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EDITORIALS

ARE WE SATISFIED WITH SULPHONES FOR THE TREATMENT OF LEPROSY?

It is agreed by all with practical experience of the treatment of leprosy that a revolutionary change has taken place in the last ten years, both for the patient in his hope of recovery and for the endemic area in the hope of control.

This is chiefly the result of the discovery of the effects of sulphones on leprosy, first in the more complex expensive derivatives of diaminodiphenylsulphone, and more recently in the simple and economical parent substance, DDS. Now that the rules of its use have been standardised, DDS (whether given orally in tablets or by injection of the suspension) has been accepted almost universally as the treatment of choice.

DDS has certain drawbacks. Lepra reaction occurs, and in some patients, even in spite of very gradual initiation from minute doses, painful reactions with generalised febrile symptoms intervene during the earlier months, and occasionally continue for long periods. Also in a small minority there are toxic symptoms such as dermatitis, which, however, can generally be easily controlled.

The chief defect, however, is the long period required to render the patient bacteriologically negative, sometimes extending in advanced lepromatous cases to as much as ten years or more. Yet, when one considers the amount of leproma that has to be got rid of, is this any wonder? As Dr. Wade[1] has said: " When the large—even tremendous—numbers of bacilli that are often present per field in smears of tissue pulp from lepromas are considered, some degree of appreciation can be gained of the myriads of them that the patient must get rid of in recovering from lepromatous leprosy. Hanks once estimated that the numbers average 2.5 billion—two thousand five hundred millions—per milligram of leproma tissue."

Still, to those of us who fought against leprosy in the old days with no better drug than chaulmoogra oil, the advantages far more than outweigh the defects. Let us recount the more important of these advantages:—

(a) The rapid healing of lepromatous ulcers of the skin and mucous membranes, bringing comfort to the patient and rendering him less infectious.

(b) The flattening of nodules and other swollen leproma, causing marked improvement of clinical appearance.

(c) The assurance that, slow as the improvement may be, it will go on towards ultimate recovery.

(d) In patients where an early diagnosis is made before they become infective, the assurance that the disease will not advance but get gradually better; and that, with the simplest form of treatment, he may continue his work without need of isolation.

(e) After use of sulphones up to eleven years the writer's experience, which is confirmed by that of many others, is that there is no clear evidence of drug resistance, however long the treatment has to be continued. This is one of the most remarkable features of the sulphones in leprosy, when we compare the drug resistance so common in recent remedies for tuberculosis. According to Scadding[2] the sort of tuberculosis most favourable to the emergence of resistant strains is " acute rapidly progressive disease, with extensive caseation and cavitation. It is probable that the danger of the emergence of resistant strains from less extensive and active lesions is considerably less." One might argue from this that the advanced lepromatous case, with its myriads of bacilli, and the need for treatment for many years, would be the kind of case to develop drug-resistant strains if they could develop at all; and that the absence of evidence of resistance to sulphones indicates that M. leprae, from its very nature and its inability to grow except in human tissues, cannot form mutants. But on the other hand, improvement of leprosy under thiosemicarbazone is found to cease after a few months, suggesting that in this instance drug resistance does develop. If these suggestions are correct then absence of drug resistance appears to be a special feature in the relationship between M. leprae and sulphones.

To sum up, we have in the sulphones, and particularly in DDS, despite certain defects, a most valuable instrument for the cure and control of leprosy. In certain countries there is evidence that, as the result of mass treatment with sulphones, leprosy is beginning to be brought under control. In fact the main obstacles to bringing about control are not the defects of sulphones but the scarcity of proper staff and of finance, and often the absence of efficient organisation.

These essentials being difficult to obtain, we naturally look forward to finding other drugs which will show the advantages of sulphones without its defects. How are we to set about finding such drugs?

(1) Wade, H.W. Internat. J. Lep., 1954, 22, p. 347-8.
(2) Scadding, J. G. Lancet, July 16, 1955, p. 100.

DEVELOPMENTS IN MYCOBACTERIAL RESEARCH

Leprosy research has certain handicaps compared with research in other diseases. One of these is failure to cultivate Myco. leprae outside the tissues of the human body. Another is the small degree of interest that has been taken in leprosy research, and the smallness of the number of suitable workers that it attracts.

This latter handicap shows signs of amendment as evidenced by a meeting recently called in London by the Colonial Medical Research Committee, when twenty-two research workers met round a table and discussed ways and means for the co-ordination of leprosy research in the U.K. and the Commonwealth. Such an occurrence could not have been envisaged a few years ago.

The chief reason for this rising interest in leprosy is a kind of cross-fertilisation between research in tuberculosis and leprosy, and new attention to the whole field of mycobacteria.

The use of sulphones in leprosy was suggested by their effects in experimental tuberculosis, though they proved of little value in clinical tuberculosis. Streptomycin, isoniazid and PAS, useful in clinical tuberculosis, are of little use in leprosy. Isoniazid and streptomycin are more useful than DDS in control of rat leprosy in rats. These and similar findings suggest considerable possibilities for useful research into the basic action of these drugs and the reasons for these differences.

Another line of mycobacterial investigation is that by Hanks into the metabolism and viability of Myco. lepraemurium. By testing its respiration and hydrogen transfer capacity, and by giving simultaneous inoculations in rats, he hopes to form " basic ground rules " and later to be able to make further tests of the viability of these organisms in various media. Work along these lines may later make it possible to test the viability of Myco. leprae, and the effects on them of sulphones and other drugs.

It is claimed that isoniazid-resistant tubercle bacilli may be formed with suitable dosage of this drug, and that consequently the persistence of bacilli in the sputum of tuberculous patients may not imply clinical activity of tuberculosis* or have a serious significance. In leprosy patients treated for a long time with DDS, and who still show residual bacilli, we are unable by *in vitro* culture and animal inoculation to test the viability of these bacilli, but it may be possible in future by the methods of Hanks to find out to what extent they are actually alive.

* Scadding, J. H. Lancet, July 16, 1955, p. 100.

Not only on therapeutic and metabolic lines is the relationship of leprosy to other mycobacterial diseases being studied, but also in regard to sensitization and immunity. In particular there are investigations into the effects on the lepromin test of such mycobacteria as BCG and the vole bacillus.

How are we to test for better Anti-leprosy Drugs?

If we accept the propositions: (a) that we require still better remedies for the treatment of leprosy; (b) that new drugs are being investigated for their effects on other mycobacteria, some of which are worthy of trial in leprosy, and (c) that possibly methods may in the near future become available for testing the viability of mycobacteria, how are we to set about testing new drugs for leprosy?

It would be absurd (even if it were possible or justifiable) to try to test the hundreds of possible drugs by clinical trials in leprosy patients. The first screening must be by the effects on experimental mycobacterial diseases, such as tuberculosis and rat leprosy, and clinical tuberculosis. A drug found in this way to be anti-mycobacterial and of low toxicity to animals, should be screened for its effect on human leprosy by a small pilot experiment on some six to eight patients with the lepromatous form of leprosy, who should preferably be in an advanced stage of the disease and without previous treatment. In such patients comparatively quick clinical improvement would be expected with drugs at all likely to be useful and which are worthy of further trial. Any drug not giving definite clinical signs of improvement within a few weeks in some at least of the patients should be discarded.

Any drug which gives definite signs of causing clinical improvement should be considered worthy of a wide and prolonged comparative trial, DDS being used as the control for comparison.

DDS has reached its present position as the drug of choice without any systematically planned experiment, and simply by a method of trial and error. Various widely scattered workers have reported their results, and others reading these results and repeating the trials, with or without modifications, the best methods have gradually risen to the top. There are some who uphold this somewhat blundering method, and there are others (not always the most experienced in the treatment of leprosy) who condemn it, and would have had general use suspended till a carefully planned, controlled experiment in a few special centres had sent in reports.

Whichever of these schools of thought is right, there is much more likelihood, now that we have in DDS a fairly uniformly

effective standard for comparison, that the consensus of opinion will be in favour of a carefully planned and controlled experiment.

In planning the trial the following rules are suggested:—

(a) If possible only previously untreated patients should be used.

(b) Chiefly lepromatous type patients should be used, though a few of the other types might be included.

(c) If possible there should be at least thirty on the test drug, with an equal number of controls on DDS, divided among four or five different centres. The whole planning and supervision of the trial and the final assessment of results should be carried out by one central authority. It would be well, however, for the final results to be assessed by two separate experts so as to lessen the margin of error.

(d) Centres should be chosen where there is likely to be adequate and continuous supervision for at least five years; and where the nutrition and general treatment as regards exercise, occupation and absence of other diseases are satisfactory.

(e) Patients should be chosen who are under control, and are likely to remain under treatment if necessary for at least five years, without changing their residence.

(f) Assessment of results should be based on clinical and bacteriological results, examinations being made before the beginning of treatment and then every six months. The first and last examinations (at least) should be made by the controlling expert or experts.

(g) Each patient getting the test drug should be carefully paired with one getting DDS, the two patients being comparable as regards the type, degree and duration of the disease, and as regards general health habits and other conditions.

(h) Provided there are enough patients and sufficient supervision is available at each centre, two or three drugs might be tried simultaneously in different groups, using the same DDS patients as controls for all the drugs tested at one time.

(i) If any drug proved definitely inferior to DDS after the first one or two years, then, at least in justice to the patients, it would have to be abandoned.

These rules may appear stringent and hard to carry out. If we refer to the drug trial mentioned on page 182 of this number of the Review, the results appear to be inconclusive; but the time allowed for the trial (32 to 48 weeks) appears inadequate in a slow-moving disease like leprosy, and in a prolonged trial special stress must be laid on the general conditions of the patients.

KOREA

The whole world breathed a sigh of relief when the Korean armistice was signed, but few of us have fully realised the terrible consequences of the recent war in that country. The two papers appearing in this number by Dr. Cochrane and Dr. Smith give at least a slight idea of one of the great problems with which that unfortunate country is still faced.

LEPROSY — SUMMARY OF RECENT WORK

For many years this publication has been sent twice a year to some 300 subscribers to LEPROSY REVIEW, and supplied free of charge at a considerable cost to BELRA.

A suggestion has been made that instead of doing this, a selection should be made of the abstracts which are considered most useful to our readers, and that these should be included in LEPROSY REVIEW. Before doing so, however, we are giving an opportunity to those who are at present receiving *Leprosy—Summary of Recent Work*, in case they should be able to put forward any strong objections to this suggested step.

LEPROSY IN KOREA

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PART I

INTRODUCTION

The problem of leprosy in Korea, like so many other problems, is one of great complexity. The war resulted in the division of the country and the migration of large sections of the population from North to South. The consequent disruption of the whole economy of the country, has faced the United Nations Organisations with almost unsurmountable difficulties. Great credit has to be given to these organisations, and particularly to the U.S.A.; for this country has undertaken and largely financed the enormous work of reconstruction and rehabilitation. The Republic of Korea, led by her President, has shown great courage and moral fortitude.

It would be wishful thinking to assume that all is now well in Korea, for there are still a multitude of dangers which threaten her. This brave little country, however, has demonstrated a determination both in war and in the uneasy peace which followed, which augers well for the future. With the improvement in international relationships there is hope that reunion between North and South will not be long delayed, for Korea cannot revive fully while she is dismembered. My task is not to give an over-all picture of disease conditions in Korea, fascinating and important though it is, but to outline the present situation with regard to leprosy.

HISTORY, DISTRIBUTION AND PATTERN OF DISEASE

Leprosy has been known in Korea for a thousand years or more. The Professor of Medical History at the National University —Dr. Kim—states that the first mention of lepers was about 1300 A.D. The popular conception of leprosy is one of the great difficulties in the way of organising an adequate preventive programme. The disease is considered primarily, so Dr. Kim states, a hereditary disease, but infectious within the family, e.g. husband and wife, and other family members. Other factors, such as unfavourable weather, carelessness regarding health, and eating of fish have also been mentioned. The disease has been described

under varying types, such as slight leprosy, severe leprosy, alopecia, crow leprosy and white leprosy. I have not been able to ascertain why the last name has been given; from the description it seems to be the very advanced reacting lepromatous type. Each of these forms has a separate Korean name. A most interesting piece of information which I gathered was that there are among the Korean people two conceptions of leprosy: the one (Mung-Doong) corresponding to our word "leper" with all its sense of ostracism and disgrace, and the other (Napyong) meaning the disease of leprosy which seemed to be accepted with less sense of shame. These ideas are extremely illuminating and could form the starting point of an educational programme, for one of the first steps in any leprosy campaign is to prevent "Napyong" from becoming "Mung-Doong." All educational efforts in regard to leprosy should emphasise the fact that leprosy is a disease and not a social stigma, an infection transmitted mostly by contact in young life and not a Divine curse.

