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Research at present under way into the most basic aspects of human biology - the genetic basis of life - presages a new scientific era, perhaps a revolution, in the medicine of the 21st century. It is opening up the possibility of changing the ways in which certain genes function in order to prevent or treat many of the diseases and disorders that are built into our cells from the moment of conception. This technology - the power to make such fundamental changes for the wellbeing of humanity - must not be abused, however. Human values, human dignity, must be safeguarded. Society must see that the delicate balance between its ethical and unethical use is preserved.

The CIOMS Conference on "Health policy, ethics and human values" (Netherlands, June 1987) and the Fifth "Summit Conference on bioethics entitled "Human genome sequencing: ethical issues" (Rome, April 1988) discussed this very timely issue. It is timely because of the decision taken recently to go ahead with the biggest biological research project ever undertaken, the "mapping and sequencing of the human genome" - the biological equivalent of the Apollo project to put a man on the moon.

What is the human genome?

DNA, or desoxyribonucleic acid, the "master molecule of life", is found in the nuclei of the cells of all living organisms - animals, birds, plants, bacteria, viruses. It consists of four chemical substances called nucleotides - namely, adenine, guanine, cytosine and thymine - together with a sugar - desoxyribose - and phosphoric acid. It takes the form of two strands of these nucleotides twisted spirally around each other in pairs - the "double-helix". In the nucleus of the human cell it is distributed along 23 pairs of chromosomes, rod-like structures which reproduce their physical and chemical structures through successive cell divisions. It is segmented into units distinguished by unique arrangements or sequences and ratios of the four nucleotides. These units are the genes, and the human being has over 100,000 genes. The complete set of genes, unique to each human being, is called the human genome. It is repeated exactly in the nuclei of all the cells that compose the body, of which there are thousands of millions.

If we can map every gene on the chromosomes that determine all our inherited characteristics, medicine will be in a position to change the function of those genes that give rise to disorders and abnormalities.

Mapping of the exact location of genes on the chromosomes is the first step to be taken. After the genetic mapping is known, the next step is to determine the exact order of nucleotide pairs within the DNA molecule.

The ultimate aim of the programme is to establish the map of the human genome in which the identity and location of each of the 3,000 million pairs of nucleotides will be known.

Each cell has a particular function - to produce an enzyme which helps in the digestion of food, for example, or to produce a hormone, or to form muscle or bone or liver or brain. What each cell does and how it does it depends on the code laid down in the DNA, in the form of different arrangements and ratios of the nucleotides. All forms of life are coded or programmed in the same way. It is this genetic code that determines whether the living organism will be a rose, a bacterium, a whale or a human being. Similarly it is the genetic code that determines every characteristic that is inherited.

Many inherited characteristics are influenced or shaped also by the environment into which the organism - the human being, animal or plant - is born and where it grows and lives. Such influences are climate, nutrition, education and occupation. They are influenced also by our understanding of ourselves and of others, our power of control over our lives, and our relations with other people.

Sometimes genes are damaged and give rise to disorders or abnormal features. Some inherited defects are so damaging that the fertilised egg, the embryo, cannot develop beyond a period of days or weeks and dies and is aborted spontaneously. Others give rise to more or less severe handicaps and the organism may survive in a favourable environment or die early in an unfavourable one.

Geneticists already have discovered the place on the chromosome - the locus - and the function, as well as the internal structure, of hundreds of human genes or groups of genes. Hence it is now possible to predict from an examination of DNA on chromosomes, even before birth, a number of genetic disorders.

The recent research indicates a close relation between individual genetic patterns and susceptibility to develop a cancer, and a group of genes (oncogenes) has been identified. The detailed knowledge of the human genome will profoundly influence the understanding of human cancer development, the role of cancer risk factors and cancer diagnosis and, later, the approach to cancer prevention and therapies. It was also possible to establish that some types of diabetes mellitus, coronary heart diseases and muscular dystrophies are related to gene abnormalities.

It is possible to envisage that the elaboration of the human genome will have, in the future, a profound
influence on medicine. At present medical practice relies to a great extent on a "probabilistic" approach where a diseased person is considered as an individual case within a diseased group. In the future diagnosis, prevention and therapy might be tailored to the unique genomic constitution of each individual patient.

Genetic research is continuously adding to the list of genes of which their loci and functions have been identified. A complete map awaits the determination of the locus and structure of each of the genes that comprise the human genome. This would give us the basis for detecting unusual or abnormal features of individual genomes.

Without a highly concerted effort it would take many years to map the human genome — that is, to discover and show the locus of every gene, or unit of DNA, on every chromosome. However, genetic research is now so advanced that it has become feasible to do so in a relatively short time, provided the resources are made available. A committee of the National Research Council of the United States National Academy of Sciences has recommended that the mapping and sequencing of the entire human genome be undertaken immediately. The National Institutes of Health of the US Government has been designated the coordinating agency for the project, which is expected to take at least 15 years to complete. Part of the work is to be done in the US, part in Japan and part in Europe. The principal benefits would be, at least to begin with, in presymptomatic diagnosis of diseases, in determining predisposition to disease, and in drug treatment based on understanding of gene function. Gene therapy, e.g., the replacement of defective genes by normal genes, may in time follow and grow in importance as a new and revolutionary field of medical therapy.

With the continuing development of DNA technology, so far applied mainly to bacteria and other non-human forms of life, its application to medicine — to the prevention and correction of genetic defects — when the position on the chromosomes, the structure and the function, of each gene is known, can only be imagined. It will be revolutionary in the sense that, for the first time, medicine will be in a position to change the function or action of many genes or groups of genes that give rise to disorders and abnormalities. So far, medicine is concerned mainly with changing or countering the outcome or expression of genetic defects — insulin for diabetes, a special diet for phenylketonuria, beta-blockers for certain kinds of raised blood pressure; society provides special education or institutional care for certain handicaps caused by genetic error; genetic counselling helps affected people, or parents of affected children or fetuses, make certain decisions.

When the human genome is fully mapped and sequenced it should be possible to locate the origin of very many more genetic defects and disorders than is possible today. It may be, for instance, that antenatal care could include obtaining the map of the genome of the fetus, or that the routine medical examination of a sick or even well person could include that person's genome map. It would then be possible to determine who will get certain diseases, perhaps many years later, and offer the possibility of changing the action of certain genes in order to prevent such diseases, as well as to cure others.

**Genetic engineering**

It may be possible even to discover particular gene combinations that bring about particular characteristics, even particular kinds of behaviour, in human beings. This could open up the theoretical possibility of engineering genes, or groups of genes, to attempt to change certain physical or psychological characteristics, with a view to "improving" the genetic stock — a form of "micro-eugenics". However, there are at present no scientific grounds for claiming that this could happen, and it could not be justified on ethical grounds.

Serious ethical issues arise in con-
connection with genetic engineering in medicine. Will individuals have the right to determine what may be done to their genes, or to their children's genes, to prevent or treat certain diseases? Does the individual have the right to know, or the right to refuse to be told, about genetic abnormalities which may cause disease years or decades later? May the genetic medicine specialist tell a young woman she should not marry a certain young man whose genomic map shows a defective gene which may shorten his life or would affect their children's lives seriously? Will the individual have the right to refuse to have her or his genome revealed? Will it be unethical to obtain an individual's genome map without her or his informed consent? Will parents have the right to refuse to have their children's genome map revealed?

Many views and aspects of human rights and dignity, and human values, must be harmonised - geneticists, the medical profession, ethicists, philosophers, theologians, lawyers, policymakers, and society at large should start to dialogue on the ethical aspects of the mapping and sequencing of the human genome. Clearly, all parties must have a say in regulating and controlling the ways in which this new knowledge and the technology are to be applied. Certain basic principles must be observed: respect individual autonomy or self-determination; do good and not harm; and ensure the just distribution of benefits. Above all, the whole complex subject of "genome medicine" must be made sufficiently comprehensible to the lay public to enable it to be well understood, discussed rationally, and used responsibly for the welfare of humanity.

