FEDERATION OF ASIAN AND OCEANIAN BIOCHEMISTS AND MOLECULAR BIOLOGISTS

7TH CONGRESS, SYDNEY, AUSTRALIA

SYMPOSIA THURSDAY 28 SEPTEMBER 1995

"THE HUMAN GENOME PROJECT AND SOCIETY"

The Hon Justice Michael Kirby AC CMG*

REALISING THE HUMAN GENOME PROJECT

Three weeks ago, I received word of a great challenge. The Human Genome Organisation informed me that I had been selected by the Ethical, Legal and Social Issues Working Group (ELSI) and the International Council of the Human Genome Organisation (HUGO) to serve as a Member of the joint HUGO-ELSI Working Group.

This body will be charged with nothing less than the mission of responding to the ethical, legal, social, psychological, economic and policy considerations of the information being rapidly produced through the international Human Genome Project. The mandate is, not only to anticipate and analyse the consequences, but to make policy recommendations and to take steps that may alleviate potential harm that could be caused by the inappropriate availability of the knowledge which the Human Genome Project will produce. More positively, the object of the Working Group is to maximise the potentially beneficial use of the Human Genome Project.

I say, without reservation, that I approach my new functions in a positive spirit. I have no doubt that the overwhelming consequences of the Human Genome Project will be for the benefit of humanity. The task of scientists, ethicists and lawyers alike, in consultation with the people of our various countries, will be to ensure that the benefits of the Project pass to the advantage of all people of the world. I have no doubt that this is the spirit in which the overwhelming majority of scientists who are working on the Project tackle their tasks.

The first meeting of the HUGO-ELSI Working Group is to take place in Bethesda, USA, on 14-15 October 1995. I plan to attend. Inevitably, this invitation and the upcoming meeting has caused me to reflect upon an intellectual framework for considering the ethical, legal and social issues presented by the Human Genome Project. In the space of this short talk, I can do no more than to indicate some of the concepts which have to be addressed.

Most of the literature, certainly that written in legal texts, has been addressed to the *use* of the material produced by the research of those engaged in the Human Genome Project. It is probably natural, and certainly unremarkable, that policy experts and lawyers should concentrate upon such use. To them, this world is a place of action. Actions can be good and they can be dangerous. When they are dangerous, they typically become of concern to society and its laws. Often actions then have perceived ethical implications.

But, prompted by a reflection at a conference earlier this week in Brisbane made by Professor William May, a distinguished bio-ethicist of Texas, I wish to push my framework of consideration back a couple of steps. I propose to deal with the Human Genome Project and society under generic headings of "Being", "Knowing", "Doing", "Co-operating" and "Advancing". These provide a chronological sequence for consideration, in a rational way, of the Human Genome Project and its potential to affect society and the individuals in it. Looking at a sequence - even the chronological sequence of a lawyer - is something that biochemists and molecular biologists might find congenial.

BEING

The human genome exists apart from our knowledge of it. It has existed for millenia before humanity stumbled upon its mysteries by the combined potent force of the imagination emanating from the brain cells of Watson, Crick and others and the technology produced by x-ray crystallography and informatics.

If we did nothing about it, our DNA would still be there. Its chemical sub-units, pairing with each other in their predictable ways, would still be making their double helix structure described by Watson and Crick. The human DNA would still contain its 3.3 billion base pairs. There would still be the 100,000 genes, or thereabouts, as there have always been, so long as there have been humans about. They would exist. They would be.

What is new about our time is the acceptance, under the auspices of the Human Genome Project, of the daunting task of getting to know about these genes, to map or locate them, and to sequence or identify the codes of all of the genetic material.

Being, alone, is a morally neutral and legally irrelevant thing. Even knowing may be neutral. Simply for Watson and Crick to work these things out in their minds could have had few ethical implications if they had done nothing. Being, and such knowing, would have no legal consequences that I can think of, if that were all. Thus, the pure research and utilising the advent of computers and informatics to assist in the task of genomic sequencing, would, of itself, have provided nothing but delight to the intellect of a very few who would bother their minds upon this enquiry of pure science and trouble to report it to scholarly conferences such as this. It would then be something quite as fascinating as the black holes out there in the universe. But it would exist in the realm of being and knowing only.

