LEPROSY REVIEW The Quarterly Publication of THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION.					
Vol. XVIII. No. 1.	JANUARY, 1947.				
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LEPROSY REVIEW.

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EDITORIAL.

THE SOUTH AMERICAN CONFERENCE.

Readers will find considerable food for thought in Dr. Muir's account of the South American Conference printed in this issue. In recent issues of the Leprosy Review a good deal of space has been given to classification, and it is evident that much of the impetus for its revision is coming from South America. It will be generally felt that the "polar" concept advocated by the Conference brings the two main divisions of leprosy into clearer It is obvious, however, that before a complete and focus. satisfactory classification can be adopted, the groups which shew material deviations from these polar divisions require further sifting and demarcation. The term Uncharacteristic or Indefinite provisionally applied to those groups is in reality a frank admission of the need for something more definite. These groups do not merely require clinical and histological sorting out. Both their place and their natural evolution with regard to the two main contrasting polar forms need further understanding and definition.

The therapeutic reports of the Conference are the most encouraging that have ever been placed before any international assembly of leprosy workers. The restraint with which the experimental work on the sulphone compounds has been described provides in itself grounds for a certain degree of guarded optimism. A clearer classification goes hand in hand with greater precision in therapeutic experiment. There is little doubt, for example, that much of the confusion that existed—and still exists—with regard to the efficacy of Hydnocarpus oil, has been due in the past to the lack of a classification based on a clear understanding of the natural trends of different forms of the disease.

The stark tale of starvation, disease and terror among the lepers of Malaya under the Japanese is told in this issue for the first time. It has not been possible within the limits of a journal which is primarily medical to give more than a mere indication of the sufferings of these pitiful victims of Japanese aggression. Reports are now coming in, however, of the reconstruction of anti-leprosy work in Malaya, and it is hoped in a later article to give an account of the rehabilitation of the well known leper settlement at Sungei Buloh.

Dr. Mackay's analysis of the role and scope of leper settlements in Tanganyika merits careful consideration and more such studies are needed from different territories. It raises the question

of the essential paradox of our strategy in any country where leprosy is endemic. The accommodation and maintenance of infective lepers in a segregated place is an essential part of an anti-leprosy campaign, and it is by far the most expensive item in such a campaign. Settlements without surveys will not control leprosy, for that is merely weeding a garden in the dark. Settlements require treatment-attraction, and treatment-attraction is growing every year. But there are financial limits to the number of infective lepers which any country is prepared to house and maintain, and the very efficiency of surveys and treatmentattraction only accellerates the deadlock, where more infective lepers are known than can be cared for in institutions. Attempts to render such institutions self-supporting are fraught with difficulties and do not appear to be a complete answer to the problem. Indeed so long as our therapy requires years of skilled treatment and maintenance, the problem will remain. It is very desirable therefore that continued studies of the role and type of leper settlements should be made in different countries. Only thus can an administration which is seriously tackling leprosy avoid the steady accumulation of expense inherent in certain types of segregation-an accumulation which before the war cost the Philippine Government between a quarter and a third of their total Health vote for the upkeep and treatment of segregated lepers.

THE SOUTH AMERICAN LEPROSY CONFERENCE.

E. Muir.

The second Pan-American Conference on Leprosy opened in Rio de Janeiro on October 19th, 1946. One hundred delegates took part, representing seventeen different countries of the American Continents.

The debates and findings of the Conference are of unusual interest in a number of ways. It is the first major international

assembly of those interested in leprosy since the outbreak of World War II. It met at a peculiarly appropriate time for the interim discussion and elucidation of problems connected with the chemotherapy and terminology of leprosy.

With regard to terminology, the need for revision has long been felt, and the Conference made a definite forward step in proposing a new and practical—if tentative—scheme of classification. The Conference also met at a time ripe for the exchange of views and experiences of the newer drugs. The assessment of these sulphone compounds in treatment may well be regarded as of paramount importance in leprosy at this juncture.

The first Pan-American Conference also was held at Rio de Janeiro in 1922. At this second Conference it was regretted that Colombia, whose contribution to leprosy problems is important, was not represented. It is, however, appropriate that both these Conferences have been held in Brazil, where leprosy is not only endemic but is being controlled with zeal and energy on the most modern lines.

The Conference lasted from October 19th—27th, its work being conducted under the able chairmanship of Dr. Ernani Agricola, the Director of the National Leprosy Service. Meetings were held in the auditorium of the Ministry of Education and Health, a large and modern building in the centre of the city.

Of the papers read at the Conference, perhaps those dealing with chemotherapy may be considered first.

Diasone and Promin. Dr. Faget of Carville Leprosarium in a weighty and important contribution reviewed the results he had obtained with these groups over a period of four to five years. About half of his patients under these drugs became bacteriologically negative in a four year period. An interesting point was his finding of steady progressive recovery, instanced by his figures of 25 per cent. in half a year, 60 per cent. in one year, 75 per cent. in three years, and 100 per cent. in four years. He found both drugs similar in therapeutic value, but noted the relative facility of oral administration with diasone, compared with promin which is given intravenously.

