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Acceptable Genes?

Religious Traditions and Genetically Modified Foods

Edited by

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and

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Genetically Modified Foods and Muslim Ethics

Ebrahim Moosa

Technological advances in the mass manufacture of food have radically altered the content of what we consume. Revolutionary innovations in genetic engineering and the decoding of the human genome now make it possible for vegetables in our food chain to bear animal transgenes. A tomato containing a gene harvested from a flounder may not generate repugnance in an observant Muslim, since fish is permissible for adherents of this tradition, but a potato with a pig gene may well trigger visceral repugnance. The reason is obvious: an observant Muslim is prohibited to consume pork or any of its products.

Are these developments in science and technology a cause for alarm? Do these changes impact the way we imagine the role of food in religious and ethical life? Indeed, in many religious traditions, Islam included, dietary restrictions and food consumption are constitutive of religious observance as well as the formation of identity. To what extent does technology-driven food production, especially genetically modified (GM) foods, as well as patterns of consumption of such modified foods, challenge traditional Muslim notions of food as well as the accompanying considerations of spiritual and bodily well-being?

Approach to Food

Muslim thinkers and representatives of the early tradition view food and gastronomic consumption as one aspect of the commandment to "live a good life." Addressing believers across the aeons through their prophets, the

Qur'an exhorts: "O you apostles! Partake [lit. eat, *kulu*] of the good things and do righteous deeds" (23:51). To eat of that which is "wholesome" or "good" means to partake from that which in Arabic is *tayyibat* (sing. *tayyib* or *tayyiba*). *Tayyibat* also connotes things that are lawful and permissible.¹ In fact, good, wholesome, and lawful things, according to Islamic teachings, have to be enjoyed and celebrated. Philologists helpfully and interestingly point out that the elements of pleasure and delight are included within the idea of lawfulness.

Thus the crucial responsibility of caring for the body involves both an element of observing ethics and an element of pleasuring the body. Since body and self are not essentially separated, for this reason caring for the body is like caring for the self. In other words, the integrity of the self becomes manifest and takes form in the integrity of the body. Hence, there is an elaborate practice of caring for the body, starting with the nourishment of the body in Muslim practice.

The reasoning goes like this: if the body is the vehicle for the self, then it attains the same inviolability as the self. However, Muslim teachings differ as to whether the body attains sanctity on its own, irrespective of the self (deontological) or whether the body is instrumental to the needs of the self (teleological). Since the purpose of human existence in Muslim thought is related to an afterworldly salvation it is interesting to observe how some Muslim thinkers imagined the body and its needs. In order to attain salvation the body has to be disciplined through learning and practice. Since the body is the locus of such discipline, the etiquette of consuming food also acquires a certain importance in the overall scheme of salvation.

Intelligent people know that seeking salvation in the hereafter, wrote the twelfth-century polymath Abu Hamid al-Ghazali, depends on learning and practice. "Only a healthy body can provide consistency for learning and practice," noted Ghazali, adding, "serenity of the body is not possible without food and nourishment. . . . In the light of this wisdom, some pious ancestors held that 'eating is part of the teachings related to salvation or religion (*din*).'"²

When it comes to food in Islam, the taboos are clearly spelled out in the normative teachings of the Qur'an and the prophetic reports, and, on the rare occasion, are to be found in the decisions of Muslim jurists who would declare some species of seafood to be abominable but not prohibited. While Muslim teachings explicitly identify foods that are banned for consumption, the tradition does not provide any reasons or rationales as to why the consumption of, say, swine and wine is prohibited. Many people reach inferential conclusions to grasp the underlying reason in the commandments that sustain religious claims. Often these are ratiocinations and not necessarily compelling evidence of the effective cause for the bans.

Historians have generally claimed that pigs and certain carnivores were banned throughout the Canaanite-Aramaic world because these animals were associated as representatives of the infernal world.³ That may well be the reason as to why herbivorous domestic animals were deemed permissible for consumption, whereas there were reservations toward scavenging, blood-consuming carnivores in both Judaism and Islam. Muslim teaching acknowledges that wine does have certain merits as a beverage, but it also goes on to explain that its demerits outweigh the merits. Disclosure of the specific demerits of wine is absent but is often divined by scholars. Some speculate that the prohibition might have something to do with the incest taboo or might contribute to degenerate conduct. Sexual violations could occur in a state of drunkenness, as some biblical accounts suggest, even though Muslim sources make no such reference.

While there is an abundance of Muslim ethical teachings related to agricultural commerce, there are relatively few guidelines with respect to food safety. During the genesis of Islam, food safety was evidently not a major concern. Scarcity of food though was a major edificatory theme in the Qur'an. And God as the sovereign in the Qur'an is the one who can withhold food through a variety of acts of nature. Elaborate descriptions of the human condition in scenes of famine, hunger, and the fear of want are scattered throughout passages of the Qur'an. Providing food to the poor and the indigent is also seen as one of the greatest acts of kindness and compassion as well as making one worth earning divine favor.

If anything, food is viewed as a source of divine beneficence and mercy. The devout, in turn, express their gratitude to God by upholding the dignity of food and showing respect for the sources and means of food. Whether it is to safeguard food sources or for aesthetic purposes, perhaps for both sets of reasons, Muslim teachings strongly advocate the preservation of the natural environment. The protection of trees, agricultural land, and sources of water are all vital components to a balanced Muslim environmental ethics.

One overriding and forceful normative trope in Muslim ethics is the preservation of naturalness (*fitra*). To preserve uncontaminated nature coupled with the celebration of a healthy or sound human nature is viewed as the highest of Islamic ideals. These multiple meanings are captured by the notion of '*fitra*,' a concept central to Muslim ethics and spirituality. *Fitra* is the inborn, intuitive ability to discern between right and wrong. "So direct your face steadfastly to faith," instructs the Qur'an, "as God-given nature (*fitra*), according to which God created humanity: there is no altering the creation of God" (30:30). God in the Qur'an is also described as the Original Creator (*fatir*), one who creates the heavens and the earth without any model.⁴ The upshot is this: even nature has an ingrained disposition that determines its order.

Nevertheless, *fitra* is susceptible to distortion and corruption through sin and disobedience. It goes back to the standoff between God and Satan in prelapsarian time. Satan on refusing to bow to Adam earned divine wrath. Then Satan asked for respite to tempt the offspring of Adam, saying in the words of the Qur'an: "And I will order them to alter the creation of God" (Q 4: 119). Even though altering the creation of God here means that humans will corrupt their inner natures through disobedience and rebellion, this passage lends itself to multiple readings. While most classical exegetes have held to a metaphorical meaning, more contemporary lay and specialist readings of these verses claim that any nonremedial physical alteration to the human body or nature amounts to one acting on a Satanic inspiration.

