SEPTEMBER 1994

THE UNESCO COURIER

A CODE FOR LIVING

THE ETHICS OF HUMAN ENGINEERING

INTERVIEW WITH
NOËLLE LENOIR

HERITAGE
THE TOWER OF LONDON

ENVIRONMENT
OF MEN AND MOUNTAINS

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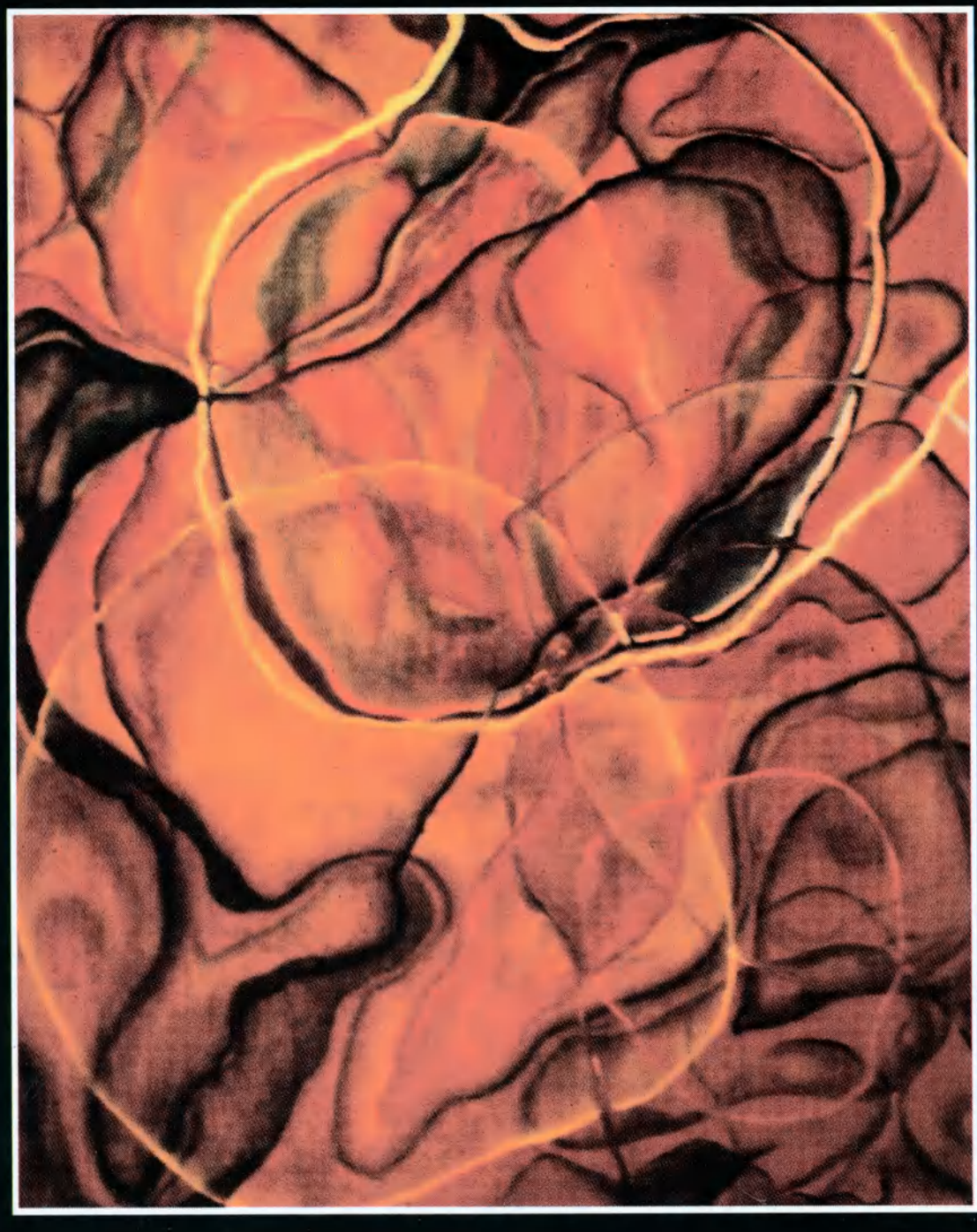
ENCOUNTERS

We invite readers to send us photographs to be considered for publication in this feature. Your photo should show a painting, a sculpture, piece of architecture or any other subject which seems to be an example of cross-fertilization between cultures. Alternatively, you could send us pictures of two works from different cultural backgrounds in which you see some striking connection or resemblance. Please add a short caption to all photographs.



Pulsating Valley

oil on wood (120 x 150 cm)
by Anne Yanoushka de Lamater

"My semi-figurative paintings are inspired by musical rhythms, mysticism (particularly Zen Buddhism) and my own internal life," writes the Canadian artist Anne Yanoushka de Lamater. "They represent overlapping realities, fluctuating tides of consciousness, expanding and contracting." She clearly drew on these sources of inspiration to produce the painting shown here, which "originated in a dream in which I was flying over mountain peaks and valleys, in a light, harmonious state."

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SEPTEMBER 1994

Cover:
The 4 letters of the genetic alphabet, A, G, C and T. Variations in their sequence make each person unique and irreplaceable.

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A CODE FOR LIVING
THE ETHICS OF HUMAN ENGINEERING

Consultant: Georges B. Kutukdjian

THE UNESCO COURIER

47th year
Published monthly in 31 languages and in Braille

"The Governments of the States parties to this Constitution on behalf of their peoples declare,
"that since wars begin in the minds of men, it is in the minds of men that the defences of peace must be constructed...
"that a peace based exclusively upon the political and economic arrangements of governments would not be a peace which could secure the unanimous, lasting and sincere support of the peoples of the world, and that the peace must therefore be founded, if it is not to fail, upon the intellectual and moral solidarity of mankind.
"For these reasons, the States parties... are agreed and determined to develop and to increase the means of communication between their peoples and to employ these means for the purposes of mutual understanding and a truer and more perfect knowledge of each other's lives..."
EXTRACT FROM THE PREAMBLE TO THE CONSTITUTION OF UNESCO, LONDON, 16 NOVEMBER 1945

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Month by month

Changes are occurring so thick and fast in so many areas that the world as we knew it only ten years ago has altered beyond recognition. All the familiar landmarks that we had regarded as permanent fixtures of our lives since the end of the Second World War have been relegated to a past which is itself already growing steadily dimmer in our memories. Yet the shape of things to come is still not clear. We are in a twilight zone, shrouded in the mists of a new dawn that is slow in coming. It is a time of questioning, a time conducive to daring thoughts and new ideas—but also a time fraught with all manner of dangers and violence.

Unesco is at the heart of the efforts being made to pave the way for a future in which the spirit of peace will vanquish the spirit of war, in which freedom and the rule of law, justice and solidarity will become key values for all of us.

The *Courier* is endeavouring to play its part in this ambitious enterprise by continuing to broaden its coverage and to eschew blinkered and dogmatic thinking.

You will probably have noticed that we have been gradually introducing a number of changes in recent issues. These stem from our concern to put readers in closer touch with the vast range of present-day developments and to remain fully attentive to their ideas and criticisms.

To make for easier reading and consultation changes are being made in the presentation of the monthly theme. The regular features section is being expanded. International affairs will be consistently followed up through a "global view" feature that will situate the activities of Unesco—especially as described by the Director-General in his regular "Commentary"—in their world context. Reports on Biosphere Reserves, appearing between the Greenwatch section and the Heritage feature, will also add to our coverage of Unesco's main fields of activity.

As we endeavour to go on improving the *Courier's* editorial style and the quality of its articles and illustrations, we look forward to benefitting from your support and suggestions, and above all from your discriminating readership.

BAHGAT ELNADI AND ADEL RIFAAT

NOËLLE LENOIR

talks to Bahgat Elnadi and Adel Rifaat

The first woman member of France's Constitutional Council, Noëlle Lenoir has been president of UNESCO's International Bioethics Committee since it was established in September 1993. She also chairs the group of advisors on the ethics of biotechnologies of the Commission of the European Communities. A specialist in public law, she is the author of a major report on bioethics, *Aux frontières de la vie* (2 vols., 1991, La documentation française, Paris).

■ *In what respects are advances in the life sciences, and especially in genetics, important landmarks?*

—There are stages in the history of science when knowledge takes such great steps forward that our understanding of the world is completely transformed. The discoveries involving the human genome belong to one of these stages.

By choosing the plants they gathered and by influencing the diversification of animal species to cater for their own needs, human beings have always been involved in genetics without realizing it.

The era of the life sciences really began in the eighteenth century, when the idea of the evolution of species emerged in what might be called an intuitive manner, through the work of Buffon[1] in particular. These insights were later borne out by the observations made by Gregor Mendel[2] in the second half of the nineteenth century, even though he did not have a clear grasp of the idea of "genes" and never made explicit reference to them.

It was not until the twentieth century, however, that genetics as an independent scientific discipline really came into its own. Progress in the field has since been marked by increasingly striking discoveries, such as the unravelling of the double helix structure of DNA by Francis Crick and James Watson in 1953, the elucidation of the workings of messenger RNA by François Gros, François Jacob and Jacques Monod in the 1960s, the emergence of genetic engineering techniques in the 1970s, and by the most recent developments in physical and genetic mapping.

These discoveries are revolutionary not only for the history of science but also for the history of humanity. For the first time, human beings now have access to *knowledge* about their own life mechanisms through genetics, neurobiology and embryology. Also for the first time, as a result of genetic engineering, they can take steps to alter the human genome. They could also acquire the capability to *transform* their own species.

■ *This is what many people regard as the mind-boggling side of genetics.*

—I think there are three reasons for this. First, as a result of the astounding developments in genetics in the past forty years or so, people are now faced with the hard facts about their condition. The explanation of life, and of human life in particular, is capable of bringing about a precisely programmed transformation of human beings.

Second, this capacity to alter living things is not just something that is theoretical or might happen one day. It results from techniques that are already being used—at least as far as other species are concerned. Transgenesis—the process whereby a "foreign" gene is inserted into the reproductive cells of a living organism, so that it is altered and becomes capable of transmitting certain properties to its offspring—is already being used on animals and plants. We are now creating laboratory animals, into which we inject, say, cancer genes, so that they can then be used as models for human diseases. Eventually we shall be able to "humanize" animals by injecting them with human genes for transplantation purposes, so that their organs will become compatible with the body of

the person receiving the transplant. Experiments on producing transgenic animals are even being carried out in order to produce improved stock, such as pigs with a reduced amount of fat. But the terrible question arises as to whether there is a taboo on applying transgenesis to the human species, even though there might be a therapeutic justification for doing so.

The third reason why people are bewildered is because of the incredible shortening of the time-lag between the making of a discovery and the time of its application. As a result of this, the gap between different cultures is growing wider, since some adapt more quickly than others. At the same time, we can see cases of countries in the forefront of research where there is a growing mismatch between the wealth of new possibilities being offered by science and people's mentalities and ways of life and their view of the world. This "credibility gap" is becoming even wider because of the speed at which the media pass on information about scientific discoveries to the public. In the past, before discoveries became public knowledge, they had to go through a process of verification, publication and discussion within the scientific community. Nowadays, it is accepted that even though the results of research may only be approximate or tentative, they can be published.

The technological and scientific age in which we live can accordingly be regarded as both positive and negative. It is positive because of the hopes aroused by science as a result of the progress made in therapeutic treatment, the relief of human suffering, the improvement of individual and collective welfare, and the creation of forms of culture which the mass of the population can enjoy or which offer increased scope for individual freedom. It is negative because of the increasing duality of the societies in which we live. Inequalities exist not only between rich countries and poor, between those which have research centres and industries and those which do not, but also within each national or cultural community. It is absolutely imperative for the sake of democracy worldwide that everybody should be informed about what is going on in the life sciences, so that they can have some idea of the changes taking place. Over and above the struggle against inequality, what is at stake is the protection of rights and freedoms. Ignorance and false knowledge are sources of prejudice. In genetics, any misreading of the facts can also give rise to behaviour that is liable to undermine those freedoms.

■ *What kind of socio-cultural upheavals are being caused by genetics?*
—Research on the human genome has implications that are not exclusively scientific or medical. They lead on to *applications which affect all aspects of people's lives*, whether it be private life (their choice of life-styles and consumption patterns; their perception of their genetic "identity"); family life (the plans people make as couples or parents; their relations with other family members); or life as members of society (health protection and access to medical care; the availability of jobs or state or private health insurance; provision for children's education, and so on).

Confronted with the upheavals due to the progress of genetics, one wonders towards what Kind of society and what new planetary equilibrium we head.

Particular emphasis should be laid on two areas of thinking. The first is bound up with the concentration of research in the industrial countries, which is giving rise to economic and socio-cultural imbalances. There is an urgent need to study the potential spin-off from this research in the developing countries, so that its applications can be controlled. The second area is concerned with the eternal question about the *meaning of life and the human condition*. It would be dangerous to imagine that there is some kind of scientific answer to this question. Science does not relieve us of our responsibility as individuals and members of the human family—quite the opposite. The quickening pace of scientific progress could even be said to make us more aware of the fact that "our future is not written... and the human condition is incompatible with certainty".[3]

■ *Is this where bioethics comes in?*
—Bioethics arose out of fundamental questions that were asked about the influence of the development of molecular biology on the future of humanity. The term appears to have been coined in the United States in the 1970s, when genome manipulation techniques, what we call "genetic engineering", were being developed.

With the passing of time, these questions have become increasingly crucial. In view of the upheavals caused by the development of genetics, people are wondering about the kind of society we are moving towards and the kind of planetary balance that will be struck.

Bioethics is not confined to thinking about the relationship between science and society. It is concerned with the relations between human beings and nature in all its biological diversity, including the nature of human beings themselves.

This may account for the constant progress being made by the ethics movement all over the world. Nowadays, it is impossible to keep pace with the number of ethics committees (see page 27) and ethics research centres being set up. Although bioethics is essentially multidisciplinary, it is now being taught as a subject in its own right in universities, schools and vocational training institutions.

The human genome mapping programmes launched in the United States, Europe and Japan are all being matched by special funding for ethics research. Ethics has become an important feature of research and health policies and even of industrial strategies. It now addresses itself to decision-makers, in both the public and the private sectors.

Bioethics is a way of thinking about our future and our values, but at the same time it is a form of language. It enables specialists to enter into a dialogue with decision-makers and the public, to work together on the problems of humanity raised by scientific knowledge and to ensure harmonious relations between individuals and society and, in the final analysis, the survival of the human species.

It has to be acknowledged that

bioethics has grown up in a context in which doubts are being voiced about the general idea of progress as being intrinsically a source of good. In this respect, it reflects the anxieties of our age.

■ *What part do scientists and doctors play in all this?*

—A decisive one, obviously. However, the problems that have to be resolved in order to contend with the new situations created by science go far beyond the sphere of responsibility of scientists and doctors. Take the case of prenatal diagnosis. It may reveal anomalies in the foetus or some more or less serious handicap or disease that is bound to affect the unborn child. This diagnosis is made in response to a pressing social demand from parents. How will the parents react if the diagnosis reveals an anomaly? Who will help them make the decisive choice as to whether or not to let the pregnancy go on to its term, try in utero treatment that is still at the experimental stage, or else prepare to accept the disabled child and provide it with the necessary postnatal care?

As knowledge and its applications grow, an increasing number of decisions of this kind have to be taken by doctors, families and communities.

Some of the advances made by science do provide solutions. Take the case of in vitro fertilization. When it becomes possible to cryopreserve oocytes, a process which is currently at the experimental stage, it will no longer be necessary to freeze surplus embryos. Other advances made in biology and genetics pose new questions, however. This is the case with "micro-injection", which can make it possible to choose a child's sex by separating out the X and Y spermatozoa, although this is not the purpose for which it is intended. This technique, which is designed as a remedy for male infertility, consists of the in vitro injection of a spermatozoon into an oocyte, so that it becomes fertilized. The resulting embryo is then transferred into the womb by in vitro fertilization. Should we allow this kind of selection process for choosing the sex of an unborn child?

There is also the question of diagnosis before conception. If a man and woman belong to families that are carriers of some transmissible defect, they can have a genetic examination. If they both carry the same

defect, they may decide not to have children. In Cyprus, the Orthodox Church, in agreement with the government, has used this type of premarital examination to check the spread of thalassaemia, a very common genetic disease on the island. By appealing to people's sense of responsibility, it has proved possible to cut the morbidity rate of the disease by half.

This is one example of how decisions involving reproduction can be monitored at the instance of the political authorities and society, with a helping hand from the church. Other examples can be cited. In China, an interventionist approach seems to be the practice in similar situations. There may be a temptation to adopt an authoritarian attitude, especially in societies facing serious difficulties in allocating health resources, largely due to demographic factors.

■ *How does bioethics differ from scientific ethics generally?*

—Bioethics is not the ethics of the biological sciences. It is not the same thing as a code of professional conduct. It is not concerned with professional practice but with its impact on society. The key idea behind bioethics is respect for human dignity. This idea runs through all currents of ethical thinking, including religions. One of the basic instruments in bioethics is the Nuremberg Code drawn up by the World Medical Association in 1947, following the revelations made about the excesses perpetrated in the name of science under Nazism. This document lays down the principle that anybody invited to take part in medical experiments should give his or her consent. The Nuremberg Code stipulates that man cannot be an object for science. The principles of human dignity, individual freedom, equal rights and solidarity appear to command an international consensus as guidelines for bioethics.

Based on these foundations, bioethics is a way of resolving conflicts of values. The conflict between community pressures and individual freedom, for example, is illustrated by the case of genetic screening programmes. Should such programmes be made compulsory in the interests of public health or should it be left to the discretion of individuals to decide whether or not it is advisable to undergo tests, knowing that the results may be fraught with consequences for themselves and their families?

The French National Ethics Committee recently gave an opinion on the subject. The issue was whether screening for trisomy 21 (Down's syndrome) should be compulsory or voluntary for certain women. The Committee considered that people had to face up to their responsibilities. It recommended that, in certain cases, doctors should be required to suggest as a matter of course that families "at risk" be tested. Those families would then be free to decide whether to accept the suggestion or not.

■ *From the standpoint of bioethics, are there are a certain number of rules that are valid for all countries and in all communities?*

—I feel that bioethics rules out a dogmatic approach, any idea of one culture dominating another. For instance, some African communities develop a stronger sense of solidarity than that in Western communities, which are often individualistic. Yet the art of living together is not practised only in the context of villages, regions and countries. Nowadays, it has to be envisaged in planetary terms. From this point of view, bioethics tries to set up a bridge between cultures, so that the new powers arising out of genetics do not make discrimination and exclusion any worse.

■ *What about eugenics?*

—Eugenics is a form of racism based on a pseudo-rationalist scientific approach. There can be no question of science "improving" the human species, in the sense of some people being of greater value than others. We must make sure that the folly of genetic purity does not take over from the folly of racial purity.

The only way to oppose eugenics is to ensure that human rights come first. Human biodiversity is sometimes said to be proof of the absurdity of racism. I personally am embarrassed by this sort of talk. Can we draw any social or philosophical conclusions from the fact that we are all different? Probably not, because biodiversity is simply a fact of life. People are what matter. The idea of "scientifically" manufacturing a set of people exclusively composed of individuals with certain characteristics must be outlawed because it runs counter to the dignity of human beings, who are unique, free and responsible for their actions. Even so, we must ask why, for the sake of biodiversity, we should seek to preserve some human communities from any outside inputs. What is unique about human beings is that they can adapt to their environment and change themselves, at the same time as they change the natural world around them. In the words of the American novelist Paul Auster[4], "Each man is the entire world, bearing within his genes a memory of all mankind".

■ *Does bioethics have anything to tell us about North-South disparities?*

—Bioethics must help to obliterate the disparities between North and South arising from the quickening pace of scientific research and its applications. Science, economics and social development are all interlinked. The economically advanced countries are virtually the only ones to invest in research and they are also the first to reap the benefits from it.

It is in a bid to break with this trend that UNESCO, under the impetus of Federico Mayor, has pledged not only to contribute to the human genome programme but to foster intercultural dialogue on the subject through the International Bioethics Committee. I shall merely mention the new generation of medicines that will be developed through the progress made by genetics. They will not be standardized medicines but will be individually designed to eradicate diseases at their source. It would be quite wrong to use them exclusively to treat the diseases found in the industrial countries. With the spread of Aids, we can no longer say that the diseases of our time are respecters of geographical barriers. We have to take a worldwide approach to human health.

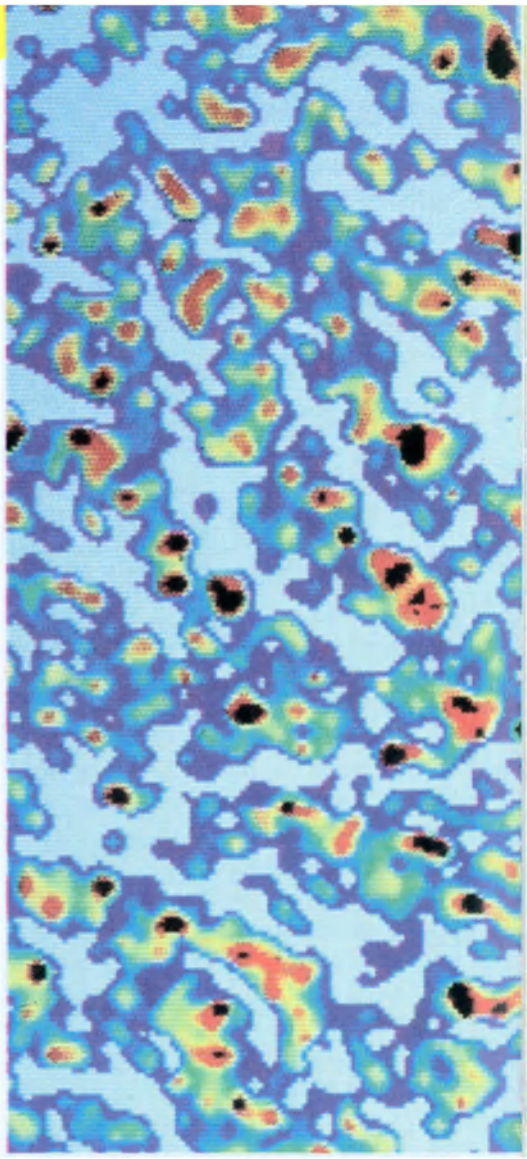
Even so, considerable difficulties are involved in framing a policy for sharing between rich and poor. How are we going to apply gene therapy in the countries of the South—say a therapeutic operation on an individual's genome, so as to provide a missing gene and counter the effects of a pathological defect? How can we make sure that the people in those countries can enjoy the benefit of new medicines produced using gene therapy techniques, whose potential is enormous? How can we ensure that the new generation of vaccines produced by genetic engineering can be manufactured and distributed all over the world?

■ *Are you suggesting that there should be a universalist approach to bioethics?*

—It's essential. Bioethics, I repeat, must be based on human rights.