It has been long known that the incidence of leprosy is much higher in Southern than in Northern Korea. Owing to the division of Korea little is known of the leprosy situation in the North. In South Korea the most heavily infected areas appear to be the four southernmost provinces of Cholla Namdo, Cholla Pukto, Kyongsong Namdo and Kyongsong Pukto. In the province in which Seoul is situated—Kyonggi-Do—leprosy appears to be mainly an imported disease from the more highly endemic areas. The estimated numbers of cases in these provinces are:—

Cholla Namdo ...	7,942.	Of these	7,329	are said to be in	Leprosaria or village colonies.
Cholla Pukto ...	3,570	do.	1,469	do.	do.
Kyongsong Namdo	5,000	do.	2,988	do.	do.
Kyongsong Pukto...	12,000	do.	2,177	do.	do.
Totals ...	28,512		13,963		

The above figures are a very rough estimate, but the figures from other provinces are still less reliable. It is, however, a fundamental principle in leprosy control to deal with the areas of highest incidence first, and not be over-concerned with regard to the leper problems in other areas.

INCIDENCE OF LEPROSY

(a) *Total number of cases*

Let us now consider the incidence of leprosy in relation to the number of known cases and the estimated number of cases in

the country. The total number of cases in leprosaria and villages throughout the country as on December, 1953, was 17,188. Dr. Y. S. Yun, M.D., Chief of the Chronic Diseases section of the Ministry of Health, gives the total number of registered cases as on July, 1954, as 25,000, with an overall estimate for South Korea of 45,000. The question will now be naturally asked how near to the true figure is this estimate? It is well known that estimates based on general data, and not on more detailed surveys, are usually far from correct. Muir stated many years ago that the census figures in relation to leprosy in India could be multiplied 10 times, and by so doing one came to a figure which is now given as the approximate number of cases in India, namely one million to one and a half million.

The figures for Korea are of registered cases taken from official files. It would, however, appear to me to be unrealistic to take this figure of 25,000 and multiply by 10 and state that this is the probable number of cases in South Korea. I believe, however, we would be nearer the truth if we were to take the figure given by Government at the end of 1953, namely 17,1
this by 10; this would give us an estimated total number of cases of leprosy of 171,880. Is there any possible method by which to check such an estimate? Dr. Paul Crane, of the Presbyterian Mission at Chonju, has been regularly examining children of school age and estimates the incidence of leprosy as from 10-12 per thousand children examined. This would give an overall incidence of about 200,000 in South Korea. I realise, because of the uneven distribution of leprosy in any country, the fallacy of trying to compute the total number of cases in the whole country from data such as this. On the other hand, a certain number of cases would be missed in a routine school examination, particularly the very early initial lesions which need a much more careful examination to discover than would be possible in a general routine check of children in schools. Further, special experience is required to recognise these lesions. Therefore, taking all these factors into account, I think the figure of 150,000 cases for South Korea may not be an over-estimate. This would mean that in a population of 29 million the overall incidence would be 5 per thousand (approximately). It is not possible to give a more accurate figure, but in any case there are far more persons with leprosy than had been formerly imagined.

(b) *Number of infective cases*

However, from the public health standpoint, it is the total number of infective cases (including those likely to become

infective) that is of chief importance. It seems to be a general observation that the proportion of infective cases to non-infective cases in the lighter coloured races of the world, e.g. the Mongolian and Caucasian, is higher (25 to 70 per cent) than in the darker people, e.g. Indian and African (15 to 25 per cent). It is difficult to give a reason for this general observation; it may be that pigment has a greater influence on tissue defence in leprosy than has been realised. If the lower figure of 25 per cent infectiveness is taken, this would give 37,500 cases in South Korea. While susceptibility to infection may not be greater among the lighter coloured races than among the darker, there seems to be a tendency in the former to develop more frequently into the serious lepromatous type. One is also struck on visiting institutions in Japan and Korea with the relatively high number of patients with extensive and crippling deformity. This makes leprosy in Korea all the more important and worthy of priority as an endemic disease. In addition to the number of serious cases which are likely to develop there is probably an equal number who are liable to become grossly deformed if proper physiotherapeutic and orthopaedic measures are not adopted for their relief, and this also means a loss to society of considerable manpower.

Apart from this, other factors must be taken into account which serve to retard all efforts at setting in motion a programme which would ultimately result in the control of leprosy in Korea. These factors are common elsewhere, but more so in Korea, and are as follows:—(1) the fear of ostracism which exists in the public mind towards leprosy, and the life-long separation it causes in the majority of instances; (2) the fact that in Korea leprosy is a serious endemic disease tends to be suppressed as it is feared it might affect the position of the country in the community of nations, and hence it is not given the public health importance that it deserves. Muir many years ago suggested that leprosy was most likely to be prevalent, other conditions being equal, in a society which was passing from the more primitive aboriginal or nomadic stage to an organised community, but had not yet fully arrived; (3) the place of leprosy in the overall Public Health programme tends to be overlooked, and general and preventive measures left to the care of voluntary organisations.

The Korean Civil Assistance Command and the Ministry of Health of the Republic of Korea have shown a commendable desire for guidance in their approach to a problem which they accept as urgent. The time therefore was opportune for a general appraisal of leprosy in the country and the American Korean Foundation (a

volunteer organisation which assists Korea educationally and culturally), with the enthusiastic support of the British and American Leprosy Missions, invited me to visit the country for this purpose.

It is impossible after a short visit of six weeks to delineate accurately the whole picture of leprosy in the country. I have tried to understand the disease in South Korea as a whole by studying its distribution in the areas of highest incidence. There appear to be two main patterns of leprosy incidence: (a) that of the village, (b) that of the house. By the former I mean one in which a whole village has a high incidence of leprosy, and the disease is uniformly distributed throughout the village, whereas other villages a very short distance away may have none. To illustrate this from Indian experience, Saidapet—a suburb of Madras—in some streets had an overall incidence of leprosy of 11 per cent among children and 8 per cent in adults. Yet in a village a short distance away the incidence was less than 3 per cent. This latter village belonged to a community which was originally referred to as outcastes, but Mahatma Gandhi renamed them Harijans or people of God. This latter village was economically worse off than the former area of high incidence, yet the number of cases of leprosy was considerably less. On the other hand the pattern of the epidemic may be what I have termed "the house pattern," that is, houses in the village may not be uniformly affected, but individual houses in many villages in the areas may have cases in them. The determining factor as to the pattern of the epidemic appears to be the social structure of the family, and the inter-relationship of each family within the village. From the Public Health standpoint it is important to ascertain which is the prevalent pattern of disease, for methods which will suit one pattern may fail if the other is predominant. My impression was that in South Korea leprosy is a house rather than a village disease. The evidence for this is twofold. Firstly, the family unit is not that of the joint family, as in an Indian village, where communities are closely interwoven and marriage is confined to within one caste. In South Korea the family unit consists of mother and father, and not infrequently the elder son with his wife, and perhaps the grandfather. Other close relatives, e.g. younger sons or daughters, leave the home and establish their own homes elsewhere. Further, to marry within the clan is not considered proper and the son or daughter has a wife or husband chosen from another clan. This means that the family unit is compact, and leprosy spreads chiefly within the family and not readily to other

relations, for instance son or daughter, and even the eldest son tends to drift away from the parental home. Secondly, in several of the larger leprosy colonies patients were persuaded to reveal the names of the villages from which they came
in a *gun* (district) or sub-district numerous cases may be recorded, but never were several houses in an individual village found to be affected in the series of areas investigated.

In attempting the control of leprosy in Korea, therefore, these basic facts must be kept in mind. Leprosy in Korea will be difficult to control because it is held in great fear. It will be hard to ascertain the source or origin of individual cases, for any public, semi-public or government inquiry for cases among the contacts of those already isolated would be considered to bring disgrace on the family. Theoretically when the disease manifests itself in the house-pattern it should be easier to control, because by tracing every known case the majority of infected individuals would be found. But, to achieve success presupposes an education in leprosy and a freedom from fear which has not yet been achieved.

(To be continued.)

SURVEY OF LEPER COLONIES IN KYONGSANG NAMDO PROVINCE, KOREA

DR. M. L. SMITH

Health Officer, Korean Civil Assistance Command

[*South Korea has a population of about* 29 *million. Kyongsang Namdo in the extreme south is the second largest province, with a population of about* 3 *million. The Pusan institution has* 1,800 *patients.*]

The Provincial Government plan for leprosy control in Kyongsang Namdo amounts to the removal of all outlying rural colonies and their concentration in one place: that is to say Sachon (14 in Map). In consideration of this plan 22 colonies (including the Sangai Won Leprosarium) were visited during the latter part of May and the early part of June. The following points came under review:—

(a) Whether the situation of a colony was consistent with the desired objective of segregation of the afflicted.

(b) Whether the tenure of land occupied or farmed by the colony was secure and unencumbered and whether each colony had enough land to offer isolation and full employment to those of its inmates capable of work, so keeping them from wandering and at the same time offering some prospect of self-sufficiency.

(c) Whether any colony approved along the above lines was recognised by the Provincial Government and at the same time accepted by the local people.

(d) Whether as part of a future Korea Civil Assistance Command (KCAC) Provincial plan for the improvement of medical services to an approved colony there was any likelihood of finding a local doctor who would be interested and capable of being trained in BCG immunization, curative and prophylactic sulphone therapy.

(e) Whether, in view of an AFAK project for the building of a preventorium, co-operation was likely in obtaining the separation of the non-infected children from their parents.

OBSERVATION AND DISCUSSION

The location of all the rural colonies visited (excluding the Sang Ai Won) was by and large one which did not satisfy the requirements of proper segregation; all were too close to towns of local importance and there was clearly an intermingling between those who were diseased with those who were healthy often for no other reason than the piecemeal ownership of land and the


KOREA
KYONGSANG-NAMDO PROVINCE
KOCHANG
6
7
HAMYANG
5
HYPCHON
4
CHANGYONG
3
MIRYANG
2
LILSAN
YANGSAN
UIRYONG
22
CHANGWON
17. MASAN
21
KUMHAE
TONGNAE
8
SANCHONG
18
HAMAN
13
11
HADONG
9
10
12
20
PUSAN
19
1
KOSONG
SACHON
15
14
16
KOJE
NAMHAE
TONGYONG
—·—·—·— PROVINCIAL BOUNDARY.
NOS: 2-22 LEPROSY COLONIES.
NO.1. SANGAN WON LEPROSARIUM.

necessity for its cultivation. Thus a field owned by the colony might be some way away, while more commonly, another immediately adjoining the colony would be farmed by an outsider.

The maldistribution of land and its evil consequences was illustrated in such colonies as Haman, Ilbansong (Chinyang Gun) and in Sachon. Apart from this, however, the customary proximity to main roads opened up obvious opportunities to those who wished to leave the colony and engage in trade or in begging, and (except at the Sangai Won) over this there appeared to be little or no control. Lack of control was especially conspicuous at Chinju, Masan and Tongyong and infective persons encountered on the streets of these cities in some cases admitted that they had come from the local colony.

The plan for the concentration of all rural colonies clearly will not succeed unless the project is tackled with sympathy and intelligence (which has not distinguished past schemes) in such a way as will ensure the co-operation of those immediately concerned. Adequate land, adequate housing and opportunities for treatment, would without doubt be a powerful incentive to bring about this end.

However there is still another aspect of the problem which must be clearly realised by the authorities and that is that anything from a third to two-thirds of the inhabitants of any colony are people from the immediate locality who, desirably or otherwise, still retain family ties.

Another matter is that each colony other than those with a non-infected superintendent had its own very tightly knit governing body which, in consideration of a newcomer for admission, viewed what he or she had to offer both in physical fitness for productive work and property which could be shared to the common good. In spite of what government officials might hold to the contrary, it is this body that makes the final decision. Thus in the well-organised colonies, numbers are self-limiting in accordance with the land actually farmed.

The question of land, its encumberment and its suitability for building and for cultivation was, except where it was adequate in extent (Miryang) and owned outright, a matter of urgency and concern to nearly every colony. This could be well understood as past experience had shown that there could arise from this cause alone a build-up of government pressure and local resentment that had at times led to eviction. The most recent incident of this sort happened in Ulsan in October, 1953, when the whole colony was removed to Sorokto. To give other examples springing from the

same causes, the Sang Ai Won leases 450,000 pyungs of what was formerly Japanese property, however, of this only about 10,000 pyung or approximately 8 acres are under cultivation. The rest is at present lying fallow, being reserved by the government for afforestation. The colony in Masan occupies land which is owned by the Home Affairs Ministry who are at present threatening proceedings to regain its possession.

Although the occasion was one unsuited to clinical examination, the impression gained was that approximately one-fifth of those seen had the disease in a lepromatous form. Except at the Sang Ai Won there were comparatively few older patients with burned out disease and by far the largest number were between twenty and forty years of age. In this group partial loss of the extremities and contractures of the hand appeared to be particularly conspicuous. Some eye complications were also observed and blindness amongst the older members of any particular community appeared by no means uncommon.