The Fifth Summit Conference on Bioethics (at which WHO and CIOMS were represented) discussed these matters and submitted recommendations to the Summit Conference of the Heads of the seven most economically developed countries, held in Toronto in June 1988. These recommendations included the strong encouragement of research into the human genome and of rapid generation and dissemination of knowledge, while always protecting the rights and interests of those who are the subjects of such research. Gene therapy must meet the same rigorous standards of efficacy and safety as all other forms of experimental therapy. In particular, the Conference pointed out, there can be no justification for gene manipulation of any germ cells involved in reproduction; this would have the effect that the altered gene would be passed on to the eventual offspring of the embryo, and thus involve a change in the genetic inheritance of future generations.

The Conference drew attention to the need for the public at large and those in influential positions to be well-informed about the new dimensions of genetic knowledge and technology, especially to prevent its misuse. The new ethical issues related to "genomic medicine" need to be considered without delay. We must make all efforts to assure society that the exploration of the human genome will not interfere with human dignity. The continuous dialogue between the scientists involved in research on the human genome, the medical profession, the ethicists, the policymakers and society at large on the ethical limits of applications of new knowledge in this field is a necessity. In this connection it is imperative to inform the public at large through a continuous flow of information of the results of the study on the human genome in order to assure understanding and acceptance of this extraordinary progress in biology and medicine. Only then can we have assurance that the application of this fundamental biological knowledge in medicine will be beneficial to human beings and the risks will be reduced to a minimum and well controlled.

Clearly, the best guarantee of the responsible use of genetic engineering in medicine, and the best protection against its misuse, is a well-educated public. Genetics needs to be included in education, from primary school onward, if well-informed rational public participation is to be assured in discussions and decisions about its use for the well-being of mankind.
Safer water for Uganda

Village communities have already shown that given, proper guidance, they can protect their own springs without waiting for government or other assistance

by Richard G. Mugga

Most country areas of Uganda suffer from a serious lack of adequate water supply. A large proportion of the population does not have reasonable access to safe water and is without facilities for hygienic waste disposal. Particularly in remote communities, water sources are either absent, inadequate, distant, polluted or unreliable. The consequences are the obvious ones: hardship and disease.

Most rural communities cannot afford to pay for building, operating and maintaining their own water supply systems, so the government has to provide improved sources of water as a general service. Since water is a limited and valuable resource, and since its development requires high investment, it must be efficiently used and must be safeguarded at the highest national level.

In the pre-colonial days, water used to be collected from natural sources. People used to collect water from such rivers as the Nile, Mayanja or Agago and from natural springs and dug wells. All these sources were open to contamination. Subsequently most of the boreholes were drilled during the colonial days. But when one looks at their distribution throughout the country, most of them are concentrated in the East and North of Uganda, while very few are found in Buganda, Toro and elsewhere.

The present government has as its primary objective to establish a working democracy based on direct popular participation both as regards decision-making and putting policies into effect. That is why democracy tops the Ten-point Programme. Development programmes are planned with the full realisation that rural areas will continue to contain the bulk of the population and to provide the backbone to the economy for many decades to come. Improved rural water supply is meant to promote economic growth in these country areas. A new water supply may even encourage permanent settlement in a particular area, and influence migration patterns by slowing down rural-to-urban migration rates. And of course, better health is expected to be a direct consequence.

Among the constraints to providing water supply systems in the countryside are the lack of any permanent settlement in a particular area, and influence migration patterns by slowing down rural-to-urban migration rates. And of course, better health is expected to be a direct consequence.

When water is rationed for drinking and preparing food, it leaves very little for maintaining personal hygiene. Hardly surprisingly, people will prefer to draw water from a nearby stream which may be severely polluted rather than trek to a distant borehole.

Any attempt to provide an alternative source must have some advantage that the people will appreciate and the most obvious one may be convenience. Apart from using water for drinking and watering animals, river water can also be tapped for irrigation schemes, fish growing, recreation or to provide small-scale electricity power for local use. All such activities which contribute directly and indirectly to the better health of the people concerned also contribute tremendously to rural development and the agrarian revolution.

It has been proved that the incidence of water-related diseases cannot be reduced by supplying safe water alone. It must be accompanied by improved hygiene, health education and improved sanitation. Through health education the community should be made aware that water drawn from a treated or good source can be contaminated during transport to or storage in their homes.

Some of the water-related diseases depend for their spread on material from human and animal faeces getting into drinking water. The chain of transmission may be broken by safe disposal of faeces as well as by protecting the water supplies. So it is important to improve sanitary excreta disposal by encouraging the use of properly constructed latrines and reducing indiscriminate defecation in or near water sources.

Indeed, it is no use developing community water supply and sanitation unless people are at the same time aware of the health impact.
From a public health point of view the essential requirements of a community water supply are safety, adequacy, convenience and continuity. Water-borne epidemics in Uganda are mainly associated with communal water supplies; and the larger the community, the greater the population exposed to risk at any one time.

The most serious water-borne diseases, apart from cholera and typhoid fever, include dysentery, gastro-enteritis and certain virus infections. Lack of personal hygiene where water supply is limited can result in trachoma, scabies and yaws. New reservoirs and irrigation ditches may form breeding grounds for insects that transmit malaria and filariasis, or may provide a habitat for the water-snails that spread schistosomiasis or the cyclops that cause dracunculiasis (guinea worm).

The government intends to provide more protection for springs and shallow well construction, to maintain existing valley tanks and build new ones, to drill new boreholes and increase the use of windmills to pump water, to rehabilitate existing piped water systems, and to extend the existing gravity-fed systems.

Village communities have already shown that, given proper guidance, they can protect their own springs without waiting for the government or any other agency to provide construction materials such as cement. Shallow well construction has proved less successful because it calls for so much skilled labour; in any case they dry up during drought periods when water is needed most.

The Ministry of Water Resources has acquired several new rotary drilling rigs to supplement those already procured with the help of international development agencies. Local pump repairers are being trained to cover the whole country and to be linked with the new borehole drilling programmes.

Since water is life, a good water supply has high priority, and Uganda has to rely first and foremost on its own strength, resources and abilities. The improvement in the quantity and quality of the water available to the people will undoubtedly promote better health for everybody, and this in turn will help to speed up the whole country's development process.

Where water is scarce, Ugandan villagers spend much time and energy collecting it from far-off sources.

Photo WHO/Interfoto MTI
Growing old in Japan

By the year 1995, Japan's elderly will exceed 25 per cent of the population. Already “the elder is caring for the elderly” but that is a fact of life rather than a long-term solution. Other possibilities need to be considered.

by Robert L. Anders and Masako Kanai-Pak

In common with many other countries, Japan is experiencing a significant increase in its ageing population. Some 10.2 per cent of their 120 million citizens are over the age of 65 and, by 1995, the total will exceed 25 per cent. This increase may be even higher because the Japanese's life expectancy is already the longest in the world.

A majority of elderly people still live with their children. Over 80 per cent of the population expect their children to care for them when they are elderly, a living arrangement that is very common in East Asian countries.

In 1980, the number of elderly who were bedridden was estimated to be 438,000. Out of this number, their children cared for 307,000, and 131,000 were confined to hospital beds. About 88,000 older persons were living in nursing homes, and a total of 219,000 were living in other kinds of institution.

Even though the elderly express a desire to live at home, it appears that slightly less than 50 per cent are in institutions. Apparently when the level of care required by the elderly increases, the number of families able to provide such care decreases.

In Tokyo, where the population is approaching 18 million, one of the
major problems is having a home or apartment large enough to accommodate both the elderly parents and the other family members. Housing is already a critical issue because of the limited availability of land. With the increase in the ageing population, it is going to be almost impossible for most families to afford homes large enough for both them and their parents.

As women gain additional education, the size of their family decreases. Since 1950, the number of children per family has dramatically decreased. The higher education and economic level for both men and women means that, in the long run, the elderly will have to look more and more to the community for their care.

In fact, the number of elderly living with their children, particularly in the big cities, is already beginning to decrease. This trend is also occurring in the countryside, where a greater percentage (more than 12 per cent) of the population are aged over 65. The children of these elderly people have moved to the cities in order to secure jobs, and this leaves the parents with fewer options available when they become unable to care for themselves.

In Japan, as in other developed nations, the tendency towards the "old caring for the old" is also occurring. It is quite common to find the eldest son and/or his wife, who may be in their early seventies, caring for a parent in their late eighties or early nineties. This trend of the elder caring for the elderly seems to have only just begun.