This ambivalence toward tampering with physical nature has some vestigial relations with tradition. There is a celebrated account involving the cross-pollination or grafting of date-palm seedlings during the prophetic era of Islam. This tradition is extremely illuminating for the light it casts on two matters: first, the limits of prophetic authority, and second, on matters related to food production. The story goes that during his career in Madina, Muhammad stumbled upon farmers grafting different species of date-palm seedlings. They did so in order to produce higher yield and resistant date crops. On observing their practice, Muhammad inquired why they did so. To which they replied: "[W]e always did it this way."⁵ The Prophet then retorted: "Well, perhaps, it would be better if you did not."

After some years the date harvest turned out to be a failure. The reason was attributed to the change in their agricultural methods. The dates produced were possibly few and of a very low quality, a catastrophe in a culture where dates were a vital staple. When Muhammad inquired as to the cause for such a decline in the harvest, his companions informed him that they had acted on his counsel not to do grafting. Somewhat surprised and puzzled that his companions adopted his personal opinion, he tried to rectify matters by providing some perspective as to the limits of his authority. In an often-quoted phrase, he said: "I am only a mortal. If I command you in matters of *din* (matters of moral and salvific consequence), hold on to it steadfastly. And, when I command you with my opinion, then I am a mere mortal." In another version of the same tradition, he reportedly said: "You are more knowledgeable in the affairs of your world."

There are several ways of parsing the intertextual hermeneutic at work here. One is the commonsense conclusion that Muhammad acknowledged that his dislike for grafting seedlings was based on his personal taste without any divine disfavor being communicated. Thus, when it came to agricultural matters, he conceded to experience and, in fact, endorsed expert opinion. His expertise is restricted to moral matters that explicitly impact on one's salvation. In other words, moral and ethical practices that are tied to worldly

(secular) pursuits that rely on scientific or empirical knowledge are decided on their scientific and practical merits.

There is a subtle point to be made here. Human stewardship is indeed tied to salvation and how we deal with nature is part of that responsibility. But the critical question is whether matters of a secular and scientific nature can and ought to be primarily decided by teachings and inspiration that are derived from revelation. Or are these primarily matters of secular knowledge where religious stewardship and ethical responsibility ought to be the guidance. From the example provided, it became clear that Muhammad's followers at first misunderstood him. They unquestioningly acceded to his prophetic authority with resultant consequences. He later admonished that not all his actions or teachings are actuated by divine inspiration and that his followers ought to be guided by their own lights in order to grasp the human-divine fault line running through much of prophetic teachings.

To understand this, one has to turn to the notion of *din* in Islam. This term is often misleadingly translated as "faith" or "religion," whereas it has a much broader semantic connotation in Muslim discourse. In Muslim life, proper performance in the secular domain, where one strives to serve both God and humans at once, secures for the actor salvation in the afterlife. Hence, the term *din* denotes practices with salvific ends in mind, but that does not mean it excludes worldly or secular concerns. What is characteristic in Islam is that the boundary between what is typically called "religious" in post-Enlightenment conceptions of religion and the "secular" is not as clearly defined as in other Western religious traditions. In some versions of say Christianity, the "secular" is normatively separate from the "religious." Salvation in Islam depends as much on ethical performance in the work place, as it relies on devotions in the sanctified sacred space designated for worship.

But in Muslim discourse, there is an interpretative metric that evaluates commandments that have a direct bearing on the ultimate questions that is regarded in the provenance of *din*. All other matters ignored by revelation or unspoken, whether these are indirectly related to the ultimate moral values in life or are instrumental to the questions of *din*, are destined to the secular realm, *dunya*. Ethical conduct in the secular realm is assured through stewardship (*khilafa*), which is epitomized by responsibility. People can differ in their understanding as to what good stewardship means. Muhammad's own personal dislike for grafting is one thing but not good enough for public advocacy; his companions also understand him differently at times since there are other instances when they would question his rationales for prohibiting a practice or solicit reasons as to why he took a particular decision.

Careful interpreters of the Muslim tradition were acutely aware of this complexity and often divined the limits of prophetic authority. Hence, very

few traditional Muslim interpreters would adduce the report of Muhammad's dislike for grafting as a normative teaching, being an analogy to demonstrate ethical disdain for genetically modified organisms (GMOs) and genetic engineering for that matter. What GMOs present are a whole series of challenges about which Muslim ethics is as ambivalent and undecided as other religious traditions. At best, Muslim ethics on a range of bioethical and scientific challenges can be described as a work in progress. Most surprising is the dearth of Muslim ethical deliberations on this topic. Apart from a few juridical responses (*fatwas*) that will be analyzed later in the chapter, even in a modern Muslim medical ethics encyclopedia there was no discussion of GMOs and safety in the entry on food.⁶

In part the muted response could in part be attributed to the daunting challenge that GMOs pose since many also view them as a benign technological advance. GMOs radically change all the inherited presumptions of a religious tradition like Islam, and present us with a dynamic system of nature, one that is a constantly emerging novelty.⁷ In fact, Amos Funkenstein's observations with respect to Christian theology could easily also apply to Muslim juridical ethics and theology. Funkenstein states: "The new sciences and scholarship . . . made the traditional modes of theologizing obsolete. . . . Never before or after were science, philosophy, and theology seen as almost one and the same occupation."⁸ The radical shifts in our experiences and understandings of some of the most important presumptions about nature, creation, humanity, society, the individual, and community, among other things, present us with the most profound challenges in trying to make sense of canonical opinions and traditions. In the past, the fundamental categories that we today deploy must have meant something very different, perhaps even unfathomable to us. But there is also a great deal of continuity in the meanings between present and past. Part of the hermeneutical challenge is to properly account for temporal differences in inherited teachings and make sense of them in the present.

Methodological Issues and Theory

There are a range of Muslim opinions and institutions that articulate views on ethics. Each brings a different approach, methodology, and history to its deliberations, and each vies for public attention. GMOs present particular challenges. There is nothing in Islamic teachings that designates foods to be good or bad, permissible or impermissible primarily on the grounds of some inherent quality of goodness or detestability in the food. As GMOs are unprecedented most Muslim ethicists view them as a matter that requires *de novo* personal commitment, study, and intellectual effort, designated as

ijtihad. Over time, accumulated intellectual effort will also update the ethical canon. Muslims refer to this body of knowledge as *shari'a*, revealed teachings that are discovered discursively and often times described as Islamic law. Therefore, *shari'a* would more accurately translate as a hyphenated juridical-ethics. An interesting insight is offered by the Andalusian juridical-ethicist Abu Ishaq al-Shatibi (d. 790AH/1387AD), who claimed that "all of the *shari'a* is about interiorizing the most noble of character."⁹ In other words, at its base *shari'a* is about virtue ethics, a fact well attested to by even some modern Muslim ethicists.

