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Should We Have GM Crops?

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A question such as, "Should we have GM crops?" must be placed in a historical context. Even presuming that the term "GM crops" is understood to include crop plants transformed using rDNA techniques such as agrobacter tumefaciens or ballistic insertion of DNA (hereinafter, 'biotechnology'),[1] the question would have seemed absurd if it had been asked twenty or even ten years ago and any reasonable response would have required some significant clarification. 'What kind of crops are you talking about, anyway?' There are a lot of ways that plants might be transformed using biotechnology, many of them quite dangerous.[2] Furthermore, the question of whether we should have *any* kind of agricultural crop must surely depend on a fairly complex understanding of the local conditions in which it will be grown, transported, processed and

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[1] Principal rDNA methods for modification of plants are described in J.R.S. Fincham and J. Ravetz, *Genetically Engineered Organisms: Benefits and Risks.* Toronto: 1991, U. Toronto Press.

[2] The molecular biology of plant transformation stipulates that any genetic sequence could, theoretically, be inserted into a plant genome, express and produce proteins. Thus, it is theoretically possible to, for example, produce highly toxic plants—a tomato that contains cobra venom, for example—though one hastens to add that such plants are not currently being developed, so far as anyone knows. See Steven G. Pueppke, "Agricultural Biotechnology and Plant Improvement," *American Behavioral Scientist* 44(2001): 1233.

finally consumed, as well as the regulatory guidelines under which we will have it.[3] And who are "we," anyway? Farmers? Americans? World consumers? Smallholders or landless laborers from poor countries?[4]

When the question of whether we should have GM crops is asked in 2005, it is still possible to respond with similar requests for clarification, but it is also possible to recognize that there is a well-established political debate in which a number of parties are quite comfortable describing themselves as "for" or "against" GM crops. In a recently reviewed essay, philosopher Ronald Sandler summarized the pro and con arguments by producing a list of eighteen key claims typically used by proponents of GM crops and another list of eighteen such claims typically made by its opponents.[5] Interestingly, almost all of these claims are of a factual nature, which imply that the debate over agricultural biotechnology turns upon contested issues that could be settled by empirical research. Anyone who has studied technical debates, however, knows that this is an illusion.[6] The debate could perhaps be settled in a

[3] Sheldon Krimsky and Roger Wrubel, *Agricultural Biotechnology and the Environment: Science, Policy and Social Issues.* Urbana, IL: 1996, University of Illinois Press.

[4] Les Levidow, "Whose Ethics for Agricultural Biotechnology?" in *Biopolitics: A Feminist and Ecological Reader on Biotechnology* V. Shiva and I. Moser, eds. London: Zed Books, p 175.

[5] Ronald Sandler, "Book Review: Gregory Pence, Editor, *The Ethics of Food: A Reader for the 21st Century.*" *J. Agr. & Env. Ethics* 18(2005): 85-93.

[6] On technical controversy see Harry Collins and Trevor Pinch, *The Golem at Large: What You Should Know about Technology.* New York: 1998, Cambridge U. Press.

purely philosophical sense; but the issues in question are so complex that parties on either side can continually shift the burden of proof to the other side with new empirical data. As a result, nominal factual questions will remain unsettled and the debate will continue for as long as anyone has the energy to carry on the fight.

As someone who was actually asking questions about agricultural biotechnology in 1985[7] and 1995,[8] I am somewhat loathe to present my thoughts about whether we should have GM crops today (or under what conditions we should have them) in the reductive format that is demanded by the current politicization of the debate. In fact, I've argued positions taken by both proponents and opponents. There are three points on which my neck has been stuck out relatively far. First, I have argued that we should respect all manner of reasons and motives that people might have for not wanting GM crops and should insure that the food system allows

[7] My first published work was a review article, *Ag. & Hum. Val.* 3(4):58-61 (1986), followed by P.B. Thompson, "Agricultural Biotechnology and the Rhetoric of Risk: Some Conceptual Issues," *The Environmental Professional*, 9:316-326 (1987) and P. Madden and P.B. Thompson, "Ethical Perspectives on Changing Agricultural Technology in the United States," *Notre Dame Journal of Law, Ethics, and Public Policy*, 3(1): 85-116 (1987).

