Pre-congress workshops

From 16 to 18 February 1984, workshops were held on the following subjects: Experimental Leprosy; Microbiology; Immunology; Experimental Chemotherapy; Epidemiology and Control; Teaching and Training; Social Aspects. As on the occasion of previous congresses, the reports were prepared by the chairmen and rapporteurs and distributed to all delegates.

Experimental leprosy

The workshop reviewed advances in the last 5 years in 4 major animal models of experimental leprosy: a, immunologically-intact mice; b, armadillos; c, athymic, nude mice and rats; and d, primates.

Immunologically-intact mice continue to be the experimental leprosy model of choice for determining drug sensitivity of clinical isolates of *Mycobacterium leprae*, for routine determination of viability of *M. leprae*, for determining the bacteriostatic or bactericidal action of antileprosy drugs and other uses. A newer model was presented consisting of an immune tolerant animal following the intravenous injection of $10^7$ *M. leprae* in naive mice. In mice rendered tolerant by intravenous injection of *M. leprae*, intradermal challenge does not result in DTH. Various potential antileprosy vaccines have been used as a means of overcoming this tolerance. With the possible exception of BCG, none have been successful.

Armadillos continue to be utilized primarily for the production of *M. leprae*. Armadillos from the USA consistently are capable of yielding large numbers of *M. leprae* (more than $10^9$ bacilli per gram of tissues from liver, spleen and lymph nodes) within approximately 2 years of inoculation with viable bacilli. Wild armadillos caught in the USA sometimes have a variety of other infections including: a, natural infection with *M. leprae*; b, *Sporotrichium shenkii* (up to 63%); c, coryneform organisms; d, cultivable mycobacteria; e, *Trypanosome cruzii*; f, *Salmonella typhimurium*, Coccidiodosis, etc. Natural infection with *Mycobacterium leprae* seems to be found in Texas and Louisiana but not in Florida, USA. Successful breeding of nine-banded armadillos (*Dasypus novemcinctus*) in captivity has occurred in Brazil. Experimental transmission has also been successful with *D. hybridus* in Argentina. This species is of considerable interest since it breeds easily in captivity.
A number of laboratories around the world are now working with nude mice as a model of lepromatous leprosy. Yields of bacilli as high as $10^{11}$ per mouse have been reported 18 months after inoculation with high doses of *Mycobacterium leprae*. In Nepal, excellent survival of nude mice has been reported in a clean room without special isolators. *M. leprae*-infected nude mice are being used as models for chemotherapeutic and immunologic studies. Other work has utilized neonatally thymectomized Lewis rats and congenitally athymic rats.

Renewed efforts to utilize primates as models of leprosy have been successful. Naturally occurring leprosy has been reported in a sooty mangabey monkey. The animal, captured in West Africa and subsequently suspected of having leprosy, was further investigated and the diagnosis confirmed. Histologically the lesions were of the sub-polar lepromatous type of leprosy. The AFB found in large numbers were indistinguishable from *M. leprae* by the available parameters of identification. The organisms from this monkey were passaged to 2 mangabey monkeys, 2 rhesus monkeys, 3 African green monkeys and 3 squirrel monkeys. Inoculation was by intravenous as also intracutaneous routes except in one rhesus monkey which received only intracutaneous inoculation. The dose inoculated was of the order of $10^9$. The mangabey, the rhesus and the African green monkeys developed leprosy within 2 years. The rhesus monkey inoculated intracutaneously and the squirrel monkeys did not develop the disease. Human (armadillo adapted) *M. leprae* were inoculated to mangabey, rhesus and African green monkeys. The mangabey monkey showed evidence of dissemination of disease in 10 months. No manifestations of the disease were evident in the rhesus and African green monkeys at 28 months.

K V DESIKAN, Chairman
R C HASTINGS, Rapporteur

### Microbiology

1 **ANIMAL SOURCES OF BACTERIA**

Colonies of infected nine-banded armadillos are established in several countries. The nu/nu mouse is a promising alternative.