Further reports on these two drugs were given by Dr. Laura de Souza Lima, who both reported and demonstrated the results of extensive experience with about four hundred cases on each. It is of special interest that marked clinical and bacteriological improvement was observed in all early lepromatous cases perhaps the most crucial stage in leprosy. Dr. de Souza Lima, however, felt that longer experience is required before the full therapeutic value of these drugs can be assessed. *Promizole.* A further paper by Dr. Faget reported on some eighteen months experience with this drug. Its advantage lies in its comparative non-toxicity, patients being able to tolerate as much as 8 grams a day, with a consequent high blood concentration. He considered therefore that enhanced benefit might derive from its relative rapidity of action

Streptomycin. Tentative experimental work with this drug was also reported on by Dr. Faget, using frequent injections. While definite improvement was observed, it was not yet possible to give an experienced opinion on its value. He expressed the view that simultaneous treatment by streptomycin and sulphones might prove of greater therapeutic value than either of these drugs used by itself.

Hydnocarpus Oil. A number of delegates reported favourably on intradermal treatment, the value of which is now wellestablished. Dr. Schujman gave a paper on the enhanced benefits of giving large doses of 30 c.c. or more of the oil per week—a high dosage method that has also been used with success in India and Malaya. Dr. Bechelli and Dr. Rotberg, in a series of papers, gave an historical study of chaulmoogra oil and of the factors (rational or otherwise) which have built up its reputation as the standard treatment in leprosy.

Dr. Faget illustrated his experience with sulphones by a series of before-and-after photographs. While these gave striking pictures of improvement, the danger was realised that, as so often in the past, photographs may record only or partly the natural vicissitudes of the disease.

As might be expected in the present state of our knowledge, there was considerable discussion and difference of opinion, in both the plenary sessions and the commission on treatment, on the relative value of different forms of therapy. No general agreement was obtained either on the real status of chaulmoogra oil, or to what extent the sulphones are likely to replace the older methods of treatment. There was, however, general agreement that the sulphone drugs must still be regarded as experimental, and that their status is not yet such as to constitute a standard treatment for leprosy.

Pan-American Classification. Along with therapeutics the other question of primary interest at the Conference was classification. It has long been felt that the Cairo classification of 1938 could not be a lasting basis for international terminology. Certain phases of the disease, for instance, are not recognised in the Cairo classification. It was also felt that a certain discordancy in nomenclature exists with regard to the two main divisions of

leprosy. The term 'lepromatous' is histological in character, while 'neural' is topographical.

It is very satisfactory to record therefore that the Conference was unanimous on three points. An international classification should be (1) a scientific one, based on the histopathology of the disease; (2) the two main contrasting divisions of leprosy should be regarded as " polar " types; (3) the classification should leave room for an interpolar type of leprosy which does not correspond to these two main types.

In the new classification the polar types are therefore designated as tuberculoid and lepromatous. The distinctive features of tuberculoid leprosy are the relative absence of bacilli, the presence of pathological foci containing Langhan's giant cells and epithelioid cells, a positive lepromin reaction, and certain clinical and macroscopic appearances. characteristic The lepromatous type, on the other hand, is typically recognisable by abundance of bacilli, by diffuse granulomatous tissue containing Virchow's foamy cells, by a negative lepromin reaction, and again by its own special clinical course and features. The contrasting pathology of these two types may be found either in cutaneous or neural lesions, so that these latter terms are reserved as purely topographical sub-classifications.

Some difficulty arose over the nomenclature of the inter polar type of the disease which clinically and histologically deviates from the two polar forms. For instance, neither of these forms appears to include the depigmented macule, characterised histologically by unspecialised round-cell infiltration. The term " chronic inflammatory " was after discussion, rejected as being too vague, while "transitional" was also felt to be inadequate as suggesting that these non-polar types are invariably changeover phenomena. The majority of the delegates felt that the non-polar phases should be classified in the meantime as " Incaracteristico " (uncharacteristic or non-characteristic). It was felt, however, that the group should have a less negative name and more in accordance with its own histological entity. In the absence of any more satisfactory suggestion, the terms " Uncharacteristic " or " Indefinite " were adopted.

All delegates felt keenly the importance of this positive contribution towards a nomenclature that can be accepted as common currency among leprosy workers everywhere. A common and accepted international basis of terminology will assist greatly in the elucidation of at least two aspects of the disease which cause divergence of opinion at present. One is the question whether polar forms can change their essential characteristics, i.e. whether tuberculoid leprosy can evolve into lepromatous. Many delegates were of the opinion that the polar types are essentially contrasting and do not merge. On the other hand, Dr. Lauro de Souza Lima demonstrated at the Conference a small number of lepromatous cases with definite photographic and histological proof of their original tuberculoid condition. A satisfactory classification will also do much to clear the divergences of view among leprosy workers caused by the differences in typeincidence, severity and therapeutic response in different races. That regional and racial variations in the disease exist, and may be marked, was made evident to many delegates visiting Brazil for the first time.

