Christians and Genetic Manipulation (GM)

Are we 'Playing God'?

This paper follows on from JRI Briefing no.5, *Genetically Modified Crops*, which discussed the science and applications of GM.

The 19th century has been called the Age of Mechanical Power, the 20th the Age of Electrical Power, and the 21st is forecast to be the Age of Biological Power. As we harnessed steam and electricity so we now have the potential to use genes and life itself. But should we? Are we breaking natural limits? Are we playing God?

The Prince of Wales has expressed strong concern about GM. He wrote in the *Daily Telegraph* 8th June 1998, "I believe this… takes mankind into realms that belong to God, and to God alone" although he went on to except "certain highly beneficial and specific medical applications" from his abhorrence of "experimenting with and commercialising the building blocks of life."

Further, there is widespread confusion about GM. A House of Lords' Select Committee (December 1998) stated: "There is no clear concept of genes being part of the natural order… Many consumers believe that genes are only present in GM foods and are scared at the prospect of catching them should they eat modified food."

The media have capitalised on such emotions and whipped up fears by sensationalism at the expense of honesty. A catalogue of technological disasters from thalidomide and persistent pesticides, from Bhopal and Chernobyl to the ozone hole and BSE have rocked public confidence in science. The idea of gene manipulation conjures up fears of an uncertain Brave New World where we are no more than automata determined by our genes which in turn may be controlled by someone else. How do we separate fact from fiction? How do we develop a Christian mind?

Bible teaching

With the possible exception of Jacob's husbandry in Genesis 30:31-43 and the condemnation of hybridisation in Leviticus 19:19 (and possibly Deuteronomy 22:9), there is nothing in the Bible about genes – not surprisingly since Mendel's paper was not published until 1865 and the word 'gene' was only coined by Johannsen in 1909.

However, God's first command to our first parents was "have dominion over the fish of the sea, the birds of the air, and every living thing that moves on the earth". This command is all-embracing; it includes every part of every living thing, genes as well as body shapes, and inherited traits as well as interactions between individuals or species. Like it or not, God has given us responsibility to care for the genetic riches of nature. And, like the men in the parable entrusted with talents, this is a divine command, not a mere option (Luke 19:12-27). We cannot plead that our role is limited to the preservation of pandas, butterflies or ancient woodlands. Biological diversity exists at the gene, the species, and the ecosystem levels. In terms of our divine mandate, we should not distinguish between them; all are entrusted to our care.

Being responsible stewards of creation for God includes therefore the obligation to be genetic stewards and we need to explore carefully the limits and constraints of that obligation.

The issues

Human involvement with genetic matters goes back to the beginnings of settled existence when our ancestors began to herd animals and grow crops for their own use. Breeding animals for domestication involves selecting certain individuals to breed from and rejecting others, a process only different from that which goes on in 'nature' in terms of the method and criteria for becoming a parent. In agriculture, the reason for selection is usefulness to humans, not merely survival. Our farm animals and crops are now very different from their primitive relatives.

Although there are moral issues in terms of the results of this procedure (such as turkeys that cannot walk or hens and pigs kept in battery conditions, or bulldogs barely able to breathe) the fact that modern day rice, wheat or cattle have been massively genetically changed by human activity is generally unchallenged by ethicists.

Current concerns centre on the transfer of genes from one organism to another (genetic manipulation or engineering) and reproductive technology (such as *in vitro* fertilisation and cloning) which does not necessarily involve genetic change but tends to be lumped with it as unacceptable interference.

Two points need making

1. These 'new' techniques have been developing over more than a century, and their dangers have been repeatedly explored (see box overleaf). In 1989, the Royal Commission on Environmental Pollution (RCEP) published an intensive study on

the release of GMOs to the environment. It pointed out that "the risks that genetic engineering may entail, and the associated ethical considerations, have been debated since the technology came into existence in the early 1970's. There can rarely have been a new technology which has attracted so much intense discussion of its potential risks from such an early point in its development."

2. We need to be aware about what we mean by 'natural'. Potato and apple varieties are clones, as are the pestilential swarms of many green-fly species, and – perhaps more morally significant – so are identical twins. Moreover, genes may 'jump' from one individual or one species to another, carried by a vector (usually a virus). The technology that we have harnessed as GM occurs 'naturally' without human intervention. Although we assume that the transfer of genes in this way is normally rare, we have no measures of its rate.

1. The nature of genes

Genes are stretches of a fairly simple chemical, deoxyribose nucleic acid (DNA) which can both replicate (or reproduce) itself and direct the formation of proteins which are the working molecules of living cells. Genes can be synthesised in the laboratory and in this very basic sense 'life' can be made artificially; we now know the molecular basis of biological life. But this is not the same thing as being able to give a chemical formula for *human* life in the fullest sense. As humans, we are distinct from all other creatures by being made in the image of God. The details of our genetic differences from other animals (we differ from chimpanzees in only 1.6% of our genetic code) is very different from our uniqueness and standing in God's eyes. The Human Genome Project will be very valuable in fighting disease; it is no threat to our true human-ness as beings created by God in his own image. We should not confuse chemical knowledge about genes with God's supernatural work in individual lives.

