Nevertheless in the West appeared what is called "the theory of evolution" which was derived by the Englishman Charles Darwin, who denied Allah's creation of humanity, saying that all living things and humans are from a single origin. We do not need to pursue such a theory because we have in the Book of Allah the final say regarding the origin of life, that all living things are Allah's creation.

After citing two Qur'anic verses on creation, the page firmly concludes "Thus our hearts are at peace with this and no doubt will enter them regarding the origin of life."

The next page adds:

However, Darwin's theory (some preceded Darwin to this theory such as Lamarck, but Darwin succeeded in promoting it in his book *The*

Origin of Species [sic], and therefore it is attributed to him) found supporters who developed and justified it, from the West to beyond where Darwin himself had reached. Unfortunately this theory emerged among some Muslims, who immediately set out to support it unaware of the blasphemy and error in it. (107)

Note the emphasis on evolutionary theory's Western origins and the "blasphemy" of Muslims who support evolution. Reminiscent of American creationism, the book goes on to claim:

Due to this theory's deviant character and its contradictions to intuition and reason, there were many Western scientists who stood against it and exposed its fallacies in scientific research and rational inferences, raising suspicions against Darwin's theory that it consists of assumptions and hypotheses that have no evidence or proof.

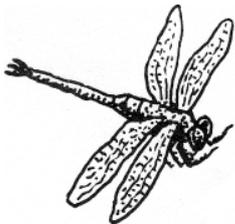
After what appear to be vague references to Piltdown man and Haeckel's embryo illustrations as examples of evolutionary fraud, the section ends:

And in conclusion evidence for the theory of evolution crumbles at the first test; it has merely resulted from misunderstanding, miscalculation, or the effects of scientific limitations, or due to imagination or speculation, or deceit or forgery.

As might be expected, the rest of the textbook, which focuses on descriptions of the various kingdoms of organisms, makes no further mention of evolution, but includes more Qur'an verses as relevant to certain groups of animals. With only this exposure to biological evolution in their public education, Saudi students may enter science programs in domestic and foreign universities.

SCIENCE AND EVOLUTION IN IRAN

In the Islamic Republic of Iran, power is concentrated in the position of Supreme Leader, a cleric



who in turn determines the eligibility of individuals for elected office or government appointments. The Iranian Ministry of Education is not comprised of clerics but is vetted by religious authorities; however, the Experimental Sciences Division of the ministry, in describing its educational philosophy and general goals for science education, makes no explicit references to Islam, though there are two subtle acknowledgments of a "creator of the world" and a "creator of natural laws" (Guruh-ye Darsi-ye Ulum-e Tajrobi 2009). Far more prominent, however, are the themes of economic development and the principal role of science and technology in the improvement of national infrastructure. Science education objectives stress the learning of practical skills, critical inquiry, and the fostering of a scientifically literate citizenry. In contrast to the Saudi curriculum, science is not described as simply an outgrowth of Islam or subject to the preconceived doctrines of any religion — rather it is affirmed as a separate, valid field of knowledge, and one of crucial interest to individual and societal welfare.

The 5th-grade science curriculum, covering the final year of primary school, mandates "The History of the Earth" as an essential topic in the subject of earth science. The 5th-grade textbook devotes a chapter to the topic, with a subsection on "A Short History of Life" (Tehrani and others 2008: 55). The first sentence in this section highlights the essential difference between the Iranian and Saudi presentations of scientific knowledge: "Geologists, via studies of fossils, have arrived at the conclusion that life began in the sea." Portraying geologists, and scientists in general, as the authoritative voices of scientific knowledge, and emphasizing the empirical evidence underlying the textbook's assertions, constitutes the organizing theme of the Iranian science textbooks at all levels.

The evolutionary emergence of life over millions of years is described in simple terms. The transition to terrestrial life is credited to the emergence of plants on dry land: "Afterward, the water and air of planet Earth changed such

that a suitable environment for the development of reptiles came to exist" (56), thus heralding the age of dinosaurs. The extinction of dinosaurs "about 65 million years ago" is noted, followed by the diversification of mammals. The next page contains a section on "The Changing of Continents and Seas," beginning: "Geologists say in the beginning only one landmass and one giant ocean existed on earth. About 200 million years ago, this large landmass slowly began to divide" (57).