Even so, the time has come to lower the temperature of a debate that sometimes gets so heated that the public becomes bewildered. We must take account of a number of factors. In the first place, we should remember that human history has always gone hand-in-hand with scientific advances that have revolutionized civilizations. The discoveries made on the human genome form part of that history and people have to be capable of coping with the issues they raise. Secondly, it is not surprising that seemingly desirable changes brought about by the applications of genetics should give rise to anxiety and even to opposition. However—and this is the third important point—bioethics has to distance itself from an outlook that is dominated by the risk of taking the wrong turning. In other words, it is urgent to switch from a defensive attitude to a more balanced approach that makes allowance for benefits and risks alike. Scientific progress should be neither worshipped nor reviled. Nevertheless, it calls on the universal conscience to provide a guarantee that everyone–individuals and societies alike–has access to it and that it will not get out of control.

Bioethics accordingly requires us to be "good, honest and virtuous", regardless of the economic and power issues at stake in scientific competition. This being so, it is bound to be a universal ethic of responsibility and solidarity. ■

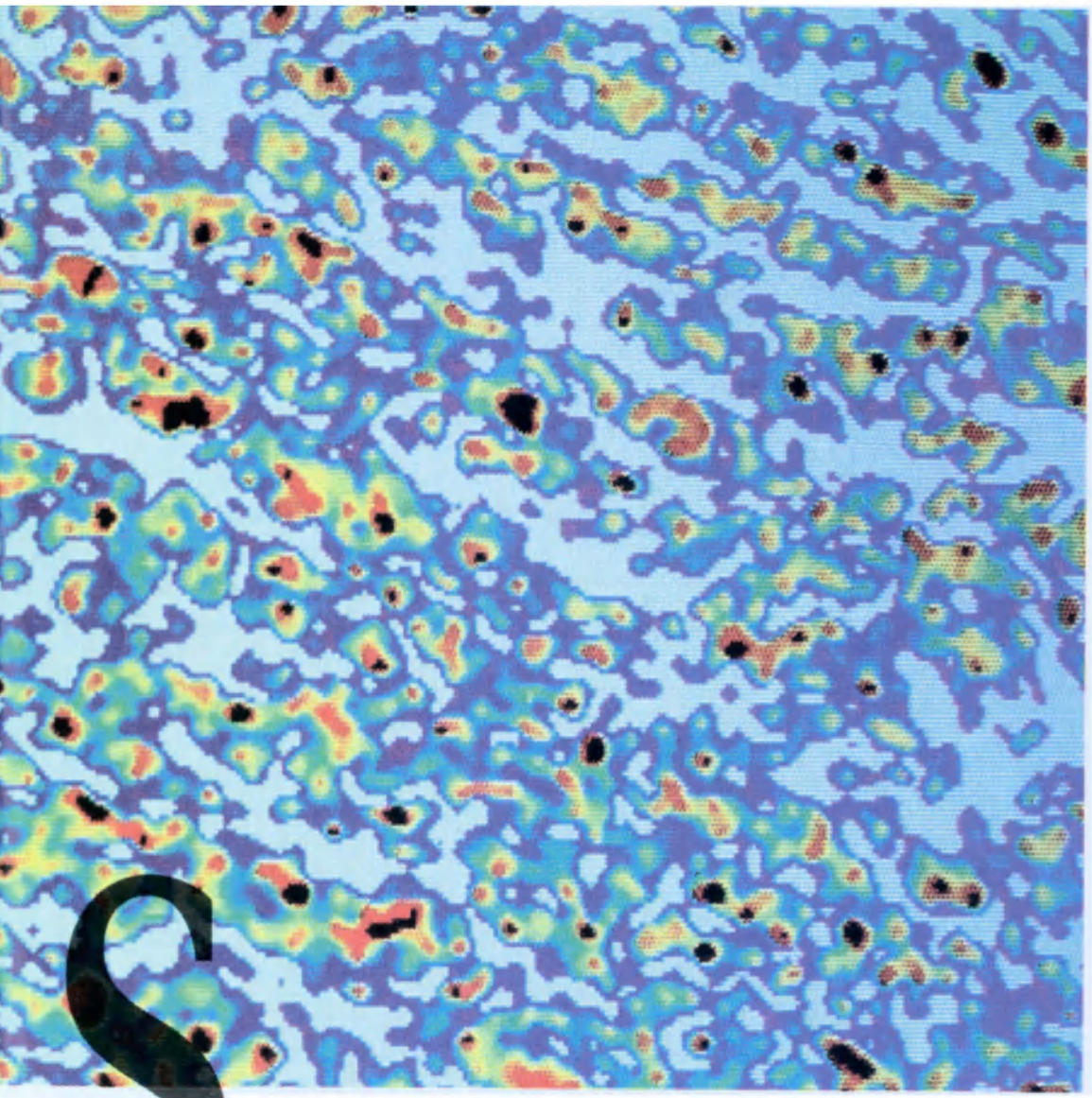


1 The French naturalist and writer Georges Louis Leclerc, Comte de Buffon (1707-1788). Through his study of the earth and its geological ages, he became increasingly convinced that the universe had come into being through a slow process of transformation and that living species were not set in a hard and fast mould. He paved the way for the theories of evolution. *Editor*

2 The Austrian monk and botanist Gregor Mendel (1822-1884). His work on the hybridization of peas led to his discovery in 1865 of the laws governing the transmission of hereditary characters which bear his name. He is regarded as the founding father of genetics. *Editor*

3 Primo Levi, in *Other People's Trades*, New York, Summit Books, 1989.

4 *The Invention of Solitude*, New York, Sun Press, 1982.



If misused, our growing knowledge of human genetics could have disastrous consequences. Should there be any restrictions on research and above all on the application of its results?

Scientific knowledge and human dignity

by Jean Dausset

Above, freeze-dried DNA produced by the Human Polymorphism Study Centre in Paris, founded by Jean Dausset in 1984. The Centre provides the international scientific community engaged in gene mapping with DNA obtained from 61 families (800 individuals) regarded as having been "healthy" for several generations.

Molecular biology has invaded all or very nearly all areas of medical research, investing scientists engaged in research in human genetics with heavy responsibilities.

Perhaps for the first time, these researchers are now faced with two agonizing questions: how far should they go in their research and how should their findings be applied?

The answer to the first question is quite unequivocal. There are no limits to knowledge, which is the pride and honour of humanity. We are the only creatures capable of understanding and influencing our environment. Under no circumstances should research be halted or even slowed down. It must be pursued on condition that studies made on human beings respect human dignity.

In theory, the answer to the second question is also unequivocal but it nevertheless raises some serious problems. It is unequivocal because new knowledge should be used for the good of humanity and not be diverted to serve the interests of individuals or communities which do not respect human rights. In the case of human genetics, unwise use of new techniques could have disastrous consequences.

There can be no doubt that the powers now vested in research scientists impose new obligations on them and raise crucial ethical issues. We are only too aware that all technical progress has

"Multi-blotters", powerful instruments used for analysing DNA at the Généthon laboratory near Paris. Founded in 1990, Généthon is the first laboratory to be equipped with facilities on an industrial scale, in order to speed up the mapping of human genes.

its positive and negative sides. It is up to society to reap the benefits from it, while as far as possible averting potential risks and deviations, so that the balance is tilted in favour of the advantages. There can be no denying that, in the long run, the advantages accruing from genetics will be considerable.

An end to hereditary diseases

Thanks in particular to the work being done by the Human Polymorphism Study Centre, in Paris, in conjunction with Professor Daniel Cohen and the Généthon laboratory, the genetic map and the physical map of the human genome have been plotted more quickly than might have been hoped, and it is now possible to locate on the long DNA strand the genes responsible for the most common genetic diseases. For instance, it has proved possible not only to pinpoint the genes responsible for cystic fibrosis and Duchenne muscular dystrophy but actually to isolate, describe and sequence them. The same is true of many other genetic diseases, and hardly a week goes by without the genes responsible for one or another of them being identified.

These discoveries have given rise to a great wave of hope. Now that we know which genes are defective, we can start thinking about developing specific therapies either to correct the gene itself or the protein coding it.

This is how the idea of gene therapy came about. A distinction must be made between two types of such therapy. One is somatic therapy, which deals only with the cells of the body (or soma). This has absolutely no effect on heredity and is therefore perfectly ethical, since it can be likened to a simple graft. The other is germline therapy, which is concerned with reproductive cells, male or female, or with the embryos of certain cells. In this case, any change is handed down from generation to generation and, in some individuals, the human genetic heritage will be altered accordingly. Thus, as things stand at present, germ-line therapy must be strictly banned.

In addition to these hereditary diseases caused by a single flawed gene, we are now studying such widespread pathological conditions as diabetes, cardiovascular or neuropsychiatric diseases and cancer. These diseases may have a variety of causes, due to the action not only of certain genes but of environmental factors.

They are now thought to be due to the simultaneous existence in one and the same individual of a relatively limited number of defective genes, say five or six in the case of non-insulin dependent diabetes, for example. If, through bad luck, these five or six genes exist together in the same person, it is to some degree probable, though by no means certain, that he or she may contract the disease. We therefore now have a means of quantifying the risk.

Prevention is better than cure

This, in turn, is how the concept of predictive medicine came about. Prevention is better than cure. And preventing means predicting.

The concept of predictive medicine came to me when it was found that many diseases are connected with the antigens of the HLA system (human leucocyte antigen system).[1] For instance, somebody with the HLA-B27 antigen is 600 times more liable to suffer from ankylosing spondylitis than somebody without it. It is now possible to identify in the genome the genes predisposing people to certain illnesses.

This gives an idea of the prospects being opened up by the application of genetics to medicine. With predictive medicine, we shall certainly be able to avoid much pain and suffering and perhaps even live in perfect health to a ripe old age. In short, medicine will be tailored to the individual and will prove less costly and more effective.

But these discoveries also have negative aspects. It seems pointless, indeed heartless, to tell people that they are predisposed to a disease when we still cannot offer any preventive treatment, not to mention the unnecessary anxiety and the host of psychological side-effects this may cause.

What is more, such information obviously has to be kept strictly confidential. The results of genetic testing should be divulged only with the authorization of the patient, since there is a risk that they may be used by insurance companies or employers to make unacceptable discriminations. If such abuses are to be avoided, it will be necessary to lay down strict rules. There must be a public debate on this issue. Universal answers will have to be found. UNESCO is actively engaged in this search.

JEAN DAUSSET,
French medical doctor, is internationally known for his work on tissue groups and the HLA system, which has been instrumental in the considerable progress made in organ transplants and grafts and earned him a share (with George Snell and Baruj Benacerraf) of the 1980 Nobel Prize for Physiology or Medicine. He is Professor of Immuno-Haematology at the Larisboisière-Saint Louis Medical Faculty in Paris and of Experimental Medicine at the Collège de France. In 1984, he set up the Human Polymorphism Study Centre (C.E.P.H.), and is now president of the Foundation Jean Dausset-C.E.P.H, which plays an active part in the human genome project. He is a former member of France's National Advisory Council on Ethics and since 1982 has been President of the Universal Movement for Scientific Responsibility.

So act as to treat humanity, whether in thine own person or in that of any other, in every case as an end withal, never as means only.

IMMANUEL KANT
German philosopher
(1724-1804)

In conclusion, I should like to dispel the myth that genetics creates in the public mind. It is only natural that current developments in this field should make people afraid. But are their fears justified? Or, rather, to what extent are they justified? People are often afraid of the seemingly all-powerful scientist. It is not the scientist they should be afraid of, but individuals or groups of individuals driven by a lust for power that is often tainted by a totalitarian ideology.

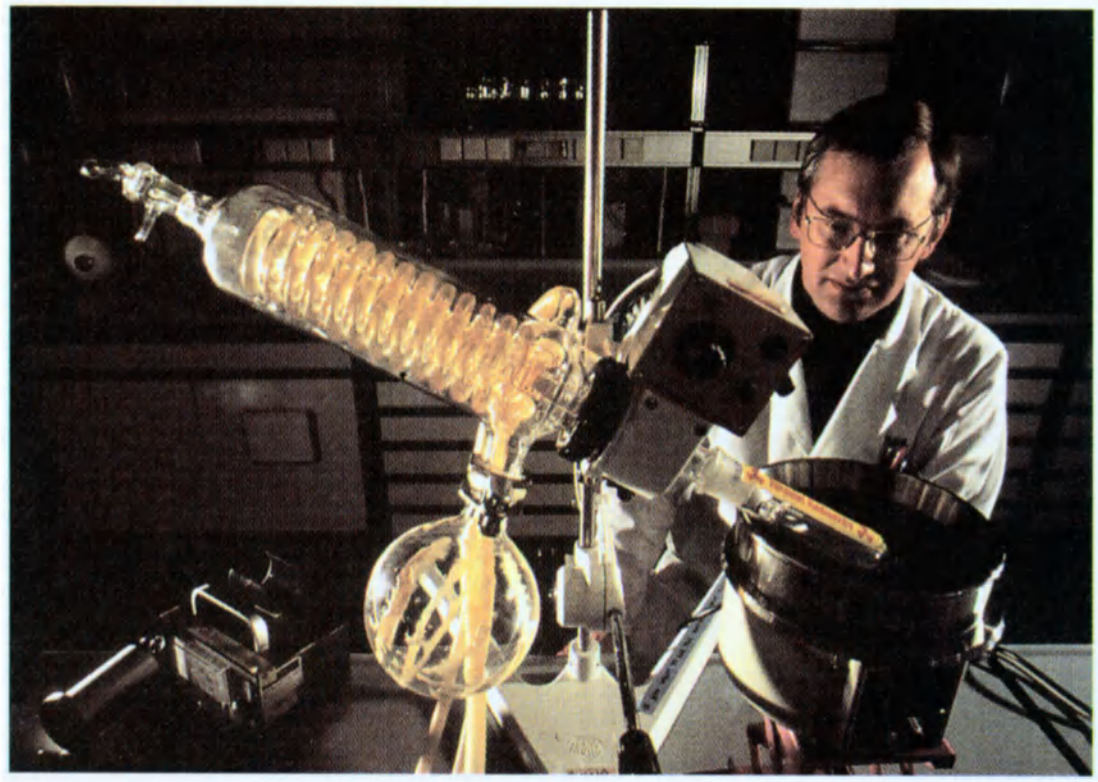
And so we must regard with serenity the revolution that is taking place today. It is a revolution that must be harnessed in the service of humanity and lead to the long life, happy and free of ailments, which we all hope for.

This is the dream I invite you to share—a dream in which genes spell hope.

The only priority we have set ourselves is to relieve suffering. As Paracelsus[2] put it, "medicine is love". ■

1 The antigens of the HLA system are present in virtually all the nuclear cells of the body, which is why they are called "cell antigens". They are genetic markers that are particularly useful for studying the biological make-up of individuals or population groups and evaluating their susceptibility to certain diseases. *Editor*

2 Swiss doctor and alchemist (1493-1541) *Editor*



The prospects for gene therapy

by Renato Dulbecco

There are an estimated 100,000 genes in the human body. By replacing defective genes with healthy ones, it will be possible to treat many hereditary diseases such as haemophilia, cystic fibrosis and, eventually, some forms of muscular dystrophy and cancer.

Rapid progress has been made in recent years in characterizing hereditary diseases and in understanding their causes. These diseases are due to alterations of genes, which encode the information for building the body and making it work. Genes are the carriers of hereditary traits and are contained in filaments of DNA (deoxyribonucleic acid) that are present in the cells of all organisms. The precise number of genes in the human body is unknown, but it is estimated to be around 100,000.

Every cell has two copies of each gene, one deriving from the father, the other from the mother. The information in the genes is used for making proteins, the agents for building the body and making it work. A disease appears when a gene is altered in such a way that either it does not make its corresponding protein, or else makes a protein that is incapable of functioning. Since the same protein is encoded in both genes of each pair, if only one fails enough protein continues to be made to satisfy the needs of the organisms, and there is no disease. A disease appears when both fail and no functional protein is made. This generally happens when a child is born from two healthy parents, each of whom carries an altered gene of the same pair. Such parents have a one-in-four chance of generating a defective child.

Hereditary genetic diseases can vary greatly in severity. At one extreme are diseases such as phenylketonuria, which, after detection at birth, can be completely prevented by adopting a suitable diet. At the other are those like Lesch-Nyhan syndrome, which affects only boys, causing a terrible form of mental retardation in which they tend to eat themselves and must be kept bound to their beds to prevent them from eating their fingers. Even so, they may eat their lips or their tongues. All hereditary diseases generate a degree of handicap, and for the majority of them there is not as yet any effective therapy.

Vectors and receptors

During the last ten years many of the genes responsible for hereditary diseases have been discovered, leading to the possibility of a new form of therapy known as "gene therapy" that is based on the introduction into the patient's cells of a good copy of the defective gene so as to perform the missing function. The concept is

straightforward, but the implementation presents many problems, which so far have limited its use to only a few cases.

To treat a hereditary disease with gene therapy several conditions must be met. In the first place the gene responsible for the disease must be known and must be isolated in a form that contains all the information needed to make the protein. Many copies of the gene must be available, to maximize the number of cells into which it can be introduced. The fresh genetic material is usually inserted into the malfunctioning cells by means of a "vector" or carrier. Such vectors are often obtained from viruses; but many viruses may either kill cells or change them to cancer cells. To prevent these adverse effects the genes responsible for causing them are removed from the viruses.

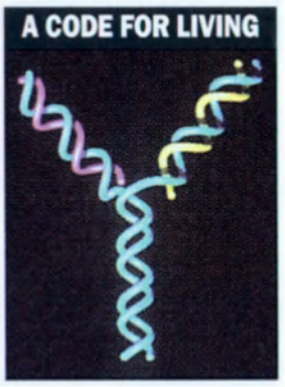
The first vectors used in gene therapy were made from viruses known as "retro-viruses". However, retro-viral vectors have important drawbacks: they only enter into some types of cell, and then the gene they carry acts weakly. The major disadvantage is that they cannot become established in cells that do not multiply. More recently viruses of another kind, known as "adeno-viruses", have been used extensively because they can become established in cells that do not multiply. Today most gene therapy is being carried out using as a vector either adeno-viruses or other viruses with similar properties.

Many attempts have been made to use other ways of delivering genes into cells. One of them takes advantage of the ability of certain "factors" present in the blood or other body fluids to enter cells by interacting with "receptors" present at the surface of cells. For this method to work, the cell into which the gene must be introduced needs to have a suitable receptor at its surface, and this limits the types of cells that can be used.

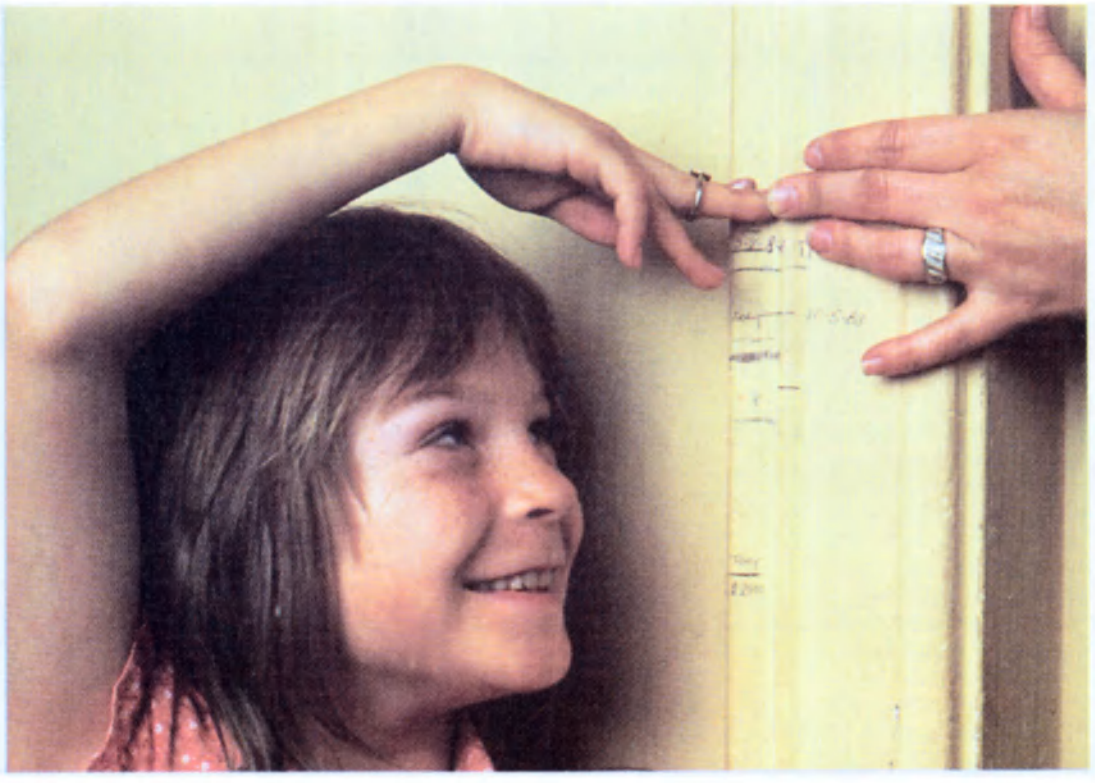
A method suitable for any cell has thus been developed, which consists in embedding the gene into a microscopic vesicle called a "liposome", made up of an artificial membrane similar to those that surround the cells. When the vesicle touches the cell, its membrane fuses with the cellular membrane, and the gene it contains enters the cell. This method seems to have few drawbacks but it has not yet been used widely enough for its efficacy to be proved. Most recently it has been shown that naked DNA can enter cells, opening up the possibility of an even simpler method for gene delivery.

Inserting the gene into a suitable vector is the first step in gene therapy; the next step is to introduce the vector into the cells. The type of cell to be targeted depends on the nature of the disease produced by the genetic defect. In many of the attempts using viral vectors the cells are taken from the body, grown in vitro, and returned to the body after introduction of the gene. To carry out this procedure the cells must be accessible, like those of muscle, skin and blood, but unlike those of internal organs. With the newer approaches using receptor binding, liposomes, or naked DNA, the handicap is not so great, and genes have been introduced into the liver, lungs and muscle.

The first attempt to use gene therapy on a human being was carried out in 1990 on a girl affected by adenosine deaminase (ADA)



Opposite page, a chemist engaged in the production of liposomes at the European Molecular Biology Laboratory in Heidelberg (Germany). Liposomes are tiny vesicles that can be used in gene therapy to introduce genes into malfunctioning cells.



Right, a girl suffering from thyroid deficiency who grew taller after being injected with human growth hormone. Formerly extracted in insufficient quantities from human cadavers, the hormone is now produced in large fermenters using a bacterium, *Escherichia coli*, under controlled conditions.

The first attempt to use gene therapy on a human being was carried out in 1990 on a girl suffering from a serious disease of the immune system. Unable to defend her body against infections, the child had to live under a plastic bell. She could not play with other children or go to school.

