

Introduction

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A lively debate about genetically modified foods has engaged around the world since their first introduction onto the markets of many countries in the last decades of the twentieth century. The debate has been especially intense in Europe, Japan, and parts of Africa and has led in many instances to moratoria on the introduction of genetically modified crops into the agriculture of the societies and strict requirements for the labeling of genetically modified foods and food ingredients produced in or imported into the country.

This debate has been uncharacteristically subdued in North America, where these products were first grown for commercial use and sent to markets for consumption. Public concern or opposition was limited primarily to small, often marginalized, environmental or consumer groups but did not become widespread as in other regions. One reason for this may have been that government regulators in Canada and the United States approved these products for the market with no public announcement that they were doing so and certainly without any prior public consultation, in contrast to the practice in most European countries. Indeed, most people in North America have been until very recently completely unaware that much of the food they are purchasing is from genetically modified corn, canola, soybeans, and other crops, and that genetically modified or cloned food animals have been developed and applications for their market approval submitted to their regulators.

Although public awareness is now more widespread in North America, levels of concern over GM food are still fairly low on the public's list of political priorities. One concern, however, is not low—that of the desire for labeling of these products in order to give consumers a choice whether or not to purchase them.

There are many surveys of what, for example, Canadian, American, or British populations think about various aspects of biotechnology and genetically modified foods. But these global surveys are rarely conducted in ways that capture the specific concerns of subpopulations whose attitudes or values might vary significantly from those of the population in general, such as those who are adherents of specific religious or ethical cultures and traditions. Indeed, it is well known that the manner in which people respond to requests for their opinions on nearly any subject is influenced significantly by many variables. Most important among these is the manner in which the question posed by the questioner is contextualized. For example, most subjects occupy different social roles, and it may not be evident to them which one they are being asked to adopt when responding to a question—that of consumer, citizen, parent, or member of a cultural or religious community. These identifications can make a significant difference in the way people respond to requests for their opinion, because the particular personal or social identification makes more salient to them the values and concerns that are appropriate to that identification.

Clearly, among the most important social and personal identities in terms of which people reflect their most profound values are their religious and ethical identities. Asking someone in his or her capacity as a religious believer or practitioner to advance an opinion on a matter from the point of view of that religious belief or practice is likely to elicit a different response than if one had asked for the opinion in abstraction from that role or from the point of view of some other role, such as the role of citizen or consumer. The very general question, “Do you think genetically modified foods are a good thing?” or even the more specific question, “Do you think genetically modified foods should be labeled?” asked out of any context and abstracted from any background of information that could be crucial to the subject’s assessment of the issue may not elicit a reliable expression of the subject’s considered judgment in light of his or her core values. A question that asks the subject to reflect on a matter from the point of view of those core values and in light of otherwise unavailable information that might be relevant to those values would be more likely to elicit a reliable response. So, the question, “As a Muslim who follows the discipline of Islamic dietary rules (*halal*), how do you feel about eating food that contains DNA from an animal that is not acceptable for you to eat?” draws the subject’s attention to aspects of the issue that may not have occurred to him or her at all if the more general question had been asked or if the question had not been addressed to the subject *as a Muslim*.

The aim of this book is to understand the moral and religious attitudes of significant subpopulations within pluralistic societies whose traditions and beliefs raise for them unique questions about food and dietary practice that

potentially influence their attitudes toward various types of food biotechnology. We have focused our study on those subpopulations who identify with long-standing religious and ethical traditions with well-articulated philosophies or theologies about what is appropriate to eat or how the food one eats should be produced or prepared for human consumption. Such philosophies are well represented in most of the great world religions and in the long-standing secular moral tradition of ethical vegetarianism. For the purposes of this study we have focused on those traditions with the most significant representation in North American society: Christianity, Judaism, Islam, Hinduism, Buddhism, Chinese religion, and ethical vegetarianism. All these traditions have within them specific prohibitions on the use of certain animals or plants in the diet or norms governing the cultivation or preparation of foods.¹ So all of them would seem to have the potential for raising questions about the propriety of growing or consuming certain kinds of genetically modified plants or animals, including those plants or animals that might contain DNA artificially transferred from other plants or animals considered morally problematic within the tradition. In this book we limit our focus to food consumption issues and do not consider the environmental or ecological concerns that GM foods may raise. Such concerns are left for others to address.