Life Care

Understandably, therefore, caring for the elderly is becoming a major concern for the citizens of Japan. Since a significant number of the elderly are currently in need of life care (home health, retirement centres, nursing homes), and an even greater number will require these facilities in the future, certain significant changes need to occur.

At present, in view of the near absence of longterm care beds, those elderly patients who need what in the United States is considered a skilled nursing facility are kept in the acute care hospitals. According to some authorities, 31.2 per cent of the patients in hospital are over the age of 70, and their average length of stay is over 105.1 days. For hospitals in general, the average length of stay is 54.6 days.

Japan's current national health insurance programme does not provide coverage for home health care, but the government has a home care demonstration project operating in seven different cities. They are trying to determine if home health care will be effective in reducing the number of hospital days for the elderly.

Assuming the programme proves to be successful, the cost of the

A majority of Japan's elderly people still live with their children. Nevertheless caring for the elderly is a major concern for all citizens, as fewer people can afford homes large enough for two generations.

Photo WHO/E. Schwab
Growing old in Japan

services, or at least some of the cost, could be included under the national health insurance. The use of home health services has the potential to play a vital role in upgrading the care given to the home-bound elderly.

Since 1979, Japan has been experimenting with providing day care for selected elderly people. By 1983, they had 81 centres located throughout Japan designed to promote independent living skills for the elderly, and also to provide the family care-taker with a break from providing the daily care. Obviously, the number of these centres will have to increase considerably if this service is to have any positive impact on the care of Japan’s senior citizens.

The number of nursing home beds will also need to increase in the not-too-distant future. In 1984, it was estimated that there were only 70,000 nursing home beds in the entire nation. More than 100 nursing homes have been opening each year but, because of the increasing number of frail elderly, the shortage has not been significantly reduced. Most facilities still have long waiting lists.

The Ministry of Health has included in its goals the development of intermediate care facilities to look after impaired elderly. These should relieve the hospitals from the task of providing long-term care for elderly patients, most of whom at present have no other option but to remain in hospital.

But what options does the Ministry of Health itself have to ensure that health care for the elderly is comprehensive? The possibilities include:

Care homes, individually owned homes which provide the frail elderly with a place to live as well as basic home-maker services. They would also benefit individuals who have no family to support them.

Respite care, enabling the family to bring their bedridden elderly into a nursing home setting for a short period of time. The short stay would offer the caregiver a break from providing daily care and support, and enable the caretaker family to take occasional vacations without worrying about the old person’s welfare.

Day health care programmes to provide skilled nursing care for the
A small boy makes music for his grandfather. Sharing the company of children helps to keep old folk “young at heart.”

Left: The elderly sick could be helped by geriatric assessment centres to function better on return to their homes.

Photos WHO/E. Schwab and WHO/T. Takahara

elderly in a day-care setting. In the evenings and on weekends, the patient would return home to the family. With this approach, the patient would not need to live in a nursing home but could receive the necessary skilled care.

Geriatric assessment centres, probably based in hospitals, would evaluate each patient’s problems so as to identify where conditions needed improvement and to make treatment simpler, thus helping the individual to function better at home.

Nursing homes, not based on a medical model but designed around a social system model of care. The emphasis would be on social interactions, patient well-being and adaptation to the ageing process, with the quality of life as the primary focus.

Home health services need to be greatly expanded. Every effort has to be made to keep the patient in the community and out of the hospital or nursing home. With the proper blend of nursing care, medical support and home-maker services, the quality of care in the home should markedly improve.

Health care professionals; medical and nursing education will need to include “state of the art” for the elderly in the curriculum. National health insurance would provide incentives for these health care providers to care for the elderly. Again, the entire health insurance package would emphasise keeping the patient out of the hospital system and focus on community-based ambulatory and home health care programmes.

The issue of ageing is a pressing one. Tremendous progress will have to be made over the next ten years if Japan is to avoid a crisis in providing for its senior citizens. As one of the strongest economic powers in the world, this nation of 120 million citizens will undoubtedly find means to provide care for its elders.
The English physicist Lord Thompson declared in 1889: "When you can measure what you are speaking about, and express it in numbers, you know something about it." A century later this neatly expresses the basic premise of regulatory agencies and the credo that is increasingly emphasised in our numerate technological world.

National regulatory agencies that have the responsibility for controlling hazardous chemicals need a number to give reality to a regulation, standard, guideline, or even a recommendation. Whatever the regulatory action, a number provides the reference point for enforcement, surveillance and subsequent monitoring. The number enables us to make a judgement as to what is safe — or, more correctly, what is judged an acceptable or tolerable risk — as opposed to what is negligent or criminal. There may not be a significant increase in risk between driving a motor car at 58 and 62 kilometres per hour, but 60 kph can provide a sensible reference point for public safety.

The chosen number should, of course, be both enforceable and amenable to change as the scientific knowledge on which it is based develops. At best, the number will be an approximation for health protection. In no sense can it be considered to give an absolute guarantee of freedom from risk.

Whether a government chooses to enforce compliance with health and safety requirements through the force of law and prosecution, or through gentler routes of persuasion and recommendations, the essential flow-path of health protection is invariably: Investigation — Criteria — Standards — Regulations — Enforcement and Compliance.

That is to say, investigation and research lead to an evaluation of the health hazards, formulated as criteria. From these criteria, health standards are derived, which are in turn converted to a legislative reality when promulgated as regulations. The final stage is enforcement of these regulations. The control loop is completed by monitoring the

A shadow on young lives: how can we measure the point where fumes become health risks? Fortunately public opinion — epitomised by these young New York demonstrators (right) — is increasingly alerted to the potential dangers of chemical pollution.

Photos L. Sirman © and WHO/J. Mohr
effectiveness of regulations, so that if they are not achieving the original intention, the cycle of investigation and regulation must be repeated once more. Ideally, such measures relate achievements to needs.

It is at the criteria stage that the role of international evaluation is so critical. Few countries have the resources or expertise to assess the health risk on all the multitude of chemicals to which we are exposed. The cost of testing and evaluating chemicals is so high, and skilled personnel so scarce, that it is incumbent on all of us to share limited resources and avoid overlap and duplication. Even for those that have the ability, the necessary objectivity and consistency can only be given in the international forum. Consistency of testing and evaluation helps to make data obtained in different countries comparable and acceptable and — in the final analysis — encourages both international trade in chemicals and the harmonisation of control measures.

In view of the key role played by international cooperation in evaluating the risks from chemicals, let us consider how valuable the International Programme on Chemical Safety (IPCS) has been in meeting this challenge. Established in 1980 as a cooperative venture of ILO, UNEP and WHO, the IPCS is required, as the first of its objectives, to prepare evaluations of the risk to human health and the environment from exposure to chemicals. In response, its wide range of publications have included 75 Environmental Health Criteria documents, with another 39 in preparation; 11 simplified Health and Safety Guides, with another 54 in preparation; and the planned publication of some 400 of the even more concise International Chemical Safety Cards this year and next. The IPCS can draw on more than 28 years of studies by WHO, in collaboration with the Food and Agriculture Organization (FAO), in which the toxicity of food additives, contaminants, and pesticide residues in food have been assessed. It has set maximum residue levels for 140 pesticides to date.

Modest resources

This is a remarkable achievement, particularly in the light of the modest resources available to the IPCS. Modest, that is, when compared to the cash spent on similar work by even middle-rank countries.

The question remains how these outputs of IPCS are actually used by WHO's member states. The fruits of many days of committee work and even longer research by high-ranking consultants are not intended for academic or encyclopaedic purposes. They are to be used in the practical application of public safety measures, for they represent the best available international knowledge on each chemical’s safety.

The health risk evaluations of pesticides and food additives carried out by the Joint FAO/WHO Com-

The numbers game

mittees are translated into regulatory implementation through the Codex Alimentarius, with its 129 member states. In this fashion, the IPCS evaluations have an enormous economic impact on the world’s food and agriculture production and trade. Summaries of Acceptances of Codex Food Standards, including food additives, and Codex Maximum Limits for Pesticide Residues are published by the Codex Alimentarius Commission. These publications give the specific details of the manner in which countries choose to accept the recommendations. In general, it may be said that all of them accept the derived Acceptable Daily Intakes. The same uniformity does not apply to Maximum Residue Limits (MRLs) for pesticides, where many developed countries have derived their own limits based on local estimated intake. Most developing countries, lacking a strong regulatory infrastructure, tend to accept the Codex MRLs as a basis for commodity trade.