[8] P. B. Thompson, "Conceptions of Property and the Biotechnology Debate," *Bioscience* 45(4): 275-282, April 1995; D. M. Vietor, J. M. Chandler, P. B. Thompson, and M. L. Kitchersid. "Should Public Funds Support Biotechnology Development? A Case About Herbicide Resistant Cotton," *Journal of Natural Resources and Life Science Education.* 24(1995): 173-178.

them to act on those reasons.[9] Second, I've argued that it is mistaken to presume that every possible GM crop poses unacceptable environmental risks and that, in fact, there may be compelling environmental reasons for using some GM crops.[10] Finally, I've argued that the science community has not done its part in addressing the many public issues raised by GM crops.[11] My remarks here will be framed as an elaboration upon these points.

Because it relates most straightforwardly to the current state of controversy and polarization, I will start with the last point first. GM crops are implicated in broader social debates over intellectual property and the privatization of the commons.[12] In a related but nonetheless

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[9] P.B. Thompson, "Ethical Issues Facing the Food Industry," *Journal of Food Distribution Research* (February): 12-22, (1993); P. B. Thompson, "Food Labels and the Ethics of Consent," *Choices: The Magazine of Food, Farm, and Resource Issues* First Quarter 1996, 11-13; P. B. Thompson, "Food Biotechnology's Challenge to Cultural Integrity and Individual Consent," *Hastings Center Report*, 27(4): 34-38 (July-August 1997).

[10] P. B. Thompson, "The Environmental Ethics Case for Crop Biotechnology: Putting Science Back into Environmental Practice," in *Moral and Political Reasoning in Environmental Practice*. A. Light and A. de-Shalit, Eds. Cambridge, MA: 2003, The MIT Press, pp. 187-217.

[11] P. B. Thompson, *Food Biotechnology in Ethical Perspective.* London: Chatham and Hall, 1997; P. B. Thompson, "Food and Agricultural Biotechnology: Ethical Issues Behind the Research Choices," *The IPTS Report,* 50 (December 2000): http://www.jrc.es/iptsreport .

[12] Robin Feldman, "The Open Source Biotechnology Movement: Is It Patent Misuse?" *Minnesota J. Law, Sci. & Tech.* 6(2004):117-168; David Magnus, "Intellectual property and agricultural biotechnology : bioprospecting or biopiracy?" in D. Magnus, A. Caplan, and G. McGee, Eds. *Who Owns Life?* Amherst, NY: 1998, Prometheus Books; Wim Broothaerts, Heidi J. Mitchell, Brian Weir, Sarah Kaines, Leon M. A. Smith, Wei Yang, Jorge E. Mayer, Carolina Roa-Rodrıguez & Richard A. Jefferson, "Gene transfer to plants by diverse species of bacteria," *Nature* 443 (2005): 632.

distinct debate, they are seen as way for agribusiness suppliers to penetrate the markets of developing countries where their prior success has been limited.[13] They are portrayed as the next generation of technical assistance for resource-poor farmers[14] and as future profit centers for companies whose key patents on chemical products are about to expire.[15] It is possible in each of these ways of viewing GM crops to believe that their success would be a very good thing or a very bad thing indeed. Here we are talking about comprehensive and competing political visions in which the success or failure of GM crops is not, in itself, very critical to the success or failure of the larger vision. Nonetheless, it is certainly

[13] Jack V. Kloppenburg, Jr. *First the Seed: The Political Economy of Plant Technology, 1492-2000.* Cambridge: 1989, Cambridge University Press; José de Souza Silva, "Plant Intellectual Property Rights: The Rise of Nature as a Commodity," in *Biotechnology in Latin America: Politics, Impacts, and Risks.* N P. Peritore and A. K. Glave-Peritore, Eds. Wilmington, DE, 1995, SR Books, p. 57; Dale Jamieson, 2000. Discourse and Moral Responsibility in Biotechnical Communication. *Science and Engineering Ethics* 6:265.