There is another reason why it is important to look carefully at the attitudes of well-defined religious and ethical communities toward a controversial technology such as GM foods. It is precisely because these attitudes are the product of fundamental *religiously* or *conscientiously* held moral beliefs that they have a social and legal standing that may raise them to a higher level of significance for industry and regulators than other consumer preferences. Fundamental religious and moral values do not affect consumer and citizen behavior in the same way as mere preferences, and they also carry with them moral and legal claims for respect and tolerance that mere preferences do not, especially in societies committed to the legal protection of religious liberty and freedom of conscience. This issue is discussed in more detail in the final chapter of this book.

There are at least two very different ways one might go about trying to shed useful light on a complex issue such as how different religious traditions might view challenges posed by food biotechnology. One way would be to ask expert interpreters of the religion to examine the nature and philosophical/theological basis of the religion's norms around production, preparation, and consumption of food and to explain the reasonable or expected implications of these beliefs and norms for genetically modified foods. This is a largely *normative* approach to the issue in the sense that it asks an expert who understands well the logic and rationale of the belief system behind a religiously motivated dietary practice to interpret how that

belief system *ought* to view aspects of the new technology. Its strength is that it provides at least one account of how the tradition is most likely to handle the issue (if it is consistent). It also provides significant guidance to members of the tradition who sincerely wish to know how they should view the matter consistently with their fundamental beliefs or practices.

This approach also has obvious and significant weaknesses and limitations, especially for predicting the actual attitudes and behavior of those who espouse the religious or ethical outlook. One is asking for the opinion of *one expert* in the tradition. With respect to most religious or ethical philosophies, expert interpreters, whether adherents or observers, are likely to reflect widely divergent and incompatible viewpoints on the issue. Of some traditions it is often observed that there are as many interpretations as there are interpreters (or maybe even more!).

A further weakness in the “expert opinion” approach is that expert and nonexpert interpreters often disagree significantly in their interpretation of the theory they both claim to espouse. This is true as much in the case of science as in that of religion or ethics. Not only do experts and nonexperts typically disagree in their interpretation of a theoretical perspective or a tradition, but the former are notoriously inaccurate in their predictions of how the latter are likely to interpret it. Or, what is even more familiar, experts tend strongly to view the opinions of the nonexperts as uninformed and/or the product of irrational fears or influences (such as a sensationalistic media). Expert interpreters of a religion sometimes view the adherents to that religion as ignorant in their understanding of the theological or ethical tradition and thus may even question whether they “really are” adherents of the religion. This raises the age-old question of what (or who), finally, defines the nature of a religion: is it what the expert scholars of religion or its own theologians and interpreters say it is (or ought to be) or what the majority of those who claim to practice it say it is (or reflect in their own behavior)?

This book attempts to deal creatively with these problems of “expert interpretation” by engaging both the expert interpreters of these religious and ethical traditions and the “nonexpert” or lay adherents to the traditions in their understanding of the issues posed by GM foods to their dietary norms. The chapters that follow in the book are written by competent scholarly interpreters of the religious and ethical traditions we consider. But we have also engaged groups of lay adherents, committed practitioners of these religious and ethical traditions, in a process of informed conversation and debate around the implications of their dietary norms for certain specific aspects of genetic modification we felt they might consider relevant.

This more empirical and *descriptive* part of the research project has been carried out through the use of focus groups whose members were recruited

from local religious communities in Western Canada.² These groups were conducted by a professional facilitator, using a carefully constructed set of questions relating to technological developments such as animal cloning techniques and, particularly, the transfer of genes from plant or animal sources considered to be unacceptable as food within their tradition. These groups were presented with a short presentation on the nature of GM food technology, designed to be as objective as possible, and then were asked to talk about their reactions to a series of different uses of this technology in light of their dietary philosophies and commitments. There is, of course, no assumption that focus groups are “representative samples” of a religious community. They clearly will not be. Their value is not that they provide a scientifically reliable picture of the attitudes of adherents of the tradition as a whole but that they help call attention to the ways these adherents can view an issue in light of their commitments to the tradition—ways that may well be missed, or even dismissed, by the expert interpreters of the tradition.

We have represented the views of the focus group members in this study within the chapters written by the scholars. An integral part of the process of this research project was two meetings of all the chapter authors and the focus group facilitator. At the first team meeting the authors agreed upon a methodology and “common focus” for the book as a whole and began the formulation of the questions for the focus groups. The second meeting of the team was held a year later, where the authors subjected their first drafts to the critique of the whole team and where they were presented with the results of the focus groups that had been conducted in the interim. Not surprisingly, the views expressed in the focus groups toward both GM food technology in general and specific applications of the technology often differed substantially from the interpretation of these same issues offered initially by the chapter authors. The authors were then asked to incorporate the views expressed in the focus groups into their revised chapters, not necessarily by *accepting* them but by trying at least to understand and explain the understanding of the religious or ethical tradition underlying the responses. As a result of this process of engagement with the focus group comments, and the peer review provided by the team meeting, nearly all the chapters express views on the genetic modification of foods that are supported both by the scholarly analysis of the tradition itself and by the understanding of this tradition expressed by lay members in the focus groups.³ Further comment on the divergence of viewpoints between the focus groups and the chapter authors is contained in the final chapter.