2 **PURIFICATION**

The IMMLEP 1/79 process yields antigenically intact bacteria with some adsorbed host material (removable by further processing). Methods using density gradients, including unit gravity sedimentation, have been described; the products have been less well characterized.
3 STRUCTURE AND ULTRASTRUCTURE
The capsular material around *Mycobacterium leprae* is ultrastructurally and chemically distinct from that around organisms of the MAIS group. The plasma membrane differs from that of other mycobacteria, since the leaflets seem symmetrical. Polysaccharide-specific stains give a characteristic appearance.

4 CHEMICAL STRUCTURE
Four types of characteristically mycobacterial lipid occur in *M. leprae*: mycolic acids, phthiocerol dimycocerosate, phenolic glycolipid and tuberculosteric acid. The glycolipid is serologically active and apparently antigenically unique; it is a major capsular component.

5 MOLECULAR BIOLOGY
DNA has been isolated from *M. leprae*. The genome size is in the mycobacterial range, but its G+C ratio is significantly low. Hybridization confirms that the organisms from experimental and ‘natural’ armadillo infection belong to the same species. Homology with other mycobacterial species is reported to be in the range of from 7 to 26%; homology with some corynebacteria is from 20 to 28%.

Although the whole genome is thought to have been cloned in *E. coli*, no expression has been detected.

The organisms will bind some types of mycobacteriophage but there is no evidence for multiplication.

6 ANTIGENICITY
*Mycobacterium leprae* possesses specific antigens and common mycobacterial antigens perhaps including one of ribosomal origin. Cell clones recognize antigenic determinants of mycobacteria that do not conform to conventional taxonomy. At least two different immune-suppressor activities have been recognized in other mycobacteria and these may be present in *M. leprae*.

7 BIOCHEMISTRY
Uptake of DOPA or incorporation of thymidine by suspension, or incorporation of thymidine in macrophage culture, has been used to screen drug sensitivity (and also viability). Measurement of ATP content is a sensitive measure of the metabolic state of organisms.

Uptake of glucose, amino acids and other potential nutrients occurs.
Glycolysis, the pentose-phosphate pathway and the tricarboxylic acid cycle appear to operate in *M. leprae*.

Nucleic acid synthesis uses ‘salvage’ pathways, as in some protozoan parasites. Many individual enzyme activities have been detected and distinguished from host-derived activity. Superoxide dismutase is present but catalase has not been detected.

8 CULTIVATION

Three types of organisms have been cultivated from infected tissues: i, mycobacteria; ii, corynebacteria resembling human pathogenic corynebacteria; iii, morphologically variable organisms with some acid-fast forms.

Type i has been reported to change its properties, especially effects on cells, during subculture. Traces of serologically active glycolipid have been detected. Type ii has been well characterized in biochemical terms. An improved culture system has been described for type iii. None of these much resembles *M. leprae* isolated from tissues.

9 PROSPECTS

The leprosy bacillus grown *in vivo* emerges as a mycobacterium-like organism with several curious features. Its metabolic processes are understood in outline and several measures of viability are, or are being, developed. The prospects for cultivation of organisms having identical properties seem good.