The extent to which other IPCS products are used by countries as a basis for their chemical safety programmes is largely a matter of supposition, although a survey of Environmental Health Criteria documents showed nearly half of the respondents claiming that the publications were being used for policy-making. Certainly, many would judge that, in developed countries, few regulatory decisions are taken on chemical problems without prior consultation of these documents at some stage, since they provide a peer-reviewed, unbiased evaluation of the dose-effect relationship. The ultimate regulatory action follows from development from this scientific base. Developing countries may be more liable to accept without question the risk evaluations produced by developed countries.

It is undisputable that, from mercury to mirex, from the PCBs to tetrachloroethylene, from mycotoxins to toluene disocyanates, the IPCS publications provide us with the basis and the rationale for regulating actions. In all our countries, the public and the media have become ever more watchful of their officials as the spirit of glasnost in the chemical field spreads. On the other hand, WHO's sound reputation is eagerly accepted as a talisman of objectivity and authority throughout the world. More and more, the importance of international guidelines for chemical safety is being recognised.
Midwives in Algeria

"My father would never have let me go out to work as a midwife if I hadn’t worn a headscarf. It’s also a guarantee of my bona fides with the women I visit."

by Olivia Zémor

It was only three months ago that Zahia took up her post as midwife at the maternity clinic of the town of Biskra, at the foot of the Aurès mountain range, but she has long since lost count of the many deliveries she has assisted.

Shapeless from successive pregnancies – ten or more in many cases – the women sitting in the hall of the clinic might be of any age. There is no hint of any male presence. Men have no access to these precincts and even the clinic’s director slips away after introducing Zahia to us. No father has ever been present at a delivery – it would be very shocking.

Khadija, whose eyes and tattooed forehead are all one can see of her under her veil, is nearing the end of her eighth pregnancy and is going to have her baby under medical supervision for the first time.

“It wasn’t easy to convince her, though she has already lost two babies at birth,” Zahia explains. The fact is that, in Algeria, one out of every two deliveries is performed by a matrone (traditional birth attendant) in dubious hygienic conditions, and even that figure does not reflect the disparities between town and country.

The maternity clinic, though, is spotlessly clean. Each woman’s stay there is limited to 24 hours so that her place is vacated quickly. In this short space of time Zahia tries to teach the mothers some of the rudiments of hygiene and nutrition.

Checking on the fetal heartbeat in an Algerian maternity clinic.

Photo WHO/B. Genier
A trainee midwife pays close attention during a nutrition class. Right: Healthy babies become healthy children; a scene in Algiers.

Photos WHO/E. Schwab and L. Sirman ©

Lying in cots beside their mother's beds, the babies are trussed from head to foot in swaddling clothes, quite unable to move. "All Algerian women believe that babies sleep better that way, and that it prevents them from having nightmares or hurting themselves by kicking about," explains Zahia. She thinks it better not to oppose this old-age custom but to concentrate her efforts on what she considers more important matters.

In particular, she wants to persuade Khadija, who lives in a small mountain village called M'Chouneche a few kilometres away, to go regularly to another midwife who will watch over her health and the baby's.

Farida, also a trained midwife, is a member of the mobile team operating from the maternal and child health centre at M'Chouneche, her native village, where she returned to practise after three years of advanced study at the Biskra para-medical school. Her monthly salary is about three times the minimum wage in Algeria. The "hejab" that covers her hair is, of course, a badge of religion but also a very useful credential in the practice of her profession.

"My father would never have let me go out to work if I hadn't worn a headscarf," she tells us. "And then, it's also a guarantee of my bona fides with the Berber women I go and visit."

Farida is "polyvalent" - that is, trained in several fields related to health. She deals with mothers, following them up through their pregnancies, but also with children and especially their vaccinations, which are the overriding priority in Algeria's health programme. A few years of routine immunization have produced spectacular results. There has been no childhood tuberculosis since 1977 nor poliomyelitis since 1984, and only two cases of measles were recorded at M'Chouneche in 1986, as against some 60 deaths from that disease two years earlier. When parents are slow to respond to a summons, Farida goes out and looks for them to perform the vaccination herself.

Away from the road, inside the nomad's tent where Farida takes us at our request, we can see for ourselves how well-kept the children's health booklets are in a family whose adult members are all illiterate. Only two children are late with their booster injections for one of the compulsory vaccinations - a "score" that many highly industrialised countries might envy.

After her vaccination round, Farida will start her tour of the wells. The water has to be inspected regularly, and every three months the mobile team replaces the porous clay bricks filled with chloride of lime that are laid at the bottom of communal and individual wells. With a little measuring device, Farida makes sure that the chlorine concentration is high enough to cut down the risk of disease.

"It's simple, it doesn't cost much, and the slow, regular diffusion doesn't give the water a nasty taste. We used to ask people to put a drop or two of bleach in every litre of water consumed, but many didn't do it and the result was a lot of cases of hepatitis A, dysentery, salmonellosis and even cholera."

With the problems of vaccination and water practically solved, it remains to tackle the spacing of birth. Not only has population growth in Algeria reached crisis point; it is also recognised that too many pregnancies, in too close succession, are a serious threat to women's health and that of their children.

"It's the most awkward problem to bring up with the women," Farida admits. "They are used to very large families and are often afraid of their husband's reactions. We sometimes try to get the husbands to come and talk about it, but without much success at present."

The hope is that the courage and intelligence displayed day after day by the midwives of the Aurès will enable the families they so devotedly serve to shake off the dead weight of unhealthy traditions.
Birth-spacing

With 860,000 births per year, an average of 6.4 children per couple and an annual growth rate of 3.2 per cent (one of the highest in the world), Algeria's population is doubling every 20 years. From 12 million in 1966, it had risen to almost 24 million by 1986, and is headed for 48 million by the year 2006.

The population is very young, with a large proportion of economically inactive persons, since 73 per cent are under 30 years of age. Every Algerian who works is the breadwinner for at least four people, so it is becoming ever more difficult for the country to provide amenities, education and health care for all.

The Algerian government has since 1980 been developing a programme of birth-spacing designed to encourage contraception which is "based on individual and collective consent" and which rules out abortion. After protracted discussions the Islamic Council, taking its stand on the Koran which emphasises that parents bringing children into the world have a duty to ensure their well-being and fulfilment, declared publicly that it was not opposed to the programme.

The health authorities have accordingly trained a thousand health officers from the maternal and child welfare centres - in particular midwives - to take charge of contraception.

"It seemed easier for the women to bring up this delicate problem during pre-natal and post-natal visits than to go to centres specially created for the purpose," commented Dr Hadj Lakal, the physician in charge of preventive health care at the national level. He added that the programme is being applied at some 340 maternal and child welfare centres distributed over the entire territory, and that around 25 per cent of married women now have access to contraception.

But it remains to convince and instruct a large number of Algerian women, many of whom are faced with opposition from their husbands and have difficulties about using the pill, which is the contraceptive method used in about 85 per cent of all cases.

Nearly 60 per cent of adult Algerian women are illiterate and come from peasant families in which every child is perceived as a pair of working hands and not as a burden, Dr Lakal pointed out. They marry young - at 21 on average - and may procreate for some 30 years. Certainly family allowances are no incentive for big families as they are very small. Moreover, fewer than 400,000 of them go out to work, which might otherwise act as a brake on their fertility.

But the government is optimistic. The mass access of women to education, and thereby to emancipation, will eventually make real planning of births a possibility. Fertility is already much lower among educated women, and schooling from six to 16 years of age will inevitably lead to a change of lifestyles, the health authorities point out.

Many individuals, however, feel that the urgency of the situation calls for drastic measures and wider mobilisation of efforts to popularise contraception, in particular by enlist ing the help of all the communication media in support of the authorities' aims.