[14]Gabrielle J. Perseley, *Biotechnology in Service to World Agriculture,* Wallingford, UK: 1990, C A B International; Nufield Council on Bioethics. 1999. *Genetically Modified Crops: The Ethical and Social Issues*. London, Nufield Council on Bioethics; Norman. Borlaug,. "Ending World Hunger: The Promise of Biotechnology and Anti-Science Zealotry." *Plant Physiology* 124(2000):487.

[15] Gary Comstock, "Genetically Engineered Herbicide Resistance, Part One," *Journal of Agricultural Ethics* 2(1989):263; Gary Comstock, "Genetically Engineered Herbicide Resistance, Part Two," *Journal of Agricultural Ethics* 3 (1990): 1; Daniel J. Goldstein, "Third World Biotechnology, Latin American Development, and the Foreign Debt Problem," in Peritore and Galve-Peritore, 1995, *Supra* Note 13, p. 37.

possible to address the question of whether we should have GM crops with such ends in view.[16]

As a practical matter, however, the question of whether we will or will not have GM crops will be decided first at the regulatory level[17] and second in the marketplace.[18] At both junctures, the question of risk is crucial. That is to say, if either regulators or consumers decide that the risks of GM crops are unacceptable, we will not have them. Although there are interesting and important questions to be asked at the regulatory level, my main focus here is on consumers and laypersons who take an interest in health and environment from the standpoint of civil society. Both can become pawns in a game of claim and counterclaim that is made by those whose interest in GM crops may have little to do with risk, and may, in fact, revert back to the way that GM crops themselves have become tokens for capture in one of the larger social debates.

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[16] Gregory E. Pence is a philosopher who sees the GM debate in roughly these terms. See his book, *Designer Food: Mutant Harvest or Breadbasket of the World?* Lanham, MA: 2002, Rowman and Littlefield.

[17] Donald L. Uchtmann and Gerald C. Nelson, "U.S. Regulatory Oversight of Agricultural and Food Related Biotechnology," *American Behavioral Scientist* 44(2000): 350; Gregory N. Mandel, "Gaps, Inexperience, Inconsistencies, and Overlaps: Crisis in the Regulation of Genetically Modified Plants and Animals," *William and Mary Law Review* 45(2004):2167; Michael R. Taylor, Jody S. Tick and Diane M. Sherman, *Tending the Fields: State and Federal Oversight of Genetically Modified Crops.* Washington, DC: December 2004, Pew Iniative on Food and Biotechnology.

[18] Brian Wansink and Junyong Kim, "The Marketing Battle over Genetically Modified Foods," *American Behavioral Scientist* 44(2001): 1405; Lennart Sjöberg, "Principles of Risk Perception Applied to Gene Technology," *EMBO Reports* 5(Special Issue-2004): S47; Margareta Wandel, "Genetically Modified Foods in Norway: A Consumer

It is not as if the scientific community has been entirely lax in providing consumers and members of civil society with disinterested evaluations of GM crops. There have been a number of statements and evaluations offered by scientific bodies such as professional organizations,[19] various royal academies[20] and the U.S. National Research Council (NRC).[21] The problem is that these statements and evaluations have seldom reflected sufficient depth or effort in thinking through the questions of risk, much less engaged the reasonable expectations of the interested public. For example, early NRC reports concluded that food safety or environmental risks would depend upon the product, not the process, followed by virtually no discussion of hazards associated with specific products, even though a number of products could have readily

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Perspective," in M. D. Mehta, Ed. *Biotechnology Unglued: Science, Society and Social Cohesion,* Vancouver, CA: 2005, UBC Press, 70.

[19] Institute of Food Technologists, *IFT Expert Report on Biotechnology and Foods.* Sept. 19, 2000, http://www.ift.org/pdfs/expert/biotech/report.pdf Accessed April 18, 2005; British Medical Association, *Impact of Genetic Modification of Agriculture, Food and Health: An Interim Statement*. 1999.

[20] Parliamentary Office of Science and Technology. *Genetically Modified Foods — Benefits and Risks, Regulation and Public Acceptance.* London: 1998, Parliamentary Bookshop; Royal Society of Canada, *Elements of Precaution: Recommendations for the Regulation of Food Biotechnology in Canada,* 2001; *Report of the New Zealand Royal Commission on Genetic Modification,* July 17, 2001.