P DRAPER, Chairman
S R PATTYN, Rapporteur

Workshop report on immunology of leprosy

Major advances made in the past 5 years in the understanding of immune responses in leprosy were discussed. Though universal agreement on mechanisms underlying the unresponsiveness in lepromatous leprosy was lacking, interesting *in vitro* studies indicated that several suppressive mechanisms were operative. One study showed that *Mycobacterium leprae* and phenolic glycolipid induced OKT8(+) T cells capable of suppressing mitogen responsiveness were present in lepromatous individuals. Their activity was reversed by chemotherapy and immunotherapy with BCG + killed *M. leprae*. Other studies reported diverse membrane-associated alterations in blood-borne macrophages of lepromatous patients and 75% familial contacts. These changes were specific for *M. leprae* in the patient group. Fc, HLA-DR and Con A receptors were found to be diminished and macrophage lysates inhibited lymphocyte responses. Moreover,
LL monocytes inhibited antigen-induced lymphoproliferation through the release of soluble factor(s). The inhibitory factors were heat stable, indomethacin resistant and were greater than 25,000 molecular weight. Macrophage lysates, monocytes and monocyte-released soluble factors from LL patients inhibited antigen-induced lymphoproliferation. Production of gamma interferon, a macrophage activating factor was found to be reduced in lepromatous patients. However, LL monocytes were capable of responding to it in microbiocidal assays. Interleukin 1 (lymphocyte activating factor) production in response to *M. leprae* was found to be normal but interleukin 2 (T cell growth factor) was not detectable in lepromatous leprosy. Interestingly, antigen responsive lymphocytes were also observed in some lepromatous patients. Addition of exogenous IL 2 along with *M. leprae* restored proliferative responses and reversed the gamma interferon defect. Similar data was obtained in C57 BL mice infected intravenously and subcutaneously with *M. lepraemurium*. Moreover, murine T cell clones induced by *M. leprae* were shown to produce IL 2, macrophage activating factor, gamma interferon and proliferative responses and to induce delayed hypersensitivity reaction, bactericidal and tumourcidal activity. The T cell clone technology in analysing immune mechanisms in leprosy was further emphasized. Alteration of T cell subsets as well as the characterization of immune complexes in erythema nodosum leprosum and reversal reactions were reported. Moreover, *M. leprae* antigens were recognized in the immune complexes and a possible defect in their handling in reactionary patients was postulated.

An important advance has been the detection and characterization of *M. leprae* antigens in several laboratories. A unique phenolic glycolipid present in *M. leprae* and not in other related mycobacteria has been characterized and partly synthesized. Leprosy patients have been shown to have mainly IgM and IgG antibodies to this antigen. Chemotherapy reduced antibody titres but immunotherapy with BCG + heat killed *M. leprae* had no effect. Healthy individuals and tuberculosis patients did not show antibodies to the phenolic glycolipid. In addition, protein and glycoprotein of 12 KD antigens specific for *M. leprae* were described. A skin test antigen which measures 24 h delayed hypersensitivity is also being characterized. Specific monoclonal antibodies against the glycolipid and protein antigens have been developed. Possible tests for the early diagnosis of leprosy and for immuno-epidemiological studies were discussed. ELISA, radioimmunoassay and indirect immunofluorescence against several *M. leprae* antigens are being tested in the field. Concomitant skin tests and tests for presence of antibodies may help in the identification of high risk groups in the community. Such tests would be of value in not only understanding the disease, but in screening for future vaccine trials.

The feasibility of developing immunoprophylaxis and immunotherapy for leprosy was indicated in three studies. *M. leprae* BCG, ICRC and *M. W* and acetoacetylated *M. leprae* are being investigated in Venezuela and India. Some 50–70% lepromatous patients showed conversion from negative lepromin
reactivity to positivity status, and developed reversal reactions. Skin biopsies revealed upgrading of tissue reaction and bacillary clearance of significance was the conversion of 90% of lepromin-negative healthy individuals to lepromin positivity with all of the above preparations.

In order to generate alternative sources of production of \textit{M. leprae} antigens libraries of \textit{M. leprae} DNA cloned in \textit{E. coli} have been made in the USA and India. Recent studies on the relationship of \textit{M. leprae} Schwann cells and axons in nerve damage associated with leprosy were presented. One study also showed a deficiency of zinc and alterations in Langerhans' cells in LL patients. An association between HLA DR2 and tuberculoid leprosy has been confirmed. Furthermore HLA MT1 has been shown to be associated with lepromatous leprosy in one study. A general improvement of cellular immunity and immunoregulatory T cell function by a synthetic thymic factor was reported in experimental models and human disease.

The understanding of inverse relationship between genetically controlled natural resistance to primary attack by live mycobacteria and the ensuing disease and cell-mediated immunity in mice were discussed. Preliminary data found in human leprosy seems to indicate analogous mechanisms. Several of the above studies suggest that lepromatous population is heterogenous in its restoration of responsiveness \textit{in vitro} as well as after specific immunotherapy. Such differences in the population as well as genetic and environmental factors need to be precisely defined for future strategy for the control of the disease.