For good or ill, we live in a world where knowing can rarely be entirely neutral. To know is usually to propel the knowledgeable into action. Being is rarely left alone. The discovery of what exists is then put down, written up, criticised, refined and reported to the scientific world at large. It tends to lead on to action.

There are, of course, some ethicists who are deeply troubled even by translating the being of the human genome into the knowing of the scientists. "Let it be alone", they cry. For unravelling these mysteries threatens the potential doings of crazy people playing God and changing the very nature of what it is to be human. Such people typically lapse into talk of Hitler and his eugenic lieutenants. They may foresee future generations which look back on us as the time when the future species stood on the shoulders of humanity, our species having at last perceived the way to unlock the riddles of life and to create something new and different from evolution's imperfect disease-ridden and always terminal creation.

People of this persuasion say that we should leave the being as it has been for countless millenia. We should lock the door before it is too late and knowing leads to doing. We should stop the human genome exploration for it attacks the very inviolability of the human species. The human species has the right to protect that inviolability. Where there is a risk, even a risk ever so slight, that the human species may be imperiled, it is the right and duty of the world of ethics and law to hold up its hand and say, "No further".

Fear propels this response to the unlocking of the door of being and even the entry into the world of knowing. Fear of science gone wrong. Fear of irretrievable change. Fear of changing the human species in a way that might prove undesirable and risky. Fear of the unknown that plagues our scientific century. As the Human Genome Project and the sequencing which it will produce is the first step on a journey to a future we cannot foresee or even imagine, such observers call for halt. Just as humanity has a right to preserve its environment, it has a right to preserve itself in all of its imperfect variety and unknowable genetic detail.

The problem with this ethical and legal response to the Human Genome Project is that it is too late and, in any case, it is wrong headed. It is too late because the Project is now most decidedly under way. Millions, indeed billions of dollars, are being poured into it. In the United States of America, at least, it is now propelled forward by the prospect of patent protection for "inventions" arising out of research, the bulk of which is conducted in that country. It has been reported that as many as 35,000 applications are pending for patents of biological material in the United States alone.

So we are talking of a world of big investments and great expectations. The object of the Project is to provide nothing less than the source book for medical science in the next century. That object may not be completed by the end of the century. But it will surely be well advanced. Improvements in information technology make it feasible that the bold plan of the Human Genome Organisation will be realised. A modern Domesday book which provides the encyclopedia of the human genome which will stimulate and facilitate the research for the coming millenium. Truly, this is an appropriate millenial task.

Those who would draw up the drawbridge at being and stop even the process of knowing, are wrong headed. The genome is knowledge that has come as part of the gift of humanity's own intelligence. In that sense, it is knowledge which was already with us in our capacity to think these extraordinary things through and to imagine the previously unimaginable. We should look at it as exciting that this has happened in our lifetimes. It should not be thought of as something alien to humanity, but as part of humanity discovered by humanity. We must resist the notion that genes and their sequences are alien, foreign, external, horrible things. They are truly part of us in the most intimate way imaginable. It is therefore our ethical business to know about them. It is also our ethical and legal business to ensure that such knowledge is not misused, but is put to use in a way which respects the inviolability of the species and the dignity of each individual member of it.

The drawbridge pullers are also wrong, and I would dare to say morally wrong, because (quite apart from the impossibility of their Luddite design) it is a moral duty to realise the potential of the Human Genome Project and other genetic research for screening of the 5,000-or-so genetic diseases which arise from single gene defects, as well as other more complex polygenic traits. If we had the means at our fingertips to discover and track down these scourges of humanity and, by appropriate scientific endeavour, to relieve human-kind from some of them, a rejection of that potential would be a condonation and possibly needless acceptance of an enormous amount of human suffering, anguish and unnecessary early death.

This may seem an unnecessary expostulation, for there are few Canites who hold their hand against the growing flood of the Human Genome Project and the countless workers engaged in it. But the lingering thoughts of fear that certainly exist in all societies teach the lesson that comes of knowing. Those who know, must share. They must explain. They must do so in language which ordinary citizens understand. Otherwise there will always be a danger of the drawbridge being pulled, however ineffectively and unadvisedly that may be attempted.