Two requirements are indispensable to the activity of *ijtihad*: The first is to grasp or comprehend the purposes of the *shari'a* or, to use a more contemporary idiom, to grasp the policy goals (*maqasid*) of the *shari'a*. The second is to acquire the skills necessary to extrapolate rules and values premised on such understanding.¹⁰

A major development in contemporary Muslim juridical-ethics is the shift towards utilitarianism. One clue for this is the growing reliance on the doctrine of *maslaha*, public interest or common good to resolve most ethical deliberations. In doing so, ethicists rely on the doctrine of public interest (*maslaha*) as set out by one of its twelfth-century advocates, Abu Hamid al-Ghazali. Classical Muslim ethicists have derived from their reading of the *shari'a* five positive goals or purposes. In this view all ethical and juridical practices must at all times advance and preserve religion, life, sanity, lineage (family), and property. Needless to say, the meanings of each of these goals converge with the idea of public interest. Together public interest claims provide a blanket that conceals a number of subjective predispositions held by actors that are difficult to capture in even the most intricate and comprehensive theory. A determination, for example, as to what is "property" and how it is to be preserved depends entirely on how an ethicist views the market, how he or she views the world. Does the state or do corporations have a role in regulating the market? If so, whose interests will the market serve? The moral force of the market will also depend on the economic and political ideology espoused by the ethicist: is she an economic libertarian, capitalist, or socialist? These are all very pertinent questions in deciding how one determines what is to be in the public interest.

Classical advocates of utilitarian ethics required the doctrine of public interest to meet a three-point test: the test of necessity, decisiveness, and universality. Once these tests were applied, classical theorists arrived at a hierarchical scale of benefits or interests in order of priority to list them as essential (*daruri*), supplementary (*haji*), and cosmetic (*tahsini*). Essential benefits or interests must satisfy one of the five policy goals of the *shari'a*, while the other, lower categories such as supplementary and cosmetic fulfill other, lesser goals. For reasons of fluidity and indeterminacy these goals are

not explicitly stipulated and are seldom vigorously debated. Contractualist models of Muslim ethics, where moral obligation is based on fidelity to a canonical tradition of ethics with all its presumptions of governance, order, and authority reasonably understood and agreed to by all the actors, have gradually given way to utilitarian models that are often scripture-centered.¹¹ It is within these ethical parameters and practices that a topic such as GMOs is negotiated within Muslim ethics.

In many Muslim parts of the developing world the ethical question as to the use of GMOs first landed on the table of governments and state bureaucracies long before they become part of a process of social and ethical debate. Given the perilous state of consultative governance in many instances, debates pertaining to GMOs or cloning, to cite two examples, are not subject to deliberative ethical discussions. These issues only arrive at the desks of ethicists, more often than not, for the sole purpose that they require rubber-stamping and legitimating from religious elites who merely endorse policies adopted by their states.

Within the broad and diverse constituencies of Islamdom one can observe at least two trends on the issue of GMOs. The first are views held by a variety of traditional religious authorities as well as some technocratic and professional Muslims who support ethical and legal sanctity in support of GMOs and view the phenomenon as a manageable risk.¹² The second trend consists mainly of Muslim professionals and technocrats. This group debates GMOs in terms of a precautionary frame.

GMOs as Manageable Risk

Few traditional Muslim authorities have issued rulings on GMOs compared to the relatively more advanced discussions on genetic engineering and human gene therapy. The Saudi-based Council for Islamic Jurisprudence (CIJ), affiliated to the World Muslim League, has deliberated on GMOs since around 1998. The question about GMOs was put indirectly to the CIJ, in the context of providing general guidelines on genetic engineering.¹³ In its ruling the CIJ permitted the use of genetic engineering for therapeutic and preventative purposes, provided that its use did not produce a greater harm than the impairment it attempted to remedy.

For guidelines more pertinent to genetic engineering and food production in the CIJ wrote: "It is permissible to employ genetic engineering and its attendant products in the sphere of agriculture and animal husbandry. This is allowed on condition that all necessary precautions be adopted in order to prevent any kind of harm—even on a long-term basis—to humans, animals and the environment."¹⁴ The CIJ's directive on genetic engineering

and food is conspicuous for its brevity and nebulous language. While the CIJ permitted the use of genetic engineering in the food chain, it issued a vague rider cautioning against harm in its use. It gave little guidance as to how harm is calculated. Who decides on the level and extent of harm? It becomes evident that the CIJ directive had no independent viewpoint on the issue of GMOs or on the larger discussion on genetic engineering for that matter. On all these issues it relied almost entirely on expert knowledge, scientists, and technologists who inform the CIJ and on the basis of which they formulate the ethical permission to use GMOs coupled with the caution against harm. On what grounds the CIJ permits the use of GMOs remains unclear. Is it because they are unconvinced that the use of GMO crops will decrease or disrupt gene variation? Or do they favor the viewpoint that GMOs help with nutritional deficiencies and aid in producing higher yield crops? Since the reasons and rationales for favoring GMOs are not given, therefore the favorable decision of the CIJ signed by some leading jurists from the Muslim world remains under a cloud.¹⁵

However, to be fair, on face value it appears that CIJ did show some awareness of the gravity of genetically engineered substances in the human food chain. For in the very same fatwa, it insists that the use of GMOs in food and medicinal products be disclosed through labeling. Consumers wary of potential harm from GMOs have a right to be informed. "The Council calls on all companies and manufacturers of foods and medicines and other products derived from substances produced by way of genetic engineering," the fatwa read, "to disclose the contents of such [engineered] substances in order to ensure transparency as well as to alert users to [possible] harm and [inform them about products] that are prohibited in terms of juridical-ethics (*shar'*)."¹⁶ If harm is anticipated in the long term to humans, animals, and the environment, then the CIJ finds this to be compelling grounds to apply the rule of precaution. Due to the absence of detailed documentation it is difficult to grasp how the CIJ debated the political, economic, and other scientific issues associated with GMOs. These aspects cannot be easily delinked from the strict ethical and moral concerns related to the ingestion of foods that may potentially have harmful consequences.

What generates considerable concern, if not visceral disapproval and skepticism, among observant and devout persons is the use of genes derived from prohibited substances. Once again manufacturers are required to inform consumers when such substances and transgenes are used in food and medicines. So the question arises: would a potato developed with a pig gene, or a medicine using heparin, a substance derived from pigs and other animals, be permissible for Muslim consumption? One of the methods applied by traditional Muslim jurists was to inquire whether the essential physical and chemical properties of a prohibited substance had been "transformed"

(*istihala*) into a totally different product. If so, then the original ban on the prohibited substance no longer applied.¹⁷ Since the prohibited substance had mutated into something else, like wine mutates into vinegar, the rule no longer applies.