\textbf{G P TALWAR, Chairman}  
\textbf{P H LAGRANGE} and  
\textbf{INDIRA NATH, Rapporteurs}

\textbf{Experimental chemotherapy}

During the past 5 years, awareness has been heightened of the threat to leprosy control posed by drug resistance, especially resistance to dapsone. Secondary resistance to dapsone has been recognized wherever it has been sought. Moreover, organisms with a low degree of resistance to dapsone have been encountered in as many as 50% of patients with previously untreated lepromatous leprosy. Although these patients should nevertheless respond to treatment with dapsone in full dosage, this observation suggests an alarming situation.

The increasing prevalence of dapsone-resistant strains of \textit{Mycobacterium leprae} requires that all multibacillary patients be treated with a combination of drugs. In addition to rifampicin, clofazimine and ethionamide or prothionamide, other well-tolerated bactericidal drugs are urgently needed. One of the major requirements for the development of new drugs is appropriate, \textit{in vitro} methods for screening large numbers of compounds for activity against \textit{M. leprae}. A
number of methods are currently being evaluated. For example, ‘M. lufu’ is being used in the search for inhibitors of the dihydrofolate reductase of *M. leprae*. In addition, advances in our knowledge of the biochemistry of *M. leprae* may provide leads to other target enzymes.

The ubiquity of poor drug compliance emphasizes the importance of using drugs that are effective when administered intermittently under supervision.

Persistent *M. leprae*—i.e. drug-susceptible organisms that survive prolonged treatment by adequate chemotherapy—have been detected in significant proportions of patients treated by a variety of multidrug regimens, among them regimens consisting of rifampicin, dapsone and clofazamine or prothionamide, each drug administered continuously in full dosage for 2 years. This suggests that no multidrug regimen is likely to eliminate persisting *M. leprae*. On the other hand, it is not certain that cure of multibacillary leprosy requires that all of the persisting organisms be killed. An 8-year follow-up of more than 300 multibacillary patients released from control after 20 years of well-supervised monotherapy with dapsone in full dosage yielded a relapse rate of only 1% per year. Among more than 100 multibacillary patients who had been treated with 2 years of intensive multidrug therapy after dapsone monotherapy of variable duration, no relapses were noted during a follow-up of 8–9 years. Thus, the use in leprosy control of intensive multidrug treatment of limited duration appears justified. Mathematical modelling may permit a more detailed understanding of the dynamics of the multibacillary patient’s bacterial population during chemotherapy.

L LEVY, Chairman
ELEANOR STORRS, Rapporteur

**Workshop on epidemiology and leprosy control**

Significant progress has been achieved in our understanding of the epidemiology of leprosy since the last International Leprosy Congress. This has resulted in striking changes in the classical strategy for leprosy control which was previously based on dapsone monotherapy.

1 **Epidemiology**

i  *Magnitude of the problem*. There has been no appreciable change in the global estimates of leprosy during recent years.

ii  *Transmission*. The importance of airborne spread as one of the methods of transmission of *M. leprae* has gained wide acceptance. The viability of *M. leprae* outside the human host for at least 10 days has now been firmly established. The
role of paucibacillary cases in the transmission of \textit{M. leprae} has not yet been clarified. Similarly, the importance of finding AFB in the nasal mucosa and skin of individuals with no clinical disease, poses the question of the carrier state in leprosy and requires elucidation.

Mycobacteria indistinguishable from \textit{M. leprae} have been identified in the environment. Isolation of similar organisms from animals, with or without a leprosy-like disease, raises the question of host specificity of \textit{M. leprae} to man.

\textit{Immuno-epidemiology.} Significant advances have been achieved in the development of immunological tools for the recognition of \textit{M. leprae} infection. The FLA–ABS test, the ELISA technique using phenolic glycolipid antigens and inhibition assays based on monoclonal antibodies deserve special mention. Recent studies with currently available tests provide strong presumptive evidence that the incidence and prevalence of \textit{M. leprae} infection far exceeds clinical leprosy in endemic areas. Availability of a sensitive and specific test feasible under field conditions to identify \textit{M. leprae} infection, is an urgent requirement for the proper understanding of the epidemiology of leprosy and the effects of control measures.