Although is was quite evident that statistics relating to non-infected children were fallacious, nevertheless enquiries were volunteered in two colonies, i.e. Ilbansong (Chinyang Gun) and Miryang, as to whether the Government had any homes for the non-infected, and hence it is believed that the value of the statistics of non-infected children is that they indicate the number whose parents would be willing to give them up.

Another observation of some importance, which was undoubtedly related as much to the bitter experience of war as it was to the ignorance and superstition of the surrounding people, was the conspicuous number of non-infected adults in these colonies. Their presence there was attributable to three main causes shared in common and one peculiar to the Dae Myung Won Colony in which the majority of inmates were war veterans. Most commonly where women were involved they had accompanied an infected spouse into the colony. Next in frequency, where there were young men they had usually been picked up by the Police for drafting into the Army and then had been found to have the scars of old wounds or of burns which had been mistaken for the lesions of a Hansen's disease.

The situation in the Dae Myung Won was that here the patients being veterans were of a social status requiring servants. Orphan girls from Pusan had been procured to supply this need. Finally there were the disabled veterans who were usually amputees and easily passed as patients. Having no homes they were glad of any asylum.

In the older colonies of Kumhae (21) and Haman (18) there were also non-infected adults who had been born in the colony and had lived there all their lives.

Generally the non-infected group was welcome in various ways, especially in dealings related to the sale and barter of goods. They acted in the absence of a non-infected superintendent as liaison with the outside world without attracting unwelcome attention.

In nearly every colony visited the most conspicuous building was the church. This often stood out in contrast to the miserable shacks which served as the dwelling places of those whose physical needs were with touching devotion clearly subordinated to the urge for spiritual comfort.

In nearly every place visited there was a strong local resentment to the presence of a colony. Agitation usually took the form of petitions addressed to the Minister of Health and lodged with the Myun office for transmittal. Complaints were diverse, but amongst those which were common was that a colony was disposing of its produce on the open market or that its presence was " responsible for a poisoning of the water supply which would ultimately lead to the infection of everybody living in the neighbourhood " (Miryang). In regard to the colony living on Taema Island, the complaint was that " they were a menace to shipping " and further " that they were selling fish." In all statements a vestige of truth was blended with a miasma of superstition; though in a governmental connection it must be mentioned that it is clearly a perverse and nonsensical situation where two colonies (Kumhae and Chanyong) pay taxation to the Myun. This is collected annually in grain from the farm land of each colony.

" Recognition " of a colony in this province is a term of moot significance. An observed fact, however, was that independent of their status and of the amount of their own agricultural produce, every colony received a standard ration of grain of three hops per person per diem and this turned out to be another local cause for resentment.

All colonies also received relief aid goods, which included an admittedly meagre distribution of first aid medicines.

Surprisingly the Taema Island Colony (20) now comes within the classification of a non-recognised institution. It is to be recollected that in 1952 this island was especially selected as a place suitable for development as Sachon has been to-day.

In addition the Dae Myung Won (19) is not recognised and although there is no known intention of evicting its inmates, attempts to come to terms with this colony and to improve its

accommodation under the AFAK programme proved to be premature because of a refusal on the part of the Government to give certain guarantees required of them. On the other hand Miryang (3) the best situated and organised colony in the province, although "Recognised," is at present in immediate danger of eviction, as also is Changyong (4).

The position of Changyong (4) is in other respects peculiar, for this colony for no apparent reason other than the influential patronage of a certain member of the church, receives consignments of sulphone drugs direct from the Ministry of Health.

The Sang Ai Won (1) is financed from a budget provided by the Provincial Government which is matched by a grant from the Ministry. This budget, however, is irregularly paid and, apart from grain, it is evident this Leprosarium relies mainly on the largesse given in kind by local American Army and Air Force Units and also on CRIK supples.

It is of interest that an item on the budget provides for the purchase of medicines, but during the period of the past six months no satisfactory statement could be given as to how this has been spent. In the same period KCAC has donated sufficient sulphone drugs to treat 168 persons, including dressings and inunctions. The Ministry's contribution is unknown.

The paid staff amounts to seven persons, including a superintendent and a doctor appointed by the Ministry of Health. An attempt to improve the facilities of the Leprosarium in equipment and accommodation under the AFAK scheme resulted in a very careful study by two medical officers of the Maintenance and Supply group at the K-9 Air Base. Lists were prepared to include an X-ray set, a generator, anaesthesia apparatus, operating instruments, autoclave laboratory equipment, hospital furniture and materials to build a 20-bed ward. However, the matter progressed no further as at that time the ROK's Army admitted their intention to dispossess the Leprosarium of its site and buildings and it would seem now, that the opportunity has been lost.

CONCLUSIONS

All colonies fell far short of providing a geographical environment or a community discipline, conducive to the ideal of segregation. On the other hand the majority could be reasonably accessible to medical services if these were available. In some cases, indeed, there were local doctors who with training and encouragement might also be entrusted to take over their medical care.

In matters relative to patient welfare some were far better off than others and this applied particularly to those where a non-infected superintendent had been attracted to the work, i.e. Miryang, Haman and Kumhae.

The Miryang colony was particularly fortunate in its endowment of land. By the deed of gift by which this colony and the Dae Myung Won (Pusan) received their property, it is clear that there are persons of affluence who are interested in the humane aspects of this important public health problem. In other ways the Miryang Colony was quite outstanding and illustrated the superiority of private over government sponsored enterprise. Personnel acting as dressers and compounders were commonly unsuitably chosen. No attention was paid to the form in which they themselves had the disease.

Medical services were either lacking or inadequate. Discounting the tenuous influence of the profession, however, there was a lack of simple medications and inunctions and of the semi-skilled technical knowledge of the dresser and the compounder. At present the most serious obstructions to the attainment of higher standards of medical care are the ignorance of the care of paralysed and anaesthetic parts and of prescription for common intercurrent ailments.

It is, however, clear that before deciding either on the maintenance of the status quo (i.e. rural colonies and national leprosaria) or of falling into line with the Provincial Government's plan to abolish all rural colonies, the following must be decided:

(1) Do certain colonies actually coincide with areas in which the disease is hyperendemic?

(2) If so, have these colonies been brought into existence to meet a local need or are they on account of the laxity of control over the goings and comings of the infective persons concentrated in them responsible for the creation of such areas of hyperendemicity?

Finally, one matter was most noticeable in regard to the general standard of life maintained in the majority of the colonies. With the possible exception of Masan, Tongyong and Ulsan the economic level of these communities was higher than that of the war refugees living in the large cities and this in itself may well account for a proportion of the non-infected adults.

SPECIFIC RECOMMENDATIONS

It is believed that immediately KCAC can play a role of but small influence, for its present relation to the Province is con-

ditioned by what in a material sense it has to offer. First and foremost, therefore, the formation of a Provincial Leprosy Control Committee is essential for the safeguarding of the rights of the rural colonies and the health of the public. This panel would advise the Provincial Assembly, who are responsible for the approval of plans, concerning the continuance and recognition of the rural colonies.

It is believed that there are a sufficient number of interested persons outside the Provincial Government to serve in this connection. Their first consideration should be as follows:

(1) In detail:

(a) The removal of the Masan Colony (17) to a place which has sufficient land and is a safe distance from the city.

(b) The removal of the Tongyong Colony (16) and its fusion with the Kosong Colony (15) with the taking in of additional land to make this plan feasible.

(c) Reconsideration of the present plight of the Ulsan Colony (2) with a view to getting back for them the land or its value which they lost when they were evicted and evacuated to Sorokto in October, 1953.

(2) In principle:

(a) The building of local preventoria for each approved colony in the same way as has been done for the Taejon Colony by provision of the Pierce Baby Home.

(b) Organisation of medical treatment for approved colonies to ensure that all non-infected children in these places are put on to suppressive sulphone therapy and BCG immunised.

(c) A general tightening up of control over the comings and goings of infected persons by the appointment of a non-infected superintendent to each approved colony.

The position of the Committee would be immeasurably strengthened if they were recognised as being the trustees of any monies donated towards leprosy control by foreign agencies or missions.

Money is immediately needed for the purchase of land. In some of the better colonies land, because of its outside ownership, is interfering with the proper segregation of the colony. This situation could be adjusted if quite small sums of money were made available for land purchase. (Average cost of marginal land is H. 30 per pyung non-irrigated, H. 50 irrigated.)

Apart from this it is most important that there should be a recognised agency for the disposal of grain and livestock presently produced in excess of the needs of some of the larger colonies and

being sold on the open market. Miryang and Haman are cases in point. Redistribution of this grain to those colonies which are food-deficient would be ideal. If this were achieved through the use of transportation there would be a considerable saving to Government, however, this would obviously never work out in practice unless there was something to offer for what was removed. This would amount to the introduction of those very things which all the more prosperous colonies are either purchasing locally or exchanging for their own surplus agricultural produce.

EPILOGUE

The firm establishment of the Sang Ai Won Leprosarium, and its proper reorganisation so as to provide departments for specialised treatment of lepromatous cases, for orthopaedic surgery, and for training of workers, should be recognised as the key which opens the lock to proper leprosy control in this province. Unfortunately this key cannot be forged without impetus from the Ministry of Health.

At present every patient has a justifiable and irrefutable complaint in that no proper treatment is available. It is not a particularly hopeful sign that the attitude of the many querulous persons who were encountered on this survey, is one which will call for sympathetic long-term re-education; that is to say if and when the affected community as a whole is to make the best of what can be made available to them in the regimen of property, controlled therapy involving the use of sulphone drugs, and the services to which reference has already been made.

LEPROSY IN BRITISH GUIANA, 1954

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GENERAL INFORMATION

British Guiana, the only British Colony in the South American continent, occupies the north-east corner of the continent, between roughly 1 degree and 9 degrees north, and extends over an area of approximately 83,000 square miles. From the mountain range boundary between British Guiana and the neighbouring countries of Brazil and Venezuela, the land slopes down to the sea, where on the coast-land it is 3 to 4 feet below sea level.

Mainly sub-tropical in climate, the mean temperature ranges from 80 degrees Fahrenheit on the coast-land to 82 degrees Fahrenheit in the interior. Humidity is relatively high, the rainfall averaging 90 inches on the coast to 52 inches in the interior.

The population of the country is estimated to be in the vicinity of 479,000, over 90 per cent of which is to be found on the coastal belt, and is composed racially of East Indians (about 44.1 per cent), people of African descent (about 36.8 per cent), mixed races (12.7 per cent), Portuguese (2.2 per cent), other Europeans (0.6 per cent), Chinese (1.0 per cent), Amerindians (2.5 per cent) and miscellaneous groups (0.1 per cent).

The birth rate (1954) in the country is reported to be 42.6, the crude death rate 12.8, and the infant mortality in the vicinity of about 80. Density figures are not available, the population being centered about the Demerara, and the Corentyne River coast land of Berbice.

HISTORY OF LEPROSY IN BRITISH GUIANA

There is no evidence in any early record of leprosy among the original inhabitants of the country, but rather does all evidence point to the contrary. Hillis mentions the first appearance of leprosy among the Warrau tribe of Amerindians, but only after the institution of a leprosy settlement in the Pomeroon in 1832. In the 1842 census of all Amerindians in the colony, the only cases of leprosy amongst them were confined to the Warrau tribe. Souza-Araujo, in a history of leprosy in Brazil, states that from early records it would seem certain that there were no cases of leprosy among the native inhabitants when this neighbouring state was discovered.

European colonists as a possible source has been discussed by Hillis. He does not think the Portuguese who first arrived here from Madeira in 1841 could have introduced the disease, though Souza-Araujo considers them a possible source in Brazil. Regarding the Dutch settlers, Hillis is quite non-committal, and states " It is not known with any certainty to what extent the disease prevailed under the Dutch who first held the Colony "; in view, however, of the fact that leprosy was still present in Holland in the 16th century at the time of the first Dutch immigrants to this part of the world, Souza-Araujo considers they may have been a possible source. It seems unlikely, though, that European colonists could have introduced more than a few cases only.

However, there is no doubt that leprosy was introduced by African slave labour, at first strictly controlled by isolation on individual plantations, but with colony-wide spread after the emancipation.

More lately, Indian and Chinese immigrants certainly introduced fresh cases, Hillis even quoting the names of the affected immigrants, both Indian and Chinese, as they were taken off immigrant ships in 1841, 1860 and 1861. It seems, however, a debatable point as to how much of the spread of leprosy in the colony was due to withdrawal of strict isolation measures with the emancipation, how much to the wholesale introduction of fresh cases with the immigration from Eastern countries, and how much to early attempts at doubtful effective isolation.