Our hope is that the two-pronged methodological approach of this book provides a more profound understanding of the way in which adherents to these religious and ethical traditions, both expert and lay, are likely to

exercise their deeply held value commitments around food production and diet in the marketplace and in the political sphere generally.

In the first chapter, Samuel Abraham sets the baseline for our consideration of “acceptable genes” by describing the scientific understanding of genes and how they work in genetically modified organisms (GMOs). A GMO is one where an alteration has been made to the genetic material that will be inherited by the offspring of the organism. Abraham explores how the current development of food and animal GMOs may be seen as an extension of a long-standing human effort to “improve” on desirable traits in agricultural plants and animals. After defining genes, Abraham goes on to describe their connection to simple and complex traits and how gene expression involves the production of proteins. He then explains how a transgene GMO (one in which species boundaries are crossed) is created and used in agricultural food production. For example, the genetic modification of plants can allow them to utilize less of an existing resource, to function better in a particular environment, or to provide extra value (e.g., more protein). In the future, says Abraham, the biotechnology industry will continue to seek new ways of genetically modifying existing agricultural practice so as to add value to the foods we consume for both the farmer and the consumer. The chapter concludes with a discussion of the risks involved in the application of genetic modification to the agricultural production of food—especially the lack of genetic diversity and genetic variation resulting from the use of fewer varieties.

In his chapter, Paul B. Thompson summarizes the ethical rationales behind using, opposing, or qualifying the use of agriculture as they have been expressed in the past twenty years of debate. He interprets the controversy over agricultural biotechnology as an episode in the ongoing social, political, and ethical struggle over the guidance of food production and consumption. He reviews this debate under five categories in which the products and processes of rDNA have been alleged to pose risk: human health (i.e., food safety), the environment, animal welfare, farming communities in the developed and developing worlds, and political and economic power relations (e.g., the rising importance of commercial interests and multinationals).

Having examined debates over the possible risks posed by gene technology, Thompson goes on to consider the use of gene technology as itself the basis of concern—that there is something about the manipulation of living matter at the genetic level that is of ethical concern. Some members of the general public, for example, hold the view that the manipulation of genes or cells is either forbidden or presumptively wrong (e.g., unnatural). This viewpoint was manifested in several of our focus groups. Arguments used to support the belief that the genetic modification of food is an unnatural activity include the following: (1) the idea that plants and

animals have “essences” that are violated by genetic engineering; (2) that plants and animals are part of a “natural order” with an underlying system of specific purposes that genetic modification will disrupt; (3) that genetic modification of foods evokes a reaction of emotional and moral repugnance (e.g., the reaction expressed by many to the cloning of Dolly the sheep in 1996), which is viewed in itself as grounds to regard cloning as intrinsically wrong; and finally (4) religious arguments that attach religious significance to species boundaries and question the wisdom of genetic engineering, which crosses such boundaries (see chapters 5–11). As the chapters in this book show, although many philosophers and theologians reject religious and special concerns about the unnaturalness of biotechnology, most would support the argument that respect for such beliefs constitutes a powerful basis for segregating and labeling the products of biotechnology so that people can make choices.

In her carefully argued chapter Lyne Létourneau finds that genetic engineering does not pose a *direct* threat to vegetarianism. The case for vegetarianism finds no rational basis to reject the use of genetically modified plants with added DNA from animal origins. But there are *indirect* reasons for concern, and these have to do with an underlying conflict between genetic engineering and vegetarians’ systems of values and beliefs about the social and physical environment. Létourneau distinguishes between “health vegetarians” and “ethical vegetarians.” Health vegetarians adopt a vegetarian diet mainly for health reasons and are less committed ideologically to vegetarianism than ethical vegetarians. Consequently, health vegetarians are less likely to oppose GM foods—whether they include transgenes from animal origin or not—if the safety of such GM foods is clearly established and if they offer proven health benefits in addition. Health vegetarians constitute the majority of people who adopt a vegetarian diet.

However, ethical vegetarians base their opposition to the consumption of GM foods more in concerns over environmental protection and global considerations for social justice along with sensitivity to human health issues. Ethical vegetarians worry that the genetic modification of food will lead to a loss of genetic diversity; that it will widen the gap between developing countries and industrialized nations; that it will reinforce the concentration of power in the hands of industry; and that it will create unknown risks for human health. Even if human health benefits were established and proven to be risk free, the genetic modification of foods would continue to be opposed by ethical vegetarianism for social and environmental ideological reasons.