KNOWING

Once knowledge is out, it tends to spread. Once it spreads, demands are made for the use of it. How useless to have the knowledge and to decline to use it.

It is in this sense that knowledge has the potential for action. Inevitably it presents challenges to ethics, society and its laws.

Knowing is also an internal thing to the knower. At the moment, most of us go through our lives in blissful ignorance of the causes of our final moments. Many of us would prefer to retain that ignorance. One of the moral dilemmas which comes in the train of the Human Genome Project, the discovery of genetic markers and the realisation of their significance, is that, for many, it will henceforth be knowledge and not blissful ignorance that will dominate human existence.

Consider the burden which the person carries, knowing that he or she is HIV positive. Anyone in doubt should read the moving new Australian book by Tim Conigrave *Holding the Man*. With ruthless honesty, the book tells the story of lovers infected and living with HIV to the last cruel moments. It is a true story. It is a story for tears and pain. To spread the burden of knowledge beyond HIV to all genetic disorders, most of which cannot be cured, and many of which may never be cured, may seem to some to impose a burden of suffering too cruel to be tolerated. Against that burden, legal protections will be called for.

Knowing is therefore not entirely morally free. Nor is it without legal consequences. Without the Human Genome Project and the discovery of the markers, blissful ignorance would be maintained. Should we remain in that halcyon, though primitive, state?

Again, the proponents of opposition are wrong headed and bound to fail. The knowing of the markers may provide, in time, the means by which some, even many, genetic disorders can be targeted. True, that may contemplate a more profound interference with pregnancies demonstrating such disorders. Many of us who exist today might not have been permitted to exist in the Brave New World which tests for a variety of discovered genetic "disorders" beyond the current purposes of amniocentesis. Yet the journey to the discovery of cures for genetic disorders cannot begin without the basic knowledge of the source. Not all may be cured. Many may not wish to be so-called "cured". A very large number might not even want to know. But the answer to these concerns is not prevent the research. It is to control the use of the knowledge.

DOING

That brings me to doing - the usual business of lawyers. Who may have access to the knowledge? This has lately been the subject of a study by the Privacy Commissioner in Australia. In June 1995 he distributed a discussion paper on the privacy implications of genetic testing. He concluded that many of the broad principles of privacy protection, developed in a committee of the OECD which I chaired nearly twenty years, remain pertinent to the defence of individual rights in the context of genetic testing. This is because those principles assert the control of each individual over private information concerning that individual. They permit exceptions to individual control of data only in specified cases, and then with the authority of law, given for some higher general social purpose.

These principles will present the framework for the solution of the problems of privacy and confidentiality which will need to be worked out as the availability of genetic information expands. They will control the right of the self to have access to his or her own genetic data. But they will also be necessary to control the rights of a family. Some writers have suggested that the patient, in the case of genetic disorders, is the entire family and not just the individual. All family members may be potential carriers of the genetic marker. It is here that issues such as the access to genetic data by insurers will be raised for legal exposition. So too with employer rights to insist upon genetic testing of workers in particular circumstances.

Doing goes beyond these individual issues. There are also important general issues for society. Does the proof of genetic disorder undermine the very foundation of individual free will which has supported, until now, the criminal law of most western countries, including our own? If, at least in some circumstances, offenders are merely playing out their genetic predispositions, are they really to be punished as if they had willed their anti-social action in a deliberate and cruel way?

Two of the chief controversies of legal, as well as social and ethical importance, concern the doing with the human genome product of intellectual property protection and germ-cell manipulation.