[21] NRC (National Research Council), *Genetic Engineering of Plants: Agricultural Research Opportunities and Policy Concerns.* Washington, DC: 1984, National Academy Press; NRC, *Field Testing Genetically Modified Ortganisms: Framework for Decisions.* Washington, DC: 1987, National Academy Press; NRC, *Genetically Modified Pest Protected Plants: Science and Regulation.* Washington, DC: 2000, National Academy Press; NRC, *Environmental Effects of Transgenic Plants: The Scope and Adequacy of*

been subjected to at least cursory discussions of hazard and possible routes of exposure.[22] Such discussions might have rather earlier signaled the serious risks that would be associated with crops engineered to produce pharmaceutical materials and biologics and would have indicated that the food system was wholly unprepared for the kinds of segregation and monitoring that would be needed for such crops.[23]

These official evaluations have also neglected virtually all exposure pathways associated with complex social causality. Thus, while there have been lengthy discussions of pollen flow and transport by wind, insects and microorganisms, the possibility that a human being might legally purchase transgenic maize imported into Mexico for animal feed and then plant it in a Mexican cornfield, despite the fact that doing that does violate Mexican law, apparently never occurred to the collective genius of the world scientific community.[24] Furthermore, in one more observation along these lines, these reports have ducked all the hard ethical questions, such as just what an adverse environmental impact might actually be. They have, almost without exception, been written as if

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Regulation. Washington, DC: 2002, National Academy Press; NRC, *Biological Confinement of Genetically Engineered Organisms,* Washington, DC: 2004.

[22] NRC, 1984, 1987, *Supra,* Note 21.

[23] Union of Concerned Scientists, *A Growing Concern: Protecting the Food Supply in an Era of Pharmaceutical and Industrial Crops.* December, 2004.

the inherently social and philosophical value judgments that must be made to view one state of affairs as better than another were wholly matters of technical expertise, on which no one lacking a Ph.D. in one of the biological sciences need be consulted.

The debate over GM crops has exposed this failure; but it would be a mistake to think that this translates into an argument against GM crops. It is not as if we have done a fine job in thinking critically about agricultural technologies such as nitrogen fertilizers,[25] chemical insecticides, herbicides and fungicides,[26] large scale water projects,[27] center pivot irrigation systems,[28] mechanical planters and harvesters,[29] or computerized precision farming systems guided by remote sensing.[30] It is worth emphasizing that all of these technologies have been closely coordinated with conventional crop breeding efforts and would not have

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[24]See Commission on Environmental Cooperation, *Maize and Biodiversity: The Effects of Transgenic Maize in Mexico.* http://www.cec.org/files/PDF//Maize-and-Biodiversity_en.pdf Accessed April 18, 2005.

[25] Charles R. Frink, Paul E. Waggoner, and Jesse H. Ausubel. "Nitrogen Fertilizer: Retrospect and Prospect," *Proceedings of the National Acadamey of Science.* 96(1999): 1175.

[26] Rachel Carson, *Silent Spring.* Boston: 1962, Houghton-Mifflin.

[27] Jennifer M. Brinkerhoff, "Global Public Policy, Partnership, and the Case of the World Commission on Dams," *Public Administration Review* 62(2002): 324.

[28] John Opie, *Ogallala: Water for a Dry Land.* Lincoln: 1993, University of Nebraska Press.

[29] Wayne Rasummsen, "Advances in American Agriculture: The Mechanical Tomato Picker as a Case Study," *Technology and Culture* 9 (October 1968): 531.

been widely adopted by farmers without the development of new crop varieties tailored to make them effective. As such, the risks and unintended consequences associated with all these agricultural technologies can truthfully be said to be risks and unintended consequences of conventional plant breeding.[31] Collectively, these technologies have had enormous impact on the make-up of the flora and fauna in both wild and domesticated ecosystems. They are associated with well-documented impacts on human health and on quality of life, as well as less well-documented, speculative and contested possible impacts on ecosystems and human beings.[32]

In contrast to these known risks associated with conventional agricultural technologies, some of the reasons cited for being against GM crops note the risk of insects resistant to the Bt toxin, the risk of creating "superweeds," and the possibility of adverse impact on biodiversity.[33] Let us examine these briefly in turn. The last is a serious environmental risk;

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[30] Naiqian Zhang , Maohua Wang and Ning Wang, "Precision Agriculture: A Worldwide Overview," *Computers and Electronics in Agriculture* 36(2002): 114.