Létourneau notes that the focus groups involved in our study emphasized moral consideration for animals and environmental protection as a major basis for vegetarianism. Moral questions over the use of animals for food were a special concern in the vegetarian focus groups, specifically the

view that it is morally wrong to treat animals as resources to be exploited or as a means to achieve human ends. Thus animal farming for the purpose of raising and killing animals is seen to be a violation of their moral status. The transfer of genetic material from an animal to a plant is described by one focus group member as a violation of the animal's essence and integrity. Thus the focus group's view that animals have intrinsic value also supports the position that there are species boundaries that must be respected and not crossed by genetic engineering. The conclusion from the focus groups was that adding animal DNA to plants violated the species boundary requirement; it incorporates into a plant an element of an animal's identity, and consequently eating such a plant may be considered as equivalent to eating animal flesh. For practicing vegetarians then, the labeling of such transgenic plants is clearly required.

Laurie Zoloth, a specialist in Jewish ethics, finds a surprising openness to GM foods and technologies in the Jewish tradition. The most respected legal authorities of the Conservative and Orthodox Jewish communities advocate the widest use of new ideas and technologies with reference to GM foods. This approach arises from an ethical perspective that begins by assuming that anything not listed in the Jewish texts as forbidden is permitted. Although the *Mishnah* prohibits the grafting of plants, this does not prohibit the joining of DNA strands from one species to the DNA of another species since DNA technology is not mentioned in the texts. Further, if something is not permitted to Jews to make or do, says Zoloth, it is not intrinsically immoral unless it violates the laws given to all peoples as Noah's family emerges from the ark. Thus, although certain sorts of crossbreeding or grafting are prohibited for a Jew, a Jew may still make use of the products of others' crossbreeding, for example, by riding a mule or eating broccoli. Other overriding aspects in relation to Jewish ethics and new innovation are the core values of saving life (*pekuach nefesh*) and healing the essential brokenness of the world (*tikkum olam*). In Jewish scriptures the world is seen as unfinished, and the role of a Jew is to be part of the ongoing act of creation that may be enacted through human interventions in illness, suffering, agriculture, and industry to better feed the world. These considerations, argues Zoloth, have led Jewish law to give a broad and sympathetic hearing to research in genetics and the genetic modification of foods. Yet Jewish ethics also contains general admonitions not to harm nature or to act in a hubristic fashion.

Zoloth helpfully describes the ethical understanding of the place of food in Jewish life. Nature is not seen as normative, and the production of food is instrumental. Food and the rules of its production are essentially the way God cares for the poor via our labor. The Jewish system of "kosher" is intended to place limits on the desire, production, and consumption of

food. It is in the sharing of food at home and in the Jewish community that these nonrational rules of kashrut (kosher practice) still apply. With regard to genetically modified animals, grain, vegetables, fruit, and dairy products, Zoloth shows how contemporary Jewish legal scholars have studied the genetic modification of foods and carefully considered the Jewish prohibitions against mixing some animals and some plants. In most cases, it seems, genetic material may be transferred from one species to another without violating the prohibition against mixing. Commentators also turn to the possibilities for healing or for the better feeding of the poor in their support for GM foods. But worries are also expressed over the possibilities for unforeseen side effects. Zoloth notes these same worries as appearing in the Jewish focus group comments along with worries over the role of greed in the production and marketing of GM food. However, in spite of these worries, Zoloth, through a careful textual study, concludes that genetic engineering is not prohibited by Jewish law, and indeed may well be a way to help the world's poor to a good harvest of improved food leading to better health. However, in the focus groups of Jewish lay people, fears were expressed about the use of GM food from the perspective of its safety, its permissibility under the rules of kashrut, and whether the genetic modification of animals is an unacceptable act of human hubris in its alteration of God's creation. Zoloth tends to discount these worries by Vancouver-area lay people as a result of, as she puts it, their living remotely from centers of Jewish population and scholarship.

In his chapter, Donald Bruce of the Church of Scotland observes that the attitudes among Christians toward GM food vary widely from enthusiasm to outright opposition but often lie somewhere in between. Unlike many other religions, Christianity does not have specific food requirements. The *New Testament* declares that there are no prohibitions on any type of food. However, Christians are to be filled with the Spirit of God rather than engaging in drunkenness or excess eating. But sharing a meal is the ideal in Christian family life. As a member of the Mennonite focus group said, "we use food to show love in the act of eating together." Food also is used symbolically in the central Christian rituals of the Lord's Supper, Holy Communion, and the Mass.

