

The Case for Mandatory Labeling of Genetically-Modified Foods

A paper prepared at the request of the
Consumers' Association of Canada

by

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A. Introduction: GMOs and food safety.

1. Product vs. "process."

Among all the health and environmental risks known to be of elevated concern to the public, food safety always stands at or near the top of the list. This is true for all countries but for some, even more so – for Japan, for example, and Europe (for many reasons, including the terrible BSE tragedy, which goes on).

Like other industrialized countries Canada has stringent food safety regulations as well as highly-capable personnel to oversee them. (Mistakes are made and surveillance can be inadequate – such as the regular outbreaks of food-borne *E. coli* and salmonella.) When a new form of food crops – based on gene technologies – came to market in the mid-1990s, food safety regulators were ready, having developed protocols to assess the novel health and environmental risks.² But at the same time, industry and regulators in the United States (followed faithfully later on by their Canadian counterparts), had also prepared a novel strategy for pushing these new products into international markets, which had the effect – whether explicitly intended or not doesn't matter – of severely circumscribing the public debate about these new crops.³

Simply put, this strategy says: *Only risk factors that are properly characterized on the basis of accepted scientific principles* may be considered in the formal processes of international regulatory evaluation – including the WTO trade rules which determine what restrictions on international trade are acceptable. The labeling issue, along with every other issue, was subordinated to trade interests.⁴ One can see immediately what is ruled out of bounds by this strategy, namely, the entire category of ethical, social, and religious values. These are deemed to be “external” considerations in the process of science-based

risk assessment, which means that they cannot even be put on the table when nations meet to negotiate the rules of trade.

This was an apparently clever strategy, to be sure, but it was doomed to fail from the start. For one thing, it has become a monumental exercise in global hypocrisy, especially for the country (the United States) which designed it: This is now a nation in which religiously-based values increasingly dominate public policy choices in huge areas of public and private life, including sexually transmitted diseases, abortion, drugs, education, and the war on terrorism.⁵ Thus one can imagine the reaction of other players, such as the EU, when they were told that something so sensitive as food was to be dealt with strictly on a scientific basis, with no “extraneous” values brought to the table. On the issue of growth hormones used in raising cattle, for example, the EU has said that its citizens don’t want beef from these sources, no matter what the formal health risk assessment says, and they have maintained this position, against U. S. opposition and threats, for twenty years.

The strategy was also doomed to fail because these new crops are produced by molecular genetics, that is, by direct manipulation of DNA. And genetics is perhaps the most sensitive issue of all, for most people. Most people in the world, outside of North American at least, are not about to be told that they can’t talk about religious and other values pertinent to genetic manipulation. *The technological process itself (gene manipulation) – what it is now, and where it will be going in the future – is of significant concern to them, and will remain so. This is the fundamental basis in consumer perception for the demand for the mandatory labeling of foods containing GMOs or processed from GM-crops.*

2. *The “Substantial Equivalence” doctrine.*

This doctrine is a regulatory device designed essentially to deal with the foods produced from crops with novel DNA or proteins in which, as a result of refining and processing, no trace of the novel material remains in the finished product.⁶ In a nutshell, the doctrine says that no novel food risks (to health, at least) should be present in principle under these conditions. But the “flip side” of this doctrine is important as well: for the same reason that there are no novel risks, *there are no new consumer benefits in the GM-based foods.*

For decades now industry and governments in North America have been harping on the unreasonableness of public attitudes about risk, especially about the alleged desire on the public’s part for “zero risk.” The message from these sources has been, “there’s no such thing as zero risk.” And indeed, it is acknowledged by everyone that those same first-generation novel foods – which may indeed present no human health risks not already described and well-controlled-for (such as allergenicity) – do indeed present unavoidable, novel *environmental* risks.⁷ Thus the inescapable conclusion: Consumers are asked to acquiesce in the creation of additional risks for no additional benefit. This is a poor deal no matter how one looks at it.⁸ The proponents of the novel technology add insult to injury when they also insist that they need not tell consumers what they are up to.