Epidemiology. The South American report on epidemiology and the number of interesting papers read on this subject at the Conference reveal several definite advances over the findings at Cairo, as a result of added experience over the last eight years. Studies were exhibited of extensive survey work, showing detailed and careful planning implemented by thorough and painstaking execution. These surveys, first extensive and later intensive, from S. America, and particularly from some of the Brazilian States, continue to bring in large numbers of cases and to supply valuable statistics. Delegates were also afforded an opportunity of studying the special leprosy filing systems in Rio de Janeiro and in the States of Sao Paulo, and Minas Gerais. These are probably the most elaborate and thorough in existence.

Lepromin. A number of papers were read on the Lepromin Test, with a general concensus of opinion on its importance in classification and prognosis. It was pointed out, however, that in the present state of our knowledge the lepromin test should not be regarded as an essential or infallible guide.

Visits and Special Lectures. From Rio de Janeiro special visits were arranged to the Leper Colony and to the headquarters of the Federal Leprosy Organisation. This organisation is the directing body in strategic planning and expenditure in the Brazilian anti-leprosy campaign. A visit was also made to the National Academy of Medicine, where the general anti-leprosy work of the countries represented at the Conference was outlined.

At the close of the Conference many delegates went to see the anti-leprosy work at Sao Paulo and Minas Gerais, hospitality and airplane passage being generously provided. The Padre Bento Colony was visited, one of five settlements containing about 9,000 patients. Notable amongst the extensive and exceedingly well-planned anti-leprosy activities of Sao Paulo is the library devoted to the disease. The library receives six hundred medical journals, circulates the titles of articles monthly to all doctors, and undertakes a copy-service of any of these on application.

The Brazilian Society of English Culture also gave lectures on sociological aspects of leprosy work, and on different aspects of the campaign against leprosy throughout the British Empire.

An extremely interesting address was given by Mrs. Eunice Weaver, President of the Federation of Societies for Assistance to Lepers and for Control of Leprosy. This Federation merges the activities of eight private associations, and the care of children is a special feature of its work.

International Leprosy Association. The opportunity afforded by the Conference was taken to hold a Council meeting of the International Leprosy Association, and also a general members meeting to which other Conference delegates were invited, and at which forty new Association members were enrolled. It is a pleasure to record that the meeting nominated with applause Dr. H. W. Wade as President of the Association, in place of the late Prof. Marchoux. It was agreed also that Dr. Alberto Oteiza y Setien, Cuban delegate to the Conference, be appointed as Councillor in place of Prof. Eduardo Rabello. Arrangements were also made, through the generosity of the American Leprosy Foundation, for the resumption of a regular quarterly issue of the International Journal of Leprosy.

It was decided that the next International Leprosy Congress should be held in 1948, either before or after the International Dermatological Congress which is to be held in that year in the U.S.A. An invitation from the Cuban Government was received, and it was therefore proposed that the Leprosy Congress, ten years after the Cairo Congress, should be held at Habana, Cuba.

A unanimous message of sympathy and hopes for a speedy recovery was sent to Dr. Wade.

The general atmosphere of the Conference was one of warm good will. While more studied contributions were presented at the plenary sessions, a great deal of the important discussions took place less formally in more intimate sections or commissions, which dealt separately with the more important subjects. The discussions often lasted late into the night. The social aspects of the Conference were very pleasantly arranged. Visiting delegates were greeted on arrival by informal reception committees who made all transport and hotel arrangements. Lunches and cocktail parties were arranged for delegates and their wives, who also received invitations to a beautifully rendered symphony concert at the magnificent Municipal Theatre. The Conference was, at this time, a peculiarly appropriate one. It met at a stage in which many of our ideas about the disease are in the melting pot. It represented the resumption, after the preoccupations of a world war, of international linkage against leprosy. In its friendly atmosphere and well-planned arrangements it achieved a number of significant contributions both to mutual understanding and to the furtherance of our control of the disease.

SOME IMPRESSIONS OF SUNGEI BULOH LEPER HOSPITAL UNDER JAPANESE OCCUPATION

Gordon A. Ryrie

On the 8th of January, 1942, Japanese troops occupied the area of Sungei Buloh Leper Hospital in the Federated Malay States. At that point there were 2510 lepers, including 265 children—Malays, Indians, Chinese, and a sprinkling of other nationalities. Thereafter all contact with the outer world ceased.

On the 16th September, 1945—after the defeat of Japan and the re-entry of our forces into Malaya—the number of inmates was 660. The number of children left was 21. The rest were dead.