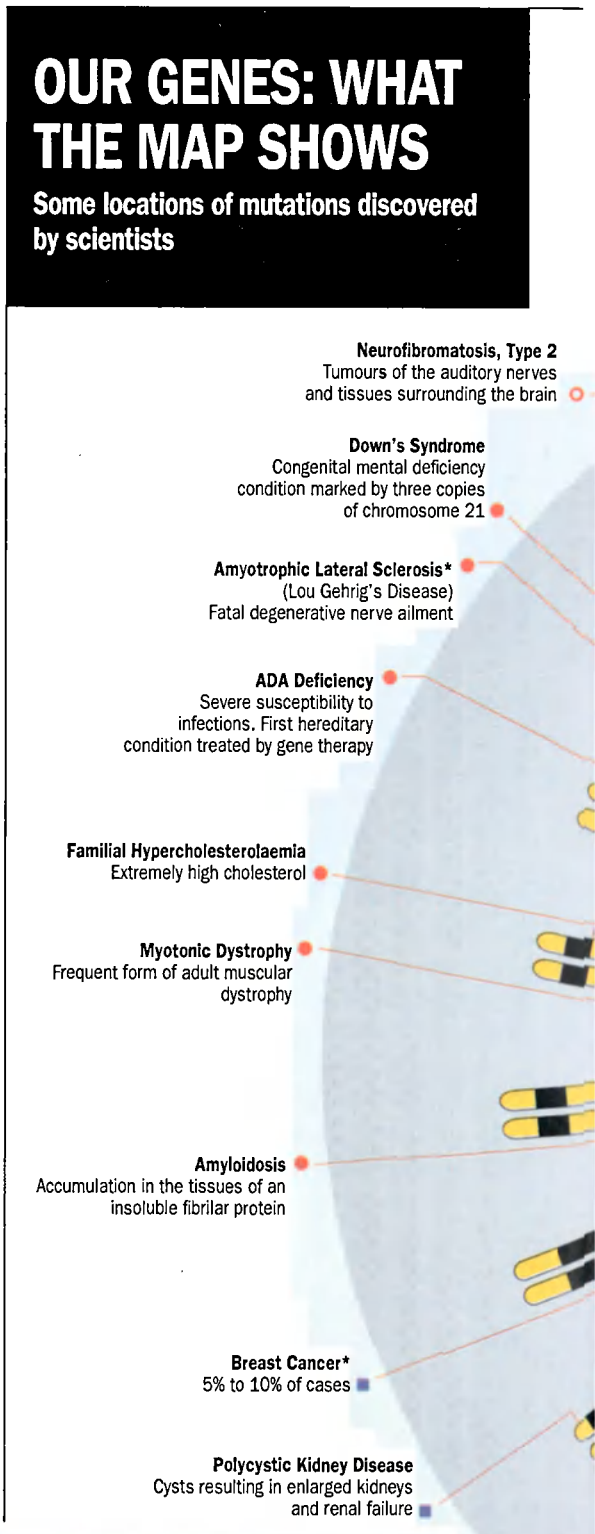
deficiency, that is, the cells of the immune system lacked an essential enzyme and were unable to defend her body against infections. The child had to live under a plastic bell. She could not play with other children and could not go to school. The cells lacking the enzyme are accessible because they are made in the bone marrow and then enter the blood. The therapy was carried out by taking the cells from the blood, introducing the ADA gene into them, and then returning them to the patient's blood. The result has been good. The defence functions of the girl's immune system were re-established and she was able to leave her abode and go to school.

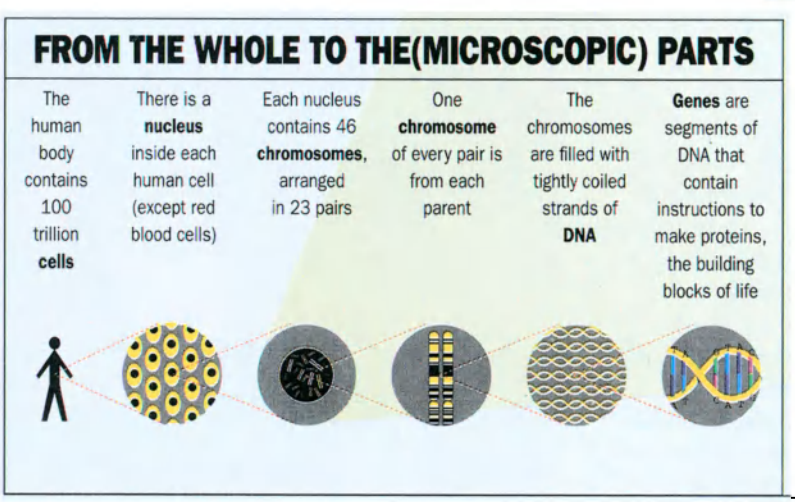
One drawback of this therapy is that the modified cells do not last a long time, and so the treatment must be repeated at frequent intervals. This difficulty might be overcome by introducing the gene into large cells of the bone marrow known as stem cells, which have a much longer life span. However they do not multiply readily in vitro, and therefore the retro-viral vector would not work for them, and, moreover, they are very difficult to isolate. The therapy is therefore effective but still needs much additional work.

Hope for haemophiliacs

Another promising case for gene therapy is haemophilia, which causes a tendency to bleed due to lack of a coagulation factor which is made in the liver and then secreted into the blood stream. There are two forms of the disease: A and B, in each of which a different factor is lacking. Attention has been concentrated on haemophilia B because the gene responsible for the factor (called factor IX) is of manageable size; the other is too big for the available vectors.

Work has been carried out on dogs, which also suffer from this form of haemophilia, using a retro-viral vector. To replenish the blood with the factor two strategies were followed. In one case, cells were taken from the animal, either from





RENATO DULBECCO
is an Italian-born American virologist who was awarded the 1975 Nobel Prize for Physiology or Medicine, together with David Baltimore and Howard M. Temin, for their studies of the workings of cells, viral contamination and the genesis of cancer. He is the co-ordinator of the human genome project for Italy and Honorary President of the Salk Institute for Biological Studies in La Jolla, California (U.S.A.). Among his published works is an 8-volume *Encyclopaedia of Human Biology* (1991).

A CODE FOR LIVING

WHEN CAN WE GET TESTED?

- DNA test currently available
- Gene mapped but not yet isolated
- Diagnosis available through family-linkage study of DNA markers
- DNA test under development

Muscular dystrophy
(Duchenne and Becker types)
Progressive deterioration of the muscles

Haemophilia
Blood defect making it difficult to control haemorrhaging

ALD (Adrenoleukodystrophy)
Nerve disease potrayed in the film *Lorenzo's Oil*

Gaucher's Disease
A chronic enzyme deficiency occurring frequently among Ashkenazi Jews

Familial colon cancer*
One in 200 people has this gene: of those 65% are likely to develop the disease

Retinitis Pigmentosa*
Progressive degeneration of the retina

Huntington's Disease
Neurodegenerative disorder tending to strike people in their 40s and 50s.

Familial Polyposis of the Colon
Abnormal tissue growths frequently leading to cancer

Haemochromatosis
Abnormally high absorption of iron from the diet

Sprirocerebellar Ataxia
Destroys nerves in the brain and spinal chord, resulting in loss of muscle control

Cystic fibrosis
Mucus fills up the lungs, interfering with breathing. One of the most widely prevalent genetic diseases

Multiple Exostoses*
A disorder of cartilege and bone

Malignant Melanoma
Tumours originating in the skin

Multiple Endocrine Neoplasia, Type 2
Tumours in endocrine glands and other tissues

Alzheimer's Disease
Degenerative nerve disease marked by premature senility

Retinoblastoma
A relatively common tumour of the eye, accounting for 2% of childhood malignancies

PKU
(phenylketonuria)
An inborn error of metabolism that frequently results in mental retardation

Sickle cell anaemia
Chronic inherited anaemia, primarily affecting blacks, in which red blood cells sickle, or form crescents, plugging arterioles and capillaries

* One form of the disease

Source: *Time* magazine, 17 January 1994

subcutaneous tissue, muscle, or the epidermis, grown in vitro, and after introduction of the vector, were implanted into the animal, where they continued to produce the missing factor for many months, and perhaps indefinitely.

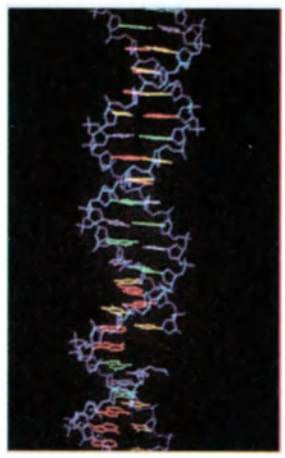
The other strategy was to introduce the same vector into the liver. To overcome the difficulty that the liver cells do not multiply, one third of the liver was surgically removed in order to cause a regeneration of the organ, and therefore cell multiplication. The result was a steady, although low, production of the factor, which again lasted for a long time, with a satisfactory correction of the disease. These results show that there is much hope for a long-term control of haemophilia through gene therapy.

A disease targeted for gene therapy since its gene was isolated a few years ago is cystic fibrosis, in which many types of secreting cells are affected, but especially those of the lung with accumulation of mucus and limitation of oxygen uptake. Results suggest that human gene therapy holds promise as a treatment for this disease, especially if it can be done by delivering the gene through nebulization, which is very simple.

Attempts to treat cancer

Attempts to use gene therapy have been made for a number of years in the treatment of cancer, which is a genetic disease, although not usually transmitted hereditarily. These attempts have taken two main directions. One, applied to brain tumours, is to introduce into the cancer cells a vector carrying a gene that converts an anti-herpes drug into a cell-killing substance. The gene, in a retro-virus vector, is injected into the cancer mass, where it is able to perform its action because the cells are multiplying, whereas it has no effect on normal brain cells, which do not multiply. Experiments with cancer transplanted into mice showed that the tumour was destroyed after the mice were injected with the anti-herpes drug. The problem in this experiment is that the vector only penetrates some of the cells so that the remaining cells may start a new growth (even though the toxic substance produced under the action of the gene can pass from one cell to another). Whether this approach will be useful in human patients remains to be seen; clinical trials are under way.

Below, model of a DNA molecule. Bottom photo, James Watson and Francis Crick (right), winners of the Nobel Prize for Physiology or Medicine in 1962. Their discovery of the double helix structure of deoxyribonucleic acid (DNA) was a turning point in the study of genetics.



The other direction being taken by attempts to use gene therapy to treat cancer is to enhance the body's defences against the tumour. It is based on the idea that, at least in some cases, the body recognizes the cancer cells as foreign and should react immunologically, causing their destruction. This does not happen in the patient because the immunological defences are paralyzed. The approach is therefore to potentiate the immune response, which is attempted in two ways. One is to grow the immune cells in vitro in the presence of potentiating factors, and then introduce into them the gene for a cell-killing substance, after which they are injected back into the patient.

Preliminary trials in patients with melanoma—a malignant skin tumour—using the potentiated cells without the introduction of the gene have given encouraging results—a reduction of the skin tumours and of their metastases in the lungs. The other approach to potentiating the immune response consists in introducing into the cancer cells a gene that will cause them to activate the immune cells with which they come in contact; once these cells are activated they can attack cancer cells at other sites in the body. The modified cancer cells thus constitute a kind of vaccine against the cancer. Experiments in animals have yielded promising results.

Many approaches to gene therapy can be applied to hereditary human diseases, and some promising results have already been obtained. The future is bright for diseases such as adenosine deaminase (ADA) deficiency, haemophilia and cystic fibrosis, and the prospects are good for muscular dystrophy and for some cancers. Development of this field is obviously still at a very early stage, and improvements will certainly be made in areas such as the mode of delivery of the gene to the cells and the isolation and growth of suitable cells. There is every reason to expect that gene therapy will become a powerful weapon in the treatment of diseases caused by gene alterations. ■

Prenatal diagnosis: foretelling the quality of life

by Hans Galjaard

Screening for most genetic risks will eventually be possible through analysis of chromosomal aberrations. But social or religious factors may impede the applications of scientific progress.

Mother and Child **(1992) mixed media on wood (60 x 60 cm) by the Moroccan painter Hamid.**

DNA technology has revolutionized the laboratory diagnosis of genetic disease. It has also provided new perspectives for the detection of very minute chromosomal aberrations which are invisible under the microscope. In the near future DNA probes for specific parts of each human chromosome will facilitate large-scale prenatal diagnosis in women at risk of giving birth to offspring with a congenital malformation or genetic disease. They will also contribute to the elucidation of the causes of hitherto unexplained mental retardation and physical handicap.

At present some 750 disease genes have been identified. This has widened the scope of the prenatal diagnosis of genetic diseases and the detection of gene-mutation carriers, who are usually healthy themselves but may have an increased risk of producing affected children. DNA technology also offers new perspectives for the development of animal models for human diseases, making it possible to study pathogenesis and work out new therapeutic strategies. The latter will be especially important in the various types of cancer for which specific chromosomal aberrations and gene defects have been identified both in germ cells and somatic cells.

These techniques of diagnosis and carrier identification form the basis for genetic counselling to couples who on the basis of their family history or exposure to possible harmful environmental factors fear the birth of a handicapped child. The choices are often difficult and involve refraining from pregnancy, accepting the risk, adoption, fertilization with donor gametes, or prenatal diagnosis with the option of terminating the pregnancy if the foetus is found to be affected. Follow-up studies in our own centre revealed that 50 per cent of couples at high genetic risk refrain from pregnancy when

Current techniques of prenatal diagnosis and detection of genetic diseases make it possible to counsel couples who risk giving birth to a handicapped child because of their family ancestry. Above, a married couple in Japan.

there is no prenatal test available. If, however, there is such a test, 85 per cent of the couples choose to have progeny because they know they can avoid the birth of a handicapped child. Hence, prenatal diagnosis should not only be considered as a technology leading to abortion but also as an approach that may provide reassurance and stimulate couples, who might not otherwise have dared to do so, to reproduce.

In the wealthy countries clinical genetics services are universally accepted as part of modern health care. The only controversial issue is whether or not a pregnancy should be terminated because of an affected foetus. Abortion remains ethically, religiously unacceptable to a minority. Nearly all countries offering this option have, however, legalized abortion up to twenty-four weeks of pregnancy and a few countries, like the United Kingdom, do not even have a time limit in the case of an affected foetus. The only remaining concern is social pressure on those parents who give birth to an affected child when this could have been avoided. It is clear that freedom of choice should also be guaranteed for people who for moral reasons do not want to use a specific technique. In the Scandinavian and northwestern European countries today 50 to 60 per cent of pregnant women of advanced child-bearing age undergo prenatal diagnosis and the rest do not want it, even if they know of its existence.

Social attitudes to screening carriers of hereditary diseases

In a number of populations a particular genetic mutation is so prevalent that population screening for carriership is justified, provided that a reliable, easy and cheap test is available, and that the population involved has been well informed. Such carrier screening programmes have led to a marked reduction or an eradication of ß-thalassaemia, a hereditary anaemia which is found amongst Mediterranean populations, of sickle-cell anaemia in Cuba, and of the severe neurological Tay-Sachs disease among Jews in North America and Israel.

The importance of economic, social and religious factors is evident in the success or failure of population screening for carriership. In some Mediterranean countries where the prevalence of ß-thalassaemia carriers is as high as one in seven, the church and health authorities have co-operated, and the same is true for the Jewish authorities in North America and Israel in the case of the Tay-Sachs screening programme.

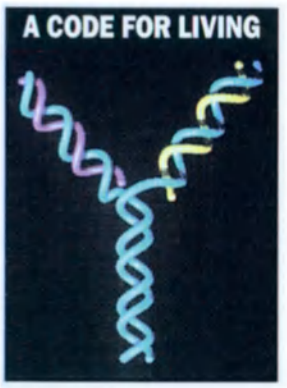
In the United States, however, attempts at carrier screening for sickle-cell anaemia among the black population, one in ten of which is a carrier, have failed. There are several reasons for this. Almost 60 per cent of black children are born out of marriage and 80 per cent are born to very young mothers, so that it is difficult or impossible to test both partners and provide timely genetic counselling. In addition, many blacks and Hispanics are not insured for health care and cannot afford genetic testing. Furthermore, termination of pregnancy in federally funded clinics has for a long period been impossible. Finally, when carrier screening was propagated, many members of the black community felt it to be yet another means of discrimination.

The fact that carrier screening for sickle-cell anaemia has been successful among the black population in Cuba demonstrates that political and social background plays an important role in the acceptance of genetics services. Cuba and China are both examples of low income countries which have given a high priority to health care and education. Contrary to many other Asian countries contraceptive use in China is high (71 to 86 per cent), people are well informed about prenatal care and the one-child-family policy motivates couples to make use of all available technology to ensure the birth of a healthy child. The main limitation is the relatively high cost of genetic testing.

In India, Bangladesh and Pakistan, which account for 30 per cent of the world's child mortality and for 40 per cent of its non-immunized

HANS GALJAARD,
of The Netherlands, is Professor of human genetics at Erasmus University and Chairman of the Department of Clinical Genetics at the University Hospital of Rotterdam. A member of his country's Royal Academy of Sciences and its National Health Council, he has published hundreds of articles in scientific journals, chapters in many specialized works, and several monographs on technological, social and ethical aspects of cell biology and genetics.

"About 6,000 conditions in human beings are now known to be associated with a microscopically invisible defect in a single gene, and more than 2,500 of these concern genetic diseases which result in early death or chronic impairment. It is possible to diagnose 400 of these diseases by biochemical analysis."



children, illiteracy, low contraceptive use (12 to 43 per cent), inadequate education, the status of women and poverty are major limitations on the future application of gene technology. The deeply rooted preference for male offspring, which has a religious basis in Hinduism, has unfortunately led to misuse of prenatal diagnosis, as it had previously for economic reasons in China. In India there are private clinics which perform prenatal sex determinations for members of the higher social classes who may terminate their pregnancy if the foetus is female. So far only one state has imposed a legal ban on this practice, and attempts at national legislation have failed.

In countries where Islam is the major religion (their total population is about one billion people worldwide) different religious schools, political structures and ethnic backgrounds are associated with different interpretations of the Qur'an in terms of reproductive technology. In general, diagnostic methods and genetic counselling will be accepted, as well as certain contraceptives, depending on the number and sex of the children already present in the family, and the goal. Sterilization and abortion are usually not acceptable. In most Muslim societies abortion during the first forty days of pregnancy is permitted ("halal"), and after 120 days is strictly forbidden ("haram"). In between those times the soul is believed to enter the foetus and abortion might be considered under special circumstances, but it is not liked ("marrouh"). This excludes amniocentesis—the removal of fluid surrounding the foetus in the womb for therapeutic or diagnostic purposes—as an option for couples at risk of having an affected child, but there would be some scope for early procedures like chorionic villus biopsy or foetal cell testing in maternal blood. Family and tribal traditions play a major role, which mean an additional obstacle to the acceptance of certain genetic services.

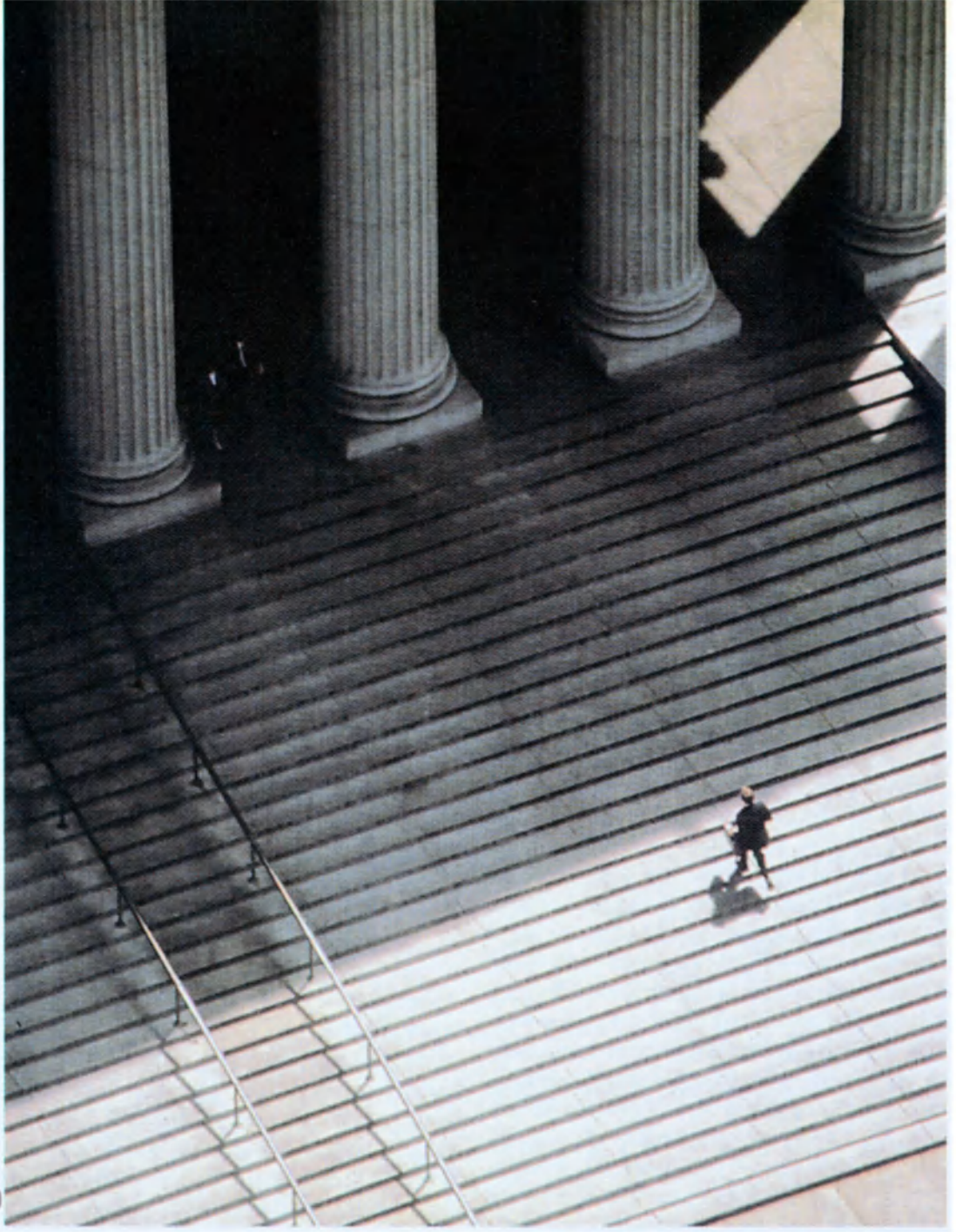
Religion also plays a role in Latin America where the Roman Catholic Church is widely influential and where abortion laws have not been liberalized. Unequal distribution of wealth, illiteracy, low contraceptive use in rural areas and a high rate of teenage pregnancy are other major problems. Again, as in several other developing countries, some private clinics offer genetics services, but their use is restricted to the few who can afford them.

An interesting illustration of the importance of religion and tradition is provided by Japan, a country with a high gross national product, very advanced technology and the world's lowest infant mortality rate. However, clinical genetics is hardly developed in Japan, for two main reasons. The presence of a handicapped relative is often hidden from the outside world because it is associated with feelings of guilt and shame. This makes it difficult to perform more extensive family studies on the basis of an index patient. Secondly, despite one of the highest abortion rates in the world for social reasons, the Japanese tradition does not approve of judgments of the value of a human being and hence the finding of an abnormal foetus is not accepted as a reason for abortion. Wealth and technology alone are not sufficient for the incorporation of new services into the health care system.

In order to implement genetic services at a global level much has to be done to improve living conditions (clean water, sanitation, housing, nutrition, work), reduce infant mortality, illiteracy and poverty, and extend education, especially of women, in order to make people aware of the possible benefits of contraceptive use and timely prenatal care. ■

In countries such as India, the status of women may be an obstacle to some applications of gene technology. Below, Indian village women in Karnataka hold a weekly meeting to manage the craft co-operative they have created.