B. Gene Technology: A radical new technology for the creation of life-forms.

Most of those in favour of mandatory labeling believe it is a straightforward case of the “consumer right to know,” and I agree. Again, as in the case of the regulatory strategy discussed above, the industry/government lobby in North America has tried to side-step this issue by, in effect, dictating to the consumer the terms under which one’s right to know should be conceptualized. The bottom-line is this: If the issue is not food safety, there’s no justification for labeling; also, as the Council for Biotechnology Information puts it, “biotech labeling can confuse people.”⁹ Well, yes, life too can confuse people, and

it often does. That's hardly a reason for denying them information they think they need. What concerns many of them is gene technology itself.

As the industry/government biotechnology lobby in North America is so fond of saying, "humans have been modifying crop plants for centuries by plant breeding":¹⁰

The late 20th century version of this is the production of transgenic plants. Traditional breeding techniques are limited to genetic mating between related species, and require several generations (often years) to achieve the desired results. With transgenic technology, a genetic trait can be introduced into a selected plant via the direct introduction of the gene responsible for that trait, a process not constrained by genetic similarity and one that broadens the number of potential sources from which desirable genetic traits can be obtained.

The report goes on from that point to give a pretty good exposition on how transgenic technologies operate, although the account is probably too advanced and brief for a non-expert audience. Still, if a greater effort were to be made to "translate" the scientific jargon into layperson's terminology (see below), the result would be beneficial for those interested citizens who have concerns about this technology and its future directions.

For many people – especially in Europe, and especially there in Germany and Austria – the mention of "genetic technologies" leads inevitably to thoughts of "eugenics." In this context the calming message ("It's something we humans have been doing for hundreds – or thousands – of years already, so what's the big deal?") is erroneous, patronizing, and inappropriate. The key point is: *Gene technology based on molecular biology has some of the same objectives as "traditional breeding" does, but the potential scope of its applications extends so far beyond its predecessors as to represent a qualitatively new dimension in human understanding and manipulative potential.* By the time the molecular biologists are done, probably in the next decade or so, they will not only be able to move hundreds or thousands of genes around, but they will have the capacity to create entirely new life-forms "from scratch."¹¹

Public concerns about GMOs are not primarily focused on the plants used as food crops. They are primarily about the science and technology of gene transfer itself – especially, about where it is ultimately headed. For many people, their first major *personal* encounter with gene technology is in the context of seeing foods derived from GM-crops appear suddenly in grocery stores. Therefore it is quite appropriate that consumers should be introduced to reliable and disinterested information about gene technology through labels that food producers are required to put on their products.

C. The labeling issue: Introduction.

In a paper published on the Internet five years ago, Peter Phillips and Grant Isaac of the University of Saskatchewan wrote: “Labeling goes to the heart of private sector, biotechnologically-based research and development in the agri-food business. Mandatory labeling is clearly a threat to the continued development of biotechnology products and processes.” The reasoning behind this contention still drives the campaign, led jointly by business and governments in North America, against mandatory labeling of GMOs, and so it is worthwhile outlining it here:¹²

With mandatory labeling of ... GMOs, producers would be forced to visibly label their goods (e.g., with a double helix to demonstrate presence of GMO) to signal that the good has been transformed using transgenic technologies, even though scientific tests may not be able to distinguish between the end-use attributes of the GMO and traditionally-produced good [*sic*]. In this case, producers would be forced to assume the costs of all the risks and uncertainties ... [associated by the public with GMOs], with the result that they would likely suffer a discount for their good in the market, which would dampen the production and consumption of this product. This is not socially desirable as firms are required to bear through government actions uncertainties related to the food safety system and *misinformed judgment* [my italics WL].

There is a most curious twist of logic here! As the application of a radically new scientific discipline, gene technology can frighten some people and lead to a variety of popular reactions, some reasonable and some (arguably) unreasonable – in the sense of being based on views that actually violate accepted scientific principles, for example.