In the science textbook for 8th grade, the final year of compulsory education, the topic of evolution appears alongside geology (Amani 2008). The chapter opens with fossils and a review of the history of life, with a clearly illustrated geologic time diagram (31). The page following the diagram is adorned with fossil images, most strikingly a specimen of *Archaeopteryx* with the caption "This is the first bird on earth, which also has some reptile traits" (32). The next five pages are devoted to a brief introduction to "The Evolution of Organisms" in which the tracing of morphological changes in evolutionary lineages is declared " [o]ne of the most important applications of fossils" (33). In contrast to 10th-grade Saudi students, who are taught that adaptations are the God-given attributes of created kinds, Iranian eighth-graders are taught about adaptations in the context of mutations and natural selection, exemplified by the following:

New traits arising by a mutation are mostly harmful and detrimental to life, [but] sometimes in a rare mutation useful traits also appear. An organism possessing one or more useful traits appears, finds greater compatibility with the environment compared to its conspecifics, and gradually the number of [organisms with those traits] increases in the environment. (35)

Perhaps of greatest concern on the international level is the evolution education of future Iranian scientists — in other words, those Iranian students who complete the secondary experimental sciences track and enroll in the correspond-

ing pre-university course. The biology textbook for *pish daneshgahi* (Karam al-Dini and others 2008) includes a 40-page chapter on evolution, as well as chapters on population genetics and "population dynamics and biological communities" (147). The evolution chapter, divided into three sections, provides a comprehensive introduction to the development of evolutionary theory, with the first section devoted primarily to Darwin and his influences and culminating in the formulation of the new synthesis; the second section to evidence of evolution, including paleontology, molecular and structural homology, and embryology, with discussion of evolutionary rates and punctuated equilibrium (94); and the third section to examples of natural selection, such as peppered moths (97) and the work of Peter and Rosemary Grant on Darwin's finches (98). The Iranian textbook humanizes Darwin with a relatively detailed account of his life and a discussion of its historical context, along with the development of support for Darwin's ideas by later scientists. Where the Saudi textbook dismisses evolution as fraudulent science, the Iranian text announces "nearly all biologists today have accepted that Darwin's theory can explain the basis for the diversity of life on earth" (75).

Human evolution is conspicuously absent throughout discussions of evolution in Iranian textbooks. The population genetics chapter reveals that natural selection does in fact operate on humans, giving the examples of stabilizing selection upon newborn birth weight (122) and heterozygote advantage in relation to malaria and sickle-cell anemia (129-30). However, explicit attempts to place humans within the larger picture of evolution do not appear. It is quite possible that the textbooks' silence on human evolution is related to the attempts of the Iranian Ministry of Education to reduce the amount of conflicting information taught in science and religion classes (Godazgar 2008).

Regardless, the extension of natural selection to humans is encouraging compared to the Saudi insistence that God "distinguished [humanity] over the rest of His cre-



ation" (al-Habib 2006: 106). Of course, what the Iranian science textbooks lack most prominently relative to the Saudi ones are the previously mentioned stress on the "Western-ness" of evolutionary theory, as well as the pervasive use of a style of "science-in-the-Qur'an" apologetics increasingly common throughout the Muslim world as a whole (see Edis 2007).

SOCIAL AND HISTORICAL FACTORS

There are several conclusions to be made from the comparison of Iranian and Saudi evolution education. First, although it may seem the two governments are operating under similar precepts that state law ought to mirror religious law, and though they share essentially the same religion (Islam), their official attitudes toward the treatment of evolution in science education are quite different. In light of the different social, religious and historical contexts of the Iranian and Saudi states, the differences in science education may not be so mysterious.

First of all, Iranian society is far more complex. Although it is governed by Shi'a Muslim clerics, Iran officially recognizes its significant minorities of Sunni Muslims, Zoroastrians, Christians, and the largest Jewish population in the Middle East outside of Israel (Office of International Religious Freedom 2008a). Though religious instruction is required in public schools at all levels, non-Muslim Iranians are exempt from examinations on the Qur'an and take classes on their own religious traditions. Iranian religious minorities do still face significant educational discrimination (Office of International Religious Freedom 2008a), but such accommodations in the religious curriculum may play a role in the lack of specific Islamic goals imposed upon the science curriculum.