"How can science be left free to pursue its discoveries and the state be allowed to exercise its responsibility towards society?"



Genetics in the market-place

The prospect of shopping for "spare part" organs and tissue confronts modern societies with acute ethical dilemmas

by Ezra N. Suleiman

There have always been but few certainties in the world, and the most fundamental of them—life and death—are now being questioned by the scientific engineering of the last decade. As Andrew Kimbrell observed in his recent book, *The Human Body Shop*, "the engineering and marketing of life . . . raises some of the most profound questions our society has ever had to answer: What is life? What does it mean to be human? Should we allow our scientists to become the genetic co-authors of evolution? How do we define death? Who determines what life is worth living? Do we want a 'free market' in human organs, tissues, genes—or children?"[1]

Genetic engineering not only raises fundamental questions about the meaning of life and death, it also challenges our notions of the life

process. It spawns whole industries that seek to exploit every scientific advance made by this process. It challenges our notion of human rights.[2] It raises ethical and moral questions about using foetuses for "spare parts" for, as Andrew Kimbrell has written, "many experts feel that the current disapproval of 'growing foetuses' for medical use will be short-lived."

While philosophers and ethicists must, and will, continue to debate the morality of some aspects of genetic engineering, the fact is that the issues raised by biotechnology cry out for policies that establish the contours within which these scientific advances can legitimately occur.

We now know that the implications for the scientific community and for society of the discovery of the genome are nothing less than revolutionary. That this discovery is the culmination of many years of research does not lessen its impact or alter its unprecedented character. When scientific research advanced to the point of giving us the atomic and hydrogen bombs, the world marvelled, but only realized the full implications of these scientific discoveries after their dangers had become a fact of life. Should the development of the weapons of mass destruction—remarkable scientific discoveries in their own right—not be seen as a warning signal for us today where genetic engineering is concerned? Should we not react now, for the process is already well advanced? To ask these questions is to ask what role the state should take in orienting research and in regulating the diffusion of the discoveries of genetic engineering.

The role of the state

This is a matter of concern to the entire international community. It can no longer be regarded as a matter best left to scientists. Just as war is too important to be left to the generals, so life and death are too important to be left to the hazards of scientific discoveries.

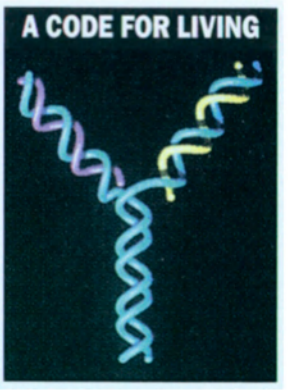
Underlying the issue of the role of the state in scientific research are the questions of the responsibility of the scientific community and the "ownership" of scientific results. These are fundamentally ethical issues, and as such must be debated by society.

There are essentially two views regarding the role that the state should play in encouraging and regulating scientific research. The first holds that the state should in no way interfere in scientific research because science can only advance unfettered. Following from this premise, it is believed that:

- The state should remain a bystander where scientific research in general is concerned.
- The state should not seek to dictate the diffusion of scientific results. Scientists are the best judges of what results should be made available to the public. They are the owners of these results and discoveries.
- The state should not determine the direction of scientific research. By the same token, it should not seek to control the outcome of scientific discoveries.
- The interference of the state in scientific research risks making science an instrument of a state ideology rather than the objective pursuit of knowledge.

The second and diametrically opposed view is that the state, charged with responsibility for society, has an obligation to involve itself in scientific research. This view is based on the belief that:

- In a democratic society, science must never become a mere instrument of a state ideology. It can proceed freely and still leave a role for the state.
- The state has a responsibility for preserving the cohesion of society and for ensuring equality before the law.
- The state has an obligation to be active in any area that poses a potential threat to individuals,



Peter loves Jane

Peter loves Jane. After an accident, Jane loses an arm. Someone else's arm is grafted to replace the amputated arm. Peter is still in love with Jane. After a time Jane falls ill with a serious kidney disease. A kidney transplant is successfully carried out. Peter still loves Jane. Then she has another accident and suffers extensive burns. Substantial skin grafts are necessary. Then Jane is diagnosed as having a serious heart condition. A heart transplant is considered.

Is Peter still in love with Jane? Is poor Jane, with an arm, kidney, skin and heart that are not her own, still the Jane he loved? How many organs, how much tissue can Jane exchange while still remaining the object of Peter's love? How many kilograms and how many square metres can she have replaced and still remain the same person?

The object of Peter's love and Jane's person cannot be measured by kilograms, square metres or even by the number of organs preserved or transplanted.

JEAN BERNARD
French haematologist
(*De la biologie à l'éthique* © Buchet-Chastel, Paris 1990)

A confrontation between science and the authorities: *Galileo before the Holy Office, 1633*, by the French painter Joseph Nicolas Robert-Fleury (1797-1890).

that affects the equilibrium of society and that affects the social order in any way.

Both these views express general ideologies regarding the proper role of the state in democratic societies. How can they be reconciled? How can they be applied to the specific context of the discovery of the genome? How, in short, can science be left free to pursue its discoveries and the democratic state be allowed to exercise its responsibility towards society?

First of all, there is no contradiction between requiring the state to guarantee the freedom of scientific research and expecting it to play a role in regulating the consequences of this research. This is particularly the case in biotechnology.

Secondly, as many of the potential consequences of biotechnological research are already becoming known, the state has the obligation to regulate some of the adverse or nefarious uses to which this research may be put.

Thirdly, regulating biotechnological research and the diffusion of its results is not a way of opposing the scientific community. Scientists themselves do not have control over the uses of their discoveries. Hence, scientists can work with the state to ensure the ethical uses of their research.

Fourthly, research in biotechnology is expensive and, in an era of scarce resources, the state needs to justify such expenditures. And justifying expenditures requires justifying the use of these expenditures.

Because of the potentially profound effect on society—on inequality among individuals, on the relation of the individual to society and, finally, on the very concept of collectivity—the state has an obligation to be perhaps more involved in this area of scientific research than in others.

The state, however, cannot merely impose guidelines. It must have its own guidelines to follow. A democratic state is always subject to controls, and the confines of its actions in the area of biotechnology must be carefully demarcated.

The state needs to develop its levels of intervention in scientific research through wide-ranging discussion in a democratic context. This ensures the legitimacy of actions, and ensures controls over actions. In short, the state needs to work *with* the scientific community to ensure the freedom of research *and* the ethical uses of the results of this research. ■

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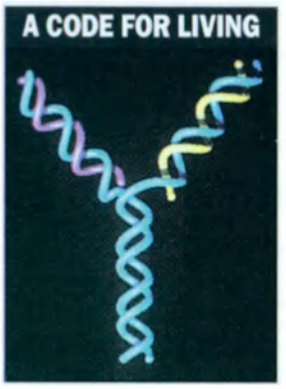
1 Andrew Kimbrell, *The Human Body Shop: The Engineering and Marketing of Life* (New York, 1993).

2 See Eugene B. Brody, *Biomedical Technology and Human Rights* (Dartmouth Publishing Co., Cambridge, U.S.A. and UNESCO, 1993).

UNESCO and bioethics



by Georges B. Kutukdjian

Through ethical reflection, humanity can now keep pace with the challenges of science instead of realizing too late when things have gone wrong

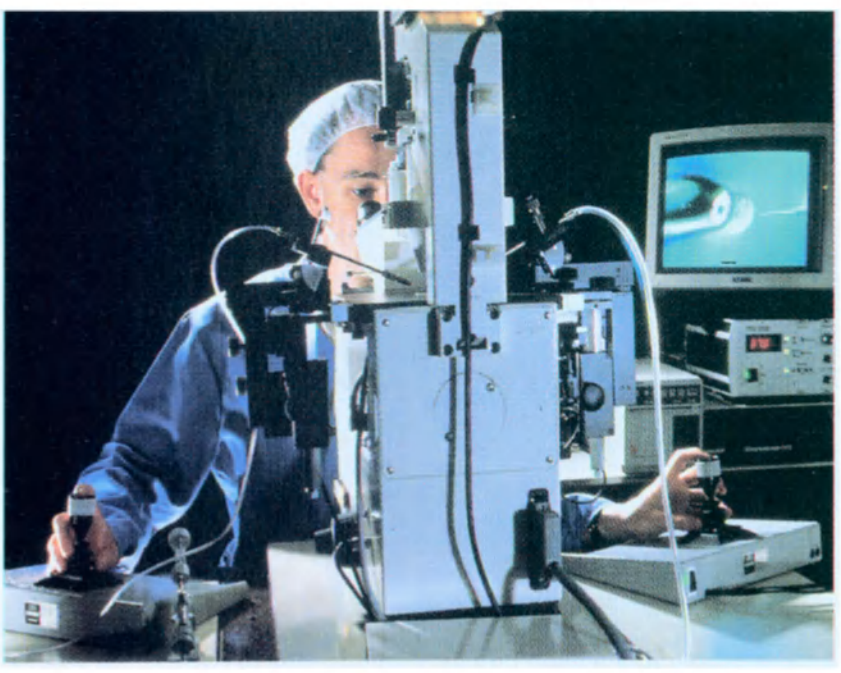
Scientific research on the human genome, and especially on gene therapy and the diagnosis of genetic diseases, has far-reaching implications for the lives of all of us—children, men and women alike. It is a field holding out immense prospects for man's self-transformation and it will, in the long run, require societies to make certain choices. As a result, it is giving rise to anxieties that may in some cases be justified but are more often irrational.

These anxieties lie behind the effort many countries are now making to look into the ethical framework of such research. Legislation is starting to be adopted to define limits for medical practice and some types of research, in order to ensure that human dignity will be respected. Two points must be stressed, however. In the first place, the type of legislation differs significantly from one country to another and we do not have any common yardstick to judge it by. Secondly, it does not exist everywhere in the world, but only in some of the industrial countries. Elsewhere, there are are still a number of grey areas surrounding research and experimentation.

It is for all these reasons that the Director-General of UNESCO decided to set up an International Bioethics Committee and invited Ms. Noëlle Lenoir, a member of the Constitutional Council of the French Republic, to preside over its deliberations.

The Committee met for the first time in September 1993 and commenced its work by identifying three priority themes. These are genetic screening and testing, the therapeutic applications of genetics research, and population genetics.

A biologist using state-of-the-art microscope equipment to insert DNA segments into embryos.



Genetic testing

Should genetic screening be made compulsory for so-called "risk" populations or should it simply be made available to them? Should it be introduced into premarital examinations or be included in prenatal diagnosis? Should it be carried out before gamete donation or the implantation of embryos fertilized in vitro?

At the outset, a distinction must be made between two kinds of genetic tests. Tests in the first category are used to identify a particular gene which is virtually certain to bring on a hereditary disease. Those in the second category show whether or not a person has a predisposition to certain diseases and thus reveal situations involving varying degrees of probability. Depending on the environment and sundry other factors, about some of which little is known, the outward symptoms of a disease may appear in its early stages or may emerge only later, and the disease itself may vary in severity. A genetic mutation may become more dominant and grow worse from generation to generation. On the other hand, the tendency for genetic damage to occur may be reversed. In short, the same defect in a person's genotype (genetic constitution) may take different forms in his or her phenotype (the physical constitution as it interacts with the environment).

This influence of the environment on the form a genetic mutation may take brings into play the concept of the responsibility of individuals towards themselves and their families and the responsiblity of citizens towards the community. Preventive medicine could therefore be said to go hand-in-hand with predictive medicine.

Should people be told that there is a probability that they will eventually develop Huntington's chorea, for example, and transmit it to their offspring? Should their close or distant

Dr. Jekyll and Mr. Hyde: the temptation

I knew well that I risked death; for any drug that so potently controlled and shook the very fortress of identity might, by the least scruple of an overdose or at the least inopportunity in the moment of exhibition, utterly blot out that immaterial tabernacle which I looked to it to change. But the temptation of a discovery so singular and profound at last overcame the suggestions of alarm. . . . I compounded the elements, watched them boil and smoke together in the glass, and when the ebullition had subsided, with a strong glow of courage, drank off the potion.

The most racking pangs succeeded: a grinding in the bones, deadly nausea, and a horror of the spirit that cannot be exceeded at the hour of birth or death. Then these agonies began swiftly to subside, and I came to myself as if out of a great sickness. There was something strange in my sensations, something indescribably new, and, from its very novelty, incredibly sweet. I felt younger, lighter, happier in body; within I was conscious of a heady recklessness, a current of disordered sensual images running like a mill race in my fancy, a solution of the bonds of obligation, an unknown but not an innocent freedom of the soul. I knew myself, at the first breath of this new life, to be more wicked, tenfold more wicked, sold a slave to my original evil: and the thought, in that moment, braced and delighted me like wine.

ROBERT LEWIS STEVENSON
Scottish writer
The Strange case of Dr. Jekyll and Mr. Hyde (1886)

relatives be warned? What about employers and insurance companies? Can a company's medical service insist on being given the results of genetic testing?

Since genetic testing may extend over several generations and involve varying numbers of individuals, questions about the storage and confidentiality of the data are bound to arise sooner or later. How long should genetic data be kept and how can its confidentiality be guaranteed? Who should be empowered to divulge or withhold information which often involves whole families?

Similarly, if people can choose to know what their genetic future will be, can they also choose not to know? Should they or should they not be compelled to take account of the results of genetic testing?

In this regard, it is important that people should be freely able to exercise their discretion. Information that is liable to change their whole lives and force added responsibilities on them should not expose them to any form of discrimination. Genetic testing should not prompt the authorities to adopt repressive policies leading to a restriction of individual freedoms.

Another ethical issue connected with genetic testing is bound up with the need to ensure that all countries, including the least advanced ones, reap benefit from them, so that they too can join the fight against hereditary diseases.

Therapeutic applications

The first question that has to be raised relates to the pre-implantation diagnosis performed on artificially fertilized embryos which, in view of its greater simplicity and lower cost, is likely to replace gene therapy in cases of rare genetic diseases. This involves a choice that is already framed in ethical terms.

The second question is whether the work currently being done is not liable to become narrowly focused on looking for the genes that account for people's behaviour—their sexuality, for example—their talents and abilities, or even their "deviances". This could lead to a kind of genetic reductionism whereby people would be defined exclusively in terms of their genome, or to a situation in which some individuals or groups of individuals might be stigmatized by society, ostracized or even eliminated. This would be tantamount to adopting eugenic policies.

There are other problems. We know, for example, that through agriculture, gene therapy could bring about radical changes in public health. A diet of genetically modified plants could become a regular form of treatment, a sort of oral "vaccine" given in repeated doses. However, the *in vivo* reproduction of these plant species would be liable to give rise to new recombined organisms that could become vectors for diseases. In such an eventuality, what kind of preventive measures and legislation should be instituted?

The same applies, *mutatis mutandis*, to the use of human genes for the development of transgenic

animals. What limits should be set on the supply of human genetic material? Should it be reserved solely for therapeutic purposes, say for xenografts, and its use for any other purpose, such as for improving livestock, be ruled out?

We have to accept that the issue of transgenesis applied to the human species now has to be faced. Reports of germ-line therapy experiments on embryonic cells or spermatozoa have recently been published in scientific journals.

As a result of the rapid strides being made by genetic engineering, it is now possible to store gametes and germ cells in "banks" for possible future use, such as for autografts. This practice is now regarded as acceptable, under certain conditions, for young cancer patients who have to undergo X-ray treatment or chemotherapy and who wish to preserve their chances of later conceiving children by in vitro fertilization techniques. With the exception of these medical cases, the storage of gametes and germ cells poses the problem of the storage of human products generally, as well as that of storage methods and the criteria governing access to such "banks".

Lastly, careful thought has to be given to the best ways of protecting the intellectual property of researchers whose inventions have industrial or commercial applications. Should such protection be regarded as akin to copyright? How is it possible to regulate access to genetic data banks and their possible industrial or commercial uses?

First, steps must be taken to secure the free and informed consent of population groups participating in major surveys on population genetics. The scientific aims and objectives of the surveys should be clearly explained to them.

The results of these surveys should not be detrimental to those who participate, nor should they lead to discrimination against them. Nor should they be allowed to lead to the establishment of a genetic pseudo-classification of the population groups involved.

These results should also be communicated to the individuals and population groups concerned. Access to genetic data banks where the information is stored, the processing of this information and its use should be rigorously defined.

The human genome project

Deciphering the totality of genetic information on the human race is an ambitious project which calls for international co-operation. The ensuing progress will help to prevent and treat genetic diseases which are incurable today. It will also make a significant contribution to understanding the structure and the functions of the genetic system and individual development, as well as the "natural history" of DNA.

Such fundamental knowledge of human beings clearly raises ethical, social and legal problems, and consequently it is not surprising that UNESCO attaches very great importance to it. The human genome project has a place among UNESCO's activities because of UNESCO's ethical mission and its competence in the fields of education, science and culture. UNESCO offers an ideal environment for multidisciplinary debates on the different aspects of study of the human genome.

UNESCO is thus fully involved in this project. By organizing or encouraging meetings, holding workshops, helping to finance training programmes and awarding short-term scholarships, UNESCO is seeking to do three things: to encourage international co-operation and co-ordination, to stimulate debate on the many repercussions of the human genome project, and to promote the participation of countries of the South and East. The sharing of knowledge between North and South, East and West is, after all, an ethical imperative in itself. ■

St. Cosmas and St. Damian graft onto the deacon Giustiniano the leg of a recently deceased Ethiopian. 15th-century fresco by Fra Angelico in the San Marco Museum, Florence.
(Illustration taken from the catalogue of *La vie en kit, éthique et biologie* © Fondation de l'Arche de la Fraternité, Paris).

GEORGES B. KUTUKDJIAN
is the head of UNESCO's Bioethics Unit. A philosopher and anthropologist, he has published a number of papers on kinship systems and proverbs, and literary essays on Marguerite Duras, Kafka and Proust. He was the co-editor, with Antonio Papisca, of a collective work on the rights of peoples, published in 1991 by CEDAM, Padua (Italy).

Doctor Frankenstein

When I found so astonishing a power placed within my hand, I hesitated a long time concerning the manner in which I should use it.... I doubted at first whether I should attempt the creation of a being like myself or one of simpler organization; but my imagination was too much exalted by my first success to permit me to doubt of my ability to give life to an animal as complex and wonderful as man.... I prepared myself for a multitude of reverses; my operations might be incessantly baffled, and at last my work be imperfect: yet, when I considered the improvement which every day takes place in science and mechanics, I was encouraged to hope my present attempts would at least lay the foundations of future success....

No one can conceive the variety of feelings which bore me onwards, like a hurricane, in the first enthusiasm of success. Life and death appeared to me ideal bounds, which I should first break through, and pour a torrent of light into our dark world. A new species would bless me as its creator and source; many happy and excellent natures would owe their being to me. No father could claim the gratitude of his child so completely as I should deserve theirs. Pursuing these reflections, I thought, that if I could bestow animation upon lifeless matter, I might in process of time (although I now found it impossible) renew life where death had apparently devoted the body to corruption.

MARY WOLLSTONECRAFT SHELLEY
Frankenstein or the Modern Prometheus
The 1818 Text
William Pickering, London, 1993

To find out more...

Books

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Periodicals

BIOETHICS (quarterly)
Basil Blackwell Ltd.,
108 Cowley Road,
Oxford OX4 1JF,
United Kingdom.
Tel: 0865 79 11 00.

BULLETIN OF MEDICAL ETHICS (10/year)
Editorial Office: 31 Corsica Street, London N5 1JT, United Kingdom.
Tel: (44 71) 354 42 52.

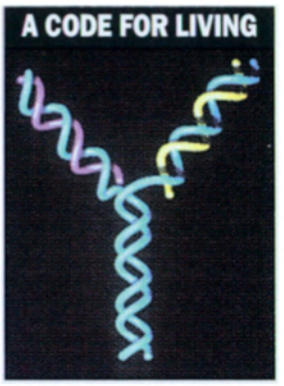
HUMAN GENE THERAPY (bi-monthly)
Mary Ann Liebert Inc., 1651 Third Avenue, New York
NY 10128, U.S.A.
Tel: (212) 289 23 00.

JOURNAL OF CLINICAL ETHICS (quarterly) University Publishing Group, 107 E., Church Street, Frederick,
MD 21701, U.S.A.
Tel: (301) 694 85 31.

JOURNAL OF MEDICAL ETHICS (quarterly) B.M.J. Publishing Group, B.M.A. House, Tavistock Square, London
WC1 9JR, United Kingdom.
Tel: (44 71) 387 44 99.

JOURNAL OF MEDICINE AND PHILOSOPHY (bi-monthly) Kluwer Academic Publishers, Postbus 17, 3300 AA Dordrecht, Netherlands.
Tel: (31)78 33 49 11.

THE LANCET (weekly)
Lancet Ltd., 42 Bedford Square,
London WC1B 3SL,
United Kingdom.
Tel: (44 71) 436 49 81.



National ethics committees worldwide

Over the past ten years or so, many countries have established national or local committees responsible for setting out an ethical position in relation to developments in the life sciences and medicine, such as organ transplants, medically-assisted procreation and experiments on human beings.

Similar committees have been set up by some hospitals to give an opinion on medical practice or on the hospital as institution, or by public bodies funding scientific research with a view to giving their approval to research projects.

In countries where no such national or local committees exist, this advisory role may be performed by bioethics institutes forming part of research centres or universities.

Many ethics committees have also set themselves the task of educating, briefing and alerting the public. Their work is essential if the public is to grasp the importance of the issues at stake and is to be involved in establishing priorities and making choices in life-sciences research and its applications. These committees often encourage discussion between specialists and the general public.

In some countries, committee members are appointed in their personal capacity by national authorities; in others they are named by professional bodies, such as the Bar or Medical Associations.

As a rule, the statutes of these committees designate the people or institutions empowered to refer to them matters within their competence. However, the committees may also decide on their own authority to examine specific issues or matters of topical interest.

In most cases, the committees hand down recommendations or opinions which, although only of an advisory nature, are largely taken into consideration by such decision-making bodies as parliaments, governments and professional associations.

UNESCO has conducted a wide-ranging survey among its Member States in a bid to identify the main national ethics committees or other similar bodies, to associate them with the work of its International Bioethics Committee, and to encourage the establishment of an international network of national and local ethics committees.

The list below gives details of the main national ethics committees in a number of countries. Readers are invited to contact their own country's committee for further information. ■

Georges B. Kutukdjian

NATIONAL BIOETHICS COMMITTEES

AUSTRALIA
Centre for Bioethics, 12 Clarence Street, Burwood, New South Wales, Australia. Tel: (6102) 745 2364
Dr. T. Connolly (Director)

International Association of Bioethics, c/o Mrs Kay Boyle, Executive Officer, Centre for Human Bioethics, Monash University, Clayton, Victoria 3168, Australia.
Tel: (61 3) 565 4279, Fax: (61 3) 565 32 79
Prof. P. Singer (President), Prof. R. Chadwick (Secretary)

CANADA
National Council on Bioethics in Human Research, 774 Echo Drive, Ottawa, Ontario K1S 5N8, Canada.
Tel: (613) 730-6225, Fax: (613) 730-8251
Mr. A. Lynch (President)

FRANCE
Comité Consultatif National d'Ethique pour les Sciences de la Vie et de la Santé, 101 rue Tolbiac, F-75654 Paris Cedex 113, France. Tel: (1) 44.23.60.16,
Fax (1) 45 85 68 56
Prof. J. Bernard (Honorary Chairman), Prof. J.-P. Changeux (Chairman)

INDIA
Indian Council of Medical Research, Central Ethical Committee, Ansari Nagar, New Delhi 110 029, India.