If the rule of the transformation of a prohibited product is applied to transgenes it could have interesting outcomes. Some jurists have been applying this analogy to their views on transgenes. The question would be: does the transgene retain any of the essential features of the prohibited substance, or does the gene merely serve as a chemical formulation outside the potato to produce another substance, which is then in turn introduced into the potato? In fact, one can even raise the question whether one can really say that a pig gene is in the same degree of prohibition as pig meat itself. Some would argue that what is prohibited for Muslims is the consumption of pork. Can pork be viewed to be identical to pig genetic materials, which "code for the nucleotide sequences in mRNA, tRNA, and rRNA required for protein synthesis"?¹⁸ Obviously, opinions would be divided on these questions depending on a range of factors. Among these factors would be the way adherents understand the moral commandments of their faith, their meritorious view of science or otherwise, and the way in which certain realities get communicated to them. Some scholars might dismiss any similarity between pig genes and pork, while others would view the two to be identical in essence. These issues have been discussed somewhat extensively in certain traditions of Jewish ethics. One of the concerns among Jews was whether the insertion of a gene in a tomato produces phenotypic change. The phenotype of an individual organism is either its total physical appearance and constitution or a specific manifestation of a trait, such as size, eye color, or behavior that varies between individuals.¹⁹ Some in Jewish circles object if transgenes produce genotypic changes, in other words, changes to the specific genetic makeup of an individual in the form of DNA. Muslim ethicists would most likely follow a similar line of inquiry and ask similar questions.

Following in the footsteps of the CIJ, Muslim religious authorities in Indonesia, which hosts the largest Muslim population in the world, have approved the use of genetically modified organisms in the human food chain. Singapore's Muslim religious authorities have also endorsed the use of GMOs, as have those in Malaysia. In India some Muslim religious authorities, generally more conservative compared to their colleagues in the Middle East, have given a cautionary green light to GMOs. As far back as October 1997 at its meeting in Bombay, the Islamic Fiqh Academy of India adopted a resolution approving the cloning of animals and plants. It qualified its approval by saying it deems permissible "such cloning in plants and animals that are beneficial to humans and which do not threaten humans from a religious, moral and physical perspective."²⁰ This openness to the altruism

of science is premised on thin versions of Muslim ethical doctrines and has emboldened other institutions to follow suit. In 2005, Darul Uloom Nadwatul Ulama in Lucknow, India, an important seminar on the subcontinent, issued a fatwa approving GMOs. Asked whether the consumption of GMOs was permissible, the brief reply issued by both Mufti Masood Hasan Hasni and Mufti Nasir Ali read: "To eat such fruit and vegetables is permissible. Unless the harm of a thing is known categorically or by means of a dominant probability, one cannot designate a permissible thing to be prohibited on a mere apprehension of harm. However, if out of precaution one refuses to partake of such foods, then that is the exercise of one's choice."²¹

In Malaysia, Abu Bakar Abdul Majeed sees absolutely no conflict in the goals of Muslim ethics and the use of GMOs as long as the dietary requirements of Islamic law are observed.²² Transgenes derived from non-permissible food sources would, in his view and those of others, constitute such a prohibition. Majeed fosters the view that economic gain and the advancement of the standards of nutrition are both highly desirable goals. If biotechnology served such ends within an acceptable Islamic ethical paradigm, then it is permissible. In his view the ends justify the means. Majeed draws on the work of bioethicist David Magnus who disapproves of reducing the question of biotechnology and GMOs to a risk-benefit analysis. For Magnus, as well as Majeed who follows him, the following question arises: is it so morally wrong to recombine genes from different organisms? Of course, they answer their question rhetorically. As much as Majeed is enthusiastic about genetically modified foods, he never directly addresses the moral question whether it is permissible to recombine genes. Neither does he provide any theological or ethical backing for his argument. From his comments it becomes clear that his approval of GMOs is informed by a highly pragmatic approach to science.

Two individual scholars shed some realist light on the debate on GMOs. A noted traditional scholar from Egypt, Shaykh Dr Hasan 'Ali al-Shadhili, showed some sensitivity and awareness that the flourishing of the human race requires a high level of genetic diversity. While he is positive about biotechnology, he is also concerned that it can go in the opposite direction with harmful effects.²³ Iran's Ayatullah Muhammad Ali al-Taskhiri was more optimistic about the outcome of biotechnology. He hews close to the scientific debates and invests a great deal of authority in the judgment of science. Ethical and political decisions, Taskhiri points out, cannot be made in advance of the scientific evidence. "There should be no haste in making ethical decisions as long as the scientific results are inconclusive," he said.²⁴

The Islamic Food and Nutrition Council of America (IFANCA), the main North American certifying body that designates food as "permissible" (*halal*) by Islamic standards, is reported to support foods derived from

GMOs.²⁵ However, IFANCA has not issued an explicit statement in support of GMOs. In one newsletter IFANCA said: "On the issue of biotechnology and GMO foods, there is no specific reference to this in the Islamic Law sources. However, it is accepted that GMO from *haram* [prohibited] sources would be *haram* [prohibited]. There is a place for biotechnology in *halal* food production. One example is the production of GMO chymosin for cheese manufacture."²⁶ Other than this statement, IFANCA appears ambivalent and demonstrates some concern about GMOs, animal feed, and food safety. "Islam stresses the need to consume 'pure' foods," IFANCA stated. "Organic products are a major step in the direction of *halal* [permissible food]." Then IFANCA makes a surprising theological leap. It points out that since God is both the author of the laws prescribing permissible foods (*halal*) and the creator of humans, the pietism that God "knows what is best" for humans must be true.²⁷

However, Richard Foltz has criticized IFANCA for its uncritical support for modern food production techniques.²⁸ IFANCA followed the letter of law, Foltz said, and as a result mechanically applied the rules to very different kinds of foods and food production techniques. Foltz proposed that it would be more profitable if IFANCA and others tried to grapple with the underlying spirit (health, compassion) of Islamic law on food, which might produce a different set of answers. As a certifying council, IFANCA restricts itself to meticulous investigation of food contamination with pork and alcohol products but paradoxically embraces GMOs that might incubate harm of an unknown kind.

Precautionary View

In Muslim communities, especially those in the West, religious authorities are not among those who exhibit greater sensitivity and concern about GMOs in the nutritional system. Rather, modern-educated persons with scientific training and backgrounds are among those who harbor the strongest reservations, with the help of rudimentary elements of a scriptural Islamic theology that is further informed and amplified by a critical and self-reflexive view of science. Among those who adopt such a theology is Mohammad Aslam Parvaiz, who unhesitatingly aligns himself with that sector of the scientific community who believe that the use of transgenes in food harbors catastrophic consequences.²⁹ Parvaiz catalogues an array of scientific opinion and studies to show how transgenic fish and crops already pose serious environmental risks.