[31] This insight is often attributed to agricultural historian Wayne Rasmussen. See *Supra* Note 28. See also Deborah Fitzgerald, *Every Farm a Factory: The Industrial Ideal in American Agriculture.* New Haven: 2002, Yale University Press.

[32] Rhys E. Green, Stephen J. Cornell, Jörn P.W. Scharlemann, and Andrew Balmford. "Farming and the Fate of Wild Nature," *Science* 307(Jan. 2005): 550.

[33] Though listed frequently, one source is Annette Burfort and Jennifer Poudrier, "Biotechnology as Modern Museums of Civilization," in *Biotechnology Unglued: Science, Society and Social Cohesion* M. Mehta, Ed. Vancouver: 2005, UBC Press, p. 133.

but it must be, again, seen in the context of other industrial technologies that have had and continue to have a serious impact on biodiversity. Bringing new areas under cultivation for the first time has an enormous impact on biodiversity, and while salt, drought, wet, heat or cold tolerances achieved through transgenics might hasten the spread of agriculture into new ecosystems, many, other technologies (including conventional plant breeding) can accomplish the same result.[34] Biotechnology has increased awareness of the role that gene flow can have on biodiversity; but the research that supports this increase in awareness suggests that this is a risk for virtually any crop, not just GM crops.[35] In sum, we must learn to do a better job of thinking critically about agriculture's ecological footprint. This is a complicated story that cannot be adequately addressed in the present context, but it would be seductively and tragically mistaken to think for even a second that opposition to all GM crops is the logical consequence of concern for biodiversity.

The environmental significance of "superweeds" operates at an entirely different order of magnitude than does biodiversity. These are not weeds bigger than your house or weeds that will menace the family pet. They are ordinary plants that grow wild in pasture and forest or along

[34] Maarten J. Chrispeels and David Sadava, "Development, Productivity, and Sustainability of Crop Production," in M.J. Chrispeels and D. Sadava, Eds. *Plants, Genes and Crop Biotechnology* 2nd Ed. Boston: 2003, Jones and Bartlett, p. 52.

roadside or hedgerow. They are wildflowers by another name. They are "super" in that they are resistant to some of the more commonly-used chemical weed killers.[36] Superweeds, in other words, stand out from other wild plants only in places where human beings are applying the herbicides to which they have become resistant. This means that they can become a nuisance in places where wildflowers are not wanted, including farm fields, suburban yards and a few other places such as structures (e.g., drainage ditches) that might be compromised by unwanted plant growth. They could be a costly nuisance, to be sure, and resistance is certainly a problem that demands attention from environmental professionals.[37] Yet is this something that the average concerned citizen or environmental activist should be mounting the barricades about? There is no reason to think that so-called superweeds will behave abnormally in the wild or protected ecosystems in which herbicides are not used.[38] One would think that tree-hugging nature lovers who value undisturbed ecosystems would see superweeds as a victory in the battle against human encroachment.

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[35] NRC, 2002, *Supra,* Note 21; Norman C. Ellstrand, "When Transgenes Wander, Should We Worry?" *Plant Physiology* 125(2001): 1543.

[36] G. Marshall, Herbicide tolerant crops – real farmer opportunity or potential environmental problem? *Pestic. Sci*.52(1998): 394; S.O. Duke, "Herbicide resistant crops – their impact on weed science*." J. Weed Sci. Technol*.43(1998): 94.

[37] J. Rissler, and M. Mellon, *The Ecological Risks of Engineered Crops.* Cambridge, MA: 1996, MIT Press.

[38] NRC, 2002, *Supra* Note 21.