With regard to the genetic modification of food, most churches that have examined the practice do not find a theological reason to say it is intrinsically wrong. Rather, Christian concerns tend to focus on the consequences or social context of such activity. The genetic modification of plants and animals to meet legitimate human needs is seen by many Christians to be acceptable as part of the dominion over nature granted to humans by God. However, humans are accountable to God in their actions, which must ensure respect for creation and love for nature and for the disadvantaged in

the use of nature. Past selective breeding has greatly changed the genetic makeup of plants and animals. So, it is suggested, if God has given humans the skill to alter food crops and animals by moving a few genes across species, and there is no clear biblical prohibition, then the practice should not be rejected. God's creation may be seen as filled with possibilities that humans, through science and technology, have a God-given mandate to develop for the enrichment of the lives of others.

Some Christians, however, feel that genetic modifications of food and animals are not natural and are an attempt to play God by wrongly changing what God has created. This worry was expressed by some people in the Christian focus groups. Both sides of this debate within Christianity are carefully reviewed by Bruce. He observes that for many Christians the issue becomes a matter of judgment as to whether GM is more hubris or a right use of our God-given talents for human good. But what about questions of risk? Because we as humans have finite knowledge and are morally fallen in our understanding, we may not have wisdom to know the outcomes sufficiently to make such far-reaching changes as the transgenic modification of species. Some focus group members worried about the unknown effects that genes or proteins introduced into a plant from another species might have upon the body or on the rest of nature. Such worries lead to calls for the exercise of precaution, but how much? The Church of Scotland concluded that because the risks vary greatly between applications, a blanket moratorium against GM was inappropriate. Others in the focus groups argued that no genetically modified crops should be used until it can be demonstrated that no harm will result. Overall the strongest concern raised in Christian assessments of GM food is a concern over issues of justice and power. This is closely tied to questions of indigenous versus scientific knowledge (as discussed in the chapter by Shiri Pasternak, Nancy J. Turner, and Lorenzo Mazgul) and issues of justice and power in both developing and industrialized countries. For example, it is uncertain if many of the GM applications invented for North American bulk commodity farmers are relevant to the needs of African subsistence farmers and their equivalents around the world. Bruce also raises worries over the use of animal cloning in U.S. beef production as going too far into a factory mass production mentality and losing respect for animals as God's creatures. Some Christian laypeople expressed reactions of "abhorrence" to such procedures.

In his chapter on Muslim ethics, Ebrahim Moosa notes that the Qur'an views food consumption as part of the commandment to live a full life. Caring for the body is a key part of caring for the self and is essential for salvation. In this context, the Qur'an and prophetic reports identify foods that are banned from consumption but do not give reasons as to why pork and wine, for example, are prohibited. However, in the Qur'anic concept of

'*fitra*' (the naturalness given by God in creation), even plants and animals have an innate disposition that determines their proper order. But *fitra* is subject to distortion through human sin and disobedience. How does this play out when humans get involved in altering plants and animals in agricultural science and practice? For Islam, the key guideline goes back to an encounter of Muhammad with workers out in the fields grafting different species of date-palm seedlings. Although at first Muhammad suggested it would be better not to graft, he later limited his authority to moral matters that explicitly impact on one's salvation. When it came to practical agricultural matters, he endorsed experience and expert opinion. In other words, ethical issues that are tied to secular or worldly pursuits and rely on scientific or empirical knowledge are to be decided on their scientific and practical merits. However, such ethical behavior in the secular realm is limited by our stewardship (*khilafa*), responsibility that we humans must exercise in our dealings with nature. Moosa concludes that Muhammad's example regarding grafting along with the questions as to what good stewardship may require leaves Muslim ethics ambivalent and undecided in its response to the challenge of genetically modified foods. It is at best a "work-in-progress" marked by its dearth of ethical deliberations apart from a few juridical responses or *fatwas*, which Moosa goes on to analyze.