Undoubtedly reactions both *pro* and *con* can be either generated spontaneously by individuals, and also, for others, be influenced by views expressed by interest groups (industry, governments, ENGOs, NGOs).¹³

But Phillips and Isaac appear to be making – at least by implication – the astonishing argument that, if “misinformed” judgments (however arising) about GMOs exist in the marketplace, presumably to any extent, this constitutes a justification for industry to refuse to identify the products it makes using gene technology! Thus if there were otherwise a consumer right to know about the applications of this technology, the fact that a few were misinformed would cancel the rights of the majority to be appropriately informed. Needless to say, one only has to try to generalize the argument to other areas of life to see that it is a self-contradictory proposition.

The example of food irradiation will help to clarify this point. Like gene technology, irradiation is a controversial food-processing technology, albeit one which has been in use in Canada, for some time already, for small classes of substances (e.g., imported spices). On the other hand, irradiation of meat (ground beef) – to protect against *E. coli* contamination – which is now permitted in the U. S., is still being considered for approval by Health Canada. But where it is permitted, in the U. S., it is accompanied by appropriate labeling, and almost certainly this practice will be followed in Canada when and if approval is given. Very few think it ought to be introduced without such labeling, even though there are in fact quite a number of popular judgments circulating that are, in the opinion of knowledgeable experts, misinformed to a high degree. To the best of my

knowledge no one has suggested that mandatory labeling of irradiated meat is “unfair” to industry because this misinformation exists.

The position taken by Phillips and Isaac is all the more remarkable because they identify so clearly the reasons why consumers might be mystified by the technology of genetic modification and, as a result, might wish to be further informed about it by those who wish to use it in growing and processing the foods they eat:

Due to the level of sophistication associated with the production of GMOs, it is difficult for consumers to know or completely understand: the scientific techniques which have been utilized in the production of the good; the impact of consumption on human health and safety, both in the short-term and over the long-term; or the impact of production and consumption upon broader consumer concerns such as animal welfare, environmental protection or moral, ethical and religious concerns.

This is a most satisfactory summary of the bases of consumers’ information deficit with respect to GMOs. In fact, it forms a solid basis for a strong case in favour of an appropriate form of mandatory labeling! This case will be outlined in the concluding section of this paper.

To summarize the case to be made later: The information deficits outlined above by Phillips and Isaac justify a specific form of mandatory labeling for products and processes where GMOs are present – namely, one which steers the interested and concerned consumer to readily-accessible (internet-based) and easily understandable sources of “disinterested” information about gene technology and its applications. Before proceeding to outline this case, I shall present and review some definitions and issues pertinent to it.

D. Various definitions of “genetically modified.”

1. *The European Union:*

“Genetically modified organisms (GMOs) and genetically modified micro-organisms (GMMs) can be defined as organisms (and micro-organisms) in which the genetic material (DNA) has been altered in a way that does not occur naturally by mating or natural recombination.¹⁴”

2. *Japan:*

Definition of genetically modified food:¹⁵

“Genetic recombination techniques consist of introducing into a crop or other organisms a gene extracted from another organism that gives useful characteristics to the crop or organism.

“A genetically modified food is a food produced using these techniques. Herbicide tolerant or harmful insect resistant soybeans, rapeseeds, and corns are among those that have been developed and produced.”

3. *Canada, House of Commons, Bill C-410:*

“An Act to amend the Food and Drugs Act (mandatory labeling for genetically modified foods),” introduced by Charles Caccia, defeated at first reading (18 March 2003): “‘genetically modified’, with respect to a food or one of its components, means that the genetic make-up of the food or component has been modified by a technique that combines DNA fragments of the food or component with DNA fragments from another source in a way that could not occur without the use of modern technology...”

4. *Food Standards Australia – New Zealand:*

Food Standard Code 1.5.2: “... a food produced using gene technology means a food which has been derived or developed from an organism which has been modified by gene technology ... [which] means recombinant DNA techniques that alter the heritable genetic material of living cells or organisms.”