The insect resistance story is similar, but with two important differences. Insects that become resistant to Bacillus thurengiensus, the toxin produced by GM crops that protects them against butterfly and moth larvae, will be a nuisance to farmers, just like superweeds. One reason that someone not professionally involved in crop production might get exercised about this risk from GM crops is that Bt is used widely and even relied upon by organic growers who have denied themselves the opportunity to use GM crops. It is therefore possible to see organic growers as potential victims of insect resistance. However, unlike industrial farmers who participate in their own downfall, organic growers are victims who have derived no benefit from biotechnology that could offset their loss.[39] The other reason for concern is that, unlike chemical herbicides, Bt toxins exist in nature. It is thus at least possible that they have some unknown functional role. If so, resistance could have ecological consequences that are wholly unknown at the present time.[40] Fortunately, current data indicate that the resistance risk may have been overstated.[41]

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[39] Donald Bruce, "Contamination, Crop Trails and Compatibility," *J. Agr .Env. Ethics* 16(2003): 595; Margaret Mellon and Jane Rissler, *Gone to Seed: Transgenic Contaminants in the Traditional Seed Supply,* Cambridge, MA: 2004, Union of Concerned Scientists.

[40] NRC, 2002, *Supra* Note 21.

[41] Bruce E. Tabashnik, Yves Carrière, Timothy J. Dennehy, Shai Morin, Mark S. Sisterson, Richard T. Roush, Anthony M. Shelton, and Jian-Zhou Zhao. "Insect

Subsequent generations of GM crops could be much more dangerous than the herbicide-tolerant and Bt crops of the first generation. Pharmaceutically active crops are a case in point. They could also be much more beneficial. For example, CAMBIA, a non-profit organization undertaking biotechnology research, has been working on plants that would allow farmers to match fertilizer applications much more closely to plant needs. This could substantially reduce nitrogen loads on the environment and contribute to an alleviation of hypoxia and algae blooms that are associated with major agricultural run-off zones.[42] Being an environmentalist is therefore a reason to pay close attention to GM crops; but it is not a reason to conclude that we should not have them.

Perhaps you are still unnerved by the citation of lapses and sloppy thinking with which I began. Or perhaps you think that, even if agricultural biotechnology could alleviate problems associated with industrial agriculture, it is a rather unnatural way to do so.[43] Or perhaps you think that biotechnology is unnatural in a more metaphysical or

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Resistance to Transgenic Bt Crops: Lessons from the Laboratory and Field," *Journal of Economic Entomology:* Vol. 96(2003): 1031.

[42] http://www.cambia.org/functional_genomics.html Access April 25, 2005.

[43] This concern ranked high in European responses to survey and focus group research on GM crops. Wolfgang Wagner, Nicole Kronberger, Nick Allum, Suzanne De Cheveigné, Carmen Diego, George Gaskell, Marcus Heinßen, Cees Midden, Marianne Ødegaard, Susanna Öhman, Bianca Rizzo, Timo Rusanen and Angelici Stathopoulou, "Pandora's Genes — Images of Genes and Nature," in *Biotechnology: The Making of A Global Controversy*. M. W. Bauer and George Gaskell, Eds. Cambridge: 2002, Cambridge U. Press, p. 244.

theological sense.[44] Or perhaps you are aligned with one of the groups protesting GM crops because they have become embroiled in political battles over property rights, corporate power or globalization.[45] Any of these reasons could lead you to conclude that you do not want to have anything to do with GM crops. Should you have the right to speak out against GM crops? Should you have the right to avoid eating them?

I cannot imagine anyone seriously arguing that people should be denied the right to speak against GM crops. Government suppression of such ideas would surely violate traditional notions of free expression and would surely be prohibited by the First Amendment to the United States Constitution. Yet one's right to avoid eating GM crops has met significant opposition in the American food industry, and has only the most tenuous standing in current U.S. policy. After more than a decade of denying that anyone could have a legitimate interest in not eating GM crops, the U.S. Food and Drug Administration reversed their position in 2001 after conducting a series of focus groups that documented overwhelming public

[44] For the view that genetically engineered foods are unnatural, see Mary Midgley, 'Biotechnology and Monstrosity," *The Hastings Center Report* 30 5 (2000): 7. A similar but slightly toned down line of argument can be found in Ruth Chadwick, "Novel, Natural, Nutritious: Towards a Philosophy of Food," *Proceedings of the Aristotelian Society* (2000): 193-208. Perhaps the following article is among the most radical in articulating the view that genetically engineered food is unnatural: Jochen. Bockmühl, "A Goethean View of Plants: Unconventional Approaches," In *Intrinsic Value and Integrity of Plants in the Context of Genetic Engineering,* D. Heaf and J. Wirz, Eds. Llanystumdwy, UK: 2001, International Forum for Genetic Engineering, p. 26.