For Islam, says Moosa, there is nothing that designates foods as good or bad, permissible or impermissible, in terms of their own inherent qualities. GMOs, however, because they are so unprecedented, lead most Muslim ethicists to view them as requiring a personal commitment to study and intellectual effort (*ijtihad*). Over time, such accumulated effort will update the *shari'a* or ethical canon so as to be able to respond to the challenges of GM foods. At present Moosa observes two trends on the issue of GMOs: (1) the group of traditional religious authorities (along with more technocratic and professional Muslims) who give ethical and legal support to GMOs while viewing them as manageable risks; and (2) Muslim professionals and technocrats who discuss GM foods in terms of a precautionary approach. An example of the first trend is the Saudi-based Council for Islamic Jurisprudence (CIJ), which has studied GMOs since 1998 and ruled that it is permissible to employ genetic engineering in the sphere of agriculture and animal husbandry so long as precautions are taken to prevent harm to humans, animals, and the environment. But little guidance is given as to how such harm is to be identified and measured. The same CIJ ruling, however, did insist that the use of GMOs in food be disclosed through labeling. Muslim authorities in Indonesia, Singapore, Malaysia, and India have also given a cautionary green light to GMOs in the human food chain. In North America, the Islam Food and Nutrition Council (IFANCA), which designates foods as permissible (*halal*), is reported to support foods derived from GMOs.

Regarding the second trend, “the precautionary approach,” Moosa points to Muslim communities, especially in the West, where it is modern educated Muslims with scientific training, rather than religious authorities, who voice reservations about GMOs in foods. With the help of some Qur’anic knowledge and a little Islamic theology, such individuals adopt a more critical stance toward genetic science and agricultural biotechnology. Here Moosa points to Mohammed Aslam Parvaiz, who aligns himself with those in the scientific community who believe that the use of transgenes in food harbors catastrophic environmental consequences. Parvaiz sees GMOs as janus-faced, producing both innovations and disrupting disturbances in Allah’s creation. Parvaiz, in his resistance to GMOs, resorts to a theological reading of Qur’anic passages that urges humans not to alter God’s creation. Moosa offers a critical assessment of the interpretation. As an example of a different sort of precautionary approach, Moosa discusses Saeed Khan, who is less theological in his urging of Muslims to join the alliance of concerned scientists, producers, and consumers in the United States and abroad to combat the use of GMOs in food. Khan sees GMOs as an alarming use of science to potentially colonize people in both the developed and the developing worlds. Canvassing opinions from the Muslim focus group, Moosa finds views that fit with both the managed risks and the precautionary approaches outlined above. Overall, the lay members in Muslim focus groups showed hesitation and ambivalence toward embracing genetically engineered foods and insisted that such foods be labeled so that Muslim consumers could avoid them. The use of a pig gene to enhance tomatoes met with strong disapproval, since pork is unlawful for Muslims. Others in the focus groups argued that genetic engineering would upset the natural balance of nature, especially when genes from one species are mixed with another. However, some discussants were favorably disposed to genetic modification and suggested that experts in Muslim law should make the final decision on such questions. Moosa notes that some focus group members, like some scholars, were worried by long-term risks from GM food, as yet unknown. Moosa also observes that Muslim scholars have not taken the views of Muslim laypeople into account in their responses to the genetic engineering of food. Moosa himself sides with the precautionary approach.

Vasudha Narayanan, in her carefully nuanced chapter on Hindu attitudes to genetically modified foods, makes clear that food is a big topic in Hindu dharma or law texts. Hinduism is a diversity of communities with various castes, philosophies, and geographical areas, all of which bear on food. Some Brahmins, for example, are strict vegetarians, but others may eat fish. If they are followers of Lord Vishnu, they will not only be vegetarian but will also refuse garlic or onion. Food is also of central importance in religious ritual activities where it is classified as pure or impure. While impure food may be eaten on a daily basis, food taken on certain holy days

or used as an offering to the deity should only be pure. It is this distinction that applies most directly to GM foods that are judged by Hindus to be impure. Discussion in the Hindu focus groups reflected this sophisticated approach to food. This is especially the case for transgenic foods in which an animal gene has been introduced into a vegetable or fruit. Such a food would be considered to be impure and not suitable for use on ritual days or as an offering in worship (*prasada*). However, such GM foods, although impure, could be used on a daily basis if there was no health hazard and if the food alternatives available would be worse in the minds of the Hindu devotees. Thus, if the cheeses available were made with animal-derived rennet and other artificial substances, they might be accepted by Hindus for ordinary but not ritual use. Overall, for Hindus, the origin of the gene is as important as the traits it may have associated with it. For example, if a gene originated from a pig it may not be acceptable to many Hindus as demonstrated in the opinions expressed in the Hindu focus group. While Hindus' attitudes toward the daily use of food are quite diverse and open to new developments (including even genetic modification), when it comes to religious rituals or use of food in worship only pure food (not foreign or GM) may be used, and this strict attitude does not change.

