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Guest Editorial

Genetically Modified Foods: Why So Much Concern?

Genetically modified (GM) foods have entered British supermarkets over this last year. The outcome has been mixed; some have been accepted without hesitation – for example, the puree made from genetically modified tomatoes, but others, notably the flour from genetically modified soya beans, have caused considerable controversy. Why is this? After all, products like insulin, growth hormone and interferon – all made by genetic modification – have been accepted by the consumer without question. If it's OK to use genetic modification for medicine then why not to produce more food?

Over the last twenty years, we have learned how to isolate any gene from any living organism, introduce the new gene into another organism, and *get it to work there*. The process is straightforward and can be applied to both plants and animals. The old species barriers have gone. This technology has many applications in the food industry, and will also lead to many new crop products. For example:

- Modification of the genetic material of plants to extend their shelf life, for example the new tomato,
- Modification of the genetic material of plants to produce novel parental lines for the production of new F1 hybrids, for example rape,
- Modification of the genetic material of plants to introduce resistance to herbicides or pests, for example, soya, potatoes, cotton and corn.

The products coming to market now are the result of research carried out in the mid-80's. For example, since herbicide resistance is due to a single gene, transfer was technically more straightforward than is the transfer of such multi-gene characteristics as nitrogen fixation although new techniques will eventually make such transfers feasible. They should also make possible the production of fruits and vegetables with improved dietary properties, for example with lower saturated fat levels or improved vitamin content. The technology is also being used for crops of importance to the developing world, like rice, and rice resistant to bacterial blight is not far away.

Why has this new technology been developed? Primarily, some say, to feed a growing world population. Global population is increasing by about 87 million per year, and is estimated to reach 8 billion by 2020 from its present 5.9 billion. In addition, loss of land to urbanisation means that the amount of cultivated land supporting food production is falling, while the need for irrigation is increasing, the climate is changing and as people become more prosperous, they

replace plant foods with animal foods – which are less efficient in trapping solar energy. How are we going to feed all these people? Surely new approaches will be needed in addition to the continued improvement of existing methods?

On the other hand, others say that GM is not needed to produce more food. They argue that the planet's food problems are due to economic and political problems, and especially endemic poverty, not because we can't grow enough food. There's truth in that, for if the world's food supply in 1994 had been evenly distributed, it would have provided an adequate diet of about 2350 calories per day for 6.4 billion people, more than the world population. But distributing it that evenly will not be easy, even if the world's population was not increasing. Of course we should aim at a more equitable distribution, but it seems perverse to me to walk away from a potential increase in the world's food supply.

The public have a series of perfectly reasonable concerns, for example, are these new foods safe? Specifically, is this new soya safe? Herbicide resistant soya was genetically modified by the introduction of a gene from a soil bacterium to make the plant resistant to the herbicide glyphosate. This change brings real advantages for the US farmer, and the new crop, which accounted for only 2% of the crop in 1996, was up to 15% in 1997 and 40% in 1998. Farmers do want to use it. But how do we know if it's safe? Before it can be sold in Britain, it needs Government approval and Ministers take the advice of the Advisory Committee on Novel Foods and Processes, which I chaired for nine years. In fact we do not eat soya beans but the flour made by grinding and defatting the beans. Both the added gene and the new enzyme are degraded by this treatment, and are then quickly broken down in the gut, so the Committee saw no evidence of risk. But trust in the regulatory process has been eroded, especially by the BSE outbreak, and although the Government is working to re-establish trust in the regulatory system, consumers remain unsure about safety.

The public are also concerned about the environmental effects. Will these crops lead to an increase in the use of herbicides? Will the modified genes escape into the environment to fill our fields with resistant rape, or will the genes spread to other species? These problems are regulated by the Advisory Committee for Release into the Environment, and a number of releases have been approved to date. However, some environmental groups remain concerned about risks, and political pressures have focused on a call for a 'moratorium' on the planting of all genetically modified crops in Britain, even though such a moratorium would be illegal under EU rules. Such pressures have recently led to Government Ministers announcing an agreement with the plant breeders to delay the introduction of full scale commercial release of genetically modified crops into the UK, with a one year delay in the introduction of herbicide resistant crops, and a three year delay for insect resistant crops.

So if GM soya is as safe as unmodified soya, and if any adverse effects on the environment can be controlled, do people want to eat it? Certainly, some do not and consumers are particularly upset about the absence of choice. The first two products, the tomato GM puree and the 'vegetarian cheese' offered the consumer both advantage and choice. In contrast, the flour from the herbicide-resistant

soya, from Monsanto in the US, offers no obvious advantage to the consumer, but rather to the producer, and the consumer has *not* been offered choice. This has been much resented by consumer groups. Why has there been so much consumer concern because of the absence of choice? What ethical issues lie behind such consumer concerns, and what can we say as Christians?

One concern is the conviction that certain sorts of genetic modification of plants are an unacceptable kind of tampering with nature. However, scientists, and many Christians, do not find this distinction between what is 'natural' and 'unnatural' a useful one, for scientists see the biological world as a unity, though a changing unity, and Christians see it all as God's creation, whatever its form. So it does not seem unethical to scientists to place a gene from a different species into, say, a tomato, although that would not have occurred naturally. There is of course a separate issue of care and stewardship, but is it intrinsically wrong, even wicked, to move genes around in the way I have described? Does the genetic constitution of some or all species have a specially protected status? I do not think so, but others disagree.

A second ethical issue is a cost/benefit analysis, involving balancing the risks of the introduction of GMOs against the likely benefits to consumers, to farmers, and to industry. There are two steps here: the first is the technical task of estimating the risk of occurrence and the second is to decide whether the risk is worth taking, and that must involve a wider community. What specific contributions can Christians offer? First, their technical expertise, and of course their total integrity too, but surely also a strong commitment to social justice.

Finally there are issues about the allocation of benefits and burdens, such as who stands to win, who to lose. There are many issues here. What about developing countries? Are the multi-nationals becoming too powerful, and if so, what should be done about it? Do consumers have an *absolute* right to choose not to consume genetically modified foods? Segregation of GM from non-GM food will raise costs; so what about those who need cheaper food? Is this all a middle-class indulgence? All these issues are raised by GM foods, but are they intrinsic to the technology?

My own view is that GM foods have become a lightning rod for many modern concerns: scepticism about the regulatory process, gusts of anxiety about our food, growing hostility to high intensity agriculture, and concern about the way in which the agrifood business has consolidated into five companies world-wide. Decisions about the future of our food are being taken in the US or in Switzerland. Consumers feel they have lost control and blame the technology, and some wish to ban it altogether.

I do not believe that that is a sensible way ahead. Rather, I believe that we should respond by regulating the fast-moving genetic technologies so that they are the least harmful and the most helpful to us all. But we shall need cool heads, the best technical expertise and an impartial sense of social justice.

Prof. Derek Burke was until recently Vice-Chancellor of the University of East Anglia and Chairman of the Government Advisory Committee on Novel Foods and Processes. Prof. Burke is also on the Editorial Board of *Science & Christian Belief*.