support for labeling of foods containing transgenes and genetically engineered ingredients.[46] Fearful that mandatory labeling of such foods might cause a panic, and doubtful that it possessed legal authority to require mandatory labeling in any case, the FDA issued a policy guidance for voluntary labels declaring either that foods are or are not products of agricultural biotechnology.[47] Consumers wishing to avoid biotechnology may do so by purchasing foods labeled as "organic". FDA officials occasionally respond to inquiries by noting this fact; but the official advice to consumers makes no mention of the organic alterative.[48]

The organic label is a U.S. Department of Agriculture marketing standard that makes no claims about the health, nutritional or environmental benefits of the products on which it appears. Indeed, the organic label makes very limited claims about the actual makeup or contents of the foods on which it appears. What it does indicate is that

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[45] Marc Lappé, "A Perspective on Anti-biotechnology Convictions," in *Engineering the Farm: Ethical and Social Aspects of Agricultural Biotechnology*B. Bailey and M. Lappé, Eds. Washington, DC: 2002, Island Press, p. 135.

[46] Food and Drug Administration, Center for Food Safety and Nutrition, **Report on Consumer Focus Groups on Biotechnology,** Oct. 20, 2000. http://www.cfsan.fda.gov/~comm/biorpt.html Accessed April 5, 2005.

[47] Food and Drug Administration, Center for Food Safety and Nutrition, **Guidance for Industry**
Voluntary Labeling Indicating Whether Foods Have or Have Not Been Developed Using Bioengineering, Jan. 2001, http://www.cfsan.fda.gov/~dms/biolabgu.html Accessed April 5, 2005.

farmers, handlers and processors have followed specified production standards, one of which is that they have not used GM crops.[49] This hybrid of FDA and USDA labeling policy does provide a right of exit from GM foods, at least for those highly-motivated consumers who take the trouble to learn the labeling system.[50] Some philosophers have argued that this narrow construal of the right to avoid GM foods does not protect the autonomy of food consumers, that is to say, their right to set their own standards, on whatever grounds they deem fit, for the food that enters their bodies.[51] My own view is that a political decision to broaden the legal scope of this moral right should only be made on the basis of a public debate that surfaces the moral, economic and enforcement issues far more thoroughly than has been the case thus far.

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[48] L. Bren, "Genetic Engineering: The Future of Foods?" *FDA Consumer Magazine*, Nov.-Dec. 2003, http://www.fda.gov/fdac/features/2003/603_food.html Accessed April 5, 2005.

[49] U.S. Department of Agriculture, National Organic Program, **Labeling — Regulatory Text** http://www.ams.usda.gov/nop/NOP/standards/LabelReg.html Accessed April 14, 2005.

[50] Jim Guest, "Label of Contents," *Consumer Reports.Org* Jan. 2003, http://www.consumerreports.org/main/ Accessed April 14, 2005.

[51]Debra Jackson, "Labeling Products of Biotechnology: Towards Communication and Consent." *Journal of Agricultural and Environmental Ethics* 12(2000):319; Robert Streffer and Alan Rubel, "Democratic Principles and Mandatory Labeling of Genetically Engineered Food," *Public Affairs Quarterly* 18(2004): 223.

I do not believe, for instance, that "zero tolerance" is a reasonable standard for non-GM foods.[52] Most of us probably think that being forced to eat insect parts or rat feces would be a significant compromise of our dignity and autonomy. Such would certainly be the case if we were forced to eat either by the spoonful. But the microscopic traces of these contaminants that are currently permitted by U.S. regulatory standards should not be thought to compromise our moral standards. Likewise, similar trace amounts of GM crops should not be thought violate our right to decide what we will and will not eat.[53] A second issue concerns the distribution of costs from labeling. Arguably, those who want to avoid GM crops derive the benefit from these labels. They should therefore be the ones to pay the costs of segregating and labeling them.[54] Needless to say, opponents of GM do not see it this way.[55] One further question concerns how the right not to eat GM crops translates into a farmer's right

[52] Friends of the Earth, "Real Food," http://www.foe.co.uk/campaigns/real_food/press_for_change/gm_labelling/ Accessed April 25, 2005.