In the field of intellectual property law, one can see some of the most intense debates that have accompanied the development of the Human Genome Project. In Australia, s18(2) of the *Patents Act* 1990, affords the only express exclusion to patent ability in the entire Australian patents statute. It provides that human beings, and the biological processes for their generation, are not patentable in this country. However, in 1994, the Patent Office issued a pamphlet stating that the only limitation which it understood this exclusion to create, was in the area of genetic research in relation to DNA or genes in the human body which are not patentable as such. On the other hand, once a DNA or gene sequence has been separated from the human body and manufactured synthetically for reintroduction into the body for therapeutic purposes, it would be patentable. Many would support this restriction on doing. They would distinguish such a therapeutic development. They would recognise it as an "invention" in the ordinary way, properly deserving of patent protection. Yet, there would be others who would oppose even this. They would call for a "public interest" exception to patenting, or for life to be breathed into the "general inconvenience" exclusion which appears in current patent law. Most of all, they would resist the very notion that gene sequences of unknown significance could be patented against the off-chance that on day they might have great therapeutic, and therefore commercial, significance.

On this very day, there is debated in the Senate of the Australian Parliament, an amendment to s18 of the *Patents Act*, to deny the "quality of novelty or inventiveness" to "naturally occurring genes; naturally occurring gene sequences and descriptions of the base sequence of a naturally occurring gene or sequence". So this is a controversy which is beginning to capture the attention of our Parliament.

Patent protection is the subject which tends to cause the greatest heart-burning in the consideration of where the Human Genome Project is taking us. Changes in Federal funding of research in the United States of America have propelled universities out of the old notions of scientific knowledge as the common property of humanity, into an energetic search for funds. This has led to a commercialisation that did not exist in earlier times. Remember, pray, that Watson and Crick sought no patent over their discovery of the double helix structure or its applications. In earlier times, science had a purer motivation. Now, it often needs large investments. Such investments propel the scientists and the technologists into the hands of corporations which, for their own survival, need to make profits.

The other heart-burning in this area concerns germ-cell manipulation. Leading scientists have called for a moratorium on such developments, at least in the human species. But, few legal restraints prohibit human germ-cell manipulation. Recent reports from the United States letter of law at University of Pennsylvania Dr Ralph Brinster has focused on a group of early stage sperm cells, called "stem cells", which arise in the testes of mice. Dr Brinster's experiments involve inserting genes into stem cells so that they will appear in the sperm derived from them and affect the cells of the animals' offspring, altering their lineage. The commentators who have worked with Dr Brinster say that this could have far-reaching clinical significance for testing infertility and genetic disorders. And I do not think that they were considering only mice. Therefore, an acute question is posed as to whether limitations on funding and general Governmental exhortations, together with moral inhibitions and scientific doubts, are sufficient to restrain the doings of genetic research at work which will effect the human germ line. If these loose inhibitions are not enough, that is where society and its laws come in.

CO-OPERATING

It is also where co-operating starts. The experience of recent times is that it is impossible for any one country or legal jurisdiction to impose limitations upon research and technological developments which will be truly effective. Already attempts have been made to secure trans-national Directives from the European Union and from the European Parliament. The endeavour of six years bureaucratic work to obtain a law on intellectual property for the member states of the European Union came to grief on 4 March 1995 when the European Parliament rejected the draft Directive from the Commission of the European Union. This rejection illustrated the imperative need in this area to consult widely about laws and policies. Otherwise, combinations of fear and ignorance will often bring down the best laid schemes of commerce and public administration.

Important international co-operating work is occurring in UNESCO and under the of HUGO itself. It is imperative that the interconnections between the human genaegisome and the environment in which it lives should be perceived. The genome grew up in the environment. The two are clearly inter-related. Yet, unless there is co-operation, clearly the endeavours of particular states to provide rules and guide-lines will only be partially successful.

We discovered this in Australia. Victoria, under the leadership of Professor Carl Wood, was one of the first world centres for invitroo-fertilisation. Great success was achieved by the team of Wood and Trounson. The success attracted a great deal of research money and very proper community debate with ethical cogitation. It also attracted legislative attention. Laws were enacted which put restrictions upon some of the work being performed in the infertility clinics in Melbourne. The consequence was that part, at least, of that work, went offshore, reportedly to Singapore. There will always be places on our planet willing to welcome high-tech industries with open arms. The introduction of laws may be effective if they are enacted by countries in the forefront of genetic research - the United States, Western Europe and Japan. Outside such countries, in jurisdictions such as Australia, the effectiveness of such laws, going it alone, will be dubious.