Olivia Zémor
Bolivia's health couriers

These volunteers are taught basic skills, either by the nearest nurse or doctor, or in the nearest health centre. Their role responds to the reality and the needs of communities in many developing countries.

by Cesar A. Chelala

My first contact with Bolivia's Responsables Populares de Salud (RPSs), or community health care workers, was in Aracarani, a small community of some 20 families located several hundred miles north of the capital city of La Paz. We arrived there after several hours of a gruelling trip by jeep and, after a much needed overnight rest, a short trip by canoe.

I went to Bolivia as part of a team to evaluate a maternal and child health programme funded by UNFPA (the United Nations Population Fund). We were interested in finding out how Bolivia's health authorities have responded to the dramatic challenge of mortality rates standing at 48 maternal deaths for every 10,000 children born alive. In some parts of the country, the infant mortality rates are among the highest rates in the American continent.

In Aracarani we were received by members of the community, including the General Secretary, and by Ricardo Segarra, a man in his middle thirties, who was the RPS for this area. He described for us his work in the community, answered some questions, and made specific requests for supplies to the health authorities who were travelling with us. Afterwards, he took us to a small hut where he showed us with pride the materials with which he works: basic medicines (oral rehydration salts, anti-malarial and anti-parasite drugs, folic acid, penicillin and rifampicin), the health manuals he used for his own training, and a notebook where he keeps accurate records of births and deaths in the community.

Difficult access

With almost half of the population living in rural areas and a very low population density (fewer than six inhabitants for each square kilometre), Bolivia faces the problem of reaching a widely dispersed population with basic medical care. As we found at Aracarani, it is highly impractical for a doctor to travel to places that are very difficult of access in order to see only a handful of people.

The use of the RPSs forms part of a strategy to provide basic medical care that started in 1982. In that year, the democratically elected government of Dr Hernán Siles Zuazo put an end to a long series of military regimes which had continuously ruled the country for almost two decades. Predictably, those military regimes had not given high priority to people's welfare, a fact that had a negative impact on the health situation of the Bolivians.

During Dr Zuazo's government, with the active promotion of the Minister of Health, Dr Javier Torres Goitia, a programme was initiated to train volunteers from the local communities. They were taught some elementary techniques which would enable them to respond ade-
quately to people's most basic health needs. These trainees became, in addition, providers of information on the health situation in their communities. They feed back that information through intermediary channels to the central levels at the Ministry of Health.

**Basic skills**

The RPSs are taught basic skills either by the nearest nurse or doctor, or in the most accessible health centre. Among those skills are how to give injections, how and when to provide oral rehydration salts for the very common diarrhoeal infections, how and when to provide medicines for acute respiratory infections and for tuberculosis, and how to disseminate information on other frequent health problems. Because of the service they lend, in some places these community health care workers are called *chasquis de salud* (health couriers).

The role they play responds to the reality and the needs of many developing countries. The great distances that separate many communities and the difficulties entailed in reaching them make it more practical to train local people who, when facing problems they are unable to solve, refer the patients to the nearest health centre or clinic.

The Bolivian RPSs differ in some ways from similarly trained people in other countries of Latin America. Firstly, they are elected in their own communities, not sent on mission from the central levels as in most other countries. And they don't receive payment for their work - a fact that had led similarly trained people to leave their communities for places which could be of more economic benefit to them. The Bolivian RPSs do their job on a part-time basis, as an addition to the work which provides their financial support.

Up to now, it is estimated that more than 10,000 people have been trained as RPSs in Bolivia. The goal of the authorities is to have more than one such health worker in each community. Their selection at the community level takes advantage of the Bolivians' remarkable capacity for getting things moving at the popular level. “Considering that we are such a disorganized country, we as people are pretty well organized,” says Dr Mario Lagrava, one of the leading forces behind these efforts to train primary care workers.

Although it is not yet possible to measure the impact of the RPSs on the health situation throughout the country, it is evident that they are gaining increasing influence in their communities. From what I was able to see in other parts of the country, it is a safe bet that they will contribute significantly to an improvement in Bolivia's health situation in the near future.
The mini-doctors of Bombay

How a new community of former slum-dwellers in Bombay learnt to improve their own health through awareness campaigns, active participation, goodwill and — above all — the harnessing of children power

by Vijaya R. Bhalerao

Every second person in Bombay resides in one of its slums. It is not too harsh to say that these slums are health cesspools that risk choking the life of the city's environment. Without access to electric lighting, safe water, drainage and other municipal facilities, they are potential breeding grounds for disease. They represent a formidable challenge to the city authorities.

One response, back in 1976, was to resettle a population of 85,000 people from the slums in a new village named Malavani, about 35 kilometres from Bombay. The King Edward Memorial Hospital and its associate, the Seth G.S. Medical College, were invited to look after the health needs of this new community.

Among the constraints that the well-meaning health advisers faced were: very low incomes and a lack of local enterprise or opportunities to improve earnings; overcrowding and unhygienic conditions; lack of a nearby hospital or maternity home; total absence of community participation or health awareness; and a lack of any international assistance. A very high percentage of the population proved to be suffering from scabies, malnutrition, tuberculosis and leprosy, and there was virtually no immunization coverage.

All we had in the beginning was a token financial assistance of 50 paise (US 5 cents) per child per day, half of which was already committed to child feeding. In these discouraging circumstances, we started by developing some recipes to increase the protein-calorie intake...
By conveying messages about health in plays and songs, the children of Malavani become in effect “mini-doctors.”

Facing page: The community has also developed a series of board games that alert young and old to sensible hygiene.

And we very soon realised that the child is “the King of the Indian household.” It proved an easy matter to contact the mothers through the children, and to make the children our very effective and forceful carriers of health messages and persuaders of the community. The mothers came forward to act as our unpaid volunteers and helpers.

The next step was to start “mother-craft clinics.” We showed the mothers photographs of child foetuses who had died: one at three months into the pregnancy - lost because the mother was anaemic; one at five months - cause of death a sexually transmitted disease; one at seven months - a result of toxaemia. The mothers were appalled at the idea of losing their babies at such advanced stages of pregnancy. They sought more information, and insisted on offering their own blood and urine samples for clinical examination.

Next we started group exercises for mothers-to-be in a central hall, and encouraged them to “gossip” about their own experiences of motherhood and family health. Out of this emerged group discussions in which the women of Malavani themselves corrected the misconceptions of others and brought home to them the real causes and means of avoiding simple pitfalls.

Now it was time to involve the menfolk, who were usually the ones - for better or for worse - who took major decisions about the home and the family. They too proved ready to participate actively in discussions on health problems, and as a result there is today a far greater acceptance of family planning methods and a measurable reduction in perinatal mortality.

A community-based clinic for children under five proved popular. The mothers liked the informal atmosphere where feeding techniques and child-rearing practices could be demonstrated. Cooking classes also helped these sessions. The mothers noticed how the babies who attended this clinic were the ones who gained most significantly in weight.

To deal with scabies - a contagious skin disease resulting from unclean conditions - we hit upon the idea of creating a mobile tub on wheels containing a ten per cent solution of benzyl benzoate solution. Not just the patient but the whole family was given a “holy dip” in the tub; and the success rate was an astonishing 99 per cent cured.

X-ray camp

Each year, we hold a “camp” at the health centre where mobile x-ray facilities help to detect tuberculosis cases. Schoolchildren are encouraged to bring along relatives and neighbours for an x-ray scan. Many cases were discovered and treated, with a subsequent fall in the case fatality rate.

The Indian Council of Medical Research carried out research into a new leprosy vaccine on health volunteers and contacts of leprosy patients in Malavani, the results of which suggested that the vaccine has important potential. This research would not have been possible if the community had no faith in our activities. We consider that the success of this project was mainly due to the high level of confidence and rapport with the community that had been created.

The immunization approach was three-fold: through the schools, by door-to-door visits, and in the under-fives’ clinic and health centre. This succeeded in raising the coverage for complete primary immunization from 40 per cent in 1977 to 96 per cent by 1984. A survey conducted by WHO showed that sporadic cases of paralytic poliomyelitis which occurred in 1983 were “imported” from outside the community.
Only in 1982, when enough confidence and credibility had been established between health centre and people did we start routine family planning "camps." The response is ever increasing, and the results can be seen from the fall in the birth rate per 1,000 population from 27.5 in 1980 to 17.2 in 1984. Over the same period, the infant mortality rate per 1,000 live births dropped from 131 to 82.4.