After providing the general definition of gene technology quoted above, Standard 1.5.2 provides – in the Table to clause 2 – a list of food ingredients derived from specified types of modified plants (e.g., “food derived from glyphosate-tolerant corn line NK603”) that have been approved for use as crops.¹⁶

These few examples pose the crucial issue, legitimately raised by opponents of labeling: What exactly is it that the label should refer to? They illustrate – paradoxically – both the difficulties in answering that question *as well as* the need for mandatory labeling!

Recall the first-mentioned of the information deficits identified by Phillips and Isaac, the mystery about the scientific techniques lying behind gene technologies. Just what are the molecular biologists doing at present in their laboratories? And what are they planning to do in the future, when their knowledge about the genomes of all living things, plants and animals alike (including humans), is more complete, and their skills in manipulating genes very much more sophisticated?

The definitions selected above try to capture in a sentence or two the essence of both the new science and the technological applications based on it. More specifically, the definitions try to epitomize what is radically different about this science and technology, as a way of manipulating the characteristics of plants and animals in the pursuit of human interests, by comparison with the far more limited and cruder techniques of the past. This is a very hard thing to do, which explains both why the definitions differ from each other and why none of them seems entirely satisfactory.

Yet this insufficiency in the definitions used by regulators is another reason why there is a need for enlarged sources of trustworthy information to be provided to the public about this new technology. As indicated below, the chief purpose of a mandatory labeling scheme should be to point consumers to such sources.

E. Illustrations of labeling requirements.

At present labeling is mandatory for GM foods in the following countries and regions: Australia and New Zealand, the European Union, Japan, South Korea, and Indonesia.¹⁷ China is currently moving in this direction.¹⁸ Three examples are detailed below.

1. The European Union:

In September 2003 the EU extended its existing labeling requirements – covering all foods made with GM ingredients – into two new areas: (a) food ingredients and foods that are highly refined, which have been processed from genetically-modified crops (such as soya or maize-oil), even where no trace of the novel DNA is present in the final product; (b) all animal feed made from genetically-modified crops. The threshold for labeling is now 0.9%, and accidental contamination of up to 0.5% is permitted without labeling. The choices for label wording are: “This product contains genetically modified organisms” and “... produced from genetically modified [name of organism].”

At the same time, an elaborate system of traceability has been established which is – in the words of the Regulation – designed “to facilitate accurate labeling of such [GMO] products,... so as to ensure that accurate information is available to operators and consumers to enable them to exercise their freedom of choice in an effective manner as well as to enable control and verification of labeling claims.”¹⁹ The United States has promised to fight against the new EU regulations at the WTO.²⁰

2. Japan:

“In the safety assessment system of genetically modified foods provided under the Food Sanitation Law, all foods are classified into one of three groups: (1) genetically modified foods that have been assessed; (2) GM foods that have not been assessed; and (3) non-GM foods.” The purpose of labeling is “to inform consumers of the constituents of foods they consume.” There are two forms of labeling for foods in category (1): “Labeling is

mandatory when a product contains genetically modified ingredients that have been handled according to identity preserved handling.” Example: “soybeans (genetically modified).” Second: “Labeling is mandatory when a product contains both genetically modified ingredients and non-GM ingredients that have not been handled according to identity preserved handling.” Example: “soybeans (not segregated from GM product).”

“Identity-preserved handling” is the Japanese term for the EU’s “traceability.” Japan provides a blanket exemption for (a) processed foods in which any novel proteins from DNA manipulation are absent in the finished product, and (b) products in which GM ingredients are not “among the three main ingredients” and do not “account for 5% or more of the total weight of the product.”²¹

3. Food Standards Australia – New Zealand:

Labeling is mandatory for any “food produced using gene technology” which “contains novel DNA and/or novel protein.” Excluded are refined foods where “the effect of the refining process is to remove novel DNA and/or novel protein” and “a processing aid or food additive, except where novel DNA and/or novel protein from the processing aid or food additive remains present in the food to which it has been added.” There are also exclusions for small amounts of flavouring agents and of ingredients unintentionally present. Where the requirement applies, the simple phrase, “genetically modified,” is specified for use on the label.²²

F. Some other issues about GMO-labeling.

(a) Who should pay for labeling?