\textit{Genetic factors.} Data on family segregation analyses of HLA, provide evidence of some genetic involvement in tuberculoid and perhaps also lepromatous disease response. Further studies are required in this direction.

\textit{Drug resistance.} Secondary dapsone resistance has been reported from more than 25 countries and its prevalence is steadily increasing. Primary dapsone resistance is also being reported with increasing frequency from several countries. Similarly, there have been reports of \textit{M. leprae} showing resistance to rifampicin and to other drugs.

\textit{Indicators of declining trends}

Indicators of declining trends have now been identified by studies from Norway, Japan, the Philippines and Venezuela, based on the fact that the decline in incidence rates has been paralleled by a change in the distribution of age at onset towards older age groups. The usefulness of such indicators needs to be further evaluated.

2 \textbf{LEPROSY CONTROL}

\textit{Multidrug therapy.} Two threats to the successful implementation of the classical strategy for leprosy control are the widespread emergence of dapsone-resistant strains of \textit{M. leprae} and the problem of persistence of bacilli. The best way to prevent the spread of dapsone-resistant leprosy is to use multidrug
therapy. Only 4 drugs can be recommended for combined therapy, namely rifampicin, clofazimine, dapsone and prothionamide/ethionamide. In 1981 the WHO Study Group on the Chemotherapy of Leprosy for Control Programmes recommended combined therapeutic regimens for the treatment of both multibacillary and paucibacillary leprosy.

While this workshop endorses the principles underlying the use of multidrug therapy in leprosy, based on the WHO recommendations, it also recognizes the fact that the schedules adopted by different countries vary in detail. All regimens need to be evaluated with special emphasis on relapse rates, occurrence of reversal reactions, side-effects of drugs and operational feasibility. Reactions should be clearly distinguished from relapses in such evaluations. The workshop recommends the development of a simple serological test to monitor the success of treatment.

ii  *Strengthening of the infrastructure.* It is now essential to perform bacteriological examinations and to classify patients correctly, since drug regimens are different for multibacillary and paucibacillary leprosy patients. The critical factor will be the flexibility of the treatment delivery system which should be tailored to meet the individual needs of patients. Continuity, regularity and completion of chemotherapy will be the keys to the success of the new strategy. The logistics of drug availability and their supply to the periphery and the retraining of staff to cope with their increased responsibilities need to be adequately strengthened. Regularity of treatment, completion of treatment and duration of surveillance should be defined in the context of implementation of multidrug therapy. Patients should be considered to have completed treatment, if they have taken 6 supervised monthly doses, within a period of 9 months in paucibacillary leprosy, and 24 supervised monthly doses, within a period of 36 months in multibacillary leprosy. It is also recommended that surveillance should be continued for at least 2 years for paucibacillary patients and for 5 years for multibacillary patients, after completion of the course of treatment.

A patient who has been absent for 1 calendar year may be considered to be ‘out of control’.

iii  *Information system.* A suitable recording, reporting and information support system, based on the OMSLEP pattern, should be designed and used. The information requirements at various levels of the health care delivery system must be explained to the personnel so that the reasons for the collection of data become meaningful to them. Completeness of case ascertainment should be an area of priority, and special attention must be given to the problems of under-reporting and multiple registration. Simple and robust indicators for epidemiological surveillance and operational monitoring of control programmes should be developed and applied. It is recommended that whenever statistics are quoted, they should include a precise description of their derivation. It is further
recommended that patients on treatment be considered separately from those under surveillance.

iv Primary health care approach. In endemic areas, with integrated health services, the full resources of the primary health care delivery system must be mobilized to implement and support the programme, so that its optimal potential can be put to maximum utilization. Every effort must be made to promote community involvement. The key factor in the primary health care approach is its focus on the consumers of the health care system. Practical methods to promote awareness and generate community involvement need to be identified, through field oriented studies.

v Urban leprosy control. In the endemic countries, increasing urbanization has resulted in the emergence of leprosy as a major public health problem in towns and cities. Prospective planning should therefore emphasize the formulation of urban leprosy control programmes so as to meet the challenges that lie ahead.

vi Primary prevention. Non-availability of an effective and practical method of specific protection has been a major impediment in the control of leprosy. Although moderate efficacy of chemoprophylaxis with dapsone and acedapsone has been established under trial conditions, mass chemoprophylaxis is not operationally feasible in a service programme. However, in this context, chemoprophylaxis with a single dose of rifampicin needs to be investigated.