Early plantation isolation could quite easily have been effective. The slaves were all known and censored and under strict control. In 1823, after the emancipation, there was an attempt at segregation in the Pomeroon. Its effectiveness could be judged by the reported spread to the Warrau tribe of Amerindians. There was a further isolation centre at Kaow Island on the Mazaruni River. Its origin is uncertain, but it certainly appears to have been in existence in 1879 when visited by Hillis. It was closed down completely on the transfer of patients to Mahaica, where a settlement and segregation centre was established in 1858 on the site of an old Dutch fort. Hillis' report of conditions as they existed then, and conditions as they exist at the present time, provides an interesting study in contrasts.

INCIDENCE

The figure calculated for over-all incidence in British Guiana is 2.7 per thousand. This is based on known and registered cases and for this reason alone is unreliable. There are many known

cases who are not registered, and many registered cases who are no longer known. Fictitious names and addresses make it difficult to trace old cases, while many referred cases neither report, nor can they be traced later.

Particular or intensive surveys have not, to my knowledge, ever been done, and I have not been able to unearth any report of one. The difficulty in communications, paucity of trained staff and the ease with which the suspect could disappear into the jungle makes the task of providing a reliable survey well-nigh impossible. As suggested by Dr. Wilson Rae of the Colonial Office, who recently visited the Colony, it would perhaps be feasible to survey the populated coast-land only. With the present staff of one doctor, one trained school-nurse, and one technician, this has not as yet been possible.

Presuming our present figures for incidence are no more incorrect than they were prior to 1924, the position is indeed heartening, for figures for prevalence published by a special medical conference on Leprosy in 1924 show an incidence of from 14 per thousand in 1905 to 15.5 per thousand in 1911, with a sharp drop to between 8.7 and 9 in 1920, and further rise to between 10 or 11 per thousand in 1923 and 1924.

General or extensive type surveys, based on the examination of school children, are meticulously done by a trained school nurse and health visitor, all primary schools capable of being reached under existing means of communication and transport being visited once every year. The three counties are done in succession, and the results of the 1954 school survey show 69,902 examinations done, with 22 cases diagnosed, 13 boys and 9 girls, giving a percentage incidence among children examined of 0.03 per cent.

RACIAL DISTRIBUTION

	African	East Indian	Mixed	Portuguese	European	Chinese	Amerindian	Total
Male	299	291	51	29	1	11	1	683
Female	312	200	33	8	1	2	0	576
Total	611	491	104	37	2	13	1	1,259

The absence of leprosy among the Amerindians is noteworthy and has been mentioned by Hillis in the last century, as well as by Frendo in 1924, and in a report of a Departmental Medical Conference on leprosy of the same year. There are, at present,

no registered cases among puré Amerindians, the one case shown above being strictly speaking of mixed blood, and originating from the coast-land.

It has been suggested that this apparent immunity may be an acquired one as a result of an early indigenous endemicity. This is not borne out by the experience of the earlier writers on leprosy, both in this Colony and in other areas of South America; nor by the fact that members of the Warrau tribe, when contact became free in the Pomeroon area in 1832, did actually contract leprosy. In this country at least, separated as they are from the infected coast-land by a barrier of impenetrable virgin forest, and protected in reservations where intimate contact is reduced to a minimum, the absence of leprosy amongst the Amerindians appears to be due more to absence of contact than any other single factor. The Mitsuda reaction as an index of tissue immunity would be of little value, as due to a high susceptibility to tuberculosis, the BCG Campaign in this country was started amongst the Amerindians.

PREDOMINANCE OF TYPE

This is difficult of assessment as only 30 per cent of the total registered cases attend for treatment and are regularly seen. Records of all registered cases have been examined, but as a few cases, classified earlier as " neural " and bacteriologically negative have since been confirmed as lepromatous, I do not think it possible, without re-examination, to accurately reclassify. Of the 1,259 cases on the register, however, 284 only are, or have been, diagnosed lepromatous, giving a lepromatous percentage figure of 22.5 per cent.

New cases diagnosed during the year numbered 64, of these 53 being tuberculoid, 2 indeterminate, and 9 lepromatous. This classification was done on clinical examination of the lesions, smear results, and the lepromin reaction. No histology was done. Of these new cases, 22 were children, 19 tuberculoid and one only lepromatous.

Reviewing admission figures to the register over the past five years, the trend towards a higher tuberculoid rate is noticeable.

Year	Tuberculoid	Lepromatous	Ratio
1950 ...	29	11	$2\frac{1}{2}$: 1
1951 ...	34	7	5 : 1
1952 ...	43	12	$3\frac{1}{2}$: 1
1953 ...	63	14	$4\frac{1}{2}$: 1
1954 ...	55	9	6 : 1

Amongst early cases seen in childhood this trend persists, the

East Indian presenting a definite tuberculoid type lesion, while the African tends more to the indeterminate, or pre-lepromatous type of macule with the negative or doubtful Mitsuda reaction.

An approximate comparison of the tuberculoid: lepromatous ratio between the two main racial groups would be: 3 : 1 among Africans and 5 : 1 among East Indians.

THE LEPROSY SERVICE IN BRITISH GUIANA

This is centred in the Mahaica Hospital, a Government Institution housing 268 inmates with a total bed capacity of 350. Of these 34 beds are set aside in the hospital proper for the treatment of complications of leprosy, intercurrent disease, and for the admission, by their own choice for both surgical and medical complaints, of any discharged or registered patient in the Colony.

All leprosy records are maintained centrally at Mahaica.

Discharged cases on maintenance therapy and tuberculoid cases are periodically seen at county clinics, there being six such in all for the three counties. At these clinics are seen referred cases, and contact examinations are done at roughly half-yearly intervals. Lepromin testing, diagnostic smears, and re-smears of old cases are done at these clinics.

The medical staff of the leprosy service includes the one leprologist, six religious Sisters of Mercy, six staff nurses/midwives, one health visitor trained in leprosy work who does the school surveys, a dispenser, and one laboratory technician. Of these, the doctor, and the technician visit the clinics in addition to their duties at the Institution where the doctor is also the Medical Superintendent. Most of the field work is done by the trained health visitor.

LEPROSY CONTROL

The measures adopted in British Guiana are:—

1. Compulsory notification and compulsory isolation of all bacteriologically positive cases only. Three negative smears at monthly intervals for a period of one year is taken as the necessary criterion of arrest, when the patient is then discharged to outpatient surveillance and maintenance therapy by a special board of four doctors, including the Assistant Director of Medical Services, the leprologist, and the Government Bacteriologist. Private home isolation under bond, though legislated for, is not encouraged.

2. Periodical examination of contacts. The institution of preventive treatment, especially in lepromin negative contacts, is being instituted. As far as possible, all contacts are examined six-monthly. It is hoped that this number will eventually be cut

down (when lepromin testing is completed) to chiefly lepromin-negative contacts at these now frequent examinations.

BCG has been given to most Primary School children as part of the anti-TB campaign. Lepromin testing in these innoculated contacts is now being done.

3. Periodical yearly re-smearing of discharged cases, whenever possible.

4. Yearly School Surveys: Most early cases discovered are the result of these school examinations. This, in turn, leads to a wider field for contact examination, and theoretically should lead to the source of infection. This latter, however, is seldom so in practice.

5. Health Education: This is, as yet, very meagre, and public opinion on the question of leprosy is shockingly ill-informed. There is a wide field for this through the medium of the radio, posters, etc., and a start has been made by Editorials in the newspapers—though this is mainly directed at the present time to enlightenment of the more educated section of the community with a view to minimising stigma—a very real problem in British Guiana. Leprosy has also now been included in the curriculum of training for health visitors, sanitary inspectors and school teachers.

LEGISLATION

The first Ordinance was passed in 1858 regulating the establishment of the Mahaica "Leper Asylum," the institution being then under the control of the Poor Law Commissioners, with provision for the compulsory isolation of all necessitous cases, private isolation also being permitted.

In the light of increasing knowledge this original Ordinance was superseded by the Leper Asylum Ordinance of 1870 and later by that of 1905, with amending ordinances in 1910 and 1911.

The Leprosy Ordinance of 1931 now in force, no longer speaks of "asylum," but refers to the "Leprosy Hospital." The main feature of this Act is, I feel, the sharp distinction shown between the infectious and non-infectious type, all legislature being designed to control disease by limiting the movements and freedom of the former type only. Immigration and landing of infectious patients is fully dealt with. Compulsory isolation of the infectious is still the law. On the whole it is a good Ordinance, but needs revision in the light of further experience gained since 1931.

A new bill is in the process of being prepared to amend the 1931 Ordinance and bring the law into line with modern views of leprosy. It is hoped to make compulsory isolation "per-

missive ' and more attention is directed to compulsory treatment and contact examinations, chiefly in children. The Mahaica Hospital by which the institution has been for years known, should come into being officially, with no mention of "leper," " leprosy," or " asylum."

Rehabilitation and After-care

This is as yet in its infancy. Without the services of a special Social Welfare Officer and after-care organisation it is felt that very little could be done for the discharged patient who, in view of his excellent condition, is desirous of and capable of being re-integrated into society. Efforts are being made, with the help of the health education afforded by certain newspapers, and the efforts of a few more enlightened employers, to place these ex-patients in suitable employment. Similar efforts are being made by the Government and it is now the official Government policy to assist wherever possible.

The formation of an Ex-patients' Association, whose aims are the promotion of a better understanding of the disease and the safeguarding of the interests of and the assistance of the ex-patient, has now been started. There is no reason why it should not play an important part in Health Education and later, perhaps, in rehabilitation and after-care.

There is as yet no organised or official physio-therapeutic set-up for leprosy cases though as much as possible is being done especially in children, to provide facilities for muscle testing, electrical stimulation, and exercise.

No reconstructive therapy has as yet been attempted.

Concluding Remarks

Much has been done in the past ten years, especially since the introduction of the newer drugs as the established form of therapy; much still remains to be done. Within the leprosarium further improvements in living conditions and work are being planned, while it is hoped that the technical side of the staff is soon to be augmented. Greater facilities for research and study by improving laboratory facilities and the introduction of histology is also planned. Unfortunately there appears to be no immediate chance of introducing some means of reconstructive therapy and physical rehabilitation. The Government, however, is becoming more conscious of the need for social rehabilitation and this matter is now engaging their attention.

SENSITIZATION TO TUBERCULIN INDUCED BY LEPROMIN

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with the technical assistance of
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INFLUENCE OF LEPROSY ON THE TUBERCULIN REACTION

The influence of leprosy on the lepromin reaction has been demonstrated and confirmed in many investigations. On the other hand, the influence of *M. leprae* on the tuberculin reaction has not awakened much interest, and the literature on this subject is by no means abundant. Wade[1] has discussed it in a well documented paper, and one of us (J.M.F.) presented his personal experience and views on the occasion of the Third Argentine Congress on Tuberculosis[2].

Convit and his associates[3] admit that infection by leprosy may interfere in the sensitization to tuberculin. In 1952 they observed persons in contact with lepers in a rural district in Venezuela and found only 8 per cent tuberculin positive cases in lepromin negative individuals and 46.6 per cent in lepromin positive subjects. In a recent paper Convit[4] confirms his former findings, stating that there are 3 per cent Mantoux positive (D.P.P. 5U) in lepromin negative, and 45 per cent in lepromin positive individuals.

Lowe and McNulty[5] have studied immuno-allergic relations between leprosy and tuberculosis in natives of Nigeria. Their results, as they themselves point out, are contradictory, because although in anergics to lepromin the percentage of tuberculin positives (59.4 per cent) was lower than in the healthy population (75.2 per cent), it was slightly above that found in cases of tuberculoid leprosy (55 per cent).

Hodler and Zitti[6] have reported recently the results of their investigations on the influence of *M. leprae*, *M. lepraemurium* and *M. tuberculosis* on sensitiveness to tuberculin in guinea pigs. They have shown that *M. leprae* and *M. lepraemurium* sensitize guinea pigs to tuberculin, with maximum intensity at thirty and sixty days respectively; later sensitiveness declines and disappears. Tuberculin hypersensitiveness induced in guinea pigs by *M. lepraemurium* is the same as that induced by BCG. They conclude that tuberculin hypersensitiveness in guinea pigs inoculated with *M. leprae* and *M. lepraemurium* depends on two factors: (a) the capacity of the macrophages of destroying these bacilli, lysis of which provokes tissue reaction and hypersensitiveness; and (b) the similarity in the chemical structure of some of the antigenic fractions of *M. leprae* and *M. lepraemurium*, which is responsible for cosensitization.

PERSONAL EXPERIENCE

MATERIAL AND METHODS

As the results of previous investigations, carried out by one of the authors of this paper, on the influence of lepromin on tuberculin reaction, were not conclusive, it was decided to repeat the tests, increasing the number of cases.