The idea that consumers who want foods containing genetically modified organisms (GMOs) to be labeled as such should pay a premium, for the additional costs involved in labeling, symbolizes the rampant confusions in issues about GMOs more generally. Peter

Phillips and Robert Wolfe kicked off this discussion by using a superficially deft analogy: a consumer asking for GMO-labeling is just like a consumer asking for kosher, halal, or “organic” foods.²³ Such consumers are in effect demanding additional services or benefits from the food industry, and thus it is appropriate to ask them to pay a premium. But note the hidden presumption – these consumers *want* those benefits. The certifying of foods as kosher, halal, or organic represents an incremental value they desire, and actual consumer behaviour tells us that they are willing to pay for these values. So far, so good.

But the analogy immediately collapses, because no consumer ever asked for genetically-modified ingredients to be incorporated into the foods supplied to the marketplace! Companies like Monsanto developed the technology, the United States government developed a specific regulatory strategy for approving them (Canada jumped on this bandwagon early on), the ingredients started to appear in foods sold to consumers, *and only then* were consumers told about this whole new enterprise. Some of them, especially in Europe but also on our own shores, don’t like these kinds of surprises in their food system, so they made their opposition quite clear to both industry and regulators. The controversy goes on.

Now let’s go back to the analogy suggested by Phillips and Wolfe and see how it plays out in this light:

1. I may cheerfully choose to pay a premium for kosher, halal, or organic foods in order to obtain an incremental benefit (a value to me) *which I explicitly seek* – namely, authoritative and reliable certification that my food has been grown or prepared in accordance with certain values that are important to me.
2. At the same time, I used to have GMO-free foods everywhere in the marketplace. I never asked anyone to change these conditions. More specifically, as a consumer I never expressed a preference for obtaining a new value or presumptive benefit: foods made with genetically-modified (in the sense indicated above) ingredients. Now, here comes the kicker: When my government, which regulates this stuff,

finally comes clean and tells me that it has approved these new ingredients for the food system, I am also told explicitly, *that there is no incremental consumer benefit* in having them! Foods made with the new, GM version of familiar crops (such as canola) are, for all practical purposes, identical to the old, non-GM foods, in terms of nutrition, chemical composition, etc.

3. Some consumers now say, "Well, I'd rather not, thanks. If you're determined to push ahead down this path, just label them for me, so that, if I want to do so, I can choose to purchase the old type with which I'm familiar."
4. Then I'm told: "All right, if you want us to restore the *status quo ante* for you, and allow you to choose non-GM foods by having GM foods properly labeled, you'll have to pay for that benefit." Is it so surprising that I might say at this point: "You're completely nuts."

Now things should be clearer. If the food industry, and the government which regulates it, want to change the conditions under which the food delivered to my plate is produced, they have to take responsibility for that decision. In particular, they ought to (a) inform me adequately *before the fact* that they have done so; (b) they should continue to give me a choice in the matter, since obviously I cannot do without food, and food represents all kinds of special values for me and my family. They can do this most responsibly by labeling the foods they have modified, so I can decide whether I want to purchase them or not. It is only commonsensical to suggest that, of course, any incremental costs for this service should be borne by those who chose to produce the novel foods and those who make an explicit choice to consume them.

What are these costs? The European Union is moving quickly to establish production systems which, first, *segregate* novel from older types of crops and seek to prevent cross-contamination between them; second, *trace* the products of modified plants through the harvesting and processing system; third, *certify* to both producers and consumers that the segregation and tracing technologies are performing adequately; and fourth, *identify*

(label) meaningfully the resulting end products for consumers, who can then exercise their rights of choice.