"Surgery at the doorstep" was another innovation in Malavani, which proved both acceptable and cost-effective. It covered minor surgical operations, cataract removal, dental surgery, vasectomies and tubectomies. The postoperative infection rate was significantly less than that usually experienced after in-patient hospital surgery, and the family planning camps proved so popular that patients preferred to wait for the next camp rather than go to the general hospital in Bombay.

More recently we have started a programme for socially-handicapped women living in Malavani. Many women who worked in small-scale industries were getting a very raw deal indeed, and were being exploited by the many "middle-men." We gave them jobs to do at the health centre on a daily wage basis - jobs like stitching bed sheets to meet orders from large companies such as Air India. As their work expands, it helps to make this new community more self-reliant, so the community health programme is helping them to help themselves.

We founded The T-Club. This is mainly for defaulters among tuberculosis patients - known cases who have neglected to make regular visits to the health centre and have stopped treatment. Each meeting brings together not more than ten members. They include three defaulters, three patients suffering from TB and three cured patients. What invariably develops is a patient-to-patient discussion which makes everyone aware of the early signs and symptoms, underlines the importance of screening all family members, and points out how vital it is to attend the centre regularly for at least a year. This informal discussion has succeeded where repeated letters, home visits and reminders have failed; the defaulters invariably understand that by neglecting themselves they threaten the health of the whole community. After six months, 60 per cent of the defaulters had been regular attenders.

Green leafy vegetables now grow in the health centre's own kitchen garden. They serve as a rich source of vitamins and minerals, and are included in the midday school meals and in the food at the nutritional rehabilitation centre for children suffering from grade III malnutrition. Children - and particularly those who are lame or physically handicapped - enjoy the work of tending the plants.

And indeed the children's involvement in health activities has surpassed all our expectations. They conveyed messages about health in plays, songs, dances, street theatre and so on. But as they became the unpaid but always willing associates of the health centre, they became in effect "mini-doctors." They proved capable of detecting such ailments as tuberculosis, anaemia and scabies, and of persuading sufferers to come forward for treatment.

Not long ago, the children went from house to house in the poorest area of Malavani (where about a third of the people live), and treated 253 cases of diarrhoea with oral rehydration salts. All except four agreed that they got relief as a result!

Now we have gone one step
Left: On the march. Children have proved to be effective and forceful persuaders of the community. Right: And the children persuaded this young mother to bring her child to the mobile immunization centre.

Photos WHO/V. Bhaleoro

further. We are using the children as health educators, a role for which their natural energy and enthusiasm makes them well fitted. They go on even when the adults are flagging, and are always full of new ideas and suggestions.

With the help of funds from the Aga Khan Foundation, a project was started to assess how effective the child is as an “agent of change.” A total of 200 children were invited to “adopt” 1,200 families comprising a total population of 6,000. Besides offering oral rehydration therapy to diarrhoea cases, the youngsters set to work to motivate “their” families to come forward for immunization – and the results worked out at 90 per cent. They arranged a small procession and at given points enacted a street play about the dire effects of not being vaccinated; mothers and fathers living nearby naturally came out to watch. Each child stuck a UNICEF sticker on the door of any house where there was a baby up to one year of age, and then convinced the mother of the need to bring the baby to the mobile immunization centre which toured the area.

These child prodigies went on to detect which women in the community were suffering seriously from anaemia, they grew their own kitchen gardens around their houses, and they set ostentatious examples of how cleanliness leads to better health.

This is a prime example of using local resources effectively without incurring additional cost. The children freely use simple psychological plays, play on family sentiment and religious beliefs. And they have no inhibitions about mixing freely with all the population to better appreciate their anxieties, hopes and phobias and jointly solve their problems. We have found it most rewarding to treat children as adults and, through them, to secure their own future health.

We health workers in Malavani do not claim any stupendous or earthshaking achievement. But we are content to have proved that, however big the problems may be, if we can only harness the power of human good sense and good will and direct it to useful purpose, then nothing is impossible.
Schistosomiasis is a major endemic disease in Brazil, where there are estimated to be more than eight million carriers of *Schistosoma mansoni*. The disease was introduced into the country when Brazil was still a Portuguese colony, from the seventeenth century onward, with the arrival of African slaves put to work in the sugarcane plantations in the north-east of the country. This is where the environmental, social and economic conditions were most favourable to the development of the disease: the presence of the intermediate snail host; a great many stretches of unprotected water; very poor living standards for the slaves; and a complete absence of personal hygiene.

From the north-eastern region, schisto spread to other parts of Brazil, carried by workers migrating to seek a better life in more developed areas. From 1920 onwards new foci of the disease emerged in areas far from the north-eastern region.

Since the 1940s, efforts have been made to control the disease. But it was only in 1976, following the discovery of oxamniquine, an effective drug that is relatively safe for mass application and can be administered in a single dose, that the control activities were organized into a national programme.

Between 1976 and 1979 the Special Programme for Schistosomiasis Control (PECE) was developed, with resources of the order of US$ 255 million and under the direct control of the Minister of Health. Politically and economically speaking, therefore, schisto control became a national priority. From 1980 onwards the Special Programme was integrated with the work of the Department of Public Health Campaigns (SUCAM), a Ministry of Health body responsible for the control of endemic diseases in Brazil. It thereby lost its special character and became known henceforth as the Schistosomiasis Control Programme (PCE).

The principal objective of the PECE was to control the disease in Brazil through specific chemotherapy, supplemented by intensive health education, measures to curb the intermediate host (the *Biomphalaria* water-snail) and improvements in basic sanitation. Control implied reducing the prevalence of the disease to levels below four per cent.

The programme started in the north-eastern region, and its awesome task was to perform 14 million faeces examinations, to treat 12 million people and to apply molluscidals like this can set back months of effort to protect watercourses from the snail vector of schisto.

Photo WHO/P. Abensur
scicide in 2,000 counties. The method adopted in the areas of transmission was to carry out a faeces survey among schoolchildren, then to treat the entire population when infection proved greater than 20 per cent among schoolchildren; to treat children under 15 years of age only when the “positivity index” was between four and 19 per cent.

Schistosomiasis, also known as bilharziasis, is a parasitic infection caused by a flatworm, or schistosome. Eggs excreted by an infected person break open on reaching water, releasing a tiny parasite (miracidium) which swims in search of its next host - a freshwater snail - in which it can develop further. Inside the snail, the parasite divides into thousands of new forms (cercaria) which re-enter the water, this time in search of a human (or mammal) host. It penetrates the skin, sometimes causing slight itching, and presently becomes a long worm.

Male and female live together in the human body for as long as 40 years, unless the person is treated. The worms attach themselves to the walls of the intestines or the bladder and start the work of damaging these organs. The infected person may suffer paralysis of the legs, and often has swollen limbs and abdomen, and feels weak and lethargic - with very severe effects on productivity, especially in poor countries. There is a clear link between schistosomiasis and a specific type of bladder cancer.

and to treat positive subjects only when the index was below four per cent. At the same time molluscicide was applied to bodies of water which proved to contain the water-snail or which were greatly frequented by the population. Close to irrigation and hydro-electric schemes the survey covered the entire population, with treatment of all positive cases. The faeces examination took place in mobile field laboratories.

The measures for diagnosis and treatment of the disease and for snail control were accompanied by health education and activities aimed at improving basic sanitation. From 1980 onwards, the PCE made no far-reaching changes but raised the threshold above which the entire population of the locality was treated to 60 per cent. When the index was between four and 60 per cent, only subjects aged between five and 25 received medication, and below four per cent only positive subjects were treated.

Harmonious and coordinated activities proved very difficult under field conditions, and this is why anti-schisto efforts have not been uniform in the different states. Activities to improve sanitation take a long time before they are effective. And it is hard to coordinate mollusciding activities with mass medication in a small locality because of climatic conditions, the unreliability of the data collected on snail population dynamics, programming problems and so forth. In practice, because they are easier to carry out, activities for diagnosis and treatment of cases have predominated. Treatments are evaluated every six to 12 months, and re-treatment is performed whenever necessary.