Saudi Arabia claims a 100% Muslim population (about 90% Sunni and 10% Shi'ite), and its nationals are overwhelmingly Arab (Office of International Religious Freedom 2008b). In comparison, Iran's total population is nearly triple that of Saudi Arabia's, and its primary ethno-linguistic group,

Persians, comprise about half the population; dozens of other groups with distinct languages and cultural histories make up the rest.

Also relevant is the difference between the traditional practice of Shi'a religion in Iran, with its emphasis on *ijtihad* (roughly, "interpretation"), and the Wahhabi version of Sunni Islam endorsed by the Saudi state, which is more preoccupied with Qur'anic literalism. Furthermore, influential Shi'ite scholars, including several who were closely involved in Iran's Islamic revolution, are not opposed to evolutionary ideas in general, disagreeing that evolution necessarily conflicts with the Muslim worldview (Godazgar 2009).

Of course, issues of theology form only a small portion of both states' educational policy motivations to include or discredit evolution in their biology education; as in the US, historical and socioeconomic circumstances may be more important in shaping such policy.

The Saudi kingdom was established as a state in 1932, by the same dynasty of Wahhabi Sunnis that rules the country today. The population of Saudi Arabia, as recently as five decades ago, was predominantly nomadic or seminomadic, with much education occurring in Islamic religious schools outside the state system. The widespread urbanization of the country that occurred in the 1970s as a result of the oil boom led to the rapid proliferation of public schools. So Saudi Arabia lacks any real tradition of secular government or education.

By contrast, Western-style secular education, particularly the French model, had already emerged in Iran in the mid-19th century about the same time the country began its first wave of urbanization. Iran under the Pahlavi dynasty (1925-1979) experienced secularization and Westernization "on a massive scale" (Godazgar 2008:87), and the Pahlavi shahs aggressively promoted their ideology through the state education system. The topic of evolution entered Iranian biology textbooks at this point, and its inclusion was evidently left unchallenged for the years immediately following the Islamic Revolution.

In 1984, however, "the name of Darwin was omitted from the textbooks" (Godazgar 2008: 146), more due to anti-Western than Islamic ideology. Godazgar (2008) documents related textbook content changes, and the conversions of Western names and terminology into Persian, as educational manifestations of the reactions against the Pahlavis' imposition of Westernization and past foreign domination of Iranian industry. The reappearance of Darwin in textbooks in 1998 (Godazgar 2009) coincided with the presidency of Mohammad Khatami, who was considerably more conciliatory than his predecessors in foreign policy matters.

EVOLUTION EDUCATION AS SOCIOECONOMIC POLICY

Saudi Arabia is probably the closer example to the Western image of fundamentalist Islam: an authoritarian state declaring the core Islamic texts to be its constitution and refusing public recognition of other religions or even other interpretations of Islam (Office of International Religious Freedom, 2008b). Yet much of the Saudi condemnation of evolution, as presented in the Saudi textbooks, is tied to a perception of Western (secular) science as a corrosive force upon the *religious* and *social* mores of Muslims. Furthermore, the Saudi government, content until now with its oil wealth, has only recently begun to show interest in developing science as an economic sector.

Meanwhile, Iranian anti-Westernism is distinctly related to a historical experience of foreign interference and domination that never occurred in Saudi Arabia; as such, Iranian anti-Western expression, even in its most vociferously religious forms, does not have the same revisionist effect upon science. Scientific development in Iran, especially the health-related aspects of biology, has been a goal of the Islamic government since the revolution (Godazgar 2008), and Iranian prominence in such fields as stem-cell research has arisen with government funding and support. Indeed, for Iran, creating an internationally renowned scientific community is a source of



national pride (Jafarzadeh 2009). As a result, Iran thus far appears to have the most in-depth and consistent coverage of evolution in its compulsory science curriculum and textbooks (Burton, unpublished data) when compared to Saudi Arabia, Israel, and Turkey.

These examples make it clear that a religious government is not necessarily a barrier to an essentially secular science education, nor to the accurate inclusion of evolution. Secular science research and education seems to be carried out relatively freely within the Islamic ideology of Iran (with some caveats; see Bohannon 2006). It is crucial to understand the history of creationism within the larger context of national political, social, and economic histories to promote evolution education effectively worldwide. If scientists and science educators can also attach evolution education to desirable political and economic goals, they may succeed more consistently on a policy level as well.

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Alford. The only exceptions are Qur'anic verses, for which the English translation of the Qur'an by Abdullah Yusuf Ali has been used. The author takes full responsibility for any errors.

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