For a number of reasons this tragic period does not yield a great deal of scientific interest. To begin with the Japanese carried off or destroyed all the scientific data of the Hospital case histories, sections, photographs and long term experimental work still awaiting completion. Much of this can never be replaced. In the second place it was impossible to keep scientific or accurate data under Japanese rule, and this for two reasons. All official figures were "cooked" in order to prove that public health was at least as good under the Japanese as under the British administration. For example, at an autopsy one might note the presence of grass in the stomach and intestines. But the inclusion of this finding in an official report would merely invite the attentions of the security police. The cause of death would therefore be marked down as "senility" or something equally innocuous. Then again the keeping of private statistics was inadvisable to say the least of it, under a regime where spying was constant, arbitrary search frequent, and where documents of any kind were regarded with extreme suspicion.

In the third place any assessment of changes in leprosy under the Japanese occupation is vitiated by the very complexity of factors involved. If, for instance, we examine a patient suffering from pellagra, chronic malaria, starvation and Gestapo psychosis, to what are we to attribute any changes in his leprotic condition?

The changes, leprotic and otherwise, were due in general to the impact of fear, famine and concurrent disease. To this must be added the sudden and continued deprivation of the means of treatment not merely anti-leprosy treatment, but such things as bandages, antiseptics, quinine and morphia.

The picture of Sungei Buloh during this period can only be appreciated against the background of Co-Prosperity in Greater East Asia, the slogan of Japanese conquest. This, as it applied to Malaya, can be divided into three phases. The first was a period of initial confusion. This gradually merged into a more or less stabilised condition of affairs-the period of organised robbery-during which the Japanese steadily stripped the country bare of all its realisable assets. When both the loot and the prospects of victory began to dwindle the frustrated Japanese instituted the third phase-the phase of the Gestapo. This division is to a considerable extent artificial. Confusion and corruption abounded all the time, and the trained thugs of the security police were active from the beginning. But a sequence can definitely be traced in which the predominant features were first chaos, then exploitation, then terrorism.

First let us consider Sungei Buloh during the period of chaos —the first months of Co-Prosperity. Undoubtedly the essential factor in the changes during this period was fear. Starvation was not in evidence. Food was variable, but the patients had probably about fifteen hundred calories a day. Concurrent disease had not yet come into its own, but the fear had a physical intensity that is difficult to describe with any degree of adequacy. On two occasions during this period I have seen a man drop dead in front of me in a paroxysm of terror. There was no electric light, no telephone, no post, no newspaper, no radio, and road communication was extremely perilous. This produced a kind of nightmare stillness punctuated by whooping raids of looting Jap soldiery, night attacks of bandits, to the accompaniment of rapid smallarms fire, "searches"- by brutal unfathomable military police —all in a tense atmosphere of spy-mania, betrayal, corruption and private crime. Suicide was frequent among the lepers during this period, mostly among the older men. Suicide was confined entirely to males.

As would be expected, loss of weight was general, the loss being entirely due, I think, to psychic dislocation. The weekly weighings shewed the loss to be most uneven. After being deeply affected by some particular incident, a patient might lose fourteen pounds or more in a week, and recover gradually with restoration of control. The weight-loss was very much less marked among the children, who did not appear to suffer significantly at this point.

The death rate rose to ten and fifteen times its normal peacetime level. During this period, for all practical purposes, all the significant anaemias, all the advanced nephritis cases, and all the active tuberculosis patients died. This represented a more or less complete group. They were the ten per cent or so of ailing and elderly people found in any non-selective leper settlement—folks who had looked forward in peace-time to their little extra issues of milk and oranges and tobacco, and whose placid and fragile lives could stand no strain.

The Japanese gradually settled down to a more or less organised stripping of the country. This phase lasted something over a year, or roughly as long as it was possible to get ships to carry the loot back to Japan. Food in the Settlement gradually became more scarce, the main article of diet being vegetables. Small quantities of first class protein—a few ounces per head could be issued about once a month. The patients had, I estimate, about seven hundred calories a day. Deterioration on a low vegetable diet is rapid unless fats are added, and the main anxiety during this phase was the provision of cocoanut oil and ground nuts. From this time on we were greatly indebted to the Resistance Movement for essential supplies of food.

Up to this time the extreme danger of being abroad at or after dusk had probably delayed the onset of epidemic malaria. All anti-malarial work had, of course, broken down under the Japanese, who were equally lacking in interest, knowledge or ability. By the time the occupation was a year old two-thirds of the patients had malaria. The first wave of the epidemic was almost entirely M.T. and the proportion of cerebral cases was over five per cent. Most of these died. The price of quinine rose till it reached the fantastic figures of f_{100} per lb. As quinine passed through the hands of Japanese officials, it became progressively adulterated, until doses of fifty and even a hundred grains had to be given to ensure that the patients had received ten grains of genuine quinine. Dressers, nurses and attendants automatically got malaria within a fortnight of being posted to the malarial wards, so that the physicians round became a sort of blurred reel in which it was difficult to differentiate between patients and staff. In any case, with the shortage of quinine, the main object of the "round" was to determine each day which of the patients were to be allowed to die. I have to record here a considerable number of cases in which men and women deliberately refused their quinine, and died in order that their sick comrades might live. It will be remembered that at this time the Japanese had control of the greater part of the world's supply of quinine.