The concrete result of the programme has been to reduce the prevalence of infection and the overall percentage of severe forms in a great majority of the localities covered. In fact, it has resulted primarily in control of the disease and to a lesser degree in the control of transmission. The latter is much more dependent on better basic sanitation and on education of the public - factors which can only be achieved through the economic and social development of the rural populations and of people living on the fringes of the great cities.
When Brazil’s Special Programme for Schistosomiasis Control (PECE), based on chemotherapy, started in 1976, it was assumed that, with the reduction of the parasite load, fewer eggs would be excreted. This would result in a low level of infection among snails, and ultimately the cercarial density in the waters would be so low that human infection would be either non-existent or sporadic and mild. This has occurred spontaneously in Amazonia, and more recently in Tunisia it resulted from the intensive, but not exclusive, use of chemotherapy.

When the programme was first announced, a number of Brazilian research workers interested in the schisto problem, including myself, were greatly concerned for three main reasons. We had recently had experience with hycanthone, a drug which proved promising in the initial trials but which, when introduced on a large scale, was found to produce massive necrosis of the liver and even death in some individuals. Secondly, we knew that patients who were treated and cured could easily become reinfected. Since we understood that other necessary measures in the fields of health education, sanitary engineering and improvement of social conditions would not be carried out, we feared that prevalence of infection would continue at the same level, and that ultimately the pharmaceutical company manufacturing the drug would emerge as the sole beneficiary of a campaign financed with public money.

Thirdly, since 90 to 95 per cent of infected individuals showed mild forms of the disease and were presumably immune (concomitant immunity), it was feared that cure of the infection might be followed in some cases by massive reinfection, producing a result counterproductive for the programme.

Everything pointed to the fact that it would be better to carry out a preliminary evaluation of the problem, with well-controlled treatment in small areas, before initiating treatment on a large scale.

Today we have definite evidence that the campaign, planned on the authoritarian model in force at that time, had many weak points. It was extremely extravagant, failed to pay due attention to social back-up measures, did not plan for the evaluation of results and did not keep to its timetable. Initially, mass treatment was accompanied by a sharp reduction in the prevalence of infection, but after a few months the indices began to rise again and...
House to house visits by the health worker ensure that children receive and swallow the drug treatment. The result has been the gradual disappearance of severe forms of the disease, especially in young people.

Gradually returned to the previous levels.

With the passage of time, however, there was a fundamental and relatively unexpected development in the areas where the population was treated: the gradual disappearance of the severe forms of schistosomiasis, especially in young people.

We now all suspect that Brazil is experiencing a vast parallel "programme" of schistosomiasis control as a result of the routine application of chemotherapy. Indeed, so much has been said about the miraculous new drugs that most physicians in all parts of the country do not hesitate nowadays to prescribe them when *S. mansoni* eggs are detected in the faeces of their patients.

In places where hepatospleno-megaly (enlarged liver and spleen) and digestive haemorrhages used to be common, clinicians have noted their gradual disappearance. In the hospitals that used to receive cases of advanced schistosomiasis, whether close to endemic areas (Recife, Salvador) or in cities more distant from those areas such as Sao Paulo and Rio de Janeiro, such cases have become less common in the wards, in the operating theatres and on the post-mortem tables.

There is at present no objective evaluation of the true schistosomiasis situation in Brazil today. The data are derived from studies of small areas and groups, and from informal reports by physicians, surgeons and public health officers with experience of dealing with the problem. Nevertheless, there is an extraordinary degree of agreement in almost all the reports.

The experience gained with the large-scale schistosomiasis treatment programme in Brazil has confirmed some fundamental facts and brought to light others. For instance, schistosomiasis control is related to the intensity of infection, its cure is followed by residual immunity, and reinfected patients generally acquire lower parasite loads than they had before. So it would therefore be no exaggeration to state that the great changes experienced in the field of schistosomiasis in recent years are associated with the advent of new, practical and efficient curative drugs.
He gave quinine to the world

by John Bland

Quinine brings relief to millions of malaria sufferers around the world, yet there are aspects of the story of quinine that have not hitherto been told. One well-known tale relates how the Countess of Chinchon, wife of the Spanish Viceroy to Peru was stricken with fever in 1638 and close to death. She was administered a powder made from a miraculous tree bark, and recovered. She then made it her business to collect the miracle cure in quantities and distribute it freely to poor people in Lima suffering from the ague (malaria), and later to peasants in Spain when she returned there.

Unfortunately — as Dr Gabriele Gramiccia recounts in a newly published book — the whole tale is a manufactured myth and was exploded 40 years ago. The Countess never suffered from malaria in Lima, never distributed the bark in Peru, and died of some quite different malady before she could return to Spain. But the legend was as deep-rooted as the miraculous tree, and when the great Swedish botanist Carolus Linnaeus needed a name for it, in 1742, he gave it the generic name Cinchona in honour of the Countess — whose name he misspelt. (The word quinine, on the other hand, resulted from another confusion: the local name for the rather similar Peruvian balsam tree was quinaquina).

Gramiccia's story is in many ways even more romantic. His book "The Life of Charles Ledger" (just published by Macmillan Press, price £30) is a meticulously researched account of a 19th century English trader who travelled widely in South America and Australia, and whose vision and determination brought the miracle of quinine within reach of everyone.

One of his companions in the Andes, Santiago Savage, recorded Ledger's adventures in vivid drawings and water-colours, reproduced as illustrations in the book.

Born in 1818, Ledger set out for Peru at the age of 18 to earn his fortune with a British trading firm. He learnt to speak Spanish and the local Indian dialects, and won the confidence of a Bolivian Indian, Manuel Incra Mamani, who had the knack of identifying 29 different sorts of cinchona trees. Together they explored the unmapped territories east of the Andes looking for trees that would yield the highest quantities of quinine.

Ledger hoped to recover his costs by selling the seeds so that cinchona plantations could be established and managed on British soil. The national authorities of the day objected quite reasonably to a foreigner's efforts to remove the seeds, and Manuel paid for his loyalty to Ledger with his life; he died after being severely beaten in prison.

But the British authorities were not very interested in Ledger's seeds. Instead it was the Dutch who profited from his enterprise. Those seeds formed the basis of the highly lucrative Dutch cinchona plan-
tations in Java - now Indonesia - and in other tropical countries. The Dutch government was no more generous than the English, however. Ledger's reward for contributing to their trading fortunes was a cash payment of less than £100, followed much later by a pension of £100 a year for life - awarded when he was aged 78.

Nevertheless, the seeds that he had smuggled out of Bolivia revived a flagging world interest in quinine because the trees that grew from them were much richer providers of the anti-malarial drug than any other species. In 1881, this variety of tree received the name *Cinchona ledgeriana*. Years later, during World War II, descendants of Ledger's seeds were flown out of the Philippines (as that country fell to the advancing Japanese) in one of three U.S. Air Force Flying Fortresses. Two of the bombers were shot down but the third, with the seeds, reached safety. So *Cinchona ledgeriana* returned to Latin America and resulted in large plantations growing up to ensure that the Allied powers were not deprived of the vital anti-malarial drug.

Dr Gramiccia, a leading malariologist who worked for WHO for 28 years before retiring in 1976 and becoming director of the Australian Army Malaria Research Institute, has subtitled his book "Alpacas and quinine." Charles Ledger coupled his efforts with cinchona seeds with a no more rewarding attempt to import alpacas - the particularly woolly type of llama - into Australia. He drove a flock of the animals in great secrecy and with much hardship over the snow-covered passes of the Andes to the Chilean coast, outwitting the local authorities who had every reason to prevent valuable breeding stock leaving their country. But the government of New South Wales in turn went back on their verbal promises of a reward for the animals; their interest was only in sheep.