Observations were made in a group of eighteen children, aged 3 months to 8 years, lodged in a home, and who had had no known contact with lepers; they were Mantoux negative at 1 : 10.

Crude tuberculin, prepared at the Malbran Institute of the National Ministry of Health, was used in concentrations of 1 : 1,000, 1 : 100, and 1 : 10. Two types of lepromin, both prepared by Dr. A. Serial and A. R. Mercau, were used: (a) bacillary, obtained by chloroform extraction according to Dharmendra's method; (b) whole, prepared by the Mitsuda-Hayashi method.

A single intradermal injection, in doses of 0.1 to 0.2 c.c., in the right scapular region, was given in four cases; this was repeated at 48-hour intervals, once in twelve cases and twice in two cases. Sensitiveness to tuberculin (Mantoux 1 : 10) was tested from the third week after the injection of lepromin, and periodically after that. However, for reasons outside our control, this could not be done at regular intervals in all cases as had been planned in order to determine exactly at what moment the Mantoux reaction became positive.

Cases classified as tuberculin negative were given a Mantoux test for at least three months following the lepromin injection, except in one instance in which the child was withdrawn before this period was up. The Mantoux reaction was read at 24 and 48 hours, the latter being considered as the final result. It was taken as positive when an infiltrated erythematous halo of not less than 10 mm. diameter was observed.

RESULTS

Results are given in the Table. In 8 (44.4 per cent) of the 18 cases the negative Mantoux became positive after the lepromin injection. The majority of the cases became positive between the sixth and seventh week after the lepromin injection; one became positive in 20 days, and in another, which could not be tested regularly, a positive Mantoux was seen only after 130 days.

Positive Mantoux reactions following lepromin injection are similar in appearance and evolution to those induced by BCG vaccination. Reactions of erythematous or erythemato-violacious type, with discrete infiltration, predominated. Frequently erythema was more marked at 24 than at 48 hours. In all cases, except Nos. 1 and 2, positivity was slight. In several cases an erythematous halo without infiltration was observed; there were considered as negative.

In those cases in which it was possible to follow the course the course of tuberculin allergy it was found to be transitory, since

after a few weeks the reactions became negative.

To illustrate the findings notes corresponding to some of the cases included in the Table are given here:—

No. 1

Maria P., aged 2 years 6 months. Routine clinical and X-ray examination: negative.

8.11.1951: Mantoux 1 : 10 negative (−).
27.11.1951: 0.2 c.c. whole lepromin intradermally.
30.11.1951: do.
27.12.1951: Mantoux 1 : 10, negative (−).
10. 4.1952: Mantoux 1 : 10 positive (+).
21. 4.1952: Mantoux 1 : 10 positive (+). In the scapular region two scars corresponding to the Mitsuda reaction (++) were observed.
21. 5.1952: Mantoux 1 : 10 positive (+). Clinical and X-ray examination, normal.
21. 6.1952: Mantoux 1 : 10 negative (−).
5. 7.1952: Mantoux 1 : 10 negative (−).

Note: The Mantoux may have become positive before April, 1952; the child left the home in December and did not return till April.

No. 2

Stella A., 1 year old. Routine clinical and X-ray examination, negative.

9. 3.1952: Mantoux 1 : 10 negative (−).
10. 4.1952: 0.2 c.c. whole lepromin intradermally.
12. 4.1952: do.
22. 5.1952: Mitsuda positive (++). Mantoux 1 : 10 negative (−).
5. 6.1952: Mantoux 1 : 10 negative (−).
21. 6.1952: do.
5. 7.1952: do.
22. 7.1952: do. Erythematous halo without infiltration.

No. 4

Rodolfo S., 6 years old. Routine clinical and X-ray examination, negative.

8.11.1951: Mantoux 1 : 10 negative.
24.11.1951: 0.2 c.c. whole lepromin intradermally.
27.11.1951: do.
30.11.1951: do.
11.12.1951: Mitsuda positive (++). Mantoux 1 : 10 negative (−).
4. 1.1952: Mantoux 1 : 10 negative (−).
25. 3.1952: do.
17. 4.1952: do.
5. 6.1952: do.

No. 17

Mario P., Argentine. Routine clinical and X-ray examination, negative.

8.11.1953: Mantoux 1 : 10 negative (−).
30.11.1953: 0.1 bacillary lepromin intradermic.
18.12.1953: Mitsuda positive (++). Mantoux 1 : 10 negative (−).
12. 1.1954: Mantoux 1 : 10 positive (+).
17. 3.1954: Mantoux 1 : 10 doubtful (±). Erythematous halo without infiltration.

DISCUSSION

Before discussing the results it is necessary to acknowledge several deficiences in this investigation. The weakest point is the insufficient control of the course of tuberculin allergy following

lepromin injection; but in children it is not always possible to repeat the tests at as short intervals as they should be. This did not allow accurate determination of the length of the pre-allergic period between the injection of lepromin and the establishment of a positive Mantoux reaction, or of the duration of sensitiveness to tuberculin. In the majority of the cases in which the negative Mantoux became positive, it did so six to seven weeks after the intradermal injection of lepromin. The Mantoux again became negative after a few weeks, but it is not possible to state exactly when it did so. Possibly the number of cases showing a positive Mantoux following lepromin would have been greater if the tests had been carried out more often.

The standard for assessing results of tuberculin tests in work such as is here reported is of decisive importance, but sometimes of difficult application. If the usual standard for classifying erythema and infiltration as positive or negative is strictly adhered to, it is obvious that some reactions do not fulfil the conditions necessary to be considered as positive, yet are not exactly negative. It is certain that some change has been provoked in the organism, but this is not sufficient to be computed in the final result. In this series often the manner of response changed after lepromin injection, but the magnitude or intensity of this change was not sufficient to consider the reaction as positive. Attention should be drawn here to the fact that Long and Favour[7] consider a tuberculin test as positive when there is some change in the response (erythema or infiltration), whatever its degree, at the site where the antigen has been inoculated.

It is possible that *M. leprae* can induce sensitiveness to tuberculin with greater frequency and intensity than has been observed in the series here reported, in which small quantities of dead bacilli have been used. If, instead, adequate amounts of live bacilli were inoculated, it is almost certain that the proportion of tuberculin positive reactions following inoculation would be greater than that observed after lepromin has been injected. This occurs when *M. tuberculosis* is inoculated; live bacilli (virulent or attenuated) have greater sensitizing activity than dead bacilli.

Owing to the deficiences of this investigation, striking results have not been obtained. It is possible to state, however, that following intradermal injection of whole lepromin, more than 40 per cent of tuberculin negative cases become tuberculin positive.

SUMMARY

A group of eighteen children, from 2 months to 8 years years old, living in a home without any known contact with lepers,

having a Mantoux 1 : 10 negative, was given 1 to 3 intradermic injection of 0.1 to 0.2 c.c. bacillary and/or whole lepromin. The following results were observed: in 44.4 per cent of the cases the negative Mantoux became positive in six to seven weeks following the injection of lepromin. The appearance and course of the positive tuberculin reaction was similar to that induced by BCG vaccination. In the majority of cases this tuberculin allergy was weak and of short duration.

INFLUENCE OF LEPROMIN ON THE TUBERCULIN REACTION

Name	Age	Lepromin Used	No. of injections	Result of the lepromin reaction F*	M	Result of the Mantoux in days after lepromin injection
1—P.M.	2 years	Whole	2	—	++	+130
2—F.M.	5 years	,,	3	—	+	+20
3—S.E.	8 months	,,	2	—	±	+40
4—S.I.	6 years	,,	3	—	+	—240
5—A.S.	1 year	,,	2	—	+	—90
6—A.M.	2 years	,,	2	—	+	+42
7—L.A.	5 months	,,	1	—	—	—100
8—M.R.	2 y. 6 m.	,,	2	—	—	—90
9—B.J.	2 years	,,	2	—	+	+42
10—W.V.	6 years	,,	2	—	—	—90
11—H.S.	4 years	,, & bac.	2	—	+	—90
12—S.	6 years	,, ,,	2	—	+	—90
13—S.J.	5 years	,, ,,	2	—	+	—47
14—H.M.	6 years	,, ,,	2	—	+	—50
15—S.B.	5 years	,, ,,	2	—	+	—90
16—M.J.		Bacillary	1	—	—	—90
17—P.M.		,,	1	—	—	+47
18—D.S.		,,	1	—	—	+47
19—V.F.		,,	1	—	+	—42

* F=Early reaction. M=Delayed reaction.

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PRELIMINARY REPORT ON TREATMENT OF ULCERS IN LEPROSY PATIENTS AT NDJAZEN LEPROSY COLONY, FRENCH CAMEROUN

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In the leprosy colony at Ndjazen, French Cameroun, financed by the American Leprosy Missions, Inc., and staffed by the American Presbyterian Mission, a recent survey of the entire colony showed that there were 1,140 patients being treated, of whom 86 were lepromatous and the balance non-lepromatous. Of the 86 lepromatous patients, it was found that 25 patients, or 29 per cent of that group were suffering from ulcers of hands, legs or feet. From the non-lepromatous group of 1,054 patients, 493 were found to be suffering from ulcers, an incidence of 47 per cent. The incidence of ulcers in the whole colony was 45.4 per cent. In view of this very high incidence of ulcers and the very considerable degree of incapacity resulting therefrom, and in view of the already straightened economic circumstances of most of the patients who must be self-supporting all through their years of treatment, it seemed imperative that a renewed effort be made to bring the problem under control. Accordingly, a revised schedule of treatment was begun on July 1st, 1954, and at the end of six months the results were tabulated in Tables I, II, III. The brevity of the period of treatment prevents this from being more than a preliminary report, or a base line from which to start the search for better methods of treatment.

The logical beginning of such treatment is obviously prevention. A study of the habits of the African patients living in mud and thatch houses and working daily in forests and gardens or in the colony's lumber mill and carpenter shop, revealed that the most frequent causes of foot and leg ulcers were as follows:

1. Burns caused by putting anesthetic parts too near the fire in the middle of the floor, or resting them directly on stones that have been too near the fire. Such practices are especially frequent on cold, wet nights and among the elderly patients who feel the need of a fire's warmth more than their younger counterparts.

2. Lacerations, contusions and abrasions caused by striking the feet or legs on stumps of small trees, stones, sharp stubble, or branches near the ground while working in the forest or gardens.

3. Walking barefoot on gravel roads where small stones cause brusing with every step.

4. Crude shoes with rough thongs and other rough parts that rub off the insensitive skin without giving warning.

Ulcers and infected wounds in hands which have become insensitive from leprosy are usually found to begin from one or more of the following causes:

1. Handling of food, vessels and other objects as cigarettes, which are too hot.
2. Careless use of tools such as the cutlass in cutting the ever present brush and grass, resulting in blisters, bruises, scratches and abrasions.
3. Use of a bare finger to guide the reeds in basket making, until the finger has lost its skin.

Once the causes have been found, it would seem, after reading the list, a simple enough matter to prevent the great majority of them, and an effort along this line was instituted. The whole colony was called together and given a series of talks on prevention of burns on hands and feet, the protection of feet with proper shoes free from rough straps, protruding nails, etc., the covering of fingers used for directing of reeds in basket making, the use of forest paths whenever possible rather than the gravel covered roads; and intensified efforts were made to have all early wounds treated before they became chronic. Simple as these remedies sounded, their enforcement was found exceedingly difficult, since any one of them meant the changing of life-long habits.

Before beginning the treatment, the patients were divided into three groups according to the type of lesions they presented. Group I was made up of patients with relatively clean and superficial ulcers, although many of them were three or more inches in diameter. Group II was made up of patients whose ulcers were grossly infected and foul. Group III was patients whose ulcers were of many years duration, deep and highly resistant to previous treatment. Group I patients were dressed at four-day intervals, their wounds being first exposed to the direct sunlight for fifteen minutes whenever possible, and then painted or sprayed with a ½% solution of Aldrich triple dye (1.5 parts crystal violet, 1 part brilliant green and 0.75 part acriflavine neutral). Group II, those with foul ulcers, were given daily dressings medicated with a saturated solution of magnesium sulfate in glycerine previously autoclaved. Three to five days of this treatment were usually sufficient to bring the patients into Group I.

Group III patients, with their deep ulcers of many years' duration, were first subjected to a light surgical curretting, the wounds were packed with vaseline gauze and a plaster of Paris cast applied. The wounds were left undisturbed for six weeks, during which no weight bearing was permitted. If the patient had only one such cast, he was permitted to walk with crutches on his sound leg. If he had ulcers on both legs, he was required to spend the six weeks in bed. At the end of six weeks, when the cast was

opened, many of the wounds were completely healed. Many others were graduated to Group I. The few that were still deep were again encased in plaster of Paris for another six weeks.