2. The nature of individuals

It is wrong to claim that our behaviour or decisions are *determined* by our genes. We may have a gene "for" short-sightedness or diabetes, but we have no qualms about correcting its effects by spectacles or injecting insulin. We may have an inherited tendency to violence or sexual adventuring but our behaviour depends on the decisions we make in specific situations. The idea that we are a prisoner of our genes comes from doctrinaire reductionists like Richard Dawkins, and from novels like *Brave New World* or *The Boys from Brazil* rather than science. Identical twins are born with identical sets of genes, but are individuals in their own right; in no sense are they theological or moral cripples. Likewise, a human or animal or plant with a few genes added (or removed) by genetic manipulation does not automatically become a different individual. A strawberry has several thousand genes and the insertion of a gene from a fish to make it resistant to frost does not mean that it is no longer a strawberry.

Key events in Genetic Engineering

1860s	Gregor Mendel's experiments; recognition of discrete inherited factors.
1878-81	Chromosomes described in cell nuclei
1930s	Physical agents, such as x-rays, produce genetic changes (mutation), Müller
1953	Watson & Crick model of double helix structure for DNA
1970	GM becomes possible following isolation of 'restriction enzymes'
1974	Voluntary moratorium on genetic manipulation until safety issues clarified
1977	First human gene cloned
1976-78	Regulation of genetic manipulation under Health & Safety Legislation (UK)
1982	GE insulin approved for use by diabetics
1983	First transgenic plant produced (tobacco resistant to herbicide)
1986	Experimental release of GM caterpillars
1994	First genetically engineered food (tomato) introduced in USA
1997	Dolly, cloned ewe born by nuclear transfer

We share about 80% of our genes with rats and 50% with bananas. It is almost impossible to say what is a 'human' gene. Genes change throughout life, since any gene can mutate at any time. Ageing is largely the consequence of accumulating mutations. Genetic uniqueness must not be treated as of moral value; for instance, most cancers are the result of mutation in the genome, producing a new genetic form.

Every time we eat food, we are taking in thousands of genes. If a plant has been given an animal gene which makes it (say) resistant to frost, it may well be a gene we have anyway. GM genes may be in a part of the plant we do not eat, for example the chemical we call sugar is exactly the same in a GM or a non-GM plant. Cooking destroys the activity of genes. It is conceivable that we might be poisoned by GM plants, in the same way as we might be poisoned by a chemical additive, but tests for poisoning are carried out on all new crops and food additives, so the risk is very small. The possibility of a 'new' gene being incorporated in our chromosomes from food we eat is almost non-existent, and any hazard from it even less. Genes are no more to be feared or exalted than any other part of the natural order.

3. The nature of species

It is sometimes argued that species are specially created by God, and therefore altering the genetic composition of a species is tampering with God's handiwork. This is false for three reasons:

a. Many species are genetically 'leaky'. Although hybrids between species are usually sterile (e.g. a horse crossed with a donkey gives an infertile mule or 'hinny'), many hybrids may be able to breed successfully with one of the parent forms, and transfer genes originating from the other parent.

b. As already noted, genes can be transferred by infection as well as by normal crossing.

c. Although a species breeds true ("after its kind"), it may accumulate differences over time, in the same way that a modern bread wheat is genetically distinct from its wild ancestor (and indeed, contains significant numbers of genes from at least two other grass species). Species are not immune from either extinction (like the dinosaurs) or genetic change.

4. Measured risks and benefits

Associated with new chemicals or new technologies are potential benefits but also potential risks. A powerful technique like GM is no exception. The best known benefits are in medicine: for instance the blood clotting Factor VIII which is used for treating haemophiliacs now comes from a GM source rather than from natural blood, thus eliminating the danger of infection. Benefits and risks in agriculture are explored in more detail in Briefing no.5.

No technology is ever risk-free. A vast amount of research has already been carried out on the hazards from GM. Much more careful research is needed. Public confidence would be increased if the results of this research was more widely known.

5. Perceived risks

Some people have an abhorrence of anything that seems to alter 'nature'. This is largely instinctive. However, there are few people who object to (for example) wearing spectacles or false teeth, or disciplining ('naturally') aggressive behaviour, or planting 'improved' plants in their gardens.

More often, opposition to GM is a simple fear of the unknown, compounded by lack of faith in 'experts'. This is understandable. It leads to demands for "more information", including, for instance, "better labelling". The answer here is a better understanding of the issues involved, but it is not easy to know how this can be reliably achieved. Although 'scientists' are still highly regarded in surveys of public attitudes, 'government scientists' are much more distrusted. A model for the way forward could be the (UK) Human Fertilisation and Embryology Authority which is both a regulator of reproductive technologies (artificial insemination, IVF, etc.) and an advisor to the Government on ethical and legal matters. Its membership has a statutory majority of non-professional members and a clearly stated policy of consultation and openness regarding its findings. It has established a degree of confidence in issues that at one time seemed irresolvable in the face of competing pressures and advocacies.