However, it is not always clear whether someone like Parvaiz is primarily motivated by scientific convictions or by scriptural theology or a

combination of both. His theological starting point is that nature had been designed or had evolved to reach a delicate and balanced (*mizān*) ecosphere. *Balance* is a term derived from the Qur'an that imports the image of the weigh scale of justice and fair balance in life. Within Muslim thought this notion has been elevated to a metaphysical principle of proportionality and measure (Q 54:49,55:7-9). Parvaiz views genetic engineering as janus-faced. While it produces "many innovations in Allah's creations," the very same technology is the source of deleterious "change [in] Allah's creations." His principal concern is that genetic engineering manipulates microorganisms about which we know very little. Transgenic organisms irreversibly interfere with the "most sacred of sacreds, that is, the gene pool of an organism," Parvaiz argues. Here he is most probably referring to genotypes and expresses doubts whether any scientific grounds can justify altering certain life forms to suit human needs. Furthermore, his major concern is that such an invasive level of human interference in the ecosystem will produce unforeseen disturbances on the planet. Parvaiz, in his resistance to GMOs, resorts to a theological reading of certain passages of the Qur'an, especially the verses that urge humans not to alter God's creation.

Parvaiz's interpretation of the Qur'an is indeed very modern. Classical Muslim exegetes did not understand the ban on the altering of nature to mean a prohibition on manipulating physical nature for meaningful ends. Rather, they believed that it was human nature that was susceptible to distortion, which could in turn result in morally degrading practices. Here lies the crucial difference between those traditionalists who support the manageable risk position on GMOs and some modernists who adopt the precautionary approach. Some of the Muslim traditionalists clearly understand the Qur'anic proscription to apply to our moral nature, not our physical nature. The Muslim modernists, in turn, read those same passages and interpret their meanings to be a prohibition on the corruption of physical nature. While the differences in practice might be subtle, they hold serious consequences for theology. Indeed, a theological ban on the manipulation of nature often produces a certain kind of absolutism and determinism. If the traditionalists are pragmatically restrained by the canon, then the modernist exuberance with science can potentially result in the rendering of absolutist interpretations of the Qur'an.

In a less theological mood, Saeed A. Khan urges Muslim communities to join the alliance of concerned scientists, producers, and consumers in the United States and abroad to combat the use of GMOs. Such opponents view GMOs as an alarming and illicit use of science that has the potential to "colonize" not only people residing in the developing world but also people living in the developed West through scientific and corporate hegemony.³⁰ Khan draws our attention to global policy concerns. While he acknowledges

that GMOs could be of benefit, he is not altogether sure if the benefits-versus-dangers algorithm has been satisfactorily addressed. He is prepared to err on the side of caution, arguing that if unregulated and unchecked then food from GMOs has the potential of "becoming a weapon of mass destruction, rather than the intended weapon of mass consumption."

The 1997 Casablanca resolution of the Ninth Islamic Medical Ethics conference serves as a capstone for this cautionary approach. "It will be excessive to claim that genetic engineering was safe in the realm of plants, despite many years of experimentation," the resolution stated. "And thus far, it is not even on the threshold in terms of its application to animals. Perhaps the unknown factor is the greatest cause for anxiety in this matter. Humanity should certainly not forget the lesson learned most recently from the splitting of the atom: the detrimental consequences of radiation to the body became apparent, a fact that was neither known nor expected at the time of the invention. Therefore, it is imperative to monitor the outcome of genetic engineering experiments on plants and animals for a protracted time."³¹

Views from the Focus Group

Viewpoints from both the managed risk approach and the precautionary approach percolated the opinions canvassed at the Muslim focus group held in Vancouver, BC, on the question of the relationship of religiously informed dietary practices with food.³² The focus group elicited a series of very productive and interesting responses as to how communities relate to food. The voices of ordinary Muslims in ethical debates are seldom heard; often the interpreters of the tradition have the final say, often without broad consultation with communities. This study is informed by the rare input of a cross-section of opinions held by Muslims and provides an index of the sensitivities and concerns they harbor with respect to food.

Several participants believed that the Qur'an encouraged Muslims to pay special attention to certain types of food. Most participants found the mention of foods in the Qur'an, such as milk, honey, figs, grapes, and pomegranates to confer a certain sacrosanct status on those food types, which made them approach these foods with a certain piety. One participant had given thought to such food types and classified it in the "encouraged" category of Islamic law. Another reason why some viewed the foods mentioned in the Qur'an differently was because these foods were "naturally originated." Others were drawn to a substance like honey, because they believed it to be particularly "nutritious," rich in vitamin K and fructose. Honey also had other properties and uses, such as the ability to combat certain allergies and heal wounds, one participant added. Not only did certain foods have nutri-

tious properties, but they also had healing and spiritual characteristics, some participants said, singling out foods such as honey and milk.

Some members of the focus group offered medical and scientific rationales as to why Islam forbade the consumption of carrion, blood, and pork. Blood contained harmful pathogens, they claimed, which could in turn be harmful to the body. For this reason Islamic slaughtering methods of allowing the blood to drain from the meat were viewed to have health benefits. Participant V8 succinctly conveyed a prevailing attitude toward food. "The philosophy of Islam," V8 said, "is to save the human body from any dangers. So Islam prohibited . . . different food[s] [since] they are injurious to human health."³³ Pork, participant V3 claimed to learn from a son who is also a neurologist, contributed to the parasitic infection of the brain, neurocystercercosis, with symptoms similar to epilepsy.³⁴ The same participant explained that to observe a religious diet was to seek God's love, friendship, proximity, and wisdom. Another person, V2, provided a more sugary rationale, arguing that the dietary prescriptions of Islam dating back to antiquity contained wisdom that even science could not fathom.

Participant V7 aired greater skepticism about science and thereby its claims about food safety and GMOs. This participant claimed that "science always takes the U-turn," meaning that later findings of science could contradict or correct earlier findings. By contrast, V7 continued, "if you analyze the Qur'an, it's never taking U-turns." While the triumphant tone favoring faith-based claims is self-evident, of greater significance is the sense the interviews convey of practitioners' views that religious teachings on food contain a higher wisdom than the claims made by science about foods. However, the same participant also appealed for a "more open-minded" approach in order to shorten "the gap" between religion and science.

Participants in the focus group demonstrated a heightened awareness about the importance of labels, since there is a strong suspicion that certain substances prohibited by Islamic rules might be utilized in foods as innocuous as cakes and pastries. Many were concerned about contamination of prohibited products. "Coming to Canada," one participant said, "we always look at the labels and what's in the product, what we can buy, and what we cannot buy, and it's a challenge." Once the full extent of the debates about GMOs dawned on some of the participants, several also insisted that genetically modified foods ought to be labeled.

GMOs elicited a spectrum of opinions among the participants, in part reflecting the lack of clarity found in the meager Muslim scholarly literature on the topic.³⁵ Overall the focus group participants showed hesitation and ambivalence towards embracing GMOs and their use in the human food chain. Predictably, the use of a prohibited gene, like the use of a pig gene to enhance tomatoes, was met with strong disapproval, since pork was unlawful

to Muslims. Another participant, V8, who followed the Ja'fari interpretation of Islamic law adopted by those belonging to the Shia sect, objected to consuming cucumbers that were modified with jellyfish genes, since most seafood, apart from fish, were not allowed in Ja'fari law.