All of the patients eventually found their way into Group I and so were subjected to triple dye treatment. It was the authors' impression that this dye, used under the conditions described, was definitely more effective in promoting healing than medications previously tried.

TABLE I

Total number of patients in leprosarium	1,140
Lepromatous cases	86
Non-lepromatous cases	1,054

TABLE II

Incidence of ulcers:		
Lepromatous patients with ulcers	25	or 29%
Non-lepromatous patients with ulcers	493	or 47%
Total ...	518	
Incidence of healing of ulcers in 6 months or less:		
Lepromatous patients healed	13	or 52%
Non-lepromatous patients healed	285	or 58%
Total healed ...	298	

TABLE III

Methods of treatment used:		
Triple dye	235	patients
Salts and glycerine	14	
Combined salts and glycerine and triple dye ...	49	
Plaster of Paris cases	3	
Curettage	28	
Amputation of digit	1	
Adjuvent methods:		
Bed rest for from 2—6 weeks	102	patients
Crutches for 6 weeks	8	

ISONIAZID IN LEPROSY TREATMENT

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It has been adequately shown by others that Isoniazid alone is not satisfactory in the treatment of leprosy. The purpose of this experiment was to find out whether it has any adjuvant action when used with Dapsone, which appears to be the most satisfactory drug all round.

For this purpose, a group of difficult patients were taken. The difficulties were either slowness or absence of bacteriological improvement or very obstinate reactions. All cases chosen were lepromatous.

From August, 1952, to July, 1953, a dose of about 3 mg. per kg. daily was given, after which I was advised by Dr. R. G. Cochrane to raise it to 6 mg. per kg. daily. This was done.

Routine smears are taken from three places and graded 1 to 4+, so that a maximum Bacteriological Index (B.I.) of 12 is obtained.

In recording the B.I. of each patient, I have selected smear results from a long list to illustrate the general trend, taking the highest recorded B.I.s during the period rather than the occasional lower ones which may have been mistaken.

The exception of this rule is Z/1652. I have recorded the last seven smears in full as I fear the development of drug resistance in his case.

Clinically, results are estimated by skin thickenings and erythema and by frequency and severity of reactions.

The experiment shows bacteriological improvement in all but one case and clinical improvement in all cases.

My opinion is that the improvement is more rapid than could be expected of Dapsone alone, but the difference is not very marked. Dapsone alone is so successful in the vast majority of our patients that the great addition to expense in buying Isonaizid and to staff time in giving daily treatment is not warranted for routine work. There are, however, the few for whom it appears that this additional treatment is of great value.

The selection of male patients for this experiment is purely because they were the ones whose leprosy was difficult to treat.

I am indebted to various firms, specially Messrs. Boots, who helped me by providing Isoniazid at first and later to Dr. Cochrane who arranged for further supplies and gave me advice and encouragement.

Z/93. P.E. Male. 35 years. According to the patient he had three flat macules in 1932. He had Hydnocarpus treatment for 11 years and was discharged in 1943. In 1944, he was admitted here with diffuse leproma, had further hydnocarpus treatment, but steadily developed deformities. In August, 1949, he was put on Sulphetrone and in November, 1950, on twice weekly Dapsone. He was subject to numerous lepra reactions on both Sulphetrone and Dapsone and his treatment had to be reduced to 100 mg. Dapsone twice weekly. In December, 1952, he was put on Dapsone as before plus Isoniazid 200 mg. daily. In September, 1953, he was much better, could take Dapsone 300 mg. twice weekly. In June, 1955, he is taking Dapsone 400 mg. and his general condition and hand-grip have improved.

Bacteriological.	4.47	B.I.	8
	10.54	,,	3

Z/51. V.I. Male. 35 years. In September, 1939, he had a very severe Nodular Leproma. Under hydocarpus oil his condition improved and smears became negative, but relapsed while still on treatment. In February, 1949, he had widespread new nodules. In August, 1949, Sulphetrone was started and in November, 1950, twice weekly Dapsone. In July, 1952, after three years of Sulphones he was much the same. He started Isoniazid. Since then his progress has been steady and slow. In June, 1955, leprosy still appears active, with erythema and some thickening, but as smears have been twice negative, it is possible that these are only scars. He is an albino, so erythema is much easier to see.

Bacteriological.	8.48	B.I.	4
	7.52	,,	10
	8.53	,,	7
	10.54	,,	1
	12.54	,,	0
	1.55	,,	0

Z/1399. O.N. Male. 15 years. 1943 leprosy started. In 1946 he had a Nodular Leproma and started hydnocarpus oil. The leprosy remained highly active. In August, 1949, he started Sulphetrone and November, 1950, Dapsone twice weekly, under which he improved clinically but had severe limb pains. His nerves were large. In August, 1952, he started Isoniazid and his limb pains and clinical condition steadily improved.

Bacteriological.	7.48	B.I.	9
	8.50	,,	8
	9.52	,,	4
	11.53	,,	2
	5.54	,,	1
	9.54 onwards		4 negatives

Z/1639. O.A. Male. 45 years. Had leprosy in 1936 with hydnocarpus treatment, but became worse. Came to Oji River in 1949 with severe nodular leproma and enlarged ulnar and popliteal nerves. April, 1950, started Dapsone 200 mg. daily. November, 1950, 400 mg. twice weekly. He had very severe reactions. In December, 1951, he started Thiacetazone, but continued to have severe lepra reactions. In October, 1952, he started Isoniazid with Dapsone for two months, followed by the addition of Dapsone, which was increased with his tolerance of the drug,

until in September, 1953, he could tolerate 400 mg. twice weekly without more than mild reactions.

Bacteriological.	10.49	B.I.	8
	9.53	,,	7
	1.54	,,	4
	12.54	,,	3

Z/1652. N.N. Male. 35 years. 1948 leprosy started on upper arm. In December, 1949, he had infiltrated leproma with early nodules, swelling of legs and very enlarged external popliteal nerves and large ulnars. He had hydnocarpus oil for four months and started Dapsone 200 mg. daily in April, 1950, and 400 mg. twice weekly in November, 1950. He had many reactions and was given Thiacetazone in 1952, but transferred to Isoniazid in October, 1952. He continued to have so many reactions that Dapsone was stopped in May, 1953, and replaced by Thiacetazone in July 1953. In September, 1953, he started Dapsone again instead of Thiacetazone, and by July, 1954, he was able to take 400 mg. twice weekly. In June, 1955, he still gets reactions in what appear to be localised lepromatous areas on the chest, but though his bacteriology in the last few months has shown a rise, clinically he seems better.

Bacteriological.	12.49	B.I.	9
	3.54	,,	3
	5.54	,,	1
	7.54	,,	0
	10.54	,,	1
	6.55	,,	**4**

Z/2124. O.E. Male. 14 years. March, 1952, had leprosy for about one year, but had severe nodular leproma. He started Dapsone, but had many reactions and could only take very small doses. In November, 1953, he started Isoniazid and his reactions improved shortly afterwards. He is now able to tolerate Dapsone 300 mg. twice weekly with very little trouble.

Bacteriological.	3.52	B.I.	9
	3.53	,,	7
	6.54	,,	3
	2.55	,,	1

Z/2238. E.E. Male. 30 years. 1950 extreme nodular leproma, had very severe lepra reactions on twice weekly Dapsone and started Isoniazid in November, 1952. In September, 1953, he had a very severe left ulnar reaction and in July, 1954, his right ulnar reacted severely. All the time he has had mild lepra and ulnar nerve reactions in addition but they are improving in June, 1955. He is able to tolerate Dapsone 2 twice weekly with few mild nerve reactions only.

Bacteriological.	5.50	B.I.	12
	10.52	,,	4
	8.53	,,	5
	6.54	,,	3
	12.54 & 3.55	,,	0

Z/106. P.E. Male. 50 years. In 1948 he had diffuse and thickened leproma with very large ulnar and extension popliteal nerves. He had a year on hydnocarpus oil and in September, 1949, started Sulphetrone. In November, 1950, he had Dapsone 400 mg. twice weekly. He had many ulnar nerve reactions with swelling of the hands, and had to reduce treatment to Dapsone 100 mg. In October, 1952, he started Isoniazid. His reactions became less severe and by July, 1954, he was able to take Dapsone 400 mg. twice weekly.

Bacteriological.	8.50	B.I.	7
	12.52	,,	3
	11.53	,,	2
	5.54	,,	1
	7.54 onwards		5 negatives

Z/1075. J.A. Male. 45 years. 1935 leprosy started, 1940 he started hydnocarpus treatment with severe nodular leproma, early deformities and invasion of the eyes. There was no improvement in nine years, but the eyes and limbs deteriorated. In December, 1949, he started Sulphetrone. In April, 1950, daily Dapsone 200 mg. and in November, 1950, 400 mg. twice weekly. He had repeated reactions until August, 1952, when he started Isoniazid. Since then his reactions have almost ceased and, though blind and crippled, his condition has not deteriorated since then.

Bacteriological.	12.48	B.I.	7
	8.50	,,	7
	1.51	,,	8
	1.52	,,	9
	2.53	,,	5
	2.54	,,	2
	9.54	,,	2

Z/1124. V.O. Male. 30 years. In 1934 leprosy started. In 1937 he had an early leproma, treated with hydnocarpus oil. He was irregular in attendance and returned in 1945 with nodules on ears and nose and some loss of sight. On hydnocarpus oil, his bacteriological findings became worse, but clinically he remained much the same. In October, 1949, he started Sulphetrone and in November, 1950, Dapsone 400 mg. twice weekly. He had frequent mild reactions. Nerve signs in the form of trophic lesions continued to get worse. In August, 1952, he started Isoniazid. His eyes improved slightly and reactions soon became less. He has had less tendency to trophic troubles, but I believe it is partly because he takes an intelligent and careful attitude to his hands.

Bacteriological.	5.49	B.I.	9
	1.51	,,	10
	5.52	,,	5
	3.53	,,	3
	11.53	,,	1
	1.54 onwards 8 negatives		

Z/1132. E.C. Male. 50 years. 1930 leprosy started. 1940 small macules (history vague), started hydnocarpus oil. May, 1953, showed first positive smear and continued to get worse, until in 1950 he had a nodular leproma. April, 1950, daily Dapsone 200 mg. November, 1950, 400 mg. twice weekly. He had many mild reactions and started Isoniazid in August, 1952, after which his reactions reduced in severity.

Bacteriological.	12.49	B.I.	7
	1.52	,,	6
	2.53	,,	**4**
	6.54	,,	2
	6.55	,,	1

Z/122. Z.U. Male. 40 years. In 1937, he had a fairly severe leproma. Improved under hydnocarpus oil but relapsed while still on treatment. In August, 1949, started Sulphetrone and in November, 1950, Dapsone. In July, 1952, there was little to see except wrinkling of the skin, but smears remained high. He started Isoniazid. Following that, his smears have continued to improve, but remain positive in the right ear, though it is mostly acid-fast dust that is now seen there. Clinically he has shown very little since 1950.

Bacteriological.	5.49	B.I.	9
	6.52	,,	8
	4.54	,,	6
	1.55	,,	3

Z/299. F.N. Male. 50 years. Leprosy started about 1930. Very vague early history, but he got worse on hydnocarpus treatment. In June, 1945, he came to Oji River with severe nodular leproma, which

showed little clinical improvement under hydnocarpus oil. In April, 1950, he started Dapsone 200 mg. daily and in November, 1950, 400 mg. twice weekly. In August, 1952, he started Isoniazid, after which his general health has steadily improved. His skin has remained thick and wrinkled. **Bact.** In spite of appearances, since 1951 the only place ever to be found bacteriologically positive was the right ear.

Bacteriological.	6.51	B.I.	3
	12.53	,,	2
	1.55	,,	1

Z/277. E.A. Male. 25 years. In January, 1949, he had a diffuse leproma with slight nodulation of face and swelling of feet. He had hydnocarpus oil until May, 1950, when he started Dapsone maximum 200 mg. daily. In November this was changed to 400 mg. twice weekly. In August, 1952, he still showed slight nodulation of ears and general erythema. He started Isoniazid. Up to June, 1955, he still has mild lepra reactions.

Bacteriological.	5.49	B.I.	9
	2.51	,,	9
	6.52	,,	8
	8.53	,,	7
	4.54	,,	6
	1.55	,,	3

LEPROSARIUM MAGAZINES

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[*The Fontilles Leprosarium is situated between Valencia and Alecante, in an ideal position on the slope of a hill, with an outlook over a fertile plain to the Mediterranean a few miles away. Its name (meaning "small fountains") is derived from the fact that several small springs of cool clear water come gushing out of the side of the hill in between the buildings of the institution.*]

The practice of producing leprosarium magazines is perhaps somewhat neglected in the English-speaking world. I can think of the famous " Star " of Carville, U.S.A., but have difficulty in recalling any others, and shall be delighted if my readers will inform me of any. Yet there is great value in a leprosarium magazine, whether produced by the " Management " and receiving contributions from the patients, or produced entirely by the patients themselves. The life and needs of the patients can become widely known, and refreshed in the public mind, and an insistent course to indoctrination of the public carried on, directed to informing the world of the true nature of the disease.