IRELAND
The Health Research Board, 73 Lower Baggat Street, Dublin 2, Ireland. Tel: (353-1) 76 11 76

MALTA
Ministry for Home Affairs and Social Development, Bioethics Consultative Committee, Casa Leoni, St. Joseph High Road, Santa Venera HMR 18, Malta. Tel: (356) 485 100,
Fax: (356) 443 595 Ms T. Mamo (Administrative Secretary)

NEW ZEALAND
Health Research Council of New Zealand, Ethics Committee, P.P. Box 5541, Wellesley Street, Auckland, New Zealand.
Tel: (64-9) 379 82 27. Fax: (64-9) 377 99 88
Professor N. Kinross (Chairperson)

SRI LANKA
Faculty of Medicine, Ethical Review Committee, Kynsey Road,
Colombo 8, Sri Lanka. Professors S. Goonewardena and K. Mendis (Chairpersons)

UNITED KINGDOM
The Nuffield Foundation, Nuffield Council on Bioethics, 28 Bedford Square, London WC1B 3EG, United Kingdom.
Tel: (44-71) 631 05 66 Fax: (44-71) 323 48 77
Mr. D. Shapiro (Executive Secretary)

UNITED STATES OF AMERICA
Congressional Bioethics Advisory Board, c/o Pacific Center for Health Policy and Ethics, University of Southern California Law Center, Los Angeles CA 90089-0071, U.S.A.
Tel: (1-213) 743 77 34 Fax: (1-213) 743 63 14
Professor A. Capron (Chairman)

Hastings Center, 255 Elm Road, Briarcliff Manor, New York 10510, U.S.A.
Tel: (1-914) 762 85 00 Fax (1-914) 762 21 24
Dr. D. Callahan (Director)

National Institute of Health, Bioethics Program, Building 10, Room 1C116, 9000 Rockville Pike, Bethesda, MD 20892, U.S.A.
Tel: (1-301) 496 24 29 Fax: (1-301) 402 02 44
Head: post vacant

UNESCO'S BIOETHICS DATABASE

To provide information on human genome research and its applications and on related bioethical publications, UNESCO's Bioethics Unit has set up a database which currently comprises more than 2,000 references. Mainly conceived as a working tool for UNESCO's International Bioethics Committee (IBC), the database could also be useful to UNESCO National Commissions, other United Nations agencies and external users (researchers, scientists, ethicists, journalists, universities, etc.) interested in updated sources of information on bioethical issues related to genetics. The database, available on personal computer under Windows, is an application based on a DBMS (DataBase Management System) software. At present it compiles publications available at the Bioethics Unit and at the central UNESCO database, and data obtained by several on-line databases and members of IBC. A summarized printout citing all publications in the database has been produced for easy consultation. The database is not at present directly accessible to the public, but the Bioethics Unit would be happy to respond to requests.

Bioethics Unit, UNESCO,
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UNESCO IN action

newsbriefs...

A UNESCO BIOETHICS CHAIR

The first UNESCO Chair in Bioethics, which was recently created in the Faculty of Law and Social Sciences of the University of Buenos Aires, is expected to foster the dissemination of knowledge and information on genetics and molecular biology and their social, cultural, ethical and legal implications. Other universities in Latin America will be associated with its activities, with the aim of developing a regional co-operation network, in particular in connection with research on the human genome. It will form part of a world-wide network which UNESCO is planning to establish, with a view to promoting international co-operation in this field.

TESTING GOD AND THE DEVIL

On 15 September, the International Marine Environment Award of the World Underwater Federation (CMAS) will be presented at a ceremony at UNESCO Headquarters in Paris to a team of divers from the Polar Biology Group of the P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences in Moscow. It rewards some twenty years of courageous research under the ice in unexplored polar regions where, in the terms of the letter which the scientist Dr Igor Melnikov addressed to CMAS, "for hundreds of hours testing God and the Devil" this team discovered and described hitherto unknown biological communities playing a key role in polar marine ecosystems. The biennial award, which is supported by UNESCO and the Intergovernmental Oceanographic Commission under the patronage of King Juan Carlos of Spain, was presented for the first time in 1992 to the British association Coral Cay Conservation.

A RADIO STATION FOR RWANDA

Dismayed at the tragic situation in Rwanda, the Director-General of UNESCO has decided that the Organization will give its support to a "Reporters sans Frontières" project aimed at setting up a humanitarian radio station for the country. The station will be located in Tanzania or Zaire and will be operated by a team of journalists belonging to Rwanda's two ethnic groups with the assistance of the Swiss French-language Broadcasting System. It will put out practical information for the country's civilian population on matters relating to basic needs crucial to their survival, such as water, food, medical care and shelter.

PEACE-MAKERS OF THE YEAR

On 6 July, at UNESCO Headquarters, Mr. Itzhak Rabin and Mr. Shimon Peres, respectively Prime Minister and Foreign Minister of Israel, and Mr. Yasser Arafat, President of the Palestine Liberation Organization (PLO), jointly received the Félix Houphouët-Boigny Peace Prize from the hands of the Director-General of UNESCO, Mr. Federico Mayor.

Mr. Mayor welcomed the three prizewinners who, he said, "by their clearsightedness, their courage and their determination, have succeeded in making the path of peace prevail". He then went on to present them with gold medals and peace diplomas and a cheque for 800,000 French francs. The presentation was followed by a repeat of the historic handshake on the White House lawn after the signature, on 13 September 1993, of the Declaration of Principles on Interim Self-Government Arrangements.

In his acceptance speech, the Prime Minister of Israel expressed the hope that similar handshakes would be exchanged "between the residents of Gaza and Ashkelon, Jericho and Ma'ale Adumim". The Minister of Foreign Affairs spoke of a "historic divorce" from war, hatred, suspicion and terror. The PLO leader called for a frank, precise and rapid application of the terms of the peace agreements.

Former United States Secretary of State Henry Kissinger, Nobel laureate and President of the Houphouët-Boigny Peace Prize jury, said: "We chose to express our faith in the hopes of our honorees, in the dreams they expressed, and not in the second thoughts that they may have. Too many have died. Too many hopes have been blighted for us to do less than pay tribute to the best possible outcome. We pay the honorees this expression of our respect and our faith that they conclude what they have started".

Created in 1989 in honour of the former President of Côte d'Ivoire, the Houphouët-Boigny Prize, one of the United Nations system's most important awards, was awarded in 1992 to the Hague Academy of International Law and in 1991 to Frederik de Klerk and Nelson Mandela. ■

THE VISA BARRIER

Before the collapse of the Berlin Wall, Western news agencies sometimes had to wait for years before they could open offices in Moscow. Now, journalists from Russia and other ex-Soviet States are having to wait from three to five months, and sometimes for as long as a year and a half, before they are granted visas for Western countries. The delays, which are due to the tightening of those countries' immigration laws, were among the problems raised by Russian journalists with representatives of eight Western media professional organizations at a meeting held at UNESCO Headquarters in May. These representatives undertook to ask the Member States of the Conference on Security and Co-operation in Europe to relax the entry requirements for journalists. They also called on UNESCO to organize and co-ordinate assistance to Russia's independent media. ■

COMMENTARY BY FEDERICO MAYOR

What happened to development?

"We can help a tree to grow by tending its roots, not by pulling on its branches"

THE cause of the serious problems confronting so many of the countries of Eastern Europe today is not freedom, but rather the burden of oppression which they had to bear for so long. Similarly, economic circumstances or the hand of fate are not responsible for keeping those countries that have long been described as "developing" on the poverty line. The fault lies in our attitudes, the attitudes of all of us on either side of the divide separating the haves from the have-nots, and in our views on how development aid should be dispensed and received.

At the receiving end, people may look upon aid as a kind of miraculous gift that will turn pumpkins into glass coaches and make deserts blossom. To wait for such miracles to happen is to wait indefinitely, like waiting for Godot. The answer to the many problems the developing countries are facing does not lie beyond their borders or beyond their reach. It lies deep within themselves and in their political determination to re-order their national priorities from top to bottom, put down the foundations of democracy in knowledge and citizenship, and see to it that development becomes everybody's business, the fruit of their creative talents and endeavours in both the sweat of their toil and the cool of their moments of rest.

COLLECTIVE SCHIZOPHRENIA

When it comes to development aid, we have to speak out and make it perfectly clear that the approach adopted hitherto, in which economic growth was regarded as the be-all and end-all, has turned out to be wrong-headed. It is true that growth is the driving force behind progress, but it is by no means synonymous with development. We have to completely change course if the intolerable and all-pervasive imbalances existing in the world, the chasm between rich and poor across the globe and in individual countries alike, the collective schizophrenia from which we are suffering, are not to spell the demise of the human species.

I am weighing my words: the fact is that poverty and famine, like war, are killers. Every day that comes, they stifle all hope and dignity in thousands of human beings and claim thousands of lives, especially of children. Combating poverty is an economic, social, political and ethical imperative—a "pol-ethical" imperative.

Today, more than ever before, development is humanity's *common goal.* The destiny we share comes from our economic interdependence, the ever-tighter interweaving of the human fabric as a result of the rapid strides being made by communications, and the planet-wide nature of such afflictions as drug addiction, Aids, pollution, terrorism and poverty, which are no respecters of national borders. No country is immune from the heavy toll they take and, as a result, a new perception is growing of what human security could and should be. It is this that is giving rise to a new approach to development.

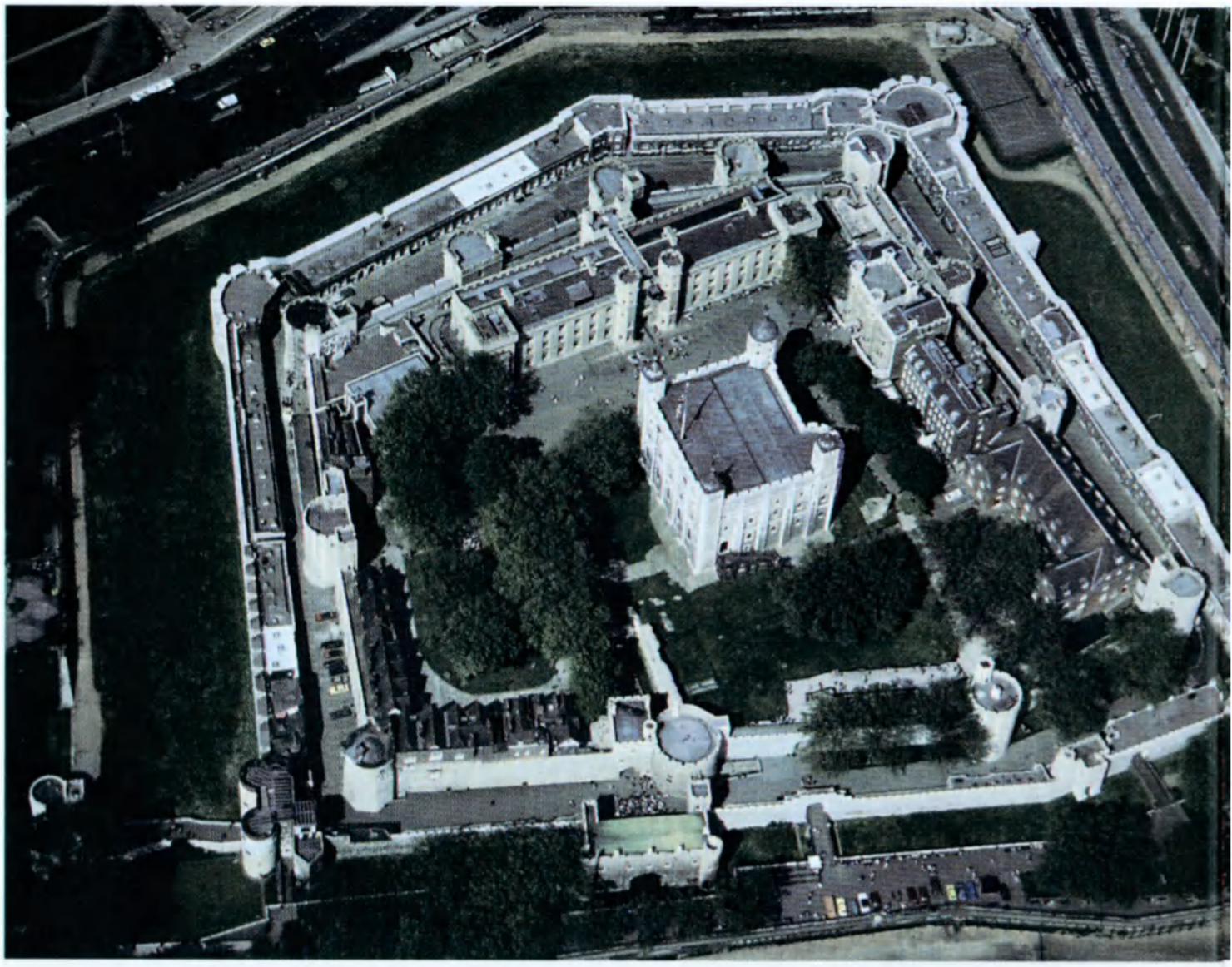
It is true that it has taken us several decades to grasp the complexity of this process, whose social, cultural and indeed spiritual features we cannot go on blithely ignoring. Whenever we cleared one hurdle and made some headway, we thought we had found the password. The ideal form of development was described in such terms as endogenous, self-directed or all-inclusive, and, later, as sustainable. We have now grasped the main point, which is that development must first of all make it possible to spark off the full potential of the human beings who are both the prime movers in the process and its ultimate beneficiaries. *Sustainable human* development is the only acceptable definition of our common goal.

A LIVING ORGANISM

World Bank Vice-President Ismail Serageldin once described the sort of development for which we are all striving as being like "a tree we can help to grow by tending its roots, not by pulling on its branches". This is an image that has the merit of giving us an immediate insight into three ideas. The first of these is that development is a complex process, with its upsteam and downstream factors and the causal links between them, and with knock-on effects that have yet to be gauged. The second idea is bound up with the first, inasmuch as development is an all-encompassing process, none of whose features can be left out of the reckoning. As a result, the approach to it has to be both interdisciplinary and intersectoral. The third idea is fundamental, since development is a process that is by definition dynamic, like a living organism towards which we have to adopt the highest standards and show respect, especially since we are dealing with people.

When it comes to environmental issues and to social justice or population growth, the change in direction will mean that there will have to be a far-reaching rethinking of attitudes and of the systems used for redistributing wealth and modes of production and consumption the world over.

Since this is bound to be a long-drawn-out task, there is all the more reason to embark on it without a moment's delay. Changes as radical as these will require everybody—young and old, men and women, rich and poor, people from North and South alike—to play their part. This is yet another reason why such a worldwide transformation should start here and now in the places where you and I live, in our homes, our neighbourhoods, our villages and towns. It is at the municipal and local levels that the answers calculated to save the world will be worked out and put to the test. ■



The Tower of London

'A very great and most strong tower'

by Francis Leary

UNESCO IN ACTION
HERITAGE

THE Tower of London is the most popular historic site in the British Isles, welcoming two and a half million visitors a year. The biggest drawing card is the Jewel House, where the Crown Jewels are displayed in all their panoply. In March 1994, a completely new Jewel House, located on the ground floor of Waterloo Block, was opened by Queen Elizabeth II. The Jewels are seen in brilliantly lit glass-enclosed cases in a series of rooms, while visitors are borne slowly past on a moving floorway or "travellator". Above the cases, giant screens project a panorama of the Jewels' history, with the Coronation illustrating their ceremonial purpose.

While the Coronation rites extend back to St. Edward the Confessor in Saxon times, the Jewels at Queen Elizabeth's Coronation, that the visitors see, come from the Restoration of Charles II in 1660 or later. The Puritans of Oliver Cromwell's

William the Conqueror's Tower, whose stark silhouette has long been a familiar feature of the London skyline, is a microcosm of nine centuries of English history. The symbol of the power of the monarchy, it has never surrendered—except to the sightseers who flock to it in their millions and make it one of the British capital's most popular tourist venues.

in the Regalia; the Coronation Robes; the Crowns, Sceptres and Orbs, among them the great gold St. Edward's Crown made for Charles II and still used at the investiture; the Imperial State Crown made for Queen Victoria, thickly set with precious stones and worn at state ceremonies such as the opening of Parliament. The State Crown also displays in its lower cross the large ruby of the Black Prince, which adorned the helmet of Henry V at Agincourt in 1415, and the Stuart sapphire, and in the uppermost cross gleams a sapphire said to be from the ring of the Confessor himself. In a royal sceptre sparkles the Star of Africa, the largest cut diamond in the world.

White granite brought from Caen

Adjacent to the Jewel House is the massive White Tower, the original tower built by William the Conqueror at the end of the eleventh century. The Norman king, who overthrew the Saxon Harold at Hastings, consolidated his triumph by

Above, aerial view of the Tower of London within its double fortifications. Right, one of the forty-odd Yeoman Warders who guard the Tower. Famed for their colourful uniform—round-brimmed hats and tunics embroidered with the royal crown and monogram—they are more commonly known by their nickname of "Beefeaters".

short-lived regime in the 1650s despised the glittering trappings of monarchy and sold off the medieval Crown Jewels. A few pieces survived and eventually returned to the royal collection.

One passes in succession the Royal Maces, Trumpets, and the Great Sword of State; the jewelled Sword of Offering girt about the Sovereign by the Archbishop; the medieval gold Ampulla and Spoon, by which the Sovereign is anointed with holy oil, the oldest objects

"The Jewels are seen in brilliantly lit glass-enclosed cases in a series of rooms, while visitors are borne slowly past on a moving floorway."

Left, State crowns. At right is the crown made in 1937 for the coronation of Queen Elizabeth, the consort of King George VI. It contains the Koh-i-Noor, the famous diamond presented to Queen Victoria by the East India Company in 1850.
Left below: in foreground, the orb made for Charles II in 1661 and used since then at the coronation of his successors. In background is Queen Mary's orb. It was made for Queen Mary, who was crowned jointly with her husband William III in 1689.

building strong castles throughout England. For London, he chose the site of a former Roman camp on the Thames and in 1078 he confided to Gundulf, Bishop of Rochester the construction of what William Fitzstephen's 12th-century *Chronicle* would describe as "a very great and most strong Palatine Tower". Unlike wooden Saxon structures, the Tower of London was built of Kentish limestone with dressings of white granite stone brought from Caen.

The White Tower, its Caen stone white-washed, with spired turrets at the four corners, still dominates the surroundings. Over the centuries, additional structures were built until the whole consisted of thirteen towers of the Inner Ward and six towers and bastions of the outer ward.

Previously, the only entrance by land was over a walled causeway, 30 metres wide, leading to the barbican of the Lion Tower. Here prowled the King's beasts, and the Constable, the chief officer of the tower, was paid 14 pence per day, with 6 pence more for chunks of bloody meat, to feed the lions, leopards, bears and wolves.

Palace and prison

Today, the Lion Tower has gone and the beasts were despatched in 1834 to the new London zoo. The entrance is now through the gate of the Middle Tower and across another smaller causeway over the dry moat, drained in 1843, up to the Byward Tower, with guardsmen in scarlet coats and tall black busbies.

The various towers before the visitor evoke mingled memories: of centuries of cruelty and anguish, of brilliant pageantry, of all the great work of the kingdom carried on within these walls. No better description of the original purposes of the Tower of London may be found than in John Stowe's Survey of London, published in 1598.

"This Tower is a citadel to defend or to command the city; a royal palace for assemblies or treaties; a prison of state for the most dangerous offenders; the only place of coinage for all England at this time; the armoury for warlike provision; the treasury of the ornaments and the jewels of the crown; and general conserver of the most records of the king's courts of justice at Westminster".

The Conqueror's massive White Tower now beckons. After the disastrous fire at Windsor Castle in 1993, the Historic Royal Palaces Agency, which manages the Tower, created a fire escape on the second floor which will take visitors, who may number 1,000 at peak periods, down to the first floor near a well-marked exit. A fire detection and alarm system is likewise installed. The Jewel House has a fire control centre for the entire site.

St. John's Chapel occupies part of the second and third floors, while the White Tower houses the finest collection of armour in Europe. It was begun by Henry VIII whose gigantic suits may be seen in the Tudor armoury on the top floor. Renaissance and medieval armour are on the second floor, while tournament armour is found on the first floor.

From the White Tower, on the left-hand side, is the stretch of greensward called Tower Green, where a plaque, placed at Queen Victoria's command,

indicates the site of the scaffold. Here, those of the highest rank, condemned for defiling or reaching for the Crown, were beheaded. Two of King Henry's unfortunate wives met their doom on Tower Green. Both were accused of adultery, though probably Queen Anne, mother of Elizabeth I, was innocent. Her execution was delayed so that, at Anne's request, a skilled headsman with a fine sword might be brought from France.

The morning of her execution, 21 May 1536, she asked the Lieutenant of the Tower if he had seen the sword and if it was good. The Lieutenant assured her that it was. "Then," quoth Anne, "it were well for me, for I have a slender little neck."

When the Tower guns boomed, announcing the execution, bluff King Hal was cross-gartered and wearing yellow, signs of joy. The royal widower was soon to wed Jane Seymour. Anne was buried in the nearby Chapel of St. Peter ad Vincula, where Queen Catherine also lies.