The question of anti-leprosy treatment had already arisen. It must be explained that in peace time the whole emphasis of Sungei Buloh had been on treatment. Everything else had been subordinated to this. There were acute tuberculoid and acute lepromatous wards, and the patients were divided into clinical groups and classifications on which all organisation was based. Without counting intradermal work, there had been a thousand injections a day, and an average of fifteen miles of bandaging a month. Stoppage of treatment meant ripping away the whole fabric of the settlement. From an administrative point of view continuance was necessary for the morale of both patients and staff.

There was sufficient Hydnocarpus oil for about six weeks of peace-time treatment. The minimum pre-war injection dose of Hydnocarpus oil was I c.c. per ten pounds of body weight twice a week. By injecting token doses of Hydnocarpus oil the stocks could last for perhaps six months. But the war was obviously going to last longer than six months.

There was a further problem. The healthly staff were already badly undernourished and suffering from malaria. A small reserve of oil had to be kept in case any of them developed leprosy under conditions of strain and lowered resistance.

In the end a small group of patients with tuberculoid leprosy was kept on full peace-time doses of Hydnocarpus oil. The rest of the patients were given weekly one c.c. doses of "New Esters, War Time Formulary." The war-time formulary consisted of a 1-5000 solution of Potassium Permanganate in water. We had thus an enforced "experiment" whereby a very large group of lepers was abruptly changed from high doses of hydnocarpus oil to a "treatment" which we knew to be useless. The results were as follows;— I. In peace time 150-200 patients were discharged each year as "cured" (I use the word as a matter of convenience). In the period under review no single patient became fit for discharge.

2. Within three or four months of the inception of the "New Esters" the patients were unanimous in declaring that the new treatment was useless, and in demanding the restitution of Hydnocarpus oil. It will be recalled that the patients belonged to shrewd and highly intelligent races, and that they had considerable experience of anti-leprosy treatment.

3. The twenty-five tuberculoids on Hydnocarpus oil compared very favourably with other tuberculoids on "New Esters". In no case, however, did the clinical improvement equal that to be expected in peace-time.

It is obviously open to question whether any kind of antileprosy treatment could be anything but a solemn farce under the conditions prevailing at the time. It may also be claimed that, in a state of malnutrition, the metabolic value of Hydnocarpus oil may constitute its only value. But yet, when all criticisms are conceded, these years convinced me as nothing else has done, of the real (I avoid the word ' specific ') value of Hydnocarpus oil. With adequate stocks of oil I believe that a great deal of the ulceration and spread of leprosy could have been averted.

During peace time there were roughly a hundred cases a month of lepromatous reaction in the hospital wards. The number of cases of tuberculoid reaction was perhaps twenty a month. There were another thirty or forty cases a month of nerve reaction, or acute leprotic neuralgia.

During the Japanese occupation there could not have been more than two or three cases a month of lepromatous reaction say three per cent. of the peace-time figure. There were, so far as I can recall, no cases of tuberculoid reaction or of leprotic neuralgia. For all practical purposes the acute manifestations of any kind of leprosy disappeared. Peace-time investigation had previously shown that the incidence of reaction was not connected with the high doses of Hydnocarpus oil.

The suppression of acute tuberculoid leprosy is perhaps understandable. It is a common finding that a certain type of tuberculoid lesion tends to fade during concurrent illness and reappears (as in "recovery reaction") when health improves. (For practical purposes we may regard the Japanese occupation as one long concurrent illness). We assume that tuberculoid manifestations are allergic phenomena, affected by antibody which is released under conditions of increased general resistance.

SUNGEI BULOH LEPER HOSPITAL

The absence of lepromatous reaction is more difficult to understand. Indeed it is very difficult to think of any analogy in disease in which an acute invasive process, with fever and baciliaemia, is inhibited by the very defencelessness of its victim. There is certainly no analogy in tuberculosis or in the common infectious diseases.

Following the period of confusion and that of exploitation came the Gestapo phase. It was natural. The Wingate attack coming on top of the strangulation of their home communications had rendered the Japanese apprehensive. Their Indian Independence League was a failure, the Resistance Movement was growing, and everywhere the down trodden people were sick of the slow necrosis of Co-Prosperity. And so the reign of terror began.

The object of Gestapo rule was to induce a continuous state of apprehension resulting in a kind of abject masochism. It was more successful with some races and types than with others. The psychological effects of Gestapo rule, however, interesting and revealing as they were, do not concern us so much as the physical results of this phase. These were the retardation of healing and the breakdown of leprotic tissue, the spread of deficiency disease, and the onset of uncontrolled sepsis.