In his chapter, David R. Loy shows that although Buddhist ideas arise in a Hindu context, the Buddhist approach to food and its genetic modification is quite different. Rather than focusing on the ritual purity or impurity of the food, Buddhism shifts the spotlight to the motivations behind our use of food and our institutional or collective reasons for its genetic modification. Relating his analysis to current ethical theories, Loy shows how Buddhism adopts a "virtue" rather than a utilitarian or deontological basis in its approach to food and the acceptability or not of its genetic modification. After outlining the traditional Theravada and Mahayana Buddhist approaches to food, Loy shows that while vegetarianism is emphasized in Mahayana traditions (especially in China), the key thing for all Buddhists is the intentional motivation involved in individual, collective, and corporate choices and whether this increases or reduces *dukkha* (suffering) for us as individuals and for the ecosystem (animals and plants, earth, air, and water) in which we humans are but an interdependent part. As a participant in the Theravada focus group put it, taking a gene from one species and transferring it to another might be acceptable as long as "it is going to improve the food and if it is for the good of the whole world." Or, in the words of another focus group member, "It is not just about scientific capability but whether we should do it." But lack of labeling violates the right of choice needed for one's Buddhist practice.

Loy shows how from a Buddhist perspective our motivations and choices construct who we are as persons and how we can reduce our *dukkha* or suffering by transforming the three unwholesome roots of human

motivation, namely, greed into generosity, ill will into friendliness, and the selfish delusion of a separate self into the recognition of being an interdependent part of the world's ecosystem. Unlike Hinduism, the focus is more on becoming a different kind of person in this life than on the possibilities of rebirth with its emphasis on *anicca* or the idea that everything (including ourselves) is constantly arising, changing, and passing away. Buddhism is open to new technologies and progress. For Buddhism, technologies such as the genetic modification of food are not a problem in and of themselves; it is the motivations behind such modifications, our use of them, and the effects on our *dukkha* (suffering or happiness) that is important. Does GM food increase or decrease our *dukkha*? The Buddhist answer involves seeing that everything is interconnected, both natural phenomena and our human technology. Thus in evaluating how GM food may increase or reduce our *dukkha*, it is often unexpected side effects that are important, for example, Bt corn pollen seeming to be poisonous to monarch butterflies.

What do Buddhist principles imply about GM food? Loy says that the three unwholesome roots of motivation (greed, ill will, and delusion) must be extended from the individual level to how they operate collectively and institutionally in the food industry. Here the current difficulties in testing for adverse side effects, along with corporate pressures for short-term profit and rapid growth, pose the following question: can the food industry subordinate its own interests in GM and place top priority on safeguarding the needs of human consumers and of the whole ecosystem? Loy's Buddhist analysis and the views of the Buddhist focus group put the ethical focus on "institutional greed" and "institutional delusion" (forgetting that we humans with our science and technology are but a part of the biosphere and its ecosystem). As Loy puts it, there are no side effects. Since we are part of the natural world, if we make nature sick, we become sick, and our *dukkha* increases. This is how karma operates.

Loy concludes that the genetic modification of food as currently practiced seems incompatible with the kinds of personal and collective motivations necessary for both human and ecosystem *dukkha* to be reduced. A fuller understanding of the genomes of plants, animals, and humans and how they can affect each other is needed if our ambitions or greed are not to outrun our wisdom. However, GM food is not necessarily always a bad thing—some future types of GM modifications (e.g., vitamin A enriched rice) might serve to reduce some types of *dukkha* in our world. But for this to happen, GM technologies must be evaluated from within the larger social, economic, and ecological contexts within which they are devised and applied. Here, the Buddhist approach requires that the personal and institutional motivations be seen as a key part of that context and be given a central position in any evaluation.

In her chapter on the Chinese approach to food and its genetic modification the historian Hsiung Ping-chen finds the basic principle for food to be so that “you may have it with no harm.” Historically the Chinese approach has a variety of food traditions in which there are in general no religious taboos. Instead the Chinese focus is on achieving balance between *yin* (cool) and *yang* (hot) foods so as to foster both health and taste. There is no separation between food and medicine; medical effects are expected from ordinary food such as congee, or rice porridge. Hsiung shows how the eighteenth-century author Ts’ao T’ing-tung in his *Book of Congee* maintains that although congees are also a medicine, comfort and taste are of ultimate importance. So the author divided congees into the categories of superior, average, or lowest depending on taste and smell. In the preparation of congee the ingredients used (e.g., rice, water, and fire or heat) are of crucial importance so that the *yin-yang* balance can be maintained along with good taste. All of this is crucial for the health of people especially as they become old and frail.

According to *The Book of Congee* the most superior congees are made with vegetarian ingredients flavored with mild-tasting animal products such as cow’s milk, chicken broth, or duck broth. Lesser congees were cooked with stronger tasting meats from deer, sheep, pigs, or dogs. This traditional Chinese approach to food, while open to change, regards genetic modification of food as human tampering with nature and something thus to be avoided. Worries are voiced over the unknown effects genetic modification of food can have on human health and the environment. For many Chinese, the genetic modification of food is seen as a violation of nature and its balance—essential for human health. Thus, food labeling is needed so that individual choice is possible.