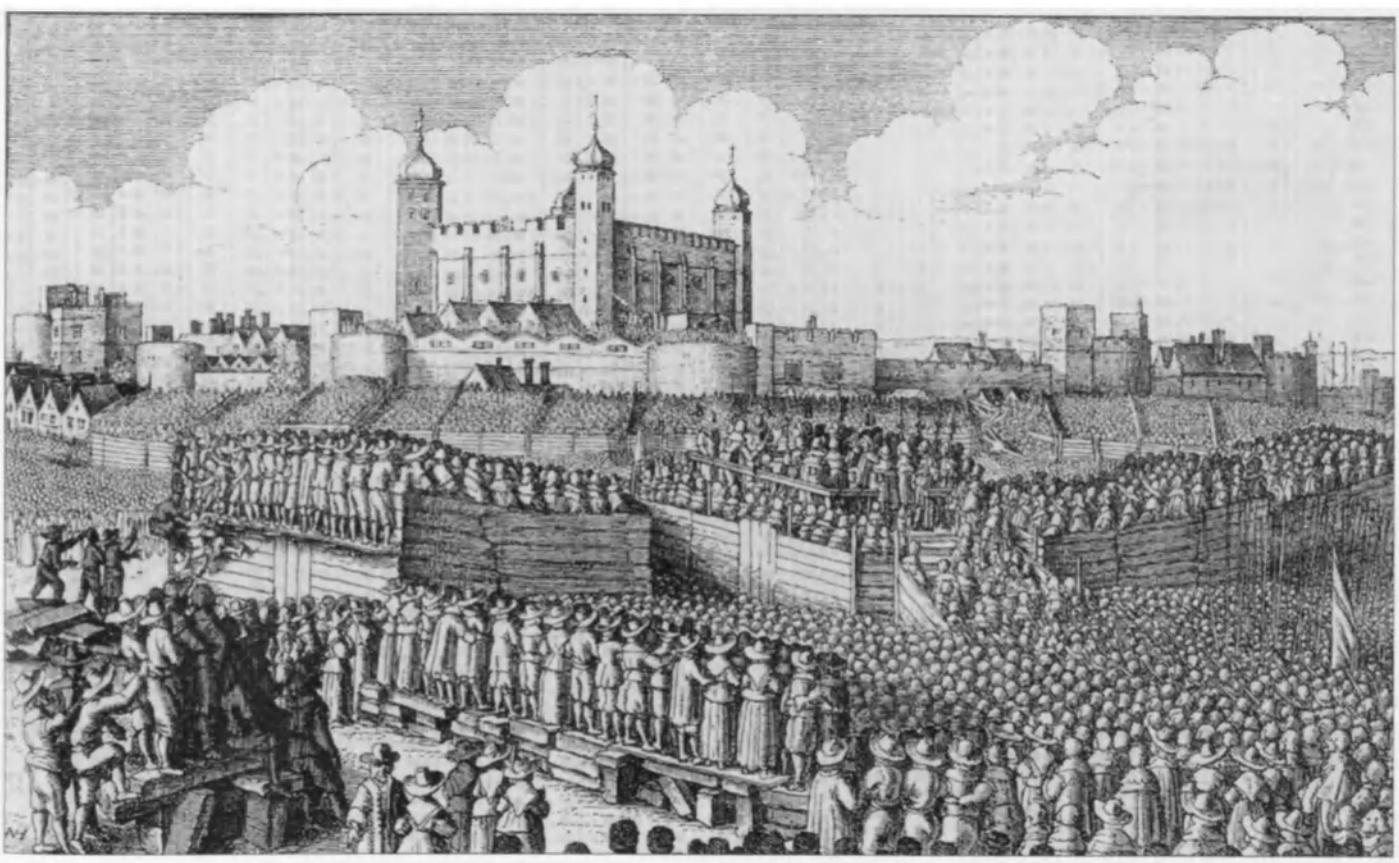
The last to perish on this raven-haunted Green was Queen Elizabeth's gallant cavalier, the Earl of Essex, who aspired to the Crown. Now plump glossy ravens strut on Tower Green, once the scene of so much blood and grief, while the wind sighs in the stately sycamores. A tradition holds that if the eight carefully guarded ravens should go, the Tower will fall.

Every night at 10 p.m., the ancient Ceremony of the Keys is enacted by the Chief Yeoman Warder, with an escort of a sergeant and three guardsmen in scarlet tunics and black busbies. First he locks the outer gate, then the great doors of the Middle Tower, finally those of the Byward. Returning to the Inner Ward, he is challenged by an officer with bared sword. The guardsmen present arms; the yeoman warder raises his Tudor hat and cries: "God preserve Queen Elizabeth!"

As chimes toll the hour, a bugler sounds the lingering silvery notes of "The Last Post", which echo across 900 years in the night and memories of London's mighty Tower. ■

FRANCIS LEARY
is an American writer and journalist whose works include *The Golden Longing*, a study of life in 15th-century Europe, and several novels.

"Glossy ravens strut on Tower Green, once the scene of so much blood and grief. A tradition holds that if the ravens should go, the Tower will fall."



The execution of the Earl of Strafford on Tower Hill beneath the Tower of London, on 12 May 1641. An engraving by the Prague-born artist Wenzel Hollar, who died in London in 1677.

MELINA'S LAST BATTLE

On 6 March Melina Mercouri, known to her fellow-Greeks as "the light of Attica", passed away after a long struggle against cancer, the last of her many battles

THE unforgettable Medea who bestrode the stage in Salonika, the headstrong Ilya who appeared, larger than life, on cinema screens all over the world, the determined resistance fighter who took on her country's military junta, the ever-active Minister of Culture, Greece's leading lady, is no longer with us. But she has bequeathed to us the legacy of the overbrimming vitality that made her so charismatic a figure.

Her memory lives on in the Melina Mercouri Foundation that has been created by her husband, the film director Jules Dassin, in order to further the causes for which she fought and fulfil her dream of completing the construction of the new Acropolis museum and bringing back the Parthenon sculptures to Greece.

Melina Mercouri fired the first shots in "the battle of the Parthenon sculptures" in the 1980s, but their turbulent history goes back many years before that.

"Furiously, but with pleasure"

Between 448 and 432 B.C., the great sculptor Phidias and the celebrated architect Ictinus built a temple dedicated to Athena, the goddess of wisdom, on the hill of the Acropolis in Athens. The temple had two parts, the "hundred-foot-long" Hecatompedon housing a 12-metre-high gold and ivory statue of Athena by Phidias, and the Parthenon, the "room of the maidens", which later gave its name to the entire building.

The forty-six simple yet imposing columns of the outside colonnade supported a frieze whose ninety-three square "metope" sections depicted scenes from Greek mythology. At either end were two pediments illustrating the birth of Athena and her contest with Poseidon. The inner walls of the "cella" or chamber housing the statue of the goddess were decorated with a 160-metre-long frieze.

The Parthenon's Doric splendour remained untouched by the hand of time for some 900 years. Then it suffered its first indignity. It was taken over by new gods and visited by foreigners prompted more by greed than respect. It was used successively as the place of worship of a Christian cult, a Catholic church and a small mosque. When the Venitians laid siege to Athens in 1687, a cannon ball caused extensive damage, and General Francesco Morosini took advantage of the situation to carry away everything he could tear off the pediments.

A century later the British ambassador to Athens, Thomas Bruce, seventh Earl of Elgin, succeeded in obtaining authorization from the Ottomans, who had ruled Athens since 1456, to remove "certain stone fragments on which inscriptions and figures have been carved". Between 1801 and 1803 he removed most of the remaining sculptures and shipped them to London. Some ten years later, the British parliament bought them from him and donated them to the British Museum, where they remain to this day and are more commonly known as the Elgin Marbles.

This, then, was how the Parthenon, one of the seven wonders of the ancient world, came to be stripped of the essence of its beauty, "It was as though it had had an eye gouged out," Melina Mercouri said not long ago. "It is cruel, and it is very ugly. I shall carry on fighting this battle to the very end." The battle to which she was referring was aimed at returning the sculptures to their original location. As the Greek poet Yannis Ritsos put it, the sculptures "cannot get used to seeing less sky".

Melina Mercouri threw herself into this struggle with the same fervour that she put into her political and theatrical life. As she said in the December 1991 issue of the *UNESCO Courier*, she campaigned in politics in the same way that she rehearsed in the theatre "furiously, but with pleasure". Passion was the driving force behind everything this exceptional woman did. The whole Greek nation gradually came to identify with her, and this in itself was a stunning act of revenge on the colonels who had stripped her of her Greek nationality. In her bid to save her homeland from dictatorship during her seven years' exile, she went on singing *The Children of Piraeus* on stages all over the world. On the international political and cultural scene, as Minister of Culture from 1982 onwards she never let up in her fight for the return of the "marbles" to their homeland.

A certain idea of Greece

In 1984, the Greek authorities lodged an official request with the British government for the marbles to be returned. In 1989, they launched the project for the construction of a new museum on the Acropolis, where "an enormous room will remain completely empty until the Parthenon frieze is returned", as Melina Mercouri stated late in 1993, shortly after she had returned to the Ministry of Culture.

But this was not her only concern. She also set out to create a University of the Mediterranean; to carry through the "Archipelagos" programme aimed at reviving the memory of the Greek islands; and to host the 1996 Olympic Games in Athens. These were all projects to which she gave herself to the full in her determination to serve a certain idea of Greece and to stave off the threat of death that hung over her for the last five years of her life.

She died without seeing the Elgin marbles back on the Acropolis. But she had already laid her plans. "Ask me if I'll be alive when they come back," she said. "The answer is yes, I'll be alive! And if not, then I'll be born again". **E.J.M.** ■

OF MEN AND MOUNTAINS

Snowy peaks of the Himalayas glow in the sunlight.

BY FRANCE BEQUETTE

THE world's great mountain ranges such as the Andes, the Alps, the Himalayas and the highlands of Madagascar and Ethiopia are not as solid as they look. Back in 1973, a report produced by UNESCO's Man and the Biosphere Programme (MAB) acknowledged just how fragile they really are. "Mountain areas in different parts of the world are at very different levels of influence by man's activities," the report points out. "Generally speaking though, man's impacts on mountain ecosystems are producing critical situations at a faster rate than in many other types of ecosystems. The inclination of the slopes accelerates and aggravates all processes of site destruction such as erosion and landslides. Site restoration is much more difficult than in lowlands. Mountain ecosystems must therefore be treated in an especially careful way."

Some 10 per cent of the world's population lives in mountain areas, but at least half of humanity depends more or less directly on the resources they provide in the shape of water, energy, minerals, forests or recreational areas. This is one of the reasons why the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, devoted chapter 13 of its Agenda 21 to developing mountain ecosystems.

"Mountain" is used here in the broad sense to cover all areas higher than 900 metres above sea level, a zone representing one-quarter of the world's land surface. "We are dealing with maximum global diversity—from sea level to almost 9,000 metres, from tropical rainforest to permanent ice and snow, and from climates with over 12 metres of annual precipitation to extreme high-altitude deserts," writes Peter B. Stone in his preface to a remarkable collective work entitled *The State of the World's Mountains* (1992) of which he is the editor-in-chief.

HOTSPOT AREAS

It should come as no surprise that 40 per cent of the world's biosphere reserves are to be found in mountain regions and that half of the "hotspot areas" are located in the tropics, in such regions as the uplands of Madagascar, the slopes of the Andes in western Amazonia, the eastern Himalayas, the Philippines highlands, the mountain forests of the eastern rift in Tanzania, India's Western Ghats and the montane forests of Sri Lanka. Although in absolute terms there are fewer plant species in mountain regions than in lowland areas, endemic species in danger of disappearing tend to be found in these regions. In Sabah, in Malaysia, for example, Mount Kinabalu is home to 4,000 to 4,500 plant species, more than one-quarter the number of all recorded species in the United States. Nor should we forget that potatoes, coffee, wheat, maize and numerous varieties of fruit trees all originally came from the mountain areas of the different continents.

Mountains also supply us with water. The rivers flowing down from the Himalaya, Karakorum, Pamir and Tibet ranges, fed by melting snow which the forests regulate and slow down, are the economic lifeblood of the areas they cross. If the forest cover were to be depleted, the snow would melt more quickly and would give rise to water shortages in the dry season. In South America, deforestation in the Andes is liable to have an adverse impact on the whole of the Amazon basin and could cause severe flooding. The same is true in Africa, where the rivers rising on Mount Kenya provide arteries for entire civilizations. Mountains also have an influence on climate and on both local and continental air-current patterns. The temperature falls by 0.5°C to 1°C for every 100-metre rise in altitude, because the air is thinner and absorbs less of the sun's heat. Precipitation increases with altitude, and hence such regions are blessed with rainfall. This is true of the North American Rockies, the Andes in South America and the Himalayas in northern India. Were it not for the mountain formations of the Maghreb, the Sahara would soon extend right up to the Mediterranean seaboard.

DAMS: FOR AND AGAINST

Advantage is often taken of these abundant water resources to build dams. A study carried out by the International Commission on Large Dams (ICOLD) shows that the go-ahead is given each year for the construction of some 300 large dams (measuring 15 metres and upwards in height) and that work is actually started on roughly the same number. Nearly 3,000 dams are expected to be built world-wide between 1991 and 2001. The surface area of the catchments they will create will cover 1.5 million square kilometres, representing an area the size of Spain, France and Germany combined. Mountain dwellers can have a very different view of dams from people living in low-lying downstream areas, who look forward to having electricity, being protected from the destruction caused by flooding and enjoying the benefits of irrigation (even though they may be deprived of the fertile silt that used to be deposited by the river before the dam was built). People living in upstream areas often resent man-made lakes because of the bitter experience of being forced out of their homes, the swallowing-up of plant and wildlife and even outbreaks of water-borne diseases. In any event, they are not asked for their opinion and there is very little prospect of their being given a hearing. In any case, is there really any justification for halting development for the sake of saving a flower or a rodent from extinction?

People remote from the seat of power with no means of representation often belong to ethnic minorities. They are left out of the mainstream as far as progress and affluence are concerned and do not even have any say in decisions affecting them. Although they are the custodians of their cultural values and traditions, they are exposed to all sorts of pressures. Their ownership of the land may be disputed in cases where it is occupied by migrant squatters who have been forced out of lowland areas and who do not necessarily share the uplanders' culture and can do only unskilled work. Their state of health and their diet may be poor. Teaching is frequently of a low standard and there may be no schools in the vicinity. The people may find it difficult to market the produce they grow—apart from the plants used in making narcotic drugs, of course. At times of conflict, mountain areas invariably become places of refuge for rebels, and there are instances on every continent where they form the borders between states that are not always on good terms. By contrast, mountain regions like the Alps have become one big playground, crisscrossed by roads and tunnels, with chair-lifts disgorging hordes of tourists, whether sports-lovers or not, all year round.

The "mountain-temples" of Angkor.

WORKING WITH LOCAL POPULATIONS

Experience has shown that it is imperative for local populations to be involved in all development projects. Between 1979 and 1986 Thailand learnt this to its cost, when the government set out to develop farming in the north of the country. As Professor Kenneth N. Brooks, of the University of Minnesota, in the United States, put it in a document he prepared for the United Nations Food and Agriculture Organization in 1993: "The main goal of the project was to sufficiently intensify agricultural production to enable shifting cultivators to settle on lands of slopes less than 35 per cent, thereby enabling steeper, more fragile lands to be reforested. This was to be achieved by (1) the development of irrigated and rainfed terraces; (2) promotion of Arabica coffee and legumes as cash crops. (3) reforestation of lands with slopes exceeding 35 per cent. The project encountered several problems which may be attributed to the failure to involve the local Karen in the planning process."

Conflict arose because the government had not taken the trouble to study the traditional land ownership practices of the Karen ethnic minority which had a different legal status from that in the rest of the country. Still more serious was the fact that, in an earlier project, a large number of farmers had been encouraged to grow Arabica, but this had turned out to be a failure. Had they been consulted, some other type of crop might have been contemplated. On the other hand, the community itself indicated the most suitable sites for building terraces, and this operation proved more successful than expected. This example illustrates the insecure status of mountain dwellers, who are treated like social outcasts in most countries. How can we blame them for the deforestation that is the blight of mountain areas when they do not know where to turn for other resources? It would be like blaming them for being poor.

Poor as they are, mountain people often have an aura of mystery about them. Situated at the meeting-point between heaven and earth, mountains are the abode of the gods. Every civilization and every religion has its sacred mountain, like the mountain-temples of Angkor, Mount Olympus in Greece and the monumental stupa of Borobudur. Is this not an added cultural reason for taking good care of our mountains? ■

Peruvian villagers of the high Andes.

FRANCE BEQUETTE is a Franco-American journalist specializing in environmental questions. Since 1985 she has been associated with the WANAD-UNESCO training programme for African news agency journalists.

A HIGHLY CHARGED SUMMIT CONFERENCE

In April 1992, the world's seven largest electricity companies decided to form the E-7 group, the energy equivalent of the Group of Seven (G-7), the exclusive club of the world's industrialized nations. Belying its name, the E-7 actually has eight member companies. France, Japan (with two companies), Italy, Canada (also with two), Germany and the United States together account for 1,427 billion kilowatt-hours of energy sales, with a turnover of $110 billion, 105 million customers, 330,000 megawatts of installed capacity, 381,000 employees and a wide variety of energy-generating facilities. One aspect of the E-7's work is, in fact, concerned with the choice of production methods, since hydroelectric power and other renewable energy sources, nuclear power plants and thermal plants running on natural gas, diesel oil or coal all have different effects on the environment. The E-7's task should be to promote clean energy, especially in the developing countries, through technology transfers. ■

MALARIA AND THE WEATHER

A group of Dutch scientists, led by H. J. van der Kaay, has studied the connection between the climatic changes caused by El Niño and the malaria epidemics which broke out in Ecuador, Peru, Bolivia and Pakistan in 1983, when the phenomenon was especially noticeable. El Niño (Baby Jesus) is a warm current in the Pacific Ocean occurring from early December onwards (which accounts for its name). At irregular intervals, its waters mix with the cold waters of the Humboldt current flowing along the coastlines of Ecuador and Peru. This gives rise to torrential downpours in the region, but at the same time causes severe drought in Australia and Indonesia. The rainfall is instrumental in spreading *Plasmodium falciparum*, the parasite responsible for the most virulent form of malaria. Advances in weather forecasting should make it possible for scientists to gain a better understanding of El Niño's different phases and give advance warning to those populations most exposed to the threat of epidemics. ■

A QUECHUA INDIAN CHAMPION OF THE ENVIRONMENT

Six champions of the cause of environmental protection were honoured by an American foundation in April, when they were each awarded the $60,000 Goldman Environmental Prize. Luis Macas, 43, a Quechua Indian, is an ardent defender of indigenous rights in Ecuador. After leading a general strike in 1990, he persuaded the government to hand over title to almost 1.2 million hectares of land in the Amazon region to Indian communities. These communities are now having to contend with the inroads being made by oil companies drilling in the region. Luis Macas is heading the negotiations aimed at prevailing on these companies to show respect for the rainforest's fragile ecosystem. ■

TOURISM VERSUS DEVELOPMENT ON RHODES

The successful development of the island of Rhodes, whose population has almost tripled in the last 30 years,

is in danger of being compromised by the yearly influx of tourists. In 1990, Rhodes had 800,000 visitors—ten times the number of local residents. Water shortages, a chronic problem for all the Greek islands, become critical in summer. There is also a waste-disposal problem and the bathing beaches close to Rhodes harbour are badly polluted. How can this superbly beautiful island, which owes its prosperity almost entirely to the tourist industry, make a success of development? ■

MORE BRIGHT IDEAS FOR RECYCLING TYRES

In the previous issue of the *Courier*, we described anti-noise screens made out of old tyres. Here is another imaginative idea for making use of this bulky waste product. *Pneusol*, known as "Tyresoil" in English, is the invention of Mr. Nguyen Thanh Long, of the Central Laboratory of the Public Works Department in Paris*. This technique, in which used tyres are combined with natural or artificial soil, is being used in civil engineering applications and public works projects. The tyres, partly or completely shredded, are used to increase the watertightness of earth dams, stabilize road embankment slopes and provide highly effective anti-earthquake material. Tyresoil not only costs three times less than concrete and other materials, it also provides a useful means of disposing of used tyres, of which Europe discards some 2.5 million tons each year. ■

** Laboratoire Central des Ponts et Chaussées, 58, bd. Lefebvre, 75732 Paris Cedex 15, Tel: (33-1) 4043-5000, Fax: (33-1) 4043-5498.*

AUSTRALIA'S "WATERWATCH"

The Australian authorities have had the excellent idea of entrusting local communities, schools and children's groups with monitoring rivers and wetlands and helping to implement the 1971 Ramsar Convention on Wetlands. Their Waterwatch programme ensures nationwide coordination of all community-based water quality monitoring projects, including Streamwatch (river monitoring) in New South Wales and Ribbons of Blue in Western Australia. Some projects provide basic equipment for monitoring water quality through the measurement of such parameters as dissolved oxygen content, bacteria levels, temperature and the percentage of phosphates or nitrates. ■

Further information about Waterwatch can be obtained from Australian Nature Conservation Agency, GPO Box 636, Canberra ACT 2601, Australia, Tel: (06) 250 0337, Fax: (06) 250 0286.

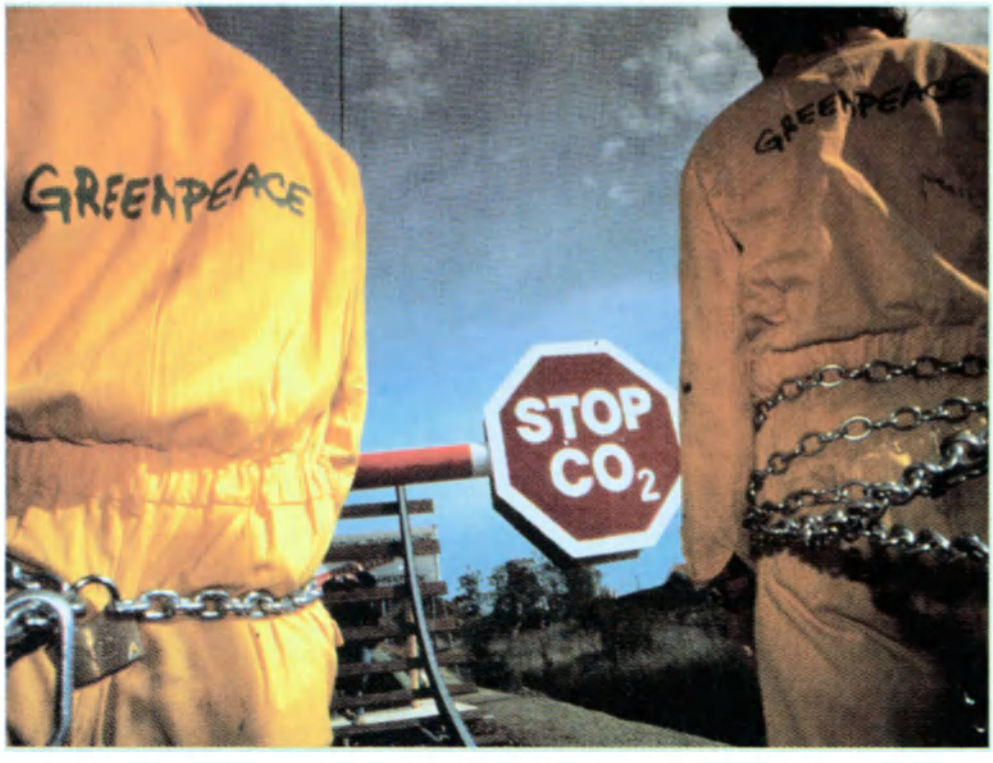
MANAGING FRAGILE ECOSYSTEMS

In March 1994, a United Nations inter-agency meeting was held at the headquarters of the United Nations Food and Agriculture Organization (FAO) in Rome on the theme, "Managing fragile ecosystems: sustainable mountain development", as a follow-up to Chapter 13 of UNCED's Agenda 21.

Unesco is contributing to the follow-up in a variety of ways, including a project on "The impact of human activities on mountain and tundra ecosystems" under its Man and the Biosphere Programme, and through the work of the International Hydrological Programme, the International Geological Correlation Programme, the Programme on Geology for Sustainable and Environmentally Sound Development and the Programme on Natural Disaster Reduction.

FAO is calling for a major international conference on the subject to be convened in the near future. ■

GREENPEACE, THE RAINBOW WARRIORS



Greenpeace activists in Austria block the railway lines into a coal-fired power plant.

THE five million-odd members of the Greenpeace movement have one thing in common—they make a nuisance of themselves. Just mention in their presence words like nuclear testing or toxic waste or the slaughter of whales and they are up in arms. Their reaction is non-violent but vigorous, sometimes fraught with danger and always with one eye on the media.

In 1971, they were just a bunch of madcaps intent on stopping the Americans from conducting a nuclear test on an island in Alaska. On their way to the test site, they stayed with the Cree Indians, who recounted to them the legend of "a tribe, composed of all peoples and all religions, which would one day take back the earth from the people who had defiled it and restore it to its former beauty". As a token of friendship, the Crees baptized them "the Rainbow Warriors".