While malnutrition and vitamin deficiency will in themselves delay healing, it will be remembered that psychogenic factors can play an important role. Healing may be regarded from one point of view as essentially a defiance of environment. When that defiance has been crushed out of the human spirit, the deficiency can affect every cell in the body. We speak of healing by " intention ". There came a phase in cases affected by nervous strain and famine when "intention" disappeared. A patient might bruise his foot, the skin of which was already infiltrated with leprosy. There would be no attempt at healing. The bruise would slowly decay and the decay spread to the surrounding devitalised tissues. The analogy of a bruised apple was one that constantly recurred to the mind. Spreading sores of this character probably affected some fifteen per cent of the leper population. It was less marked among the Chinese.

Cases of beri-beri and pellagra began to occur during this third phase. Both were markedly atypical. Orthodox wet or dry beri-beri was not observed. One difficulty in diagnosis was that drop-foot and anaesthesia occur in both beri-beri and leprosy. The main features observed were lassitude, numbress of the finger tips (unexplained by the leprotic condition) and loss of tendon reflexes. Between five and ten per cent of the patients showed signs of Vitamin B deficiency.

Pellagrous manifestations were also atypical, for as far as one could judge in the circumstances there was no mental abnormality and no specific diarrhoea. The first case observed in the Settlement was of some diagnostic interest. A chronic lepromatous (L₃) case was reported to have developed a fresh tuberculoid batswing lesion across the nose. I stated dogmatically at the time that such a lesion combination was impossible in any coherent view of the leprotic process. The diagnosis was finally made by the discovery of definite pellagrinous lesions on the patient's feet.

Pellagra is unlikely to be confused with leprosy where only the one disease is present in a given case. But pellagrinous lesions on a tuberculoid leper can be difficult to differentiate. They may resemble tuberculoid plaques quite closely, and in my experience they are often faintly anaesthetic on the hands and feet.

I have already mentioned the cessation of intention in healing, a condition in which the body ceases to defend its own frontiers. This forms an ideal breeding ground for sepsis, and during this period sepsis became uncontrolled. The tiny remaining stocks of effective antiseptics, cotton wool and dressings had to be reserved for use in major operations. Septic cases were therefore treated with local applications of various jungle concoctions (all equally useless) and bandages of banana leaves. There resulted a rapid spread of sepsis under pre-Listerian conditions among devitalised lepers affected by famine and strain.

It will be sufficient to give the very briefest picture of a ward in Sungei Buloh on any given day in the autumn of 1943. On entrance the smell struck one like a physical wave. The air was filled with a fine gummy exudation that clung to the eyes, nostrils and forearms. The floor was criss-crossed with trails of pus where patients had staggered about. Patients moaned for poison. Under the beds were pools of pus, blood and urine. Mattresses had long disappeared and the bedboards creakedrotten through with encrusted pus. A patient would bruise his The next day half the foot would be grey-black and toe. putrifying. The next day the ankle would be affected, and an incision near the head of the fibula would release frothy pus travelling along the interfascial sheaths. The next day he would be dead. Patients pleaded for operation, not with any hope, but for the luxury of dying without being submerged in their own foctor. By the beginning of 1944 half the patients were dead.

It may be asked why the Japanese did not exterminate the

SUNGEI BULOH LEPER HOSPITAL

lepers. They certainly threatened to do so with a regularity that never became monotonous. Indeed I canot recall a week during which they did not threaten to bomb-out or machine gun the whole settlement, The reason why the Japanese confined themselves to threats is simply told. The leper settlement contained patients from all over the Federated Malay States. Under the British regime these various states paid so much per head per day for their lepers maintained at Sungei Buloh. This payment was continued under the occupation for the Japanese, terrified of infectious disease, would rather levy money than risk the return of lepers to their various districts. Except for a token payment for the maintenance of Sungei Buloh this money was retained by the local Japanese Governor for his own use. It will be realised that if he retained one shilling per head per day (which is about correct) for a thousand patients, he was making a profit of fifteen hundred pounds per month. And so the lepers were spared-they were profitable.

When the end came the hospital wards were empty, for no-one was left able to care for the sick. Like wraiths over the untended paths, the patients came out of their houses with uncertain eyes and waivering gait, to welcome their liberators.

*TREATMENT OF LEPROSY WITH DIASONE—A PRELIMINARY REPORT

By G. H. FAGET, M.D. and R. C. POGGE, M.D., Carville, La.

Recently a number of new derivatives of diamino diphenyl sulfone have been tried in the chemotherapy of experimental animal tuberculosis and more recently of human tuberculosis. One of these agents is diasone, the disodium formaldehyde sulfoxylate derivative of diamino diphenyl sulfone. Callomon has reported that diasone inhibited the progress of experimental tuberculosis in the guinea-pig and that it was less toxic than promin. Feldman and associates have corroborated the therapeutic

^{*}Reprinted from New Orleans Medical and Surgical Journal (1945), 98, 145,

effect of diasone in experimental tuberculosis and found it less toxic than the parent drug diamino diphenyl sulfone. Diasone has been used in human tuberculosis with promising results by Petter and Prenzlau, but their report has not been generally confirmed and the status of diasone therapy of tuberculosis is still under clinical investigation.