For some time now I have been receiving " Fontilles," a monthly magazine dealing with the life and affairs of the Colony-Sanatorium, containing 300 patients, at Fontilles in Spain. This magazine has impressed me so much as an example of what such a publication can be, that I propose to take the latest number to hand, that of June, 1955, and describe it more or less page by page, hoping this will stimulate interest and emulation.

The issue of June, 1955, contains 32 pages, exclusive of the covers. The size is handy, 9½ by 6¾ inches. The colour-scheme of the front cover is a simple and tasteful green and white, and it carries a picture 4½ by 6¾ inches of the laboratory buildings at Fontilles. On page 18 of the text there is given a description of the cover-picture and its subject: this cover-piece is changed every month.

The first page carries an editorial under the heading " Witnesses," and turns out to be a homily with vigour and clarity on the day of St. John Baptist, and what witnessing means. Having absorbed the inspiration of this excellent "sermonette," one

turns to page 2, on which there is a mixed bag of interest. First there is a quotation in an enclosed column from Lucius Anneus Seneca (a Spaniard himself, by the way) in which he denounces the love of mere physical beauty. Second, there is a paragraph recounting donations during the Valencian carnival season to Fontilles by Valencian well-wishers. Third, in clear type is a quotation from St. Cyril of Alexandria, " He who practises mercy, travels directly to his reward: he who does not practise it, journeys towards punishment." Under this is the direct query, " Do you have mercy to the lazarines? " Fourth, there is a photograph of four cheerful gentlemen, and it is explained that they are the friendly and helpful mayor and councillors of Tormos, a township which is a near neighbour of Fontilles, taken during one of their visits to Fontilles.

On page 3, there is reproduced a prize essay by a boy of the College of Santo Domingo of Orihuela (Alicante). This essay described the impressions made on him by a visit to Fontilles, and is a fine piece of work, containing the striking phrase, " Fontilles is a book whose pages should be read by all men at least once in their life." The boy, Andres de Barcala Muñoz, gave for the welfare of Fontilles the 100 pesetas which, with a book, constitutes the prize for this essay!

Also on this page there is the customary column headed " Things needed in Fontilles," in which appeal is made for gifts of money to replace the worn furniture of the dining rooms.

The next two pages are headed " Step by Step " and seem to be one of a series of factual reportings on the internal activities of Fontilles. This one deals with linen and clothing. There is an attractive photograph of the women patients at sewing and mending, accompanied by three Sisters, and the text describes the work of the laundry, the linen room, and the sewing room. No piece of clothing can enter the laundry without passing through the sterilising room. The gowns of workers in the sanatorium are also sterilised here, and also letters written by the patients. The latter is done, it is said, for the peace of mind of the recipients, not because of any real danger of transmission of germs. The women patients who do the work, do it with great cheerfulness, and sing and pray at their task, and at the end of the month receive a modest payment.

Pages 6 and 7 contain a moving tribute to Don Adolfo Bernabeu, a well-loved benefactor of Fontilles, who had died in a motor-bus accident. Two relevant photographs are given, one of the deceased gentleman, and the other depicting a large group of

workers and employees of his factory on one of their visits to Fontilles. The tribute to Don Adolfo is written by Padre Romaño, S. J., and even a stranger reading it mourns with Fontilles at the loss of such a man and is comforted by the spiritual comfort proffered.

Pages 8 and 9 contain, apart from three commercial advertisements, a report of the collective visit of the Padres of the Third Order, who presented a concert in the theatre for the benefit of the patients and staff, and were helped in this by the coincidental presence of a group of ten medical students from Madrid. It seems to have been a happy occasion. There is also a photograph of a group of other visitors, a number of Valencian young ladies with their Spiritual Director, who came at the conclusion of their course of spiritual exercises. Also, there is a striking appeal in large print in the following words: " In order to rescue children threatened by leprosy, the College-Preventorium of St. Henry takes care of children of leprosy patients: will you help it? Fontilles broadens its work with this foundation in the city of Alcira."

On pages 10 and 11 there are " Notes on a Journey to Fontilles," which are extracted from articles which appeared in the paper " Jornada " of Valencia, by Adolfo Cámara. It is interesting that the outside papers are publishing material on Fontilles, and that their reporters carry and diffuse the truth about Fontilles. This particular example is most excellent, being factual and impressive. Also on page 11 there is a report about a place called Cuart de Poblet, which staged a festival for the benefit of Fontilles, and handed over 1,573 pesetas. After that, for the stranger-reader, there is no need to wonder what sort of a place is Cuart de Poblet! Finally on page 11 there is a notice requesting subscribers to " Fontilles " to notify any change of address.

On page 12 there are some more commercial advertisements, but the most interesting thing is another appeal for Fontilles, as follows: " All can be subscribers to this magazine; all can collaborate in its pages; all can be friends of Fontilles; but do all know it? propagate the magazine: help Fontilles."

Page 13 contains two delightful pictures of the seven young men patients who are members of the new orchestra at Fontilles. The old orchestra was dissolved because most of its members left Fontilles cured, and it is noteworthy that some of them obtained musical posts in the outside world. The new members face the camera a little shyly, attired in dark trousers, short white jackets, collar and bow tie (I like the Castilian for " bow tie," which is " tie of the little bird ").

Pages 14 and 15 contain, under the general heading " Notebook of Personalities," the report of an interview with one of the patients at Fontilles. It is written in direct reporting style, and clearly reveals the life and heroism of Don Santiago Martín. The interview concludes, " Have you anything to add about your present life? " to which he replies, " To pray, to chat, and sing; all is reduced to this. I like to go to the chapel, I converse with my friends, and I keep on singing jotas."

On pages 16 and 17 with two photographs, there is a description of more visitors to Fontilles, this time of members of a Valencian religious association, with distribution of gifts, a game of football, and a grand festival in the square.

On page 17 there is another appeal on behalf of Fontilles. There is a quotation from St. John Chrysostome, followed by " Three hundred patients ask your aid: help Fontilles."

Pages 18 and 19 contain the description of the visit to Fontilles of the members of Radio Alcira, who came in a caravan of motors and motor-buses. There are two photographs. The Motoring Club of Alcira provided a vanguard of thirty motorcyclists, after which followed the ten motor-buses of the expedition. The gifted members of Radio Alcira gave a concert, toured the sanatorium, brought gifts, and even on returning to their coaches left two baskets full of monetary gifts. It must have been a magnificent occasion, the type of thing which one covets for our lonely sanatoria throughout the world.

Page 20 has another " sermonette," on the meaning of prayer, with three small pictorial illustrations. Page 21 has three photographs and a short description of a small happy picnic in Nazaret by a group of women patients, at the cost and invitation of some benefactors.

Page 22 has facts about Fontilles from the archives of forty years ago, when there where seventy-one patients. In that year a building was constructed to provide dining rooms for the patients, and other improvements were being carried out. On this page also there is another appeal for Fontilles. It begins with a quotation from Tobias, " Be charitable according to your ability. If you have much, give abundantly: if you have little, try to give with good will from the little you have, since thus you store up as treasure a great recompense for the day of your death." Then follows the appeal, " Fontilles stretches out its hand in the name of 300 leprosy patients."

Page 23 has an historical note describing how the words of Queen Isabel the Catholic gave origin to the names of certain places. There are also advertisements, which get more frequent in the last pages of the magazine. Page 24 has " Three Columns " of events, men, and customs. This month the subjects are Argentina, the success of the play " La Muralla," and the inflated publicity of Hollywood.

On page 25 there is a Crossword Puzzle, in which the clues are not too abstruse, and the solutions are given printed upside down at the bottom of the page. On pages 27 to 32 there is the " Chronicle of Charity," in which detailed acknowledgement is made of all current gifts in money or kind to the sanatorium. Gifts in kind include such things as towels, sheets, clothes, shoes, chocolate, tobacco, sweets, reading matter, stockings etc.

On page 29 there is a selection of humorous stories, but the centre piece is a quotation from St. Paul, " Knowledge puffs up: charity builds up." The back cover gives a list of local treasurers in twenty-seven different centres, and the names of banks which will receive donations direct. " Fontilles " is published from Plaza de Tetuán, 18, bajos, Valencia, Spain.

That completes my picture of the June number of Fontilles: it speaks for itself, and I am sure it will be of deep interest to all who have to do with leprosy work. In order to round off the picture, I would like to point out that " Fontilles " has poetry too, and though there is no example in the June issue, there is much in previous numbers. I conclude with a translation of " La Noche " by María del Mar, in the March number of " Fontilles."

THE NIGHT

Midnight; the moon ashine
Of silver places on all things.
The frogs croak in the mud
And ceaselessly a cricket sings
Fontilles sleeps. Come dawnings
Of the warm dayspring.
Tell me, how many sorrows
Are veiled by this quiet night?

PREVENTION OF SEPSIS IN HANDS AFFECTED BY LEPROSY

A. S. GARRETT

Area Superintendent, Onitsha Province, East Nigeria

The majority of serious septic troubles in the hands and feet in leprosy usually start as trival injuries.

As a method of combatting these in their earliest stages, I thought of issuing to those with trophic changes something in the nature of an " Iodine pencil," but using a more modern antiseptic.

Messrs. Ciba kindly let me have a sample of their plastic nose-sprays together with some " Bradosol " as the antiseptic. I have issued about 40 to patients with a tendency to trophic lesions at a time of year (the beginning of the farming season) when injuries are most common. All patients had recent evidence of injuries which would benefit by prompt attention.

There has been a noticeable absence of sepsis in all these patients and they unitedly say that small injuries heal quicker than they did previously.

REVIEWS

International Journal of Leprosy, Vol. 22, No. 4 (Oct.-Dec. 1954).

In the Editorial, Wade traces the slow growth of the idea of the " borderline " as a special type of leprosy. He gives two points mentioned in recent articles which seem worth mentioning:—

" (1) From the experience of many workers in the period when various dyes were being tried out in leprosy therapy, it is known that after repeated intravenous injection of methylene blue in lepromatous cases the skin lesions became coloured, so that even ' inapparent ' lesions are made evident, because of selective absorption of the dye by the lepra cells. On the other hand tuberculoid lesions remained uncoloured, the cells which compose them lacking the capacity to store dyes. Montel, in his article in this issue of *The Journal,* tells of cases with both tuberculoid and lepromatous lesions, the former uncoloured by methylene blue, the latter intensely stained by it; and a photograph is presented to demonstrate this condition. This statement suggests a new means for the study of borderline cases, one by which anyone who can give the necessary course of injections might obtain help in differentiating between the severe reactional tuberculoid case that has not gone over and may be expected to subside to the quiescent phase, and the case whose lesions have actually begun to go over the border to the lepromatous region of the spectrum.

" (2) Another point of interest is the recent report of Hale, Molesworth and others on isoniazid treatment. A large proportion of the cases studied were of an ' atypical ' class, ' more or less of the order of what is called " borderline " by some workers.' They stated that erythema nodosum leprosum occurred in many of the lepromatous and atypical cases, especially if the dosage was high. Now, it is generally recognised that that type of reaction is a characteristic of lepromatous cases but not of tuberculoid. That being true, it follows that if a borderline case under

treatment develops this reaction, it has gone pretty far in its essential character to the lepromatous side. It is suggested that observations on this point should be recorded."

" Clinical Evaluation Studies in Lepromatous Leprosy," by J. A. Doull. An acount is given of a carefully planned evaluation of the treatment of leprosy made in four widely-separated institutions: Aisei and Komyo in Japan, Eversley Childs Sanatorium in the Philippines, and the Westfort Institution near Pretoria in South Africa. The following drugs were used either alone or in combination: Diasone, DDS, dihydrostreptomycin and PAS. The patients were suffering from lepromatous leprosy and were arranged in comparable groups. Control groups were arranged with PAS at Westfort, and with placebos at the other institutions. The trials took place for 32 to 48 weeks. The results were judged on clinical findings such as changes in infiltration and nodules and the healing of ulcers. Bacteriological changes were judged by comparisons of smears from five or six sites made before and after the periods of treatment. Lepromin tests were also done in all the patients.

All the drugs were beneficial in approximately the same degrees. From 0.5 to 0.3 improvement was shown in the various groups. Combinations of drugs did not add to the effectiveness. One-sixth part of those on PAS showed improvement, and there were some improvements even among those on placebos. Bacteriological results changed to negative in a few in each group, even in the controls. It varied from 5.3 to 23.3 per cent. In a few patients the lepromin test changed from negative to doubtful or positive. (See Editorial on page 139.)