An armadillo-derived killed \textit{M. leprae} vaccine has been shown to confer protective immunity in animal models. Its evaluation in humans is now being undertaken through small-scale studies. Vaccines derived from related mycobacteria are also being developed. It will, however, be several years before accurate information regarding the efficacy of these vaccines can be established.

M CHRISTIAN, Chairman
B NAAFS, Co-Chairman
J P MULIYIL, Rapporteur

**Teaching and training**

**INTRODUCTION**

Prior to the workshop, it was agreed to focus on the selection, production and distribution of books and pamphlets for leprosy control workers. There were 4 reasons for this:

1. Appropriate literature is still by far the most influential source of new information and ideas.
2. Books do not require any elaborate apparatus for their effective use.
Books are relatively cheap to produce and distribute.

Really good and appropriate written learning material can make a great contribution to the effective training of the large numbers of health workers who will become responsible for leprosy patient care in integrated and primary health care programmes.

However, the participants of the workshop were also aware that much of the reading material available is not entirely appropriate and that distribution of appropriate literature is very patchy.

**AIMS**

The aims of the workshop were as follows:

1. To prepare a short list of current titles in English appropriate for various categories of health staff.
2. To identify gaps in existing literature in English.
3. To prepare similar lists of material available in languages other than English, especially in major international languages.
4. To outline proposals for further development of effort to produce, distribute and assess material for leprosy workers.

**PROCEEDINGS**

Based on previous work done primarily by INFORMEP in Amsterdam and The Leprosy Mission (International) in London and the varied experience of the workshop participants, short lists of books in English appropriate for 6 broad categories of workers were prepared and a number of important gaps and deficiencies in the literature were identified. Due to limited time and lack of full representation, it was decided not to attempt to do the same for other languages at this time.

The second day of the workshop was taken up with the presentation (by participants) of field experience in production, distribution and utilization of learning materials in a variety of situations at the central and peripheral levels. This was followed by a sharing of AMREF experience in East Africa in line production and distribution of learning materials in the field of general health by Dr Christopher Wood. Extensive and frank discussion intensified the exchange of information and ideas.

**CONCLUSIONS**

A great variety of literature exists in English and with a few exceptions can potentially meet the need of most workers who can read that language with reasonable fluency. There are, however, 3 areas where improvement is essential:
Much of the existing literature could be made more useful by simplifying the language and improving presentation.

2 Distribution leaves much to be desired: many workers are not even aware of the existence of literature which could help them and the present system for distribution of material often fails to deliver literature to those who need it.

3 Many students and workers have little or no skill in the use of literature as an aid to learning for basic or continuing formal or non-formal education.

It is apparent that there is a serious shortage of readily available material in languages other than English, especially for paramedical workers. Translation of existing English material is one way of coping with this situation. But translation of technical material is not easy, and translations, even by experts in linguistics, should be checked for technical accuracy by people familiar with both the language and the subject matter.

RECOMMENDATIONS

1 The contribution of appropriate learning material to the competency and motivation of workers should be recognized and funds for literature should be provided as an essential item in every leprosy control programme.

2 Efforts to collect and disseminate information about literature in languages other than English should continue.

3 Assessment and subsequent improvement of existing material in English should in general have priority over production of new material in that language.

4 Efforts to provide learning material for field workers in local languages should be intensified since there is a notable lack of literature for this particular group.

5 Training in the use of written material should be an integral part of basic and refresher courses for all staff.

6 Effective distribution of literature, especially to staff at the periphery, is as important as the distribution of drugs and should be given similar priority.

