Comment:
Genes

So it turns out that we humans have far fewer genes than was thought: around 30,000, rather than somewhere between 80,000 and 140,000 as previously supposed (see *The Independent*, Monday 12 February 2001).

Scientists at two rival camps, American and British, Celera Genomics in Rockville, Maryland, and the Sanger Centre's Human Genome Project in Cambridge, have published provisional reports of their 'maps' of the genetic information locked up in the DNA code of the 23 pairs of human chromosomes. This is what is called the human genome. It controls how our bodies are built from a single fertilised egg cell, how they function, normally or abnormally.

It turns out that we are not much richer genetically than very simple lifeforms. For example: the fruit fly has 13,000 genes, the nematode worm has 18,000, and the thale cress has 26,000. The highly complex and sophisticated beings that we are, it thus emerges, have few more genes than a scrubby little plant that lives on crumbling masonry.

One implication, these reports say, is that there must be a lot more to us than our genes. Having more accurate knowledge will certainly tell us much more about our own evolutionary history and our biological relationship to flies, worms and wallplants. But we must look to environment, and the interaction between upbringing and genetic make-up, to account for the immense difference between *homo sapiens* and *arabidopsis thaliana*. We are not so determined by our genes as some have maintained.

Knowing more about our genes will, of course, enable us to exercise a certain control over the development of the human race. 'Designer babies' will become a realistic possibility within the next thirty years, so they say. Indeed, with so many fewer genes to juggle, producing a better kind of person might be all that much easier. The ethical questions remain.

Knowing more about our genes will improve our understanding of a whole range of diseases. This will lead, in some cases at least, to more effective treatments. Cancer, for example, is now understood as a genetic disease, caused by something going wrong at the DNA level — though people who live in the neighbourhood of nuclear power stations, and veterans of the Gulf War, will remain concerned about the contribution of environment. Mental disorders, such as manic

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depressive illness and schizophrenia, already supposed to have some biological basis, should be better understood and it follows that new therapies may be devised.

The human genome turns out to have vast stretches that are completely devoid of genes. These 'deserts' are interspersed with 'jungles', stretches that are exuberant with genes. Interestingly, one of the most 'desertified' regions of the genome, with barely a gene to call its own, is the Y chromosome, which men but not women inherit from their fathers — indeed, which makes a man a man. What genes the male Y chromosome does have, the scientists now say, seem to have been copied from the female X chromosome. Being male, that is to say, is not determined so much by the presence of the Y chromosome as by the absence of an extra X chromosome.

Theologically, this has implications. How Jesus got his Y chromosome is a question that is not discussed in the Catechism of the Catholic Church but that fascinates a certain kind of theological mind. Many would argue, indeed, that Jesus must have had a human father (Joseph, they usually say), since otherwise, having no man to give him the Y chromosome, he must have been a woman. Hitherto, upholders of the doctrine of the virginal conception, if they theorized this far, have posited a miraculous change of an X into a Y chromosome, or the suppression of an X and the production of a Y to take its place. Perhaps the news about the dependence of the Y upon the X chromosome might allow us to envisage the possibility of a somewhat less radical interference with the natural process of human conception.

The news that we have far fewer genes than was thought, one of the scientists was quoted as saying, deals a body blow to the idea that single genes determine all human traits, from alcoholism to homosexuality — as if we were each the sum total of our genes, such that, in principle, given time, and the expenditure of a great deal of money, our genetic make-up could be broken down and analyzed in terms of some simple deterministic explanation. If we are not 'hardwired', as the scientists put it, replicating something as dependent on nurture, environment and history as human beings appear now to be, after all, will not be so straightforward. Whatever genes may be passed on, from one generation to the next, they do not constitute a sufficient set of instructions to engineer the hoped for product. But this deflation of our genetic inheritance is no occasion for theologians to rejoice: on the contrary, there is only much more to discover about us human beings, and the ethical and theological implications remain as contentious as ever.

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