Ledger retired to Australia with what little money stuck to his unbusinesslike fingers, and died a pauper in 1905, aged 87. His grave in the Rockwood Methodist Cemetery in Sydney bore only the names of his second wife's brother and sister. After the remarkable story that his researches threw up, Gramiccia had a new tombstone erected, with the help of a donation from the Dutch quinine manufacturer ACF Chemiefarma. Beneath the name of Charles Ledger, the stone is engraved with the words: "He gave quinine to the world."
Non-Smoking: Begin With Kids Under Age 11

A study of children’s behaviour in 10 European countries has shown that health education programmes to encourage non-smoking should begin with under 11-year-olds. And that programmes to help children quit should begin with 13-year-olds—before they succumb to the addictiveness of tobacco.

According to the results of samplings among children of those ages: “Already by the age of eleven, some 30 per cent of boys and 20 per cent of girls have tried smoking,” and by age thirteen, 48 per cent of boys and 43 per cent of girls smoke.

All told, the study is based on a survey of some 38,000 children, 13,000 aged 11, 13,600 aged 13, and 11,600 aged 15. About a half were boys and a half girls in the three groups.

Carried out by the WHO’s regional office for Europe, the study is aimed at determining how many children in the three ages smoke—daily, weekly and occasionally, that is less than once a week—why they do so, and what can be done about it.

The study was presented last month at the 1st European Conference on Tobacco Policy held in Madrid.

“It is vital to commence educational programmes during the period when most children experiment,” the report counsels, “and before they become regular smokers.”

Although at age 11 “daily or weekly smoking was relatively rare,” the report says, samplings showed countries with “high rates of occasional smoking especially among boys.”

It is between ages 11 and 13 that “an increasing number take up smoking on an experimental basis,” the report notes. While 0.5 per cent of boys and 0.1 per cent of girls smoked daily among 11-year-olds, the numbers increased to 3.9 per cent for boys and 4.1 per cent among 13-year-olds girls.

At age 15, the number of daily smokers increased to 15 per cent for boys and 13.8 per cent for girls. Increasing still more to about 30 per cent for both sexes by age 18.

“More than 60 per cent of children had tried smoking by the age of 15,” the report says. “Almost a third will be daily smokers before age 18... and eventually addicted smokers.” Among teenage smokers, girls are in the majority.

Where under-age kids get cigarettes, despite laws.

Editor: Peter Ozorio

Celebrating the Role of Sports in Health.

Celebrating the role of sports in health, these U.N. stamps draw inspiration from the pledge by the International Olympics Committee and WHO to promote healthy lifestyles. The two organizations committed themselves to that goal following an aide-memoire signed in 1985 by them.

Appropriately enough, the stamps were issued in the year of the 24th Olympic Games. Said U.N. Secretary-General, Javier Perez Cuellar, in a comment on their theme: “Active physical exercise is a necessity for everyone at all stages of life.”

The stamps were designed by U.S. artist LeRoy Neiman, described as a “master of sports art,” and, in 1984, the official artist to the Winter Games in Sarajevo, and the Summer Games in Los Angeles.

The stamps are available from the U.N. post office in New York (denominations of 50.25 and 50.38 cents), in Geneva (Swiss francs 0.60 and 1.40), and in Vienna (Austrian schillinge 6 and 8).

In a related development, the decision to hold the Seoul Olympics last September in an essentially smoke-free environment was applauded by WHO Director-General, Dr Hiroshi Nakajima. He said, in a tribute to the organizing committee, that it had put the cigarette where it belongs, “out of bounds.”

The committee in Seoul is the second, after Calgary in Canada, to have taken measures to limit smoking during the Olympics. These decisions “unequivocally make the point,” he said, that “there is no place for tobacco in the world of sports.”

While commending the organizing committees of the 1988 Olympics, Dr Nakajima deplored “advertisements that link tobacco with sport and healthy living,” as well as practices by cigarette manufacturers that circumvent bans on television advertising.

He referred specifically to the sponsorship of such events as Grand Prix car racing, snooker tournaments and sailing racing. Because of TV coverage of such sporting events, cigarette logos and colours are constantly seen on screens, thus in effect indirectly advertising the brands.

“There is no more fitting moment, therefore, than these Olympics to sound an alert against such practices, and to urge all countries to resist them through legislation, and through health education and information,” he said.

From UNEP: A Sober Report on Global Contamination

Some 600 million people today live in urban areas throughout the world where the average level of sulphur dioxide pollution endangers their health, according to a first global report on the effects on human health of air and water pollution and food contamination.

A billion more are exposed to pollution from coal, wood and oil combustion and automobile traffic dust, writes Horace Avari, for the Third World Network Features, a service of the Consumer’s Association of Penang, Malaysia.

The report is the work of the Global Environment Monitoring System (GEMS) of the U.N. Environmental Programme. Details:

Air. Monitored from 170 sites in or around large cities in 50 countries where pollution levels are generally highest. According to Richard Jones, the GEMS director, the places chosen represent different climatic conditions, levels of development and pollution.

Water. Monitored from 344 stations, 240 of them on rivers, 43 on lakes and 61 on ground-water servors. European rivers have the highest average levels of, primarily, nitrogen and phosphorus, the report says, “some 45 times higher than their natural level”. This results in algal blooms that are harmful to fisheries. And because of the high levels of chemicals in rivers, the cost of “producing safe, palatable drinking water” has risen drastically.

UNEP warns that as a result of population increases and the deterioration of water quality, the per capita availability of water fit for human consumption is dwindling rapidly, and in the Third World will decline by almost 50 per cent by the year 2000.

Food. Monitored from 19 contaminants in more than 400 individual foods in the diets of 35 countries.

In light of the decreased use of pesticides in many industrialised countries, the report points out that pesticides are still in the soil and water and can enter the food chain. As a result, measurable levels of these chemicals continue to occur in foods of animal origin such as fish, milk and meat.

The lowest concentrations of lead in blood were found in...
**Newsbriefs**

**“An Open Mind is the Morale Essence of Medicine”**

So says the calligraphy here by Dr Taro Takei, President of the Japan Medical Association (1975-82), and the World Medical Association (1987-82), who has given his name to a programme in international health administered by the Harvard School of Public Health.

With an endowment from two pharmaceutical companies, Tsumura Jinten no Inc. and Kaken Seivaku, the programme provides graduates and mid-career professionals with a 10-month fellowship beginning on 1 September 1989. The deadline for application is 15 January. (For details write to Professor David Bell, Takei Programme in International Health, Harvard University, Boston, Mass. 02112).

**No More Free Samples:** The United Kingdom's baby food industry has agreed to discontinue the long-established practice of giving away free samples of baby milk powder in hospitals, thus in effect, complying with WHO's International Code of Marketing Breast-milk Substitutes.

The move by the Infant and Dietary Foods Association of the Food and Drink Federation, was timed to coincide with a nation-wide initiative, launched in October, to promote breastfeeding, for which the industry also pledged financial support. These decisions drew praise from Parliamentary Secretary for Health, Edwina Currie, who characterised developments as a "further step by the government, in partnership with industry, to protect breast-feeding.

**Presidential Warning:** In an address to mark the 40th anniversary of WHO, Sir Dawda K. Jammeh, President of Gambia, had this to say about smoking: "The threat to health of tobacco, and the role that advertising plays in promoting smoking, is one of the most serious health hazards in the developing countries."

**Generic Drugs:** A 17-month campaign led by Dr Alfredo Bengzon, Secretary of Health for the Philippines, resulted in the adoption of the Generic Act of 1988 by the country's legislature. Signed into law by President Corazon Aquino last September, the act reflects policy to make low-cost drugs available.

According to the Department of Health, a total of 11,412 medications were registered in the Philippines at the end of last year. Of those, 8,067 were brand name, and hence more expensive. Thus, it has been estimated that 3,345 were generic drugs.

**Changed Name:** Hungary has advised WHO that the Szeged University Medical School has changed its name to the Albert Szent-Gyorgyi Orvostudomanyi Egyetem (P.O. Box 479, H-6701 Szeged). The change will be reflected in the seventh World Directory of Medical Schools.

In the next issue

The January–February 1989 issue of World Health takes as its theme the slogan of this year's World Health Day: "Let's talk health." Only if we make sure of all the available means of communication can we ensure that the messages of good hygiene and sensible lifestyles arrive where they are needed: the country, the town, the village, the family, the individual. This issue examines some of the ways of "putting the message across."
Immunization for a young Bolivian at the competent hands of a community health worker.

Photo WHO/PAHO/D. Downie