This was the starting-point for a series of operations focusing on eight main themes: civilian uses of nuclear energy; disarmament; chlorinated hydrocarbons found in pesticides and some types of plastic; the ecology of the oceans; toxic waste and pollution transfers; the ozone layer; climate change; and forests.

Like top-flight athletes, Greenpeace's hardiest members scale the smokestacks of nuclear power plants, clamber up cranes or dam walls, chaining themselves to the installations or draping banners from them. They travel all over the world on their fleet of eight ships, two helicopters, a hot-air balloon and a bus fitted out as a mobile laboratory. In their small inflatable dinghies, they deliberately position themselves in the line of fire of harpoons or directly under the gangplanks used for dumping drums of toxic waste into the sea.

The national or international campaigns they mount are based on the work done by a network of scientific experts and on on-the-spot investigations. In 1990 Greenpeace-United States published a new edition of its massive survey of the international trade in waste products. More recently, Greenpeace-France has brought out an interesting document on the shipment into France of large amounts of waste from other countries. The account it gives of some of the cases with which we are personally familiar is strictly accurate. This virtue of accuracy is essential if Greenpeace is to be seen to be credible in the eyes of the international organizations with which it has consultative or observer status.

Greenpeace justifies its activities by pointing out that it has contributed to the halt to French nuclear testing in the atmosphere in the South Pacific, the outlawing of seal-fur imports by the States of the European Union, the adoption of a moratorium on whale fishing and bans on ocean dumping of nuclear waste and the incineration of toxic wastes.

The stands Greenpeace takes on issues and the campaigns it conducts are often regarded as going too far and as being ill-timed. The advocates of nuclear energy would be happy to do without their constant on-the-ground opposition. The same goes for arms merchants, ever since Greenpeace launched a crusade against landmines, with the backing of many humanitarian organizations appalled at having to pick up the shattered remains of horribly mutilated corpses in Afghanistan, Cambodia and Mozambique. ■

portrait

Mercator

cartographer of genius

by Jean Portante

On 4 December 1994, UNESCO will be associated with the commemoration of the 400th anniversary of the death of the Flemish geographer Gerhard Mercator, founder of modern mathematical geography and inventor of the plane map projection of the earth that bears his name.

This portrait of Mercator is inset into the border of a 1631 edition of a revised version of his Atlas first published in 1605 by the Dutch geographer Jocodus Hondius and often reprinted since.

For me the name of the great cartographer Mercator will always be associated with cigars. I have a distant memory of his bearded face, at once jovial and pensive, emblazoned on a cigar band, and for some reason—perhaps because of the Atlantic tobacco trade—it always evoked for me the myth of the boundless ocean and of endless voyaging from one continent to the other. In fact it was only much later that I learned that the face on the cigar band was that of Mercator, the man who rescued the word "Atlantic" from oblivion by reviving it on the map of the world he drew in 1569, at the height of the Renaissance. The term "Atlantic" had first been coined in Antiquity, but in medieval times the vast expanse of sea to the west of Europe was usually designated as the "Northern Ocean" or the "Occidental Ocean".

Mercator, whose real name was Gerhard Kremer (the German word *Kremer* means merchant, *mercator* in Latin, the international language of the Renaissance), had settled in Duisburg in the Rhineland in 1552 and had been working for years on the then unprecedented scheme of projecting the planetary globe—or at least what was known of it at the time—onto a flat surface.

Maps predate writing

Cartography had been invented long before the Renaissance. Indeed, the first rudimentary maps probably predated the appearance of writing. Tablets of Phoenician origin show that by about 3000 B.C. men were already charting the main commercial shipping routes. Although the Egyptians, with their cadastral measurements, carried on where the Phoenicians left off, it was the Greeks who invented map-making as we know it. Once Thales of Miletus had established that the earth is round, and his findings had been confirmed by the Pythagorean school, Ptolemy, at the beginning of the Christian era, determined mathematically the concepts of latitude and longitude. Although Ptolemy miscalculated the earth's circumference—a most fortunate error that was at the root of Europe's encounter with America—the cartography of Antiquity, which was preserved in the Arab world until the Middle Ages, contained all the data on which Mercator based his work.

After the use of the compass became widespread, sometime in the thirteenth century, the first advances in cartography were subsequently made by navigators like Christopher Columbus, Vasco da Gama, Balboa, Magellan and Elcano. By the early years of the fourteenth century, however, rapid strides were also being made through the work of mathematicians and astronomers, most of them German or Flemish, like Mercator himself.

An armchair traveller

What do we owe to Gerhard Kremer Mercator for all these developments? Born in 1512, he was a typical Renaissance man, combining his talents as a philosopher and geographer to devise a system for projecting the earth's spherical surface onto a flat map. When he was only eighteen and still a student at Louvain University, his teacher, the astronomer Frisius, introduced him to the art of constructing terrestrial globes. He produced his first rudimentary map of the world at the age of twenty-six. Not many years later, in 1541, he was commissioned by the Emperor Charles V—Flanders was then under Spanish rule—to create a terrestrial globe and its celestial counterpart.

The planisphere bearing his name was first published in 1569 after more than fifteen years' work. Consisting of a set of eighteen engraved sheets based on portolano charts, it is the product of an original method of projection. The earth's surface is shown in the form of a flattened-out cylinder, with the meridians and parallels represented by perpendicular straight lines intersecting at right angles, and the spacing between the parallels progressively increasing from the equator to the poles. This arrangement gives rise to some distortion in the representation of distances, but it enables navigators to set their course and ensure that the route they take tallies with the map. The Mercator projection is still used in sea and air travel today.

One of the founders of modern cartography was thus himself an armchair traveller. His passionate interest in cartography and his skill in accurately portraying the world, with its continents and oceans, in the limited space of only a few pages prompted him to complete two other works: a critical study of Ptolemy, *Tabulae Geographicae C. Ptolemaie ad mentem autoris restitutae et emendatae* (1578), and *Atlas sive Cosmographicae meditationes de Fabrica Mundi et fabricati figura* (1585) ("An Atlas or Cosmographical Meditations on the Making of the World"), the definitive version of which was published by his two sons in 1595, a year after his death. ■

JEAN PORTANTE
is a Luxembourg writer whose work includes stories, poems and plays, as well as travel books and radio programmes. His latest novel, *Mrs. Haroy ou la mémoire de la baleine, chronique d'une immigration*, was published in 1993 by PHI, Echternach.

Seoul at age 600

A city built to face in the right direction

by Choe Chong-Hyon and Yi Tong-Ok

Capital of the Republic of Korea since 1945, Seoul stands on the Han river 60 km from its estuary with the Yellow Sea. This city whose story can be traced back to prehistoric times became the prestigious capital of the Yi dynasty 600 years ago.

When General Yi Song-gye, founder of the Yi dynasty (1392-1910), came to the throne in 1392, his first wish was to transfer his capital to Han-yang (present-day Seoul), but he was prevented from doing so because of objections by some of his subjects. The following year, at the prompting of one of his court officials and with the encouragement of a Buddhist monk named Muhak, the sovereign decided to set up his capital on Mount Kyeryongsan. His plans were again frustrated, however. The mountain lay too far south on the Korean peninsula and was not consonant with the *p'ungsu* theory based on the principles of yin-yang and the five elements, according to which good fortune was closely bound up with the environment of one's place of residence and the direction in which it faced.

Some ten other sites were envisaged including, yet again, Han-yang, which was finally chosen in 1394. Its location was deemed to be favourable on several counts: the city was in the centre of the country, was accessible to shipping, had roads fanning out to the north, south, east and west, and was surrounded by mountains and rivers.

What was the reasoning behind this decision, which created such difficulties and took so long to make? The answer is that our Korean ancestors looked upon the earth as a living substance. Whenever they selected a site, for whatever purpose, they not only took account of its geographical location but abided closely by the principles enshrined in the divinatory tradition of geomancy ("earth divination"), based on the *ki*, the life force informing the universe. According to the *p'ungsu* theory, the *ki* was considered to emanate from Mount Paektusan, the highest mountain on the peninsula, and to strike southwards in the direction of Mount Pukhansan, one of the four mountains surrounding Seoul. The city would therefore be cocooned and protected by this life-enhancing energy.

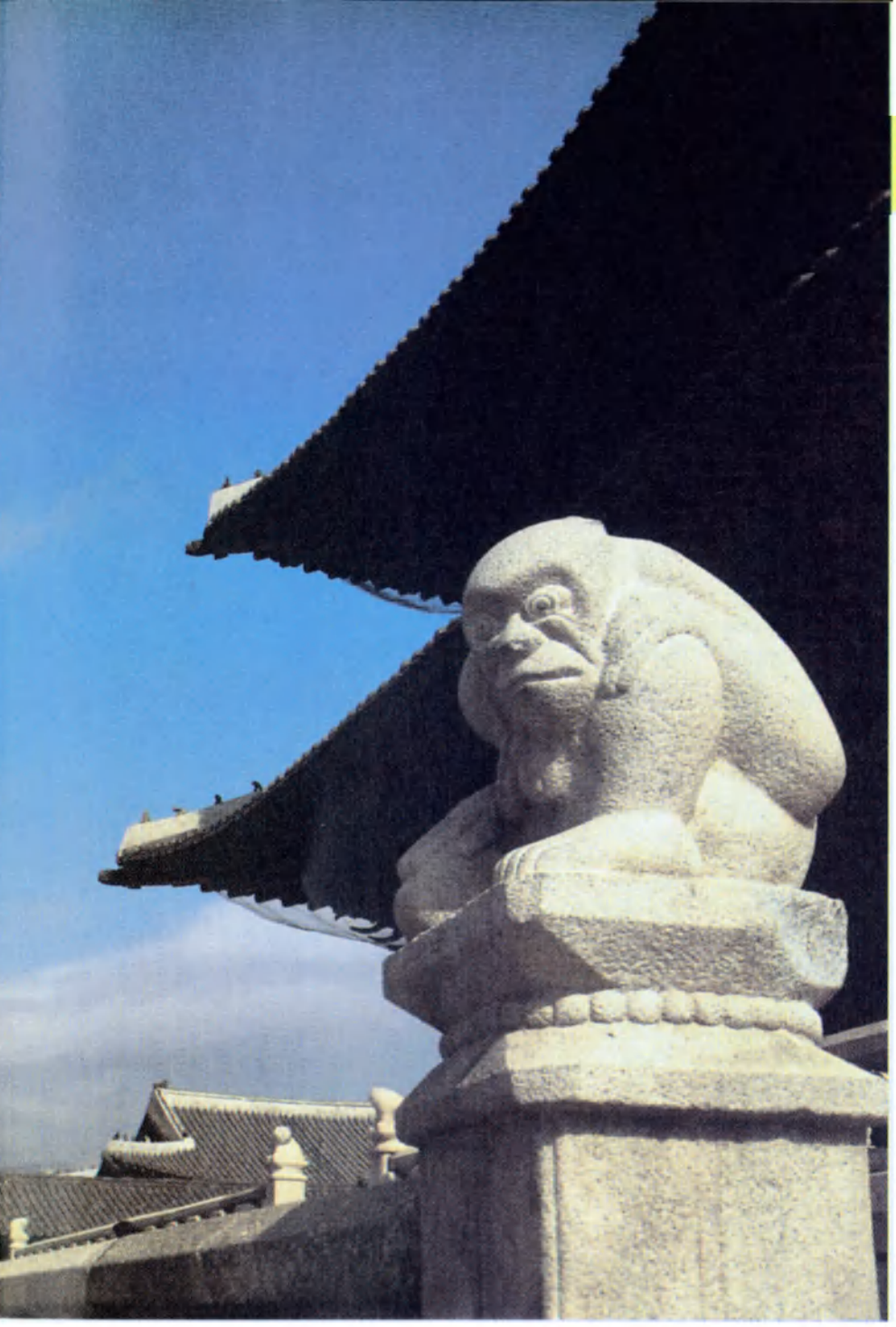
KYONGBOK PALACE

General Yi Song-gye ordered the Government Bureau in charge of the capital's foundation to build a royal sanctuary for his ancestors, temples for the tutelary salt

Below, the National Museum building in Kyongbok palace.

CHOE CHONG-HYON, of the Republic of Korea, is Professor of Architecture at Hanyang University in Seoul. One of his main fields of interest is traditional Korean architecture.

YI TONG-OK is in charge of the Korean edition of the *Unesco Courier*.



The twelve animals of the Chinese zodiac, left, keep watch on the stone balustrades of the staircase leading to the Kyongbok palace throne room. Below, detail of the palace roof. Bottom, Kyongchon pagoda (1348), a ten-storey-high edifice of carved marble.

and grain deities, and palaces and defensive walls, and to lay out the streets. Before work started on the new capital, ritual sacrifices were made to the earth and sky gods, the spirits of mountains and rivers and the spirits of the five directions protecting Kyongbok palace.

The symbol of the Yi dynasty, the palace was built at the very heart of this highly propitious location. Inaugurated in 1395, it was comparable in size to the Palace of Versailles. In front of the building, the Kwanghwamum Gate marking the centre of the capital was flanked by two stone carvings of *haet'ae*, mythical creatures resembling lions and representing water. According to the principles of geomantic divination, these beasts protected the palace from the spirit of fire emanating from Mount Kwanaksan, south of Seoul. Round the palace were the "four great gates"—Tongdaemun to the east, Sodaemun to the west, Namdaemun to the south and Pukch'ongmun to the north. Between them were the "four small gates" facing north-east, north-west, south-east and south-west.

Owing to its location and design, the palace functioned as a source of energy. The literal meaning of the name "Kyongbok" given to it by a certain Chong To-jon (1337-1398), a Confucian sage from the early days of the Yi dynasty, is "pray for good fortune". According to the theory of the five elements, the southern gate of the royal residence faced "the earth and the centre". It was from this point that the sovereign's authority extended in all directions to the furthest corners of the country. ■

global view...

Human development: a question of security

"We need another profound transition in thinking—from nuclear security to human security". In these terms the *Human Development Report 1994*, published by the United Nations Development Programme (UNDP), proposes a new approach to world affairs in which security and territorial integrity are no longer regarded as synonymous, and people rather than national borders have to be protected. It is true that the nuclear threat continues to exist, but the risk of a global catastrophe is a thing of the past. By contrast, unemployment, famine, disease, the deterioration of the environment and rising crime rates are widespread problems against which weapons are of no avail.

Security is based on development, not weapons

Over the past twenty years, the number of jobs created in the industrial countries has increased at only half the rate of growth in Gross Domestic Product (GDP). In 1993, more than 35 million people were seeking work, a high proportion of them women. Young people continue to be haunted by the spectre of unemployment, which is often bound up with their ethnic origins. In the developing countries, more than 10 per cent of the active population are jobless. Insecurity of employment goes hand-in-hand with insecurity of incomes, which are eroded by inflation rates as high as 1,500 per cent. In short, one-fifth of the world's population, the bulk of them living in the industrial countries, monopolize more than four-fifths of the world's income and virtually all promise of development.

What is more, although the overall availability of food in the world is no problem, some 800 million people suffer from malnutrition. This is compounded by enormous disparities in health standards between rich and poor: the industrial countries have one doctor for every 400 people, but the developing countries, where infectious and parasitic diseases kill 17 million people every year, have only one doctor for every 7,000 people, and this figure falls to as low as one doctor for every 36,000 in sub-Saharan Africa.

Harvesting the peace dividend

The military statistics are equally alarming. With the sharp increase in conflicts within individual countries, some 90 per cent of war casualities are now civilians, whereas at the beginning of the century 90 per cent of them were military personnel.

In spite of significant cutbacks, military expenditure all over the world is still equivalent to the combined earnings of almost half the population. If the resulting savings are to be put to good use, they must not be allowed to become swallowed up in the overall mass of expenditure and debt. The *Human Development Report* underscores the need to invest all of them in human development. If all countries were to agree to cut back their military expenditure by 3 per cent per year between 1995 and the year 2000, the peace dividend could be $460 million.

What can be done?

"It is justice not charity that is wanting in the world," wrote the English novelist Mary Wollstonecraft as long ago as 1792. Two centuries later, we are still faced with the same anomaly, in that aid

The health of indigenous peoples

IDSMT, the Institute for the Development of Health Amenities in the Tropics, has recently been created in Marseilles (France). Its aim is to safeguard the health of indigenous peoples living in isolated communities in the world's tropical regions. The Institute's multidisciplinary staff has called upon Survival International, a non-governmental organization which has been defending the rights of indigenous peoples all over the world for the past 25 years, to help it set up health training facilities that will enable the communities themselves to cope with their health problems. The first target group will be the Yanomami who live in Neblina National Park (Brazil), where recent incursions by gold prospectors have given rise to outbreaks of infectious intestinal and respiratory diseases. ■

IDSMT, Hôpital Houphouët-Boigny, 416 chemin de la Madrague-Ville, 13005 Marseilles (France).

Mothers international

Every Thursday since April 1977, a group of Argentinian mothers, their heads draped in white headscarves, have paraded round the Plaza de Mayo in Buenos Aires, demanding to be told the truth about the fate of their children who disappeared during the military dictatorship between 1976 and 1983. Having become the symbol of a non-violent struggle for the sanctity of life, they were awarded the Sakharov Prize recognizing the freedom of the human spirit by the European Parliament in 1992. They have now decided to give their movement a broader international basis. On their initiative, 30 mothers from different countries, including Brazil, the former Yugoslavia, Ukraine and Italy met in Paris in March to exchange experiences and join forces in denouncing the oppression to which their children fell victim and combating such evils as drug abuse, nuclear pollution and organized crime. ■

All for one against drug abuse

"Drug abuse is a worldwide threat that must be tackled in a spirit of solidarity on an international scale," said United Nations Secretary-General Boutros Boutros-Ghali before the Organization's General Assembly in October 1993. Following the adoption of the 1988 Vienna Convention against Illicit Traffic and the 1990 Global Programme of Action, in 1991 the international community created an effective weapon in the form of the United Nations International Drug Control Programme (UNDCP). This Programme has attacked the problem on all fronts and, in particular, has started to mobilize the non-governmental organizations (NGOs) active in this area. The World Forum due to be held under its auspices in Bangkok (Thailand) from 12 to 16 December this year will lay stress on the NGOs' role in curbing drug demand. ■

UNDCP, B.P. 500, A-1400 Vienna (Austria).

Learning to be tolerant

The United Nations Year for Tolerance in 1995 will coincide with the fiftieth anniversary of the United Nations. With this in mind, the Director-General of UNESCO, Mr. Federico Mayor, has launched a solemn appeal to public figures, families and the media to encourage children and adolescents to show tolerance towards others and reject violence as a means of resolving conflicts. This appeal was echoed by the World Conference on Human Rights held in Vienna in June 1993, which underscored the importance of education for peace, tolerance and international understanding. This is the theme chosen for this month's session of the International Conference on Education in Geneva, which will be attended by Ministers of Education from all over the world. ■

Further information about the Conference may be obtained from UNESCO-IBE, case postale 199, 1211 Geneva 20 (Switzerland).

Danger: landmines!

In 62 countries all over the world, some 100 million landmines are waiting to explode at any time. In Cambodia alone, there are more mines in the ground than there are people in the country. Since 1975, anti-personnel mines are thought to have caused one million victims, most of them civilians and above all children, who often take them for toys. Mines are cheap but lethally effective weapons which have in recent times come to be used on a massive scale and may remain dangerous even after hostilities have ended. Some continue to be active for as long as 40 years! Existing international instruments have so far proved inadequate for combating this hazard, and so the 1980 International Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons is to be revised at a Conference scheduled to be held in Geneva in 1995. In addition, a worldwide campaign aimed at outlawing the production, sale and use of anti-personnel mines has been launched by Handicap International, a French NGO, with the backing of the International Committee of the Red Cross and UNICEF. ■

Handicap International, 14 avenue Berthelot, 69361 Lyon Cedex 07, France.

is all too often tied to circumstances. There can be no doubt that the aid made available in cases of the utmost urgency is essential, but it cannot provide a lasting solution.

The industrial countries commit, on average, 15 per cent of their Gross National Product (GNP) to social security as against 0.3 per cent to foreign aid. The disproportion is even more dispiriting when it is realized that the 15 per cent is spent on about 100 million people, while the 0.3 per cent is supposed to help almost 1,300 million people. Another paradox lies in the fact that, until 1986, the bilateral donors of the industrial countries gave, on average, five times as much assistance per capita to high military spenders as they gave to low military spenders. In addition, after 40 years' foreign aid, 90 per cent of the $1,200 million spent on technical assistance each year continues to be used to finance the services of foreign experts, whereas the beneficiary countries now have their own national experts in many areas.

Without detracting from the cases where foreign aid has proved successful, such as in increasing food production, building infrastructural facilities, eradicating smallpox or promoting family planning, it is still necessary to completely recast the structure of international co-operation, strike a proper balance when furnishing emergency aid, reform technical assistance and set up social security systems all over the world. In short, action has to be taken upstream rather than picking up the pieces downstream.

Among the strategies put forward in the UNDP Report, the worldwide "20-20"-type compact appears to be particularly promising. The principle behind it is quite straightforward. At the present time, the developing countries devote, on average, 13 per cent of their budgets to human development priorities. Their goal should be 20 per cent, representing $88 billion a year, which is not beyond their capabilities. Likewise, now that the cold war is over, the donor countries are in a position to increase their aid for human development from 7 per cent to 20 per cent, from $4 billion to $20 billion.

If such a compact were based on shared responsibility and were placed under international management, it would be possible for all countries to achieve their key objectives between now and the end of the century. ■

Haiku by Bashô

"A League of Nations presupposes a league of minds," said Paul Valéry in 1932. In line with this approach, the International Institute of Intellectual Co-operation published between 1925 and 1946 several series of books on economics, social issues, education, art, literature and other themes. The Japanese series published in 1936 featured an anthology of poems by Matsuo Bashô (1644-1694), the great haiku poet, with illustrations by his compatriot Fujita Tsuguhara, a painter better known as Léonard Foujita (1886-1968), who lived in France. Below are four of the haiku, with the commentaries and paintings that accompanied them.

Octopus traps: how soon
they are to have an end—these dreams
beneath the summer moon.*

Under the bright moon
I walked round and round
The lake—
All night long.**

** Japanese fishermen caught octopus using traps thrown into the sea. The fate of all creatures is equally ephemeral and the dream of poor humanity does not last much longer than that of the condemned beast. This is a traditional Buddhist idea that life is but the evanescent dream of an instant. . . . For those who understand it, this haiku not only evokes a picturesque image, it is full of intense and profound emotion.*

*** All night long Bashô admired the moon in the sky—or in the water's deep round mirror. He could not make up his mind to sleep.*

I V E S

English translations by Harold G. Henderson (1 and 2, opposite page), *an Introduction to Haiku, An Anthology of Poems and Poets from Bashô to Shiki* (Doubleday, New York, 1958) and by Noby Yuasa (3 and 4, below), *Bashô, The Narrow Road to the Deep North and other travel sketches.*

Wake up! Wake up! It's I,
who want you for companion,
sleeping butterfly.