In the chemotherapy of leprosy, promin is still being used intravenously at the National Leprosarium with encouraging results. Promin, however, has been found to be too toxic when medication is advantageous in such a chronic disease as leprosy, the low toxicity of diasone when given by mouth had a special appeal to the writers.

Petter and Prenzlau advocated I gram of diasone a day as an adequate dose in treating human tuberculosis. They found blood levels ranged between 1.5 mg. and 2 mg. per 100 c.c. with this dose. Upon increasing the dose they found that the blood concentration levels did not increase proportionately, and expressed the opinion that a dose greater than 2 grams a day was not indicated in the treatment of clinical tuberculosis.

Technic of medication.

In the writers' preliminary study a small group of leprosy patients were started on I gram of diasone daily (one 5 grain capsule three times a day). Careful clinical and laboratory examinations were conducted. Urinalyses and hemograms on every patient were done twice a week at first and later at intervals of at least two weeks, and other laboratory tests were carried out when indicated. Within a few days of the inception of treatment, several patients experienced hematuria, so that treatment was necessarily discontinued. Indeed the frequency of hematuria was the chief indication for changing the technic of administration of diasone. It was found that by starting with smaller doses of diasone, 1/3 gram daily, the development of hematuria could be avoided. After the patient had acquired a tolerance for the drug, that is after one or two weeks, it was found to be safe to increase the dose to 2/3 gram daily. Several weeks later, if no toxic symptoms had developed, the full dose of I gram could be administered.

At present, the maximum dose is I gram daily, and this dose is administered only to patients exhibiting no evidence of intolerance after one month or more of clinical and laboratory observation.

Toxic manifestation and reasons for discontinuing treatment. Although diasone was administered to 70 patients altogether, treatment had to be discontinued in 23 of them. Table I lists the causes for discontinuance of treatment.

			ABLE	1.			
Causes j	for a	liscontin	шпсе	of dia	sone	treatme	nt.
Hematuri	a					·	6
Gastritis	•••						6
Anemia							4
Dermatiti	s						3
Iridocycli	tis						1
Hyperten	sion			• • •			1
Deserting	abs	conding	patien	ts			2

Renal damage. Renal irritation resulting in gross or microscopic hematuria was the cause for interrupting therapy in six patients. This condition developed exclusively during the early stage of the investigation, when the drug was given in initial doses of I gram. Since the adoption of new technic of starting all patients on I/3 gram of diasone daily and increasing to 2/3gram only after one or two weeks of treatment, no further evidence of renal dysfunction has occurred.

Gastritis. Nausea of a mild nature was reported at first by approximately one-fourth of the patients taking diasone. With continuance of treatment, as the patients acquired a tolerance for the drug, nausea decreased or disappeared. Only a few patients complained of severe nausea with anorexia and loss of weight. Vomiting seldom occurred. It was found that, by giving diasone during meals or in conjunction with alkalies, nausea often could be prevented. Some patients experienced instead of nausea an improvement in appetite, gain in weight, and increase in energy. Gastric irritation with nausea and vomiting was the complaint of six patients, in whom treatment was discontinued at their own request.

Hemolytic anemia. Diasone being an hemolytic agent, anemia developed in the majority of patients early in the course of treatment. The anemia was generally mild and with the development of tolerance was often replaced by an actual increase in erythrocytes and hemoglobin. Even a moderate degree of anemia was usually controllable by the oral administration of iron, liver extract and Vitamin B or by Ventrex as adjuvant therapy. The writers have considered a fall in the red blood cells below the level of 3,000 000 as an indication for temporarily discontinuing diasone. Persistent anemia necessitated permanent discontinuance of treatment in four patients.

Table 2 shows the changes which occurred in the erythrocyte counts of the 47 patients who were able to continue treatment

for more than three months.

TABLE 2.		
Changes in erythrocyte counts	during treatm	ie nt .
No change (differences	Decreased	Increased
of less than 50,000).	counts.	counts.
10.7%	53.2%	36.1%
5	25	17
	TABLE 2. Changes in erythrocyte counts No change (differences of less than 50,000). 10.7% 5	TABLE 2.Changes in erythrocyte counts during treatmNo change (differencesDecreasedof less than 50,000).counts.10.7%53.2%525

The average decrease in red blood cells counts in individual cases varied from 50,000 to 1,480,000 and the mean of the averages for the patients was 350,000.

The average increase in the red blood cell counts in individual cases varied from 50,000 to 900,000 and the mean of the averages for the 17 patients was 270,000.

Dermatitis. Toxic dermatitis, manifesting itself twice as erythema nodosum and once as erythema multiforme was the reason for discontinuance of treatment in three patients.

One case of iridocyclitis, one case of hypertension, which were merely coincidental, and two patients who deserted account for the other interrupted treatments.

It is interesting to note that all 23 patients in whom treatment was stopped had taken diasone less than three months, too short a period for evaluation of therapeutic results. It is gratifying that, symptoms of intolerance severe enough to demand cessation of treatment, do not develop after the early stage in the course of treatment.