W F ROSS, Chairman
A C McDougall, Rapporteur

Social aspects

1 POLICY STATEMENT

The aim of social research in leprosy should be to assist in improving the policy and execution of leprosy control. At the same time, it should contribute to a conceptual framework which helps to understand the social, economic and psychological problems experienced by leprosy patients, their relatives and health staff concerned.
2 CRITERIA FOR RESEARCH

(a) Research should be scientifically sound, ethically acceptable and cost-effective.
(b) Research should be carried out by interdisciplinary teams of social, medical and, if appropriate, economic scientists.
(c) The active participation of local personnel (medical, paramedical, social workers), as well as patients and community members should be encouraged.
(d) Research should preferably be undertaken by national researchers who meet the required qualifications.

3 RESEARCH TO DATE

Research to date has concentrated on the following topics:

(a) Knowledge, beliefs and attitudes concerning leprosy and health-related behaviour of leprosy patients and community members. Often research results are geared to health education.
(b) Social, economic and psychological consequences of contracting leprosy, namely stigma, and their relationship to rehabilitation.
(c) Patient compliance: medical, social, economic, cultural, psychological and leprosy service factors influencing case-finding and case-holding.
(d) Management and functioning of leprosy control: health staff's knowledge of leprosy and leprosy treatment, and its behaviour towards leprosy patients; organizational bottlenecks in leprosy services; cost-effectiveness, e.g. of vertical services, of integrated services, and of primary health care including leprosy control.

These topics have been elaborated in a number of meetings organized by WHO and national/international leprosy associations.

4 PROPOSALS

This working group strongly encouraged a comprehensive approach to problems in leprosy control, paying equal attention to factors related to the patient, his near surroundings and to the leprosy services. Research should ultimately concentrate on those areas where problems are most obvious and where remedial action seems most feasible.

The following topics were proposed for elaboration:

(a) Definition by community and patients of the concepts of illness and cure in leprosy: Terminology of different manifestations/stages of leprosy used by community and patients.
(b) Stigma:
Possible differences between perception of stigma by community members and patients, and the degree of stigma actually experienced.
Forces that make some leprosy patients stigmatize themselves (comparative research).
Mechanisms that help patients to maintain and regain their social and economic position in society; determinants of self-acceptance and community acceptance of patients.

(c) Evaluative research of:
Acceptability to patients, community and health staff of different types and ways of providing services.
Content and impact of health education.
The possible contribution of community, leprosy patients and social services to leprosy control, including care of the handicapped.
Economic and social consequences of reconstructive surgery.

(d) Participation in the planning and monitoring of trials with multidrug therapy; evaluation of the effect of MDT on community and patient perceptions of leprosy.

(e) Participation in planning, monitoring and evaluation of vaccine trials in the field.

(f) Investigation of factors in human behaviour which may be contributing to transmission of leprosy, e.g. migration.

5 RESEARCH METHODS

A combination of research methods should be used: study of relevant documents; informal and formal interviews; questionnaires; systematic observations.
Questionnaires as a single research tool may give superficial and misleading results.

6 IMPLEMENTATION OF RESEARCH RESULTS

Social research should provide direction for possible solutions to problems, as well as alternative proposals for action.

The results should be presented in terms which are understandable to the potential users.

Implementation of research results will be more effective if the social scientists who conducted the research are invited to participate.

In order to increase the quality and quantity of social research and its impact on leprosy control, it was suggested that regional centres be developed as focal points for collection and dissemination of research results. These centres would
also develop training programmes for social research in leprosy and carry out investigations.

The manual on *Social Dimensions of Leprosy* (published by ILEP, 1982) was discussed in the workshop. This book could be useful to paramedical teachers who have some training in social sciences and who can adapt it for local use.

In order to be useful at the field level, the theoretical part needs considerable revision and focusing on the working situation of field staff.

CORLIEN M VARKEVISSE, *Chairperson*

F GIRARDIN, JUDITH JUSTICE

and PATRICIA ROSENFIELD, *Rapporteurs*