Objections to GMOs ranged from particular understandings of Islamic law and theology to making certain presumptions about what is natural and balanced in terms of an Islamic worldview. For V7 it was not so much that certain genes were stained by rules of prohibition; rather it had to do with a natural balance in nutrition that GMOs would disturb. "So when we genetically modify a food," V7 said, "what happens is we are creating one ingredient; we are creating an imbalance into that food, right? . . . [Y]ou are creating an imbalance in the nutritional value of that particular food." The main concern was about the unknown and hidden effects of GMOs. "Since you are creating an imbalance," said V7, "it has multiple after-effects of that food, right?"

Some participants showed an awareness of the grafting of date-palm seedlings in prophetic times and the Prophet's later approval of the practice. So V3 was very much in favor of putting wisdom, which was seen as a God-given endowment, to beneficial use. But the principle concern was that such wisdom must not lead to a situation where lawful and unlawful items were mixed. More important, V3 had strong reservations about mixing genes from one species to another. Taking genetic materials from animals to plants and vice versa was to V3 an instant when one disturbs the balance of nature. Mad cow disease alleged to stem from the use of animal products in the food chain for herbivores such as cows was offered as an example of mixing the genetic makeup of the food in the food chain from different species and the harm it causes.

Among the participants, V8 pleaded for greater nuance and pointed out that there were some contradictions in the views posited by fellow Muslims in the focus group. Gene transfers involved the moving of invisible particles, V8 said. Gene transfers of prohibited substances were different from genetic modification involving lawful substances. Genetic modification already occurred in nature, V8 said, and human beings only accelerated the modification process via technology. If a gene from a pig were to be used to prevent the transfer or spread of mad cow disease, then V8 would be positively predisposed towards such modification and use. Another participant, V1, was also favorably predisposed to genetic modification, arguing that Islam was not opposed to such practice. These participants detected a weakness and lack of complexity in the reasoning adopted by other participants in their various attempts to address an issue as serious as GMOs. They wished to adopt some distance from an oft-displayed religious reflex that caused many adherents as well as traditional experts to take refuge in

the binary permissible (*halal*) or impermissible (*haram*) logic of Islamic law. As to the use of prohibited substances in GMOs, V1 pointed out that the use of "one gene is negligible." However, like V8, V1 also preferred that Muslim experts be the final arbiters of this question. They both expected experts in religion to be in conversation with scientists in order to decide on such weighty matters as GMOs.

Participant V5 offered some advice to Muslim bioethicists, especially when deliberating on GMOs. One should determine this issue not only on the grounds of permissible or impermissible substances, V5 said. "I think Islam . . . looks from many other perspectives also before it can say whether something is acceptable or not acceptable." Of specific concern to V5 was this:

[W]hat would be the effect of [GMOs] on the environment short-term and long-term? What would be the effect of [GMOs] on the health of the people who consume [them]? What would be the effect of [GMOs] on the ecosystem, right? . . . I have a verse from the Qur'an where it says that there is no changing in God's creation. And, in another place the Qur'an talks about the balance which brother V7 mentioned. I think the balance is not only nutritious balance . . . it's talking about balance in the absolute sense. . . . So if we modify something and it has an effect which is not wanted, how do we take care of that? . . . I don't think Islam can say much on this point at this time because the results are not in front of us.

This participant demonstrated a sophisticated understanding of "balance" as not merely being a matter of metrics, but that it involved something more subtle. One is loath to second-guess the intentions of focus group participants, but here there is more than a hint of maintaining a metaphysical and cosmic balance, which includes the nourishment of the human body as well as the maintenance of the ecosystem.

Several of the participants were dubious of the long-term effect of GMOs and urged caution and appealed for a slow-down in its application. They feared that technology was hurtling forward at breakneck speed without any pause, a prospect that might lead to a situation of no return with unquantifiable possibilities of harm, especially if GMOs swamped the food chain. Others canvassed expressed a certain helplessness and incapacity to deal with issues of food at this level of complexity. At the same time they also displayed a certain pragmatism mingled with anxiety.

In many ways the reasoning of some of the participants in the focus group resembled the theology utilized by those Muslims who had specialized

in science and who held firm views against the use of GMOs. Many of the laypersons participating in the focus group inflected the idea of human stewardship (*khilafa*) and responsibility in human relations with the ecosystem. Surprisingly, this overarching ethical theme was absent in the Muslim scholarly literature produced by the traditionalists.

GMOs and Muslim Ethics

Not only GMOs but also a whole range of modern practices in bioethics ranging from organ transplantation, brain death, gene therapy, and now genetically modified foods pose challenges to the inherited legacy of Muslim ethics. As true as Funkenstein's insight shows how religion and science have become delinked in the modern period, there are other more complex challenges.

Muslim ethicists, whether they are of the traditional stripe or of the modern scientifically trained kind, have yet to configure the theory and practice of Muslim ethics in relation to vastly changed social realities. It is self-evident from the snapshot of views on GMOs that the mechanistic application of either traditional rules of the *shari'a* or enlightened interpretations of scriptural authority at best produces a hit and miss version of ethics, and at worst is deeply unsatisfactory. In part, this has to do with the intellectual lay of the land in ethical thinking in different parts of the Muslim world and in places where significant communities of Muslims find themselves.

The critical fault line lies with those who advocate a normative ethics, who determine, judge, and justify practices with a tool kit of knowledge from the canon. This canon has been slow to update itself and carries a baggage of norms, practices, and forms of reasoning that no longer resonate with contemporary experiences of Muslims. Hence, anachronism is often the product of such reasoning, even though such traditional modes of thinking can be utilized for pragmatic ends to justify modern practices. But whether this approach restores intellectual integrity remains questionable. It therefore comes as no surprise that the rulings from traditionalist practitioners, such as the CIJ and the Nadwatul Ulama, can with unmitigated clarity rule on the permissibility of GMOs with a perfunctory paean to caution.

Even those who advocate a precautionary approach to GMOs provide a rather thin theology to justify some emotional resistance to the use of GMOs. In fact, the case of GMOs and food safety is not really about whether a food product is lawful or unlawful. Rather, the desirability of GM food products actually forces us to think about larger questions, such as what are desirable lifestyles and life forms? How do we utilize resources on earth? In

other words, meaningful ethical discussions on GMOs ought to reflect fairly serious thinking about how individuals and communities envisage what they deem to be desirable lifestyles, practices, and truth claims. Unless one has thought about some of these metaissues and adopted a political position for or against certain decided and desirable ends, only then can ethical judgments for or against GMOs cohere and make sense.

Ethics is a discourse, a system of interwoven truth claims that are embedded in social relations and material practices. Since it is embedded in social relations and material practices it is also in a certain state of flux and part of a network of relations. Things converge and diverge from old and new positions. New elements merge with old ones to become starting points for new modes of thinking in keeping with changing experiences and newer forms of knowledge. In order to deal with a range of contemporary ethical issues, I recommend a constructivist approach to ethics, one that indicates a particular way of understanding the relation between knowledge and what we experience as reality.³⁶ In constructivist accounts, the way we perceive the world in terms of truth, cognition, science, and related matters is not independent of sensory and conceptual-discursive activities, but rather, as Barbara Hernstein Smith put it, our knowledge emerges from or is constructed by those activities and experiences.