That is why co-operating is an important moral obligation. It is also a legal and practical necessity if we hope to produce laws which will be useful, well targeted and hopeful of effectiveness. In the future of human rights, it is essential for states, inter-governmental organisations and non-governmental organisations, individuals and public and private entities in general, to recall their duties towards future generations. Those duties impose upon all of us, an obligation of co-operation. That duty springs from our very humaneness. It is an aspect of human rights.

These are the reasons why the International Commission of Jurists, the oldest of the human rights global organisations, has adopted as a project for the future definition of human rights, the human rights implications of the Human Genome Project. It is why attempts have been made at La Laguna to formulate a declaration described as the *Universal Declaration of the Human Rights of Future Generations*. It is timely that we should reflect upon those shared rights. They impose on us, who are the temporary guardians of the human genome and of our global environment, to co-operate. But, to do this, we must have institutions. We must also have an understanding of the science and technology that are in issue. We must have the political, social and legal leaders who can co-operate with the scientists and technologists in the endeavour to develop achievable guidelines. And above all, we must have the will to do something and not simply to drift.

ADVANCING

But what should we do? This brings me to advancing.

We should, I believe, look on the Human Genome Project, the associated genetic research and the new Human Genome Diversity Project as opportunities for advancing the human rights of all individuals. We should recognise that perceptions of our societies, their laws, and even of ethical questions, change over time.

When I was a young lawyer, artificial insemination donor (AID) was the great controversy. Who fusses about that now? Then came surrogacy. This is not now of pressing concern. Along came *in vitro* fertilisation. It still presents many quandaries. Now we have a new and greater challenge with very many ramifications. Those ramifications should not be exaggerated. But nor should they be ignored. What are the challenges that wait around the corner of the century?

For example, cloning, the reproduction of biologically identical individuals, was initially used with plants alone. It has subsequently been extended into the animal world leading to the appearance of amphibious clones, such as frogs and cloned mammals (rats, rabbits, sheep). We must confront the potential need to forbid or control this development and to define the principles by which we do so. It is a global, not a local, concern.

Similarly, we must confront the possibility, still in science fiction, of the production of hybrids through trans-specific fertilisation, ie, of eggs and spermatozoids from different species, such that the resultant beings, which would be unable to procreate, contain in their cells the genetic heritage of different parents. Mules are the best known instance.

Animal hybridization, which already occurs in nature and is currently being undertaking in laboratories because of rapid developments in bioengineering, has led to the creation of real monsters (a zebra/horse; a tiger/lion; a sheep/goat). One reported example of human/animal hybridization has been the fertilisation with human sperm of polecat eggs in research on male infertility. It should be said that the resulting embryo did not develop beyond the two cell stage. As reported in the recent *Law and Human Genome Review* article by Mantovani, the *in vitro* fertilisation of chimpanzee eggs with human spermatozoids is now, not only possible, but indeed has been experimented with successfully, in secret, in a number of laboratories, although usually interrupted at the early stages.

If this is true, it is of concern to all humanity. It is of legitimate concern for scientists. But it is also a proper subject for ethical reflection, public knowledge and debate and ultimately, laws which assist and enforce society's standards.

CONCLUSION

Being. Knowing. Doing. Co-Operating. Advancing.

These are the challenges which genomic research presents to society, ethics and law. It is more likely that Australia will influence the shape of ethical and legal policy if we become more active in the work of science. Saintly ethicists and smooth-talking lawyers are less likely to cut ice than good scientists and technologists who win laurels for our country in this Olympics of scientific endeavour. Gold. Gold. Gold. Is there indeed to be won in biotechnology. The challenge is enormous. It will stretch the scientific capacities of humanity. It will also present great opportunities to social scientists, it will require them to be useful and constructive and to stretch their minds in a way worthy of the age of the double helix.

Humans must remain in charge. But the lingering question is: Who, at the dawn of the next millenium, will be humans? If we protest against this pace of change we need to be reminded of Primo Levi's aphorism: "Our future is not written. The human condition is incompatible with certainty."

---

[*] President of the Court of Appeal
Chairman of the Executive Committee of the International Commission of Jurists