To date both industry and government representatives in North America have resisted mightily the introduction of such a tracking system. But I suspect that they might yield on this point, and before long. What will force them finally to come to their senses on this matter is GM wheat, now awaiting a regulatory approval in Canada and the U. S. This approval will be forthcoming, but, I predict, not without our first putting into place an adequate tracking system. For Canada to approve GM wheat without such a system would be suicidal.²⁴ Once we do this, we can stop the idiotic EU-bashing that North American governments love to indulge in, and cooperate with Europe in making the tracking systems work well. And – by the way – the EU is most certainly not going to back down on its new regulations, no matter how many trade-related disputes are initiated by the United States, so we might as well just accept the fact and move on.

This isn't about food safety. It's about the rights of citizens in a well-ordered democracy to have their freedom of choice respected by their own governments.

(b) How should mandatory GMO-labeling be done so that it is useful?

With reasonably reliable tracing regulations in place, foods can be segregated into one or more categories (as the Japanese do) and be labeled accordingly. Without traceability the situation becomes more difficult – including, of course, for those producers who wish to seek to attract customers with the stipulation, “GM-free.” In other words, in order to be useful to consumers, mandatory labeling must be accompanied with a regulatory structure that deals with all of the following dimensions:

- (a) Tracing of inputs,
- (b) Maximum threshold for unwanted ingredients (e.g., EU, 0.9%),
- (c) Maximum threshold for accidental contamination (e.g., EU, 0.5%),

(d) Exceptions (see Japanese, Australia – New Zealand illustrations above).

The general purpose is, as EU regulation 1830 puts it, “to ensure that accurate information is available to operators and consumers to enable them to exercise their freedom of choice in an effective manner.” The best choice for the specific wording on the label itself can be a matter of debate; it is more important to recognize that only the larger context, indicated above, makes mandatory labeling useful and meaningful.

G. A recent case study.

Throughout the entire debate over GMOs in North America, the industry/government lobby has argued that mandatory labeling will make some consumers wary of GM products, and therefore labeling poses an unacceptable risk to the biotechnology industry. I leave aside here the important question about how this argument possibly could be seen as somehow trumping the more fundamental consumer right to know. Rather, I wish to refer to a recent published study which bears directly on the plausibility of the contention itself. The study is based on survey research about consumers’ perception of risk, in the context of the labeling of milk produced with rBST in the United States. The study’s conclusions are as follows:²⁵

The results indicate that greater availability of labeled milk would not only significantly increase the proportion of consumers who purchased labeled milk, its availability would also reduce the perception of risk associated with rBST, whether consumers purchase it or not. In other words, availability of rBST-free milk translates into lower risk perceptions toward milk produced with rBST.

In an age where public trust in industry and governments has been sinking ever lower, this study has important lessons for those institutions. Many consumers think about their food purchases, and they appreciate having choices. When they have such choices, based on the provision of information that they think is important to them, they tend to respond

in quite rational ways. What annoys them is the idea that major institutions are hiding things from them through inadequate disclosure. What really annoys them, I suspect, is having someone impute “misinformed judgments” to them.

H. A mandatory labeling proposal for Canada.

It is said that a group of Canadians are busily working on the text of a “voluntary standard covering the labeling of foods obtained through biotechnology.”²⁶ The draft text is not yet available for public dissemination, but this is of little moment, since most of the public (as shown repeatedly in opinion surveys) want mandatory labeling for GMOs, and therefore a voluntary standard will be of no interest to them. In fact, voluntary labeling is a simple absurdity; it is a self-defeating exercise because it undermines the very principle (the right to know) to which it ostensibly pays lip-service. The result of these extended deliberations will be still-born.

Let us return to the wise words of Phillips and Isaac quoted earlier:

Due to the level of sophistication associated with the production of GMOs, it is difficult for consumers to know or completely understand: the scientific techniques which have been utilized in the production of the good; the impact of consumption on human health and safety, both in the short-term and over the long-term; or the impact of production and consumption upon broader consumer concerns such as animal welfare, environmental protection or moral, ethical and religious concerns.