Guinto, R.S., Rodriguez, J. N., Doull, J. A. and De Guia, L., write on " The Trend of Leprosy in Cordova and Talisay, Cebu Province, Philippines." This is probably the most thorough and concentrated piece of epidemiological research on record. The Municipality of Cordova was surveyed for leprosy in 1933 and 1941, and re-surveyed in 1950-51. Combining the results in these two areas, the earlier surveys gave 19.3 per thousand, and the later ones fourteen years later 18.5 per thousand. Although lepromatous leprosy had diminished from 11.6 to 5.4 per thousand, the non-lepromatous forms had increased from 7.7 to 13.1 per thousand. These changes had occurred equally in both municipalities and in both sexes. The increase in the non-lepromatous forms was most marked in children. The yearly incidence for males with the lepromatous form was 0.39 per thousand, and for females 0.25; with the non-lepromatous forms it was 0.82 for males

and 0.67 for females. The total yearly incidence was 0.75 cases per thousand, the maximum being in the 10-14 age group. The diminution of lepromatous leprosy was less pronounced in those who had been subjected to home infection as compared with those who had not been so exposed. The change over to the less severe forms, if maintained, would suggest that a gradual eradication of the disease is taking place.

Hanks, J.H., describes the "Relationship between the Metabolic Capacity and the Infectiousness of M. leprae murium." This is one of a series of articles by the same author in which the relationship of the metabolism of mycobacteria, and particularly of the bacillus of rat leprosy, to their infectiousness is studied. The two methods of measuring the metabolic activity are the respiration and the hydrogen transfer capacity (HTC) of the mycobacteria. While metabolic study may provide new insight into pathogenesis, the simultaneous inoculation of animals appears necessary in order to learn the "basic ground rules." When these rules have been fully learned, metabolic study will be able to replace the tedious and expensive observations in animals. The animals must, however, always be kept "as a court of final appeal."

It was found that although at room termperature the HTC and the infectiousness of Myco. leprae murium deteriorated rapidly, washed organisms could be kept in a refrigerator from deteriorating for a fairly long time in a suspension of sucrose solution with pH 7.5. Still better results were obtained with albumen and yeast supplement added to the solution.

Hanks, J. H. and Gray, C. T., write on "Extracellular Inhibitors in Leprotic Infections and their Role as Barriers to Experimental Transmission." The hydrogen transfer capacity test and inoculation in rats showed that Myco. leprae murium was adversely affected as regards its endogenous metabolism and viability by exposure to serum taken from rats and other animals. It is considered that possibly this process accounts in a similar way for the difficulty in transmitting human leprosy. In the case of Myco. leprae murium protection against such damage to the organisms may be obtained by prolonged refrigeration in albumin solutions.

Leprosy in India, Vol. 27, No. 2, (April 1955).

This issue is devoted entirely to the All India Leprosy Workers' Conference, held in Jamshedpur on March 5th and 6th, 1955, and

to the Second Biennial Meeting of the Indian Association of Leprologists which met on the two previous days.

In the opening address the President mentioned that the new Central Leprosy Teaching and Research Institute in Madras will doubtless make its own contribution in due course in all aspects of the leprosy problem. Mr. Nehru, in a message to the Conference, wrote: " I am glad that this fight against leprosy has been taken up in earnest in India. I wish it every success. I need not point out that we should work for positive health and well-being and not merely to cure illness." Mr. Bailey of the Mission to Lepers got to the root of the problem when he said: " In the absence of . . . suitable personnel, any scheme of work, however intelligent it might be, was bound to be a failure. To overcome this shortage of dedicated individuals and to produce an army of such persons, every worker should make up his mind to win over at least one other individual to this cause."

The Director-General of Health Services, Government of India, made an important speech regarding the future policy of the Government.

" Full advantage has got to be taken of the almost spectacular results of the sulphone therapy in a campaign for the eradication of the disease. For this purpose, it would be essential to establish, both in rural and urban areas, special leprosy clinics in sufficient numbers in order to make the treatment readily available to the patients." He said that two types of control units were envisaged: " treatment units " and " study units." A few pilot units had already been begun, and it was hoped to raise the number to 25. A sum of Rs. 30 lacks (about £225,000) had been allocated for the purpose in the remaining period of the remaining five-years period of the First Five-Year Plan. Each unit would cover a population of about 50,000 persons in known endemic areas. The units had been provided with facilities for the assessment of the results of sulphone therapy, and for the study of yet unsolved problems in the epidemiology of the disease. " A careful watch will be kept on all contacts and they will be brought under treatment whenever necessary. Health visitors will make periodic domiciliary visits to ensure the fulfilment of the above objectives, and health education will form an integral part of the programme. The results will be assessed after another detailed survey after the scheme has been in operation for a certain number of years, and in comparison with a control area where incidence of the disease will be studied but where no special measures will be undertaken apart from the traditional ones normally available in the area." It is also proposed to take up a trial of the value of BCG in association with one of the research units, this being given by mouth and with suitable controls. It is estimated that there are more than a million sufferers from leprosy in the country, while there are only 18,500 beds available and only 1,000 outpatient clinics for treatment. Special stress is to be laid on leprosy in the undergraduate curriculum and on post-graduate training of doctors. It is not proposed to create a special cadre of Medical Leprosy Officers as few would desire to remain as leprosy doctors throughout life. He suggested that it would be better to " create workers with special training in the general field of epidemiology who could then be seconded for dealing with problems as they arise, be they in the field of leprosy or tuberculosis or any other. It is far more desirable to create a multi-purpose doctor than the one

qualified to deal only with one isolated aspect of any medical or public health problem."

Dr. Mukherji said, regarding the planning of BCG trials: " One method of approach seems to be the selection of an endemic area with a more or less static incidence of leprosy, containing a sufficient number of child contacts, dividing the area into two, vaccination being given to one, and the other serving as a control. A better method seems to plan the investigation in a familywise basis, taking the area as a whole, half the number of lepromin-negative contacts in a family being vaccinated and the other half serving as control. It is also important to keep the lepromin-positive contacts in such families under observation at the same time."

In a paper on methods of testing the prophylactic use of DDS in child contacts, Dr. Wardekar said that all the children chosen should be lepromin tested and divided into groups. Lepromin-positive children are divided into two groups, one being given DDS and the other not, the two groups being compared for assessing the results. The lepromin-negative children should be inoculated with BCG and retested with lepromin. Those that become positive should be treated in two groups again as above. Those that persist as negative should be divided into two comparable groups, the one being put on DDS and the other not. If sufficient numbers were tested in this way the results would be of value.

Drs. Dharmendra and K. R. Chatterji read a paper of particular value as it covers a period of 20 years.

There were found available for re-examination in the District of Bankura, 680 patients, the records of whose lepromin tests performed 15 to 20 years previously were available. After these periods of years it was found that of 156 negative reactors 9.6 per cent had developed lepromatous leprosy, and 4.4 per cent non-lepromatous leprosy. Of the 524 positive reactors only 3.2 per cent had developed leprosy, and all these were of the mild non-lepromatous type.

In one of the experiments made 20 years before, an attempt was made to increase the reaction to lepromin by repeated testing, and for this purpose a total of three tests was done in 109 of the lepromin-negative patients in the course of one year. In 93 of these the reaction became positive (weak in 30, moderate in 35, and strong in 28). " It cannot be said to what extent this conversion from negative to positive was a result of the repeated testing; however, since the positive result was seen after the repeated testing, these individuals should be excluded while assessing the value of a spontaneous lepromin reaction. Their exclusion will reduce the number of negative reactors to 63, while the number of positive reactors will remain unchanged (524)." A correlation of the results of the lepromin test on there 587 persons with the development of leprosy and type of disease shows that of the 63 negative reactors 22.2 per cent developed lepromatous leprosy, and 4.7 per cent non-lepromatous. These findings point to the great prognostic value of the lepromin reaction in persons exposed to leprous infection. They lend support to the generally

held view that compared to the contacts who have a positive lepromin reaction, those who have a negative one are likely both to develop the disease and get it in the more serious form.

A paper by Dr. Paul Brand of the Christian Medical College, Vellore, is of outstanding interest and value. Especially encouraging is the hope he gives of remedying one of the most distressing disabilities of leprosy—drop foot. He describes briefly his technique:

> "Even as the median nerve is spared in the upper arm when the ulnar and radial may be paralysed, so in the leg the medial popliteal nerve is preserved when the lateral popliteal and posterior tibial are lost. It does not become paralysed until it has given off its branches to the gastrocnemius, soleus and tibialis posterior. This means that the tibialis posterior muscle is available for a tendon transplant operation for the correction of drop-foot. If this operation is planned, it is essential that all foot ulcerations should be soundly healed before tendon surgery is attempted. The tibialis posterior is then detached from its insertion and re-routed subcutaneously from the middle of the calf across the front of the ankle joint and inserted into the middle cuneiform bone. This operation has only been introduced recently for leprosy patients, and we are still following up the early cases. It is safe to say even at this stage that the results are encouraging and that the operation may be recommended for further trial."

The Conference was attended by 160 medical and non-medical delegates, and was held in Jamshedpur, India's great industrial city.

Drs. Ramos, Silva and Peryassu write on "Some Observations on the Treatment of Leprosy, particularly the Tuberculoid type, with Streptomycin, alone or in combination with Sulphones" (Brasil-Médico, 1954, Vol. 68, p. 439). They first refer to former work on this subject and then describe their own experiences. They treated 27 patients for periods up to 3½ years, 20 being for more than a year. With the exception of one indeterminate case all were of the tuberculoid type. The dosage was 1 gm. of dihydrostreptomycin injected once or twice daily intramuscularly. The minimum total dose was 80 gm. and the maximum 180 gm. Of the 27 patients 26 showed a disappearance of all active signs. Lesions became flattened and lost their erythema. Nerves lost their thickening almost entirely and there was a considerable restoration of sensation. Histologically, there was quick change in the tuberculoid granuloma with a change of the epithelioid cells into vacuolated cells resembling those of Virchow. Later, lymphocytic infiltration alone remained, and this also gradually disappeared.

In addition to streptomycin, sulphone treatment was given later for fear that bacilli set free by the former drug might form fresh lesions. The authors, however, consider that the good results were due chiefly to streptomycin. In only one patient was there

a relapse, with an outbreak of tuberculoid reaction occurring five months after all the lesions had apparently cleared up.

Drs. Perrin and Caplin (Arch. Dermat. 1955 (June), 71, p. 742) write on "Leprosy Acquired during World War II." This is only the second case of leprosy that has been reported among the U.S. forces so far, apart from two patients in whom leprosy developed in tatoo marks. The present patient is a negro who worked in the navy, but was employed during the war in rounding up patients with leprosy in the Philippines. Although from the photographs and from the bacteriological examination this appears as a very obvious case of the lepromatous type, there was considerable difficulty and delay in making a diagnosis, showing how necessary was Levan's comment to be watchful for leprosy in veterans of World War II and the Korean campaign who have served in endemic areas.

Drs. Nakawa and Nakamura, writing in the Kurume Medical Journal (1954, Vol. —, p. 135), describe their method of keeping rat leprosy bacilli alive for at least 2½ years. They made a suspension of rat leprosy leproma, and after diluting it five times, added equal quantities of various solutions: saline, saline with inactivated bovine serum, 4 per cent glycerine water, and 10 per cent Kirchner's medium. These dilutions were placed in 1 c.c. ampoules, frozen and evaporated with a rotary pump. They were examined after 7 months and again after 2½ years. While the first two suspensions were found to be in the form of a dry powder, the other two, especially the one with glycerine, were not dry. When rediluted and injected into rats, all of them showed live and infective rat leprosy bacilli, but greater infectivity was shown by the suspensions that had been completely dry, especially the one diluted with bovine serum.

Drs. Laviron and Kerbastard write in the Bulletin Soc. Path. Exot. (1953, Vol. 48, p. 129) that after seeing the published work of Lemaire and Housset in the treatment of vascular and trophic affections with intravenous injections of bile salts, they used similar injections of sodium dihydrocholate in 11 leprosy patients suffering from perforating ulcers and other leprosy ulcers, some of which were of up to 3 years' duration. Five perforating ulcers of 6 months' to 2 years' duration healed up rapidly. Eight others, some of them very bad and of long duration, were very much improved. In only one case did the improvement, rapid at first, not continue.

A 20 per cent solution is used and 5 to 10 c.c. injected intravenously, very slowly, daily for 15 to 20 days. In no case were there any bad results, though there is a bitter taste in the mouth and may be a feeling of nausia for about ten minutes. The results obtained justify further trial of this method.

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The letters after the entry have the following significance: Original Articles (O); Editorials (E); Reports (Rep); Reviews (R); Abstracts (A).

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