With a hat on my head
And straw sandals on my feet,
I met on the road
The end of the year.***

*** *A simple reflection by the poet-pilgrim on the last day of the year.*

Texts selected and presented by Edgardo Canton

The Maroons, musicians of freedom

by Isabelle Leymarie

Right from the beginning of the slave trade, black people in almost every part of the New World rose up against slavery and, whenever they could, escaped from the slave ships or from mines and plantations. They took refuge in the impenetrable tropical forests, where they set up more or less self-governing communities, in some cases with a highly organized ranking structure. The runaway slaves were called "Maroons", probably from the Spanish *cimarrón* meaning "wild". These communities were given such African-sounding names as *cumbes, mocambos, quilombos* and *candombes*. In some countries, such as Puerto Rico, they were also known as *palenques*, from another Spanish word meaning "stockade", since they often built fortifications to defend themselves from attack. Some of them were short-lived, but others survived for several centuries. One of the most famous *quilombos* was that of Palmares in Brazil, between Alagoas and Recife, which featured in Carlos Diegues' film *Quilombo*. The population of Palmares chiefly consisted of blacks of Bantu origin. When they were attacked by the whites, their king, Zumbi, threw himself over a precipice rather than surrender.

In some cases, the members of these Maroon communities all had the same ethnic origins and, because of their isolation from other groups, were able to preserve musical forms going back to their Ashanti, Yoruba or Bantu roots. These forms, which generally evolved more slowly than in Africa, now provide us with an idea of the kind of music that used to be played on the continent in earlier times. In cases where peoples of different origins lived together in the *cumbes* and *palenques*, they produced original forms of music specific to their particular locality.

REBEL COMMUNITIES

Four main groups of Maroons, each remarkable for its closely-knit social structure and the strength of its culture, have survived up to the present day. These are the Garinagu (singular: Garifuna), also known as Bush Negroes, who settled on the seaboard of Belize, Honduras and Guatemala; the Djukas and Saramakas of Suriname; the *palenque* of San Basilio, near Cartagena in Colombia; and the Maroons of Jamaica living in the Saint Elizabeth parish of Accompong Town and in Cockpit Country and the Blue Mountains.

The Garinagu took refuge with the Carib Indians of the island of Saint Vincent, intermarried with them, learned their language and shared their way of life. In 1797, some years after France had ceded Saint Vincent to Britain, the British deported these Maroons to the virtually barren islands off the coast of Honduras, from where they made their way to the mainland.

The Djukas and Saramakas escaped in 1633 when their Portugese Jewish planter owners hid them in the jungle in order to avoid paying taxes. Their ranks were swollen by fugitive slaves from the Dutch coastal plantations.

San Basilio was founded in 1608 by slaves who had escaped from Cartagena under the leadership of Domingo Bioho (known by the name of "King Benkos"). Benkos was eventually captured and hanged, but the *palenque* survived.

In Jamaica the Maroon phenomenon began during Spanish colonial rule. When Oliver Cromwell seized the country in 1655, other slaves took advantage of the political disorders to escape in their turn. A number of chiefs, named Juan Lubola, Cudjoe, Johnny, Accompong, Cuffee and Quaco, took command and grouped their followers into "nations", each with its own political system, language and customs.

One distinctive feature of the Maroon communities is the overwhelming importance they attach to spiritual things. They worship their ancestors, along with forest and water spirits, animal deities and the gods of the Ewe, Fon and Congo "nations", a clear pointer to the ethnic origins of their members. Some cults are hybrid; the *Winti* (a word meaning "wind") of Suriname pray to the divinities of both Dahomey and Congo. The *Kromanti* rites of the Djukas and Saramakas are intended to appease the anger of their gods and heal the sick. The *Kromanti play* of the Jamaican Maroons is used to call up the spirits of the dead thrcugh religious dances named after the Ibo, Mandinga and Kokose Mongola (Bantu) "nations".

For the uprooted Africans of the *quilombos* and *palenques*, sometimes speaking different languages and with no other way of communicating among themselves, music came to play a fundamental role. In the Caribbean during colonial times, the rebels gave the signal to attack the whites by beating their drums or by blowing into conch shells (known as "lambis" in Martinique and Guadeloupe) or cow horns (called "abengs" in Jamaica). As intermediaries between humans and their ancestors or gods, the drums are endowed with divine properties, and the dancers pay their respects to them before they start dancing or performing before them. The drums are blessed and plied with offerings. Each god or group of gods has its own drums and rhythms, and the ancestors or gods whose favours are being sought stand over the worshippers and convey messages to them.

The Maroons, runaway slaves whose descendants still live in a few communities scattered round the Caribbean, have preserved a culture in which music and dancing are the prime modes of expression and are a hymn to freedom.

A FORM OF RESISTANCE

According to African custom, death gives rise to outward expressions of joy in order to gladden the dead person's soul, and in some cases it cuts across the dividing-line between the sacred and the profane. In Garinagu funeral rites, for instance, the mourners perform the *punta*, an ancient fertility dance which is notable for its gyrations of the pelvis and quivering buttock movements and is also performed on other occasions out of sheer pleasure. The *Awasa*, which is sung and danced at funeral wakes among the Maroons of French Guiana, is sometimes performed in play-acting situations in which members of the opposite sex are openly taunted. In such cases, it helps to relieve tensions that would otherwise be liable to upset the fragile balance of the community.

In black societies generally singing, dancing, instrumental music and the words accompanying them are all connected and are a favoured mode of expression. The words of songs in particular are used as a way of mocking other people and exercising social control. Although the Maroons show respect for their religious traditions—because ritual strengthens the solidarity of the community and its links with the ancestral homeland—in their secular music they attach special importance to improvisation and innovation, which help to preserve the vitality of their societies.

In the 1930s, for example, local orchestras in the *palenque* of San Basilio adopted the Cuban rhythm known as *son*, while in the 1960s the Maroons of Suriname added the *kaseko*, a kind of calypso from the coast, to their repertoire. In Jamaica, young Maroons have introduced a reggae beat into their traditional drum playing and in Belize and Honduras Maroons are returning from the cities with a modernized version of the *punta* called *punta rock*.

The Maroons are also well known for their graphic art and their oral tradition and are a striking symbol of the forces of resistance and freedom. Their survival is under threat from the encroachment of the modern world. Will it be possible to safeguard their music, their songs and their paintings before they disappear forever? ■

ISABELLE LEYMARIE,
a Franco-American musicologist, is the author of *La Salsa et le Latin Jazz* (PUF, Paris, 1993). She is currently working on a study of black music in Latin America and the Caribbean.

elvis the African

by George Darley-Doran

2 THE RETURN OF THE CHIEF
A royal welcome

For eleven months a year, Elvis Johnson-Idan lives in London with his wife Elizabeth and their three children. Each December, however, he returns to the village of Jukwaa, his birthplace in Ghana, where he reigns supreme. In the previous issue George Darley-Doran described how he met the young Anglo-African chief in London and Accra. Here he accompanies him on his return to Jukwaa.

It was late morning when we reached Jukwaa. People emerged from all the tintop mud and brick houses and gathered excitedly around the car as we parked in a little open space on the other side of the main road. A man of about fifty-five, in a T-shirt and shorts, thrust his hand through my window and exclaimed: "You are a 100 per cent welcome!" He introduced himself as Elvis's brother Rutherford. We got out of the car, smiled back at the crowd and filed into a simple little house. This apparently served as a kind of royal sitting room with sleeping quarters attached to it.

We had only been in the room for a couple of minutes before we made for the Bethel Chapel—the big, grey Methodist structure that looms in a solemn and imposing manner over a village otherwise characterized by an atmosphere of happy chaos. We must have made an unusual sight: Elvis, Matthew, Christopher and myself in jacket and tie and Liz, Eunice and Theresa in dresses. We walked into the church from a side entrance, with the congregation beaming at us.

The preacher, a diminutive man of about sixty, continued his sermon in a high falsetto. Every few moments the sermon would be interrupted by a member of the congregation, to whom he would nod sagely in agreement. At the front of the congregation was the choir, who in their black cloaks and mortarboards looked as if they were about to receive their diplomas. After a few minutes, the preacher broke off from his sermon, came down from the pulpit and announced—in English—everyone's happiness that God had brought us safely to Ghana and his wish that God would inspire us all towards greater love and unity. Then the whole congregation shouted "Akwaaba!" (welcome) and burst into a rousing Fanti rendition of "While Shepherds Watched Their Flocks by Night" to the accompaniment of bongos, maraccas and jazzy vocal harmonies. That was followed by some more preaching, after which everybody left the church and we headed back to the royal sitting room.

Nana Elvis and Liz took their places on the ceremonial U-shaped wooden stools at the head of the room, and the rest of us sat on armchairs and sofas around the walls. Matthew and Christopher fidgeted in their formal clothes. People immediately began filing in to pay their respects. They introduced themselves to me as either a brother, sister, cousin, nephew or niece of Elvis. I later discovered that these terms are applied to even the most distant of relations. The main thing was that everybody was family, and overjoyed to see their chief and his *broni* (white) family. Elvis smiled benignly and murmured his thanks to all and sundry. Matthew leaned over and asked me, "Why is everybody being so nice to us?"

A walking encyclopaedia of traditional knowledge

Seated protectively in front of Elvis was Douglas, his *okyeame*, the direct translation of which is "linguist". Every Fanti chief has a linguist, who serves as a kind of first lieutenant, communicating with the people on behalf of the chief and acting both as a political envoy and a personal bodyguard. The linguist is a walking encyclopaedia of all the traditional knowledge and information connected to the stool under which he serves. He is also the bearer of the *akyempona*, or sceptre, of his chief. These sceptres are made of wood, stand about two metres high and are topped by a gilded symbolic emblem. Elvis's *akyempona*, for example, features a little seated man pointing his finger at three smaller figures—an indication of his special responsibilities for youth.

Douglas occupies a position of some importance, and certainly looked the part that day: short, thick-set and bullish, he was swathed in a heavy robe of thick blue cotton (as worn, in various colours, by all Fanti men on ceremonial occasions). He had a gold chain around his neck, from which dangled a gold lion pendant. Douglas is in his early thirties and will serve under Elvis until one or the other dies. There is little doubt that Douglas would lay down his life to protect his chief.

The next morning, Elvis had to attend a formal welcoming ceremony, which the rest of us (including even Liz) were excluded from. When he

A village party in Jukwaa.

came back towards midday, he was wearing a stripy blue robe and cap. He did not give much away about the ceremony. All he said was that libations had been poured and that spirits had been invoked, which had manifested themselves through some of the people attendant. We went to a restaurant for lunch. Over the meal, Elvis joked that we didn't need to worry about dinner because he had fined someone a goat that morning. I asked what sort of crime had been committed and he just replied, "Oh, somebody said something they shouldn't have in my absence."

The main event of the day

The main event of the day was a "beach party" on the banks of the Ayensu River, which flows past Jukwaa towards the sea. The party was organized as a fund-raising event for the public latrine. This happens to be the major construction project of Jukwaa. The site is on the outskirts of the village, and the project will cost another 1.5 million cedis (about $3,500) to complete. The village does what it can to raise the money, while Elvis has been approaching various charitable foundations in Britain. Until such funds are raised, and the latrine is completed, the people of Jukwaa will simply have to make do—as they always have done—with the village dump.

The beach party was a great success. Elvis (in his robe) and Liz (in a more demure European outfit) sat on their ceremonial stools in the shade of a big green awning. Surrounding them were the senior members of Jukwaa's six leading clans. These were accompanied by their wives, who all wore Dutch wax-printed cotton dresses. It was every Westerner's idea of a traditional African durbar. Facing away from them, it was a different story. Hundreds of children and adolescents danced wildly to the HiNRG disco music blasting out from the banks of speakers on either side of the DJ. A big crowd assembled on the banks of the river and cheered as the little nanas Theresa, Matthew and Christopher were pulled through the water on an inflatable plastic dinghy.

I left the party towards evening with Rutherford, who had offered to show me around the village. Our first stop was at a small, four-walled structure located to one side of the royal sitting room. This was the *pusuban* or spiritual heart of Jukwaa. Growing out of the roofless monument was a thicket of plants and trees. These, according to legend, had been planted by the original Idan settlers of the village. Painted on one of the walls of the monument was the message (in English), "KNOW YOUR ASAFO LEADERS", under which was a long list of names. Rutherford explained that the *asafo* leaders constituted a kind of military hierarchy. In the old days, the *asafo* class had been responsible for defending the stool lands against marauding tribes. Nowadays, titles such as *tufohene*, *asafo supi* and *asafo akyere* are only ceremonial, but they do confer an element of prestige. Another wall of the *pusuban* was decorated by a marvellous picture of a double-headed flying dragon. This, Rutherford told me, was a mythical beast relating to the legend of the people of Jukwaa. Many generations ago, the ancestral forebears were routed from their original home by the Asante. They went into exodus, in the course of which—legend has it—they were led by this mythical dragon to the present location of Jukwaa. The name of the village, incidentally, means "place of peace", which is what the first Idan settler is said to have exclaimed upon arriving at the site.

A place of peace

The legend of Jukwaa and its people is an ongoing one. The "keeper" of the legend is the Okyeamehene, or state linguist. From an early age, the Okyeamehene will have memorized and learned how to articulate the history of his people. On the most significant occasions, he will recite the legend in the form of extended poems and songs. Part of the legend is related in drum language. The entire recitation takes an hour a day for two weeks. The Okyeamehene of Jukwaa died in 1990 and his son is still in the process of being groomed to take his place.

From the *pusuban*, Rutherford and I went down a path that led away from the main road, out of the village and past the school (a long, low building at the top of a gradually sloping football pitch). After a few minutes, we came upon the local *akpeteshie* distillery. *Akpeteshie* is a spirit derived from sugar cane. The distillery was operating at full capacity, and the chief distiller kindly agreed to give us a guided tour.

Around the distillery compound were large piles of sugar cane, which resembles thick bamboo. In the middle of all these piles was a shed in which was situated an antique petrol-driven sugar cane crusher. This made a roaring noise as long stalks of sugar cane were fed into it. Juice poured out from one side and crushed pulp from the other. The pulp is taken away and burnt, and the juice is fermented in big metal vats. After two weeks, the fermenting liquid is transferred into old petrol drums. The drums are covered with lids and log fires are lit underneath them. There are usually about six drums on the go. Emerging from each lid is a metal pipe, which spirals downwards through a vat of cool water. The alcohol condenses in this pipe and then seeps through a cotton-wool filter,

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from which it spurts into a plastic bottle. The resulting *akpeteshie* is a clear white spirit, the Ghanaian equivalent of Italian grappa, Cretan raki, and Yugoslavian slivowitz.

It was dark by the time Rutherford and I left the distillery. We got back to the village and entered the royal sitting room, where Elvis and Liz were holding court. Somebody brought in the goat referred to earlier. It was presented to Elvis, who patted it affectionately. Then the animal was led away to be slaughtered as a ritual offering to the spirits.

Sports day

Liz and Elvis went to Accra the next day. I spent the morning in the village, where life was carrying on as usual. In front of each house women were making fufu, the staple of the Ghanaian diet, which is prepared from plantain and cassava. The two ingredients are boiled until soft, usually over a charcoal fire. Then they are transferred into a big wooden mortar and pounded for about fifteen minutes with a long, thick sugar-cane pestle. The final result is a doughy lump of fufu. This is covered in a spicy tomato broth and eaten with fingers out of a communal bowl. Fufu is swallowed without being chewed, like oysters. Ghanaians of every class love fufu so much that they will happily eat it every day of their lives. The "thump, thump, thump" of fufu being pounded is perhaps the archetypal sound of Ghana.

Around the women making their fufu, children played, chickens pecked at the dust and goats wandered about with their kids. Children queued up with buckets at the village water tap. It made a peaceful little scene. Tranquil as things were, however, one could also feel the excitement mounting for a major event that was to be held that afternoon: the annual sports day.

After lunch I walked up to the school with Elvis's older brother, Payne, who is an architect. There was already a big crowd by the time we got there, virtually the entire population of Jukwaa. The normally featureless schoolyard had been turned into a spectators' gallery. Beneath the green awning, the men of consequence sat with their wives. All of them were in their best robes and dresses. Payne and I sat down, he on a stool and myself in an armchair that had been carried up especially for me.

Launching the afternoon off was the under-10s' football. One of the teams was called the Christian Babies. They had black uniforms, with a white skull and crossbones on the chest. The other team was called the Idan Stars. There was laughter and applause from the audience as the little boys battled it out. The Christian Babies came out on top.

Next was a game played by the teenage girls. This is a little difficult to describe. There are several teams of about fifteen girls each. They all form a big ring. Girls hop into the ring two at a time, from opposite sides, making a kicking motion as they hop. The first girl to make such a motion "kicks" the other one out, although they never actually touch. The girls compete with one another until there is one clear victor and her team wins the game. As the game progressed, the girls displayed a competitive spirit that can only be described as intense. Upon their victory, the winning team let out an enormous cheer and then trooped in formation around the chiefs' enclosure, chanting all the while.

The high point of the afternoon was the men's football. This pitted the born and bred Jukwaa men against those who had come to live in the village from other parts. Prior to the game, the two teams lined up in the centre of the field to be given a speech by Nana Kwesi Ansa, a frail but dignified elder in a colourful chequered robe. He called upon them to play fairly and honourably. Then he sat down and the game kicked off. Regrettably the result was a foregone conclusion. The visiting residents were tougher, almost to a man. Jukwaa's finest played hard but were just not up to the competition. The game was considerably livened by the occasional invasion of the pitch—first by a flock of chickens, then by a herd of goats and finally by a long green snake. Douglas went to work on the snake with his big stick and then picked it up and waved it at the crowd, to the horrified shrieks of all the females. Despite all the mishaps, it was a fine match and the final score was only 1-0 to the visitors.

Once all the games were over, the prize-giving took place. The Christian Babies were presented with a bunch of plastic flowers, the winning girls' team with a silver plaque and the visiting men with a silver trophy. As he presented the trophy, Nana Kwesi congratulated the visitors warmly and called upon the home team to bear no hard feelings and to play better next year. Then everybody dispersed and gradually trailed back to the village.

Payne and I returned to the royal sitting room and rested for a while. We were going to need plenty of energy for the funeral rite that was to be held later that evening. ■

Village elders with teams before a football game.

3 Next month: NEW YEAR'S EVE IN JUKWAA

LETTERS TO THE EDITOR

SPEAKING OUT AGAINST NUCLEAR FUNDAMENTALISM

Your October 1993 issue ("Time to Disarm") is easy to read and contains some stimulating contributions. In particular Jasjit Singh in his article raises questions which rarely get asked, concerning what he rightly calls "nuclear fundamentalism".

The glossary which comes as part of his section, but which may not be his, is not quite accurate about the Non Proliferation Treaty. As Article VI of that Treaty makes clear, it is also a nuclear disarmament treaty. That is the obligation on the nuclear signatories, and it balances the obligations placed on non-nuclear powers.

Why is it that in such a good issue you neither use nor refer to the Non-Governmental Organizations and their campaigns for disarmament? Those who have written for you are either official or semi-official people. Nothing wrong with such status. But there are many many others actively and intelligently working for change who might have contributed.

Bruce Kent
Past President,
International Peace Bureau,
London, United Kingdom

AN EXCEPTIONAL DEBATE

Your December 1993 issue ("The Meaning of Progress, A North-South Debate") made excellent reading. I have been a subscriber to the *UNESCO Courier* for several years, and although I appreciate all your articles for their honesty, erudition and broadness of scope, one or two issues a year are outstanding. However fascinating cultural differences and disparities may be, I prefer to read about the ideals and values of universal humanism that draw people closer together and prove the essential unity of human beings.

Lucette Perrin
Decazeville, France

GANDHI AND RESPECT FOR OTHERS

I was extremely moved by Richard Attenborough's film about Gandhi when I saw it again on French television last April. What wisdom, what intelligence, what rectitude and what humility! It is wonderful to see that such qualities exist, but what a challenge it is to cultivate them in oneself!

Drawing inspiration from Gandhi's wise words, I should like to remind the world of the fraternal bonds constituted by our common flesh and our common origin and by the fate we all share on this little plot of earth sailing through the cosmos.

Why then should there be there so many wars and so much hatred and intolerance towards all that is different, when these very differences are the source of our originality and our wealth? A love of differences, though so often conspicuous for its absence, is the necessary fertilizer in the compost of humanity that can enable all races, all opinions, all cultures and all religions to express, develop and make known their unique features.

Why do the world's political and religious leaders, scientists, philosophers and thinkers not follow Gandhi's example and take action, creating national and international institutions and passing laws to ensure that all citizens of the world, in all places and in all circumstances, can live in peace and harmony in respect for the rights and freedoms of others, as stipulated in the 1948 Universal Declaration of Human Rights?

For how much longer shall we allow ourselves to be led by self-centredness and money rather than by our minds and our consciences?

Alfred Schanzenbacher
Metz, France

ANOTHER FORM OF ENERGY?

In the article entitled "Energy for a Sustainable World" in your November 1991 issue ("Environment and Development, A Global Commitment") you cite numerous ways of using the energy sources that our planet possesses in abundance, i.e. water, wind, solar, geothermal, photovoltaic cells, etc. But what about snow, ice and névé?

If you hike through high mountains, you have to use special creams and oils to protect your skin from being burned not only by the sun but by its reflection off the snow. There are many névé glaciers around the world. Many ice-fields were formed in the ice ages that are far from having melted. Would it not be possible to exploit this energy source, which is located in areas that, for obvious reasons, are uninhabited?

Claudia Merazzi
Bienne, Switzerland

UNESCO ACTION IN BIOTECHNOLOGY

I should like to add the following precisions to the box on "UNESCO's International Network of Microbial Resources Centres" which appeared on page 21 of your June issue ("The Resourceful Gene").

In 1991 UNESCO launched, with the Biotechnology Action Council (BAC), chaired by Prof. I.K. Vasil (U.S.A.), a scheme for short-term fellowships in plant, aquatic and allied environmental biotechnologies which was complemented by a UNESCO professorship scheme in all fields of biotechnology. So far 130 UNESCO BAC fellowships have been awarded (50 to women and 80 to men) to: 20 applicants from Africa, 43 from Asia, 9 from the Arab states, 34 from eastern and southern Europe and 24 from Latin America and the Caribbean. Six eminent scientists from the U.K., Sweden, Australia, Lebanon and Switzerland have been sent as UNESCO biotechnology professors to Brazil, Malaysia, Thailand, Viet Nam and Jordan. UNESCO chairs in plant biotechnology have been established at the University of Beijing (China) and Makerere University (Uganda).

Edgar DaSilva
Division of Basic Sciences,
UNESCO

HUMAN RIGHTS AND THE *SHARI'AH*

In your March 1994 issue ("Human Rights, The Unfinished Task") I read with close attention the Vienna Declaration and Programme of Action adopted on 25 June 1993 by the World Conference on Human Rights, as well as the Tunis, San José, Bangkok and Cairo Declarations that preceded it.

All these documents expressly or implicitly recognize that human rights are "universal, indivisible, interdependent and interrelated". However, I find the Cairo Declaration disturbing in that it specifies that human rights are subject to the provisions of the *Shari'ah*, the Holy Law of Islam. As soon as a conflict arises between human rights and the rules of the *Shari'ah*, the latter will take precedence over the former, which will thus be ignored.

André Hamy
Bois-Grenier, France

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OF

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YEHUDAH AMICHAI

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