Editorial

"As knowledge advances and understanding grows, the prospects are even brighter for the eventual conquest of leprosy. . . . I wish all associated with the world-wide efforts to alleviate the suffering associated with this disease the greatest success in the years ahead."

These words formed part of the message President John F. Kennedy sent to all leprosy workers at the end of 1961. Incidentally, this was the same year in which he predicted that man would set foot on the moon before the end of the decade. As I am writing these lines, on an historical Sunday, 2 men will actually land on the moon within the next 12 hours.

Many things have been accomplished over the last 10 years. In his efforts to control his environment, man increases his knowledge of the world and develops new tools. The moon has been conquered, the genetic code has been unravelled, poliomyelitis is disappearing, rubella becomes preventible, and hearts are re-used. But leprosy at least has not yet been controlled. One of the most ancient scourges of mankind, it is still with us, affecting millions of people the world over. Yet, considerable efforts to fight the disease have been and are being made in many quarters, through national and international bodies, official and voluntary agencies. As a cheap drug, definitely active and easy to administer, the sulphones raised great expectations for controlling leprosy on an out-patient basis. The principles of their action seemed simple, for there is a consensus of opinion that leprosy is caused by *Mycobacterium leprae* and that patients affected with the disease constitute the sole reservoir for the micro-organism; destruction of all *Myco. leprae* through treatment of all the patients should, therefore, put an end to the transmission of leprosy. Throughout the world thousands of leprosy workers are tracking the bacterium by case-finding and early treatment. Provided that enough enthusiasm, enough workers and enough bicycles were available, it looked as though giving every leprosy patient the chance to get his weekly dose of the drug regularly over a number of years would eventually make the disease disappear from the earth.

However, is it too much to say that, unfortunately, the hopes raised 20 years ago, when sulphones were first used on a mass-scale, have not been fulfilled? Although some localized efforts in selected areas or countries have been successful, our aim to control leprosy on a global scale within a decade or two has not been achieved. In some areas, between 3 and 4% of the population are still affected. Still worse, new patients are appearing. Although no precise figures are available, it has been estimated that over the whole world the number of new cases per month runs between 15,000 and 20,000, a figure which most probably exceeds the total number of patients either cured or dead during the same period of time; it is even possible that the balance of cases is "in the red"; and while the population of the world continues to increase this figure is not likely to level off.

In spite of the accumulation of a bulky mass of statistical data, often complete and well collected, there have been few attempts to use them to evaluate the efficacy of large mass campaigns in controlling leprosy. Local experience in some areas is, however, somewhat disturbing. In a pilot study in India, with intensive case-finding, prevalence was found to be reduced by between 33 and 72% after 10 years of mass treatment. Although no threshold has been defined, it is generally admitted that interruption of transmission of the disease requires that a large proportion of the patients must be treated, more particularly those with lepromatous leprosy. Yet, in a relatively small country in Africa, it has been calculated that it would take over 25 years to ensure a progressive treatment coverage of the whole population with the resources at present allocated to leprosy control, and allowing for the comparative importance of this disease in relation to other health problems. In other

African countries where extensive coverage has been achieved for some 15 years, it looks almost as though the greater the number of patients treated and cured, the greater the number of new cases that arise. These are data from areas where relatively regular treatment of the patients may be expected. Every leprosy worker knows by experience, however, how difficult it is to secure regular attendance for treatment and how distressing is the rate of drop-out. The duration of treatment required to suppress the source of infection in any one patient is not known with certainty. Studies conducted in the Congo have shown rates of 50% and 90% of non-infectivity in lepromatous patients regularly treated with dapsone by mouth for $5\frac{1}{2}$ and 9 years respectively. Animal studies with *Myco. leprae* suggest, however, that the bacilli die after a much shorter period of treatment.

Thus, despite all our efforts and the availability of an active drug, the situation is not very bright. It is high time to stop for a moment and think, and ask ourselves: why did we not succeed? or at least why did we not succeed according to our expectations?

There may be many reasons for this, some good and some bad. Lack of money or of roads, poor local administration, shortage of personnel, or low priority for leprosy as compared with other health problems—these are some of the reasons that may be true locally, or for some campaigns, but they cannot explain the lag of leprosy-control activities in the world. We all know full well that compared with other diseases, leprosy is not desperately short of money. Poor roads, weak administration, insufficient personnel and other factors may also be reasons in some places. There is no easy pathway to the moon, but man tries to get there. There may be little or no administration in a locality, but when cholera strikes everything is organized at once; in the case of malaria there may be no personnel, but thousands of workers are soon set to spraying huts or distributing antimalarial drugs on a mass scale in the bush! As far as priority is concerned, this depends on the epidemiological situation in the various countries; in many parts of the world leprosy, be it only for the deformities it causes, is and will remain a high priority. The question that is still very debatable is not so much leprosy itself as perhaps the way leprosy control activities are carried out. These are incidental reasons which may or may not apply locally.