[53] Alan McHughen, "Predicted Failure for Labeling of Genetically Modified Foods, SCOPE, April 2001, http://www.biotech-info.net/predicted_failure.html Accessed April 25, 2005.

[54] Kirsten Hansen, "Does Autonomy Count in Favor of Labeling Genetically Modified Food?" *J. Agricultural and Environmental Ethics* 17(2001): 935.

[55] Alan Rubel and Robert Streiffer, "Respecting the Autonomy of European and American Consumers: Defending Positive Labels on GM Foods," *Journal of Agricultural and Environmental Ethics* 18(2005): 75.

not to grow them, or perhaps to have a non-GM crop protected from contamination by GM pollen.[56]

These are but three instances of the kind of issue that would need to be aired in taking a decision to require labeling for GM crops, as has currently been done in Europe.[57] Were a robust debate conducted jointly in the public forum and in decision making bodies of the three branches of government to end up with Europe's result, I would not find that inconsistent with the moral principles on which I have argued for a right to opt out of eating GM crops. For the time being, however, I will continue to argue that a more limited form of legal protection is adequate. It appears as something comparable to the current mixture of FDA and USDA policy, perhaps, though I would prefer a standard that makes it easier and more economically attractive for the food industry to offer a straightforward, but voluntary, non-GM product label.

So should we have GM crops? I think I have argued that we should, but only on a number of conditions. First, biotechnology presents an issue that other farm-production oriented crop technologies have not in that there are philosophical reasons why consumers may not want to eat them. I have argued that we should regard consumers' ability to seek or

[56] Rosie S. Hails, "Genetically Modified Plants—The Debate Continues," *Trends in Ecology and Evolution* 15(1; Jan. 2000): 14.

avoid whatever foods they wish as a right, and that this right provides the basis for evaluating market structure for foods from GM crops.[58] Second, the National Research Council report, *Environmental Effects of Transgenic Plants,*[59] began to articulate some of the principles that should be used to evaluate the ecological risks of all agricultural crops. The report also conceded that it may be reasonable to differentially regulate transgenic and conventional crops as a matter of practicality for the time being. However, moving toward a risk-based regulatory policy eventually presupposes that *all* crops be subjected to the same standard of scrutiny.[60] Finally, I believe that the scientific community, including especially public agricultural research institutions, has been lax in their ethical responsibility to engage the public more broadly, including non-governmental organizations, concerning the oversight and guidance of biotechnology. As such, they bear the primary responsibility for the deplorable state of the current debate.[61] The public should demand better

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[57] Nicholas Kalaitzandonakes & Jos Bijman. "Who Is Driving Biotechnology Acceptance?" *Nature Biotechnology* 21(2003): 366.

[58] P. B. Thompson, "Why Food Biotechnology Needs an Opt Out," in *Engineering the Farm: Ethical and Social Aspects of Agricultural Biotechnology*. B. Bailey and M. Lappé, Eds. Washington, DC: 2002, Island Press, pp. 27-44.

[59] *Supra* Note 21.

[60]See also P. B. Thompson, "Value Judgments and Risk Comparisons: The Case of Genetically Engineered Crops," *Plant Physiology* 132(2003): 10.

performance from the agricultural research system. While these conditions do not exhaust the issues that might be raised in connection with GM crops, I have exhausted myself on the present occasion.

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[61] P. B. Thompson, "Bioethics Issues in a Biobased Economy," in *Genetically Modified Foods: Debating Biotechnology,* Michael Ruse and David Castle, Eds. Amherst, NY: 2002, Prometheus Books, pp. 68-76; reprinted from *The Biobased Economy of the 21st Century: Agriculture Expanding into Health, Energy, Chemicals and Materials,* Allan Eaglesham, William F. Brown and Ralph W. F. Hardy, Eds. NABC Report 12. Ithaca, NY: 2000, National Agricultural Biotechnology Council, pp. 113.