Furthermore, a constructivist ethics must take cognizance of the fact that in a range of issues in contemporary life, but especially with respect to the industrial reshaping of life and the turn to science, we enter into a very different kind of discursive struggle that fits with what Michel Foucault had termed "biopolitics."³⁷ Foucault helps us to understand what modernity changed in terms of the way we perceive ourselves and our specific notions of existence. It is our existence as social and living beings that modernity questions. This is the new "politics," as Peter Andr ee explains, in the sense that the ways we come to understand life are increasingly constituted through scientific truths. And these truths are more than "facts" since they are value-laden in their framing. Thus the biopolitics of genetic engineering and the way it plays out in concerns about food safety and GMOs are not merely decisions taken about "facts," but they center around certain sets of values.

The significant point Foucault makes is to claim that unlike ancient governance, where sovereign power was marked by the right to take a life, modern power became obsessed with the "administration of bodies and the calculated management of life."³⁸ Biopower today has its parallel in ecopower or geopower with its distinct object as a concern with "life" accompanied by a wide array of knowledges and practices.³⁹ Power no longer deals with modern human beings as legal subjects but deals with living beings and seeks to attain mastery over them. GMOs fall squarely within the flux of contemporary iterations of biopower, namely, ecopower. Given the dynamic nature

of biotechnology, neither rejectionist nor panglossian approaches result in productive engagements with biopower. Rather, a discursive approach allows one to see both the productive and disciplinary character of ecopower and especially the numerous points of resistance that exist within discourses.

Beyond a simplistic scripturalism and a decontextualized traditionalism, a constructivist ethical turn will enable Muslim ethics to address the challenges of a radically changing ecosphere with greater conviction and efficacy. Provisionally, my own position is molded in the precautionary frame toward GMOs for a number of reasons. First, there are compelling reasons why one should be cautious, given the fact that risk management is no guarantee against irreversibly harming the ecosystem. Second, both the precautionary and risk-management frames acknowledge the links among norms, science, and risk in decision making. In that sense they are opposite ends of the same spectrum. Third, one needs to explore GMOs and food regulation within a framework that is not restricted by science-based decision making. Unfortunately, religious communities, including Muslims, have not been able to go beyond science-based decision making on this issue.

Conclusion

Lack of vigilance against GMOs and the inability to probe beyond science-based decision making also has to do with the location of Muslim communities. Many live in the developing world where food scarcity, international aid, and food imports are subject to international and geopolitical considerations. Political and economic exigencies may prevent religious authorities from investigating biotechnology with a hermeneutics of suspicion. To do so would require religious authorities to be prepared to politically and intellectually challenge political authorities, which in many places could be a risky and intimidating venture. Such an approach could come with attendant political risks, and the intellectual skills and resources to counter the hegemonic scientific discourses would often be lacking.

Science and technology are often presented as a panacea for the problems of the developing world with promises of life-changing possibilities and the potential to save lives. In the case of vaccinations and other forms of health care, this is not a totally untrue proposition. With science's prophetic aura increasingly becoming a marker of "civilization" few people have the power and authority to resist the darker side effects of this juggernaut. Hence people, including religious authorities, come under the ideological spell of science and do not always possess the skills, moral as well as critical, to resist and question science and its practices. The absence of democratic

governance compounds the moral issues. Often religious authorities merely have to endorse government decrees instead of facilitating public debate.

Religious authorities take a very pragmatic approach in evaluating biotechnology associated with GMOs. Since there is no compelling evidence that GMOs can harm the body, coupled with the fact that it is rare that prohibited transgenes are used in food, Muslim religious authorities are willing to give GMO-producing biotechnology the green light. Whether the long-term environmental impact of frontier biotechnology will be subject to serious ethical and moral scrutiny within Muslim quarters is not always evident. However, there is some hope that those who adopt a precautionary approach might be instrumental in expanding the parameters of the debate and thereby bring a larger set of issues and concerns into ethical and discursive purview.

Notes

1. Muhammad b. Mukarram Ibn Manzur, "Lisan Al-'Arab," ed. 'Abd Allah 'Ali al-Kabir (Cairo: Dar al-Ma'arif, nd), 4:2733.
2. Abu Hamid Muhammad b. Muhammad al-Ghazali, "Ihya 'Ulum Al-Din" (Beirut: Dar al-Kutub al-'Ilmiyya, 1421/2001).
3. S. Daniel Breslauer, "The Vegetarian Alternative: Biblical Adumbrations, Modern Reverberations," in *Food and Judaism*, ed. J. Leonard; Ronald A. Simpkins Greenspoon, and Gerald Shapiro (Omaha: Creighton University Press, 2005), p. 83.
4. Thomas Cleary, *The Qur'an: A New Translation* (Starlatch, 2004).
5. Muslim Ibn al-Hajjaj, ed., *Sahih Muslim*, 9 vols. (Cairo: Dar Abi Hayyan, 1415/1995), 8:128.
6. Ahmad Muhammad Kan'an, *Al-Mawsu'a Al-Tibbiya Al-Fiqhiya* (Beirut: Dar al-Nafa'is, 1420/2000).
7. Ronald Cole-Turner, "Theological Interpretations of Biotechnology: Issues and Questions," in *Claiming Power over Life: Religion and Biotechnology Policy*, ed. Mark J. Hanson (Washington DC: Georgetown University Press, 2001).
8. Amos Funkenstein, *Theology and the Scientific Imagination from the Middle Ages to the Seventeenth Century* (Princeton, NJ: Princeton University Press, 1986), p. 3.
9. Abu Ishaq Ibrahim b. Musa al-Shatibi, *Al-Muwafaqat Fi Usul Al-Shari'A*, ed. 'Abd Allah Daraz, 4 vols. (Beirut: Dar al-Ma'rifa, nd), 2:77.
10. 4:105–06. Some scholars prefer to give *ijtihad* a restricted scope, stating that juridical-ethicists can only engage in activism in the absence of clear directives from the revealed sources and the rules established by precedent. To make it even more restrictive some require contemporary experts in juridical ethics to abide by the onerous and largely dated methodology and hermeneutics established by the canonical schools of law (*madhahib*). For orthodoxies of this stripe then, adhering to