6. Commercial interests

Other worries about GM, particularly in agriculture, arise from the potential it provides for unscrupulous exploitation by large multinational agrochemical companies through, for instance, the concentration of seed production within these companies or their patenting of GM products. Added to this is the remit of the World Trade Organisation to foster free trade independent of adequate social or environmental constraints. These are important complex questions to which Christian principles and values are highly relevant. Part of the answer is much tighter international regulation, but to consider them fully is outside the scope of this particular briefing.

That there are large overlaps between commercial and social concerns as is illustrated by a Christian Aid Report (1999) on *Selling Suicide. Farming, False Promises and Genetic Engineering in Developing Countries.* This describes the desperation of poor farmers when they have to buy expensive seeds and agrochemicals from remote industrial giants, rather than retaining part of their own crops for planting in the next year. It vividly highlights the plight of traditional practices in the face of new possibilities of greater yields and greater profits. It provides an important reminder that not only do all changes have social costs as well as possible benefits but also raises questions about the ability of traditional agricultural practices to provide enough food for a world where the population will double over the next century, where soils are deteriorating from erosion, mineralisation and pollution, and where crops will be increasingly threatened by climate change.

GM crops have the potential to help but new crops and methods must be introduced with great care and appropriate regulation. Developing countries are recognising this potential. China is one of the biggest growers of GM crops; India has welcomed GM technology but declared its intention of developing it in their own way rather than being dependent on foreign GM products. We, in the developed world, face problems in helping needy countries to feed themselves, while encouraging states and businesses with technical expertise to invest in ways that are affordable to the poorest. We are called to love our Third World neighbour, and this may involve helping poor countries with GM technology.

A Christian understanding

As Christians, we properly recoil from the idea of 'playing' God. But we should be enthusiastic about accepting our roles on behalf of God. He has appointed us to be responsible to him for the genes of his marvellous creation as genetic stewards, gardeners, farmers, land-owners, care-takers. Nowhere are we told that we can be selective in the responsibilities we take on; God has entrusted *all* his creation to us. Consequently:

1. We must beware of exaggerating the importance of genes. We are not controlled by our genes. We are creatures made in God's image, which makes us reliant on and responsible to him.

2. We are called to be honest in all our dealings. We must do our utmost to separate fact from fiction; this includes making every effort to discover both the benefits and risks of GM, and to help others to do the same, however seductive the misrepresentations of the media and of pressure groups with different ideologies.

3. We must be just in our relationships. We are wrong to deny our neighbour his GM food unless it is going to harm him. If it is his only chance of an adequate diet, we must help him acquire it, even if we do not want it ourselves. We must also strongly challenge improper exploitation for personal or commercial gain.

4. We must be wise and balanced in our judgements. If we look at the Bible, we find a story of continual change; only God remaining constant. Some things change more quickly than others, but it is almost impossible to attach any eternal meaning to something being 'natural'. The key is that "all things hold together" in Jesus Christ.

Although it is right to be cautious about new developments in bio- or any technology, we must always seek to judge on the basis of our Christian understanding – a daunting challenge but one that God has laid on us.

Further reading

Bruce, D. & Bruce A. (eds.) *Engineering Genesis.* (London: Earthscan, 1998).

Deane-Drummond, C.E. *Genetic Engineering for a New Earth*. Grove Ethical Studies, No.114. (Cambridge: Grove Books, 1999).

Nuffield Council on Bioethics. *Genetically Modified Crops: the Ethical and Social Issues.* (London: Nuffield Council on Bioethics, 1999). (http://www.nuffieldfoundation.org/)

Reiss, M.J. & Straughan, R. *Improving Nature? The Science and Ethics of Genetic Engineering.* (Cambridge: Cambridge University Press, 1996).

The Society, Religion and Technology Project of the Church of Scotland has produced a number of helpful fact sheets: *Genetic engineering*; *Cloning animals and humans*; *Patenting life?; What is genetic engineering?*; *Genetically modified food* (http://www.srtp.org.uk/publmain.htm)

Methodist Church study guide. *Making our genes fit. Christian perspectives on the new genetics.* (Methodist Communication Office, 1999).

This briefing has been prepared for *The John Ray Initiative* by R J Berry, Professor of Genetics at University College London. Thanks are due to Professor John Bryant and the JRI Trustees for helpful comments.

THE JOHN RAY INITIATIVE

The John Ray Initiative promotes responsible environmental stewardship in accordance with Christian principles and the wise use of science and technology. JRI organises seminars and disseminates information on environmental stewardship.

Inspiration for JRI is taken from John Ray (1627-1705), English naturalist, Christian theologian and first biological systematist of modern times, preceding Carl Linnaeus.

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