We may, however, wonder whether there are not perhaps more general explanations why leprosy control has not come up to expectations. It might well be that we embarked on these activities without sufficient knowledge of the natural history of the disease. *Mycobacterium leprae* was identified by Hansen around 1873. Almost a century later we are still unable to cultivate the organism *in vitro*. Animal inoculations have persistently failed, and recent achievements in the inoculation of the footpads of mice are not exactly what could be termed a routine technique. All this is well known and has often been repeated. It means, however, that no simple experimental model is available, with the result that neither bioassays, nor screening of drugs, nor studies for the production of a possible vaccine, are yet possible.

It is widely accepted that man is the sole reservoir of the organism. With respect to transmission, nothing is positively established, not even the route of entry. What happens to the mycobacteria once they are inside the human organism and during the months and even years of latency is not known either. The factors governing the host–parasite relation which determine whether an individual develops lepromatous or tuberculoid leprosy are a matter of speculation and conjecture, to say nothing of the factors involved in borderline transformation.

With respect to environmental factors, we known one thing—probably the only thing known for certain in the epidemiology of leprosy—and that is the higher risk of contracting leprosy by home exposure to lepromatous patients, as compared with similar exposure to tuberculoid patients or with

absence of exposure in the home. This is not saying much. To imagine what would be the efficiency of malaria control if we knew nothing about anopheles, or of tuberculosis if we had no access to *in vitro* models for drug screening, we have only to look back to the past. It is true that Snow was able to control cholera in London before the cholera vibrio was known and in the days before the bacteriological era, but this only shows that cholera control is less difficult than leprosy control.

Knowing so little, workers in leprosy quite naturally indulged in great hopes as soon as the sulphones became available. For centuries, with a few notable exceptions, the care of leprosy patients had been conducted in a swamp of ignorance, prejudice, denial, and sometimes selfishness. Suddenly it had become possible to cure the disease; all that seemed to be needed was simply to discover the patients and then treat them regularly with sulphones for a few years. Hard work and dedication would do the rest. Of course, hard work and dedication are still imperatively required. Nothing can be achieved without them. The point is that as man proceeds in the conquest of his environment, be it celestial bodies or diseases or social plagues, hard work and dedication have even more to be supported by knowledge. Columbus could afford to rely on courage, tenacity and chance to discover America, coupled with what seems today very meagre information and few techniques. Astronauts need no less courage and tenacity, and even good luck, but these qualities must be supported by a vast amount of sophisticated knowledge and elaborate planning. It is possible that accomplishments which can be achieved by "know-how" and goodwill alone are on the verge of being exhausted; further conquests, including that of leprosy, will require a great deal more investment in research.

In order to conquer leprosy, we need to know more about the deep mechanisms involved in the life and transmission of the infective organism responsible, the reaction of the human host, and the behaviour of the disease in populations. This means increased knowledge in the fields of microbiology, immunology and epidemiology. Then we shall eventually be able to face leprosy with more powerful weapons. Then efficient logistics for controlling the scourge could be planned, as is the case in the control of tuberculosis or yaws or smallpox.

Examples of potent weapons are either a specific vaccine—and this is speculation—or a fast-acting drug. This implies the cultivation of *Myco. leprae* and a demonstration of animal transmission. How many research workers in the world are involved in developing *in vitro* models at the moment? Only about a dozen and a half or so, I would guess. In the meantime, we have to do our best and continue with the present methods of sulphone mass-treatment. As we wait for new developments in research, this is our present task and the only thing we *can* do. However, in order to increase efficiency, control activities should be more completely assessed. An epidemiological evaluation of the present methods of control is badly needed. A business approach, and recourse to the methods used in economics, should be considered: for instance, a study of why we do not succeed in making patients accept treatment. Only so will it be possible to plan leprosy control activities efficiently, according to the needs and available resources, and with due consideration for all the other problems existing in the same population. And let us mean by planning the setting-up of priorities and the choice of optimal strategies in a concrete way, geared to the real situations, and not this kind of society game and self-deluding jargon which at times is called "planning".

On the other hand, research should be accorded a much higher priority in leprosy. If research does not provide us with new methods for controlling the disease, then whatever the amount of work, dedication, and money we put into control activities, we run the risk in 20 years from now of seeing not 15 million patients but perhaps twice as many. At the moment, the proportion of leprosy funds used for research is unreasonably low, especially when one considers

that one simple discovery (for example, in the field of microbiology) could change the face of the disease in the world and mean a cure for millions. More funds for research are thus positively needed; and this would be a safe choice, since it is known where the attack should be made and which type of research should be conducted to obtain a return considerably exceeding the sum invested.

Decision-makers concerned with the allocation of funds face a great responsibility. Either they will promote research, or run the risk that for many years to come efforts will be nullified and hopes deceived. More research is needed if the present dedication and activity of many workers are to yield their full results. Let us therefore not permit leprosy to play us its last trick by deceiving us into remaining romantic and thinking that action can replace knowledge.

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