the formalistic rules makes all the difference between an acceptable and legitimate production of *ijtihad* and one that falls short of such standards that impute legitimacy or its opposite. Countering this more formalistic school are others who argue that even when clear directives, texts, and statutes do exist, ethico-judicial activism, *ijtihad*, is integral to the moral enterprise, albeit a highly circumscribed activism. For it could be argued that every act of interpretation such as choosing one precedent in favor of another or preferring one analog above another involves an element of activism. In fact, al-Shatibi shows instances where even transparent verses of the Qur'an are subject to interpretive *ijtihad* (al-Shatibi, *Al-Muwafaqat Fi Usul Al-Shari'a*, 4:103). He further claims that *ijtihad* is a requirement in every age. The reason for his claim is self-evident but often missed: textual rulings that constitute the early legal sources are based on a number of finite events. Therefore, such texts by their very nature have in-built limitations, Shatibi argues, whereas contingencies are unlimited. Therefore, the fact of temporality requires an ongoing process of *ijtihad*. (Shatibi: 4:104.11). Apart from trying to explain some of the difficulties in making ethical determinations within contemporary Muslim juridical ethics, this necessary diversion also sheds light on another dimension. Practices involving GMOs, genetics, and cloning, as well as brain death, organ transplantation, and a range of issues in biotechnology are all very much science- and technology-driven enterprises. If we keep in mind my earlier observation that the relationship or fit between inherited theories of Muslim juridical ethics and the presumptions of scientific tradition have been ruptured and that their resolution remains a work in progress, then issues related to GMOs or any of the ethical dilemmas raised by modern technology are profound questions of translation. Given the diversity of Muslim societies, subcultures, and economic and political disparities ranging from developed world to developing world contexts and a myriad of intermediate situations, it is extremely difficult to speak in magisterial terms about any of these issues without losing some of the rich textures of what ought to be discussed. One of the disadvantages of such decontextualized discussion is that the ethical deliberations are extremely mechanical in nature.

12. I am indebted to Peter Andr e, "The Biopolitics of Genetically Modified Organisms in Canada," *Journal of Canadian Studies* 37, no. 3 (2002) for the helpful categories of framing the GMOs debate in terms of manageable risk and the precautionary approach.

13. Majlis Majma' al-Fiqhi li Rabitat al-'Alam al-Islami, "Bi Sha'n Istifada Al-Muslimin Min 'Ilm Al-Handasa Al-Wirathiya" (Pertaining to Muslims Deriving Benefit from Genetic Engineering), <http://www.themwl.org/fatwa/> (1419/1998).

14. Ibid.

15. The thinkers on the IJA committee included the late Shaykh Abd al-Aziz Abd Allah bin Baz of Saudi Arabia, the late Shaykh Mustafa al-Zarqa of Jordan, Shaykh Yusuf al-Qaradawi based in Doha, Qatar and the late Mawlana Abu al-Hasan Ali al-Nadwi from India, in addition to some thirteen other signatories.

16. al-Islami, "Bi Sha'n Istifada Al-Muslimin Min 'Ilm Al-Handasa Al-Wirathiya (Pertaining to Muslims Deriving Benefit from Genetic Engineering)," <http://www.themwl.org/fatwa/>.

17. iMajlis al-Majma' al-Fiqhi bi Rabitat al-Alam al-Islam, "Bi Sha'n Hukm Ist'Mal Al-Dawa Al-Mushtamal 'Ala Sha'y Min Najis Al-'Ayn: Ka Al-Khinzir Wa

Lahu Badil Aqall Minhu Fa'idatan Ka La-Hebarin Al-Jadid," <http://www.themwl.org/fatwa/> (1424/2003).

18. <http://en.wikipedia.org/wiki/Genetics>.

19. <http://en.wikipedia.org/wiki/Phenotype>.

20. Qadi Mujahidul Islam Qasmi, "Jadid Sa'insi Teknik: Cloning" (New Delhi: Islamic Fiqh Academy, India, 2000), p. 75.

21. Fatwa issued 24/08/1426 AH, Darul Ifta, Nadwatul Ulama.

22. Abu Bakar Abdul Majeed, ed., *Bioethics in the Biotechnology Culture* (Kuala Lumpur: IKIM Institute of Islamic Understanding Malaysia, 2002).

23. Hasan 'Ali al-Shadhili, "Al-Istinsakh: Haqiqatuhu, Anwa'Uhu. Hukm Kulli Naw' Fi Al-Fiqh Al-Islami," *Majallat Majma' al-Fiqh al-Islami: al-Dawra al-'Ashira* 10, no. 3 (1418/1997), p. 204.

24. Ayatullah Muhammad 'Ali al-Taskhiri, "Nazratun Fi Al-Istinsakh Wa Hukmuhu Al-Shar'i," *Majallat Majma' al-Fiqh al-Islami: al-Dawra al-'Ashira* 10, no. 3 (1418/1997), pp. 219–20.

25. Rob Lake, "Current Awareness of Genetically Modified Food Issues Project 99," [http://www.Moh.Govt.Nz/Moh.Nsf/7004be0c19a98f8a4c25692e007bf833/4bfbc7660fe2d8d44c25695f007efbda/\\$File/September2001.Pdf#Search=%22ijc%20and%20gmo%22](http://www.Moh.Govt.Nz/Moh.Nsf/7004be0c19a98f8a4c25692e007bf833/4bfbc7660fe2d8d44c25695f007efbda/$File/September2001.Pdf#Search=%22ijc%20and%20gmo%22) (Institute of Environmental Science and Research Limited & Christchurch Science Centre, 2001).

26. http://www.ifanca.org/newsletter/2003_08.htm.

27. http://www.ifanca.org/newsletter/2003_01.htm.

28. Richard C. Foltz, *Animals in Islamic Tradition and Muslim Cultures* (Oxford: Oneworld, 2006), p. 117.

29. Mohammed Aslam Parvaiz, "Scientific Innovation and Al-Mizan," in *Islam and Ecology: A Bestowed Trust*, ed. Richard C. Foltz, Frederick M. Denny, Azizan Baharuddin (Cambridge, MA: Harvard University Press, 2003).

30. Saeed A. Khan, "Neocolonialism in the Muslim World through Genetically Modified Foods: The Empire Strikes Back?" (Association of Muslim Social Scientists, 32nd Annual Conference September 26–28, 2003).

31. Islamic Fiqh Academy, "Tawsiyat: Al-Nadwa Al-Fiqhiya Al-Tibbiya Al-Tasi'a Cassablanca 1418/1997," *Majalla Majma' al-Fiqh al-Islami* 10, no. 3 (1418/1997), p. 431.

32. Muslim Focus Group, May 30, 2005, Vancouver BC.

33. Ibid., 13.

34. "Epilepsy," *Encyclopædia Britannica Online*. Accessed September 23, 2006 from <http://search.eb.com/eb/article-9032798>.

35. Muslim Focus Group, May 30, 2005, Vancouver, BC.

36. Here I draw upon the work of Barbara Hernstein Smith, *Scandalous Knowledge: Science, Truth and the Human* (Durham, NC: Duke University Press, 2006).

37. Michel Foucault, *The History of Sexuality Volume 1: An Introduction*, trans. Robert Hurley, 3 vols., vol. 1 (New York: Vintage (1978), 1990), p. 138–44.

38. Ibid., p. 140

39. Andr e, "The Biopolitics of Genetically Modified Organisms," p. 167.