Turning to indigenous peoples we find that they do not share a common religion, but most share a common history of colonization and Christian missionization. In their chapter, Pasternak, Turner, and Mazgul argue that for indigenous peoples genetically engineered foods are an extension of the ongoing worldwide colonial destruction and desecration of their local knowledge systems and the natural world. Indigenous cultural practices relating to food production and consumption have been central to preserving and transmitting to future generations local ecological knowledge, social institutions, ethnic identity, and spiritual teachings. A common position shared by indigenous peoples around the world is the essential connection between traditional foods and practices for the maintenance of their cultures—a connection currently being challenged by the genetic modification of food. This chapter offers two case studies into this situation. In the first, Mazgul and Pasternak traveled to Guatemala to conduct focus groups with the Maya community. In the second, Turner sent out questionnaires

to indigenous colleagues in North America with a specific interest in food. In both case studies the focus was on the impact of transgenes and GMOs upon traditional food-gathering practices and the belief systems in which they are embedded.

In the Maya case study, corn is seen to be not only an essential traditional food but also crucial to the Maya spiritual worldview and ecological practice. In focus groups, corn is described by the Maya participants as “our mother,” and members talk about rituals around planting, harvesting, and eating that are being lost under the impact of colonial and corporate food practices. Similarly, all of the North American indigenous questionnaire respondents emphasized the essential connection between traditional foods and cultural practices and how this connection is under threat from the development of biotechnology, of GM foods, and of the global market economy. On this point there is no divergence between expert opinion and the Maya focus group. Also, the privileged position given to science in modern life is questioned in relation to traditional wisdom regarding food. Rather, science should be seen as one story among others and not as a hegemonic truth that trumps traditional food knowledge systems.

In these case studies the majority of indigenous participants rejected outright the eating of GM foods under any circumstances. The introduction of DNA or genetic material from culturally prohibited foods to acceptable foods through genetic engineering techniques was judged to be offensive—a violation of spirituality, of cultural practice, and of the natural order. This violation was imposed by colonial forces, capitalism, and corporate power. Some even described it as yet another attempt at the cultural genocide of indigenous peoples. Another point is that indigenous peoples generally view plants and animals as different clans of people. Thus the question of genetically modifying food is of the same order as genetically modifying humans. However, some Mayas did say that they might tolerate small modifications to domesticated animals such as pigs. But if it is a sacred plant such as corn, no genetic modifications would be tolerated. Also, in the Maya view God created animals and plants that in themselves are perfect. Therefore, the idea that genetic modification can improve on them is unacceptable. It is important to know by labeling if something is a GM food so that it can be avoided for cultural and spiritual reasons or because there may be unknown long-term health risks.

In the concluding chapter Conrad G. Brunk, Nola M. Ries, and Leslie C. Rodgers consider some of the regulatory and market implications of the above chapters. They pick up the worries over GM and transgenic foods expressed in the preceding chapters and the need for labeling that results. They explore the policies that need to be put in place to ensure that the

labeling of food for human consumption will allow individuals to make the ethical and religious choices required for the practice of their own beliefs.

While these chapters contain much diversity in their views on the position of animals and the acceptability of the genetic engineering of food, one point stands out as held by all traditions, and that is a focus on the underlying motivation. If animal genetic modification is meeting a real human need, it may be seen as acceptable. However, if it primarily reflects individual or corporate greed, or a scientific drive to be first, then it is not considered acceptable by any religion. Also, the possibility that the naturalness or species integrity of animals may be challenged by genetic engineering is a concern adopted by some theologians and by the focus groups of all traditions. Doing such things as cloning or transgenesis to animals created by God generated a sense of abhorrence among laypeople in virtually all focus groups. This strong sense of abhorrence is not always shared by the expert opinion of theologians. Thus, in some traditions a conundrum results on this point between the views of ethics theologians and the laypeople of those traditions.

Notes

1. Mainstream Christianity, as noted in the chapter by Bruce in this volume, does not generally have any prohibitions on any food sources, but Christianity does have norms relative to the just production of food, as exhibited in the Christian focus groups.

2. The exception was the aboriginal focus group conducted in Guatemala within a community with whom one of the chapter's coauthors had family and tribal connections.

3. One exception to this is the chapter by Laurie Zoloth on Judaism, which is more critical of the opinions expressed by lay Jews in the focus groups.