No better statement of consumer information needs about GMOs has ever been penned. Satisfying those needs requires mandatory labeling. This is how it ought to be achieved in Canada:

- (a) Establish a regulatory scheme for tracing and labeling GM products that allows consumers to “exercise their freedom of choice in an effective manner” (the EU formulation);

- (b) Use a small number of simple label texts, such as “genetically modified” or “produced from genetically modified [name of organism]”;
- (c) Add only a website URL and a toll-free telephone number;
- (d) Establish one or more Internet-based public information resources, *with content provided by disinterested third-party sources only*, on all aspects of gene technology and its applications to food crops, continuously updated, and including a question-reply facility.²⁷

Endnotes.

Note: The websites cited below all were accessed in the period November 4-6, 2003.

¹ About the author: William Leiss is author, collaborator or editor of twelve books, including *In the Chamber of Risks: Understanding Risk Controversies* (2001), *Mad Cows and Mother's Milk: The Perils of Poor Risk Communication* (co-authored with Douglas Powell, 1997) and *Risk and Responsibility*, 1994 (all from McGill-Queen's University Press). Over a period of twenty years he has worked extensively in an advisory capacity with industry and with Canadian federal and provincial government departments in the area of risk communication, risk management, public consultation, and multi-stakeholder consensus-building processes. He has been an advisor on issues dealing with pesticides, toxic chemicals (chlorine, dioxins, and others), tobacco, prescription drugs, radio-frequency fields, genetic engineering, and others. He was a member of the Senior Advisory Panel for the Walkerton Inquiry (2000-2002) and in 2000 was Chair of the Task Force on Public Participation for Canadian Blood Services. <http://www.leiss.ca>

² The best overview of such risks done to date in Canada is the one issued by the expert panel established by The Royal Society of Canada [RSC], *Elements of Precaution* (Ottawa, 2001), available at: <http://www.rsc.ca>

³ The regulatory structure for biotechnology was “politicized” from the outset, as detailed in a brilliant piece of investigative journalism by *New York Times* reporters Kurt Eichenwald, Gina Kolata, and Melody Petersen, “Biotech Foods: Lost war for public trust,” *International Herald Tribune*, 26 January 2001, pp. 1, 6. They show how Monsanto went directly to Vice-President George Bush in 1986 to lay out their requirements for a regulatory structure (including limiting the authority of the FDA): “What Monsanto wished for from Washington, Monsanto – and, by extension, the biotechnology industry – got.” Then it all fell apart: See W. Leiss, *In the Chamber of Risks: Understanding Risk Controversies* (Montréal: McGill-Queens University Press, 2001), ch. 2.

⁴ R. Chaitoo & M. Hart, “Labeling of GMO Products: Strategic Trade Policy Considerations for Canada,” a paper prepared for the Canadian Biotechnology Advisory Committee (November

2000), available online at: [http://strategis.ic.gc.ca/epic/internet/incbac-cccb.nsf/vwapj/Labeling_GMO_Chaitoo_Hart.pdf/\\$FILE/Labeling_GMO_Chaitoo_Hart.pdf](http://strategis.ic.gc.ca/epic/internet/incbac-cccb.nsf/vwapj/Labeling_GMO_Chaitoo_Hart.pdf/$FILE/Labeling_GMO_Chaitoo_Hart.pdf)

⁵ The current Bush administration is in the process of imposing values derived from its bizarre religiosity on the promised aid package for HIV/AIDS victims in Africa as well as on international human rights issues: Editorial, "Misguided Faith on AIDS," *The New York Times*, 15 October 2003; E. Bumiller, "Evangelicals sway White House on human rights issues abroad," *The New York Times*, 26 October 2003.

⁶ The best discussion is in RSC (note 2), *Elements of Precaution*, chapter 7.

⁷ See the current controversy in Great Britain about risks to wildlife from GM-crops:

<http://www.guardian.co.uk/gmdebate/>
<http://www.guardian.co.uk/gmdebate/Story/0,2763,1066322,00.html>
<http://www.guardian.co.uk/gmdebate/Story/0,2763,1065894,00.html>
<http://www.guardian.co.uk/gmdebate/Story/0,2763,1064739,00.html>

⁸ Future generations of GM-based foods promise to have significant, direct benefits to consumers (such as improved nutrition and vitamin content). This will represent a different situation. One waits to see if the producers will in this case want to boast to consumers about their cleverness in gene manipulation.

⁹ Council for Biotechnology Information [CBI], "Biotech labeling (2003)," available online at: <http://www.whybiotech.com/index.asp?id=1811>. CBI's members are "the leading biotechnology companies and trade associations."

¹⁰ American Medical Association, Council on Scientific Affairs, "Genetically modified crops and foods" (December 2000), section "Producing a transgenic plant": <http://www.ama-assn.org/ama1/pub/upload/mm/-1/csa10cropsandfoods.pdf>

¹¹ See W. Leiss, "Elementary, my dear Watson" (2003): <http://www.leiss.ca/chronicles/88>.

¹² <http://www.agbioforum.org>: "GMO Labeling: Threat or Opportunity?" *AgBioForum*, 1 (1), 1998, 25-30. They distinguish between "process-based" and "product-based" GMOs, but since this distinction is not relevant to the issue of labeling, I omit it here. See also G. E. Isaac & J. E. Hobbs, "GM Food Regulations: Canadian Debates," *Isuma*, vol. 3, no. 2 (Fall 2002), 105-113 (online at: <http://www.isuma.net>); M. D. Mehta & J. J. Gair, "Social, political, legal, and ethical areas of inquiry in biotechnology and genetic engineering," *Technology in Society* 23 (2001), 241-64.

¹³ Where GMOs are concerned governments in North America are interested parties, since they have chosen to be strong promoters of biotechnology industries. See W. Leiss, *In the Chamber of Risks: Understanding Risk Controversies* (Montréal: McGill-Queens University Press, 2001), ch. 2.

¹⁴ http://europa.eu.int/comm/food/fs/gmo/gmo_index_en.html

¹⁵ <http://www.mhlw.go.jp/english/topics/qa/gm-food/gm2.html>

¹⁶ <http://www.foodstandards.gov.au/foodstandardscode/>

¹⁷ C. A. Carter & G. P. Gruere, "International approaches to the labeling of genetically modified foods," Agricultural Marketing Research Center, University of California, Davis (March 2003), Table 1, online at: <http://www.agmrc.org/markets/info/cartergruere.pdf> . This six-page document is the best current summary available.

¹⁸ <http://www.china.org.cn/english/2002/Feb/27756.htm>

¹⁹Go to: http://europa.eu.int/comm/food/fs/gmo/gmo_index_en.html and follow the links for the complete text of Regulation (EC) No 1829/2003 on genetically modified food and feed and Regulation (EC) No 1830/2003 "concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms" (both promulgated 22 September 2003).

²⁰ <http://www.newscientist.com/hottopics/gm/>

²¹ <http://www.mhlw.go.jp/english/topics/qa/gm-food/gm4.html>

²² http://www.foodstandards.gov.au/srcfiles/Standard152_GM_%20v62.pdf

²³ "Read the fine print on GMO labels," *The Globe and Mail*, 2 September 2003.

²⁴ Murray Fulton, Hartley Furtan, Richard Grey & George Khachatourians, "GM wheat may be great, but our markets don't want it," *The Globe and Mail*, 11 August 2003, online at: <http://record.workopolis.com/servlet/Content/qprinter/20030811/COWHEAT>

²⁵ L. Zepeda, R. Douthitt & S. You, "Consumer risk perceptions toward agricultural biotechnology, self-protection, and food demand: The case of milk in the United States," *Risk Analysis* 23 (2003), 973-84.

²⁶ Canadian General Standards Board: http://www.pwgsc.gc.ca/cgsb/032_025/intro-e.html; see also the objections raised at: <http://www.georgiastrait.org/Articles2003/labeling.php>

²⁷ A template for such resources will be found at <http://www.emcom.ca>, which deals with the issue of endocrine disruptors; the information provider is a university-based research team. The site features a "science translation" modality where scientific description is expressed in layperson's terms; animated graphics to illustrate biological processes; "layered" information to respond to different levels of need; a question – reply function ("ask a scientist"); and other features.