Clinical material.

The above 23 patients eliminated, there were 47 who took treatment for more than three months. These 47 cases form the clinical material upon which this report is based.

Type of disease treated.

Of the 47 patients under study, 42 were of lepromatous or mixed type, 4 were of the maculo-anesthetic or neural type, and I was of the tuberculoid type. It is thus evident that patients with the least favourable prognosis formed the bulk of the clinical material under investigation.

Furthermore, of the 42 lepromatous and mixed cases, 25 were far advanced, 14 moderately advanced, 3 minimal in extent of the disease.

Approximately four months of treatment with diasone usually was necessary before clinical evidence of improvement was observed. Thereafter, improvement was usually progressive and increased directly with the length of the period of treatment. This is demonstrated in table 3.

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	Re	lation	n of duration of a	liasone the	rapy to therape	utic effect.
				No. of		Percentage
» Dura	atio	n of	therapy.	cases.	Improved.	improved.
3 to	6	mo.		16	11	68.7
6 to	12	mo.		26	19	73
12 to	18	mo.		5	5	100
			TOTAL	47	35	74.5

TABLE 3.

Table 4 shows that the percentage of improvement also increased with the size of the daily dose of diasone up to a certain point.

TABLE	4.
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Relation of	average	daily	dose of di	asone to therap	eutic effect.
			No. of		Percentage
Gram/day	<i>.</i>		cases.	Improved.	improved.
ü.1— .19			3	1	33
.2— .29			6	4	67
.3— .39			1	1	100
.4— .49			6	6	100
.5— .59			12	10	83
.6— .69			6	5	83
.7— .79			2	2	100
.8— .89			9	5	56
.9—1.00			2	1	50
	Total		47	35	74.5

From the above tables it is apparent that the percentage of improvement was in direct proportion to the duration of treatment and to the average daily dose of diasone up to 0.8 gram. In estimating the average daily dose, periodic rest intervals of several days, during which no drug was administered, were taken into consideration. Although the optimal dose of diasone for leprosy has not been established, it is felt that I gram a day is the maximum dose which should be administered over an extended period of time. A dose of 2/3 gram daily was tolerated by a larger number of patients than the I gram dose and was adequate in most cases as can be judged by the improvement shown in table 4. It is doubtful that doses larger than I gram daily would be therapeutically more potent than the smaller doses.

Of the 47 patients in this investigation only three have shown any advance of the disease in spite of treatment with diasone. In two of these patients, who had apparently shown some improvement after six months of treatment, a few small nodules appeared at the site of old ones which had temporarily receded. This development can be considered a progression of the disease during treatment, and these two patients can be classified as having become worse. However, upon continuation of diasone, the new nodules showed evidence of subsiding. Another patient with faradvanced lepromatous leprosy died of progressive leprous laryngitis. She had taken very inadequate treatment because of repeated and prolonged periods of interruption due to a secondary anemia. Two blood transfusions were necessary when the red blood cells reached the low level of 2,500,000. Altogether this patient was able to tolerate only 47 grams of diasone scattered over nine months of treatment—an average of only 0.21 gram daily. The above three cases, 6.5 per cent of those under study, are the only ones in which the disease advanced.

Previous experience in the National Leprosarium indicates hat with the type and stage of leprosy under investigation the frequency and the degree of improvement shown are much greater than might be expected in the absence of treatment with diasone.

Tuberculosis is a frequent and serious complication of leprosy at the National Leprosarium.⁶ The development of tuberculosis may be re-regarded as an additional indication for the institution of promin or diasone therapy. Thus far ten tuberculosis patients have been placed on promin or diasone treatment in the hope that both diseases might be favourably influenced by the same drug. In two of them the tuberculosis disease advanced during the course of treatment but in the majority of the others an improvement was shown by serial roentgenograms.

Two brief case histories, representative of a large group, will serve to demonstrate further the effects of diasone in leprosy.

Case Reports.

Case 1.—Coloured female, 30 years of age, had far advanced lepromatous leprosy at onset of diasone treatment. The disease was of five years' duration. Clinical findings were large confluent nodules and infiltration of the face with generalised nodular eruption on arms, forearms, buttocks, thighs and legs, smaller discrete nodules over the chest and evidence of leprous rhinitis. Nasal and skin smears were positive of *M. leprae*. There was some advance in the disease following chaulmoogra oil treatment. Diasone was administered in doses of 2/3 gram daily, totalling 130 grams. In 7 months objective improvement was observed, although skin and nasal smears remained positive.

Case 2.—Coloured male child, 6 years of age, with moderately advanced lepromatous leprosy of two years' duration. Clinical manifestations were multiple nodules scattered over the face, plaques on the right side of the forehead and the left cheek, infiltration and scattered nodules on the forearms, hands, buttocks, thighs, legs and feet, and evidence of leprous rhinitis. No improvement was noted with oral administration of chaulmoogra oil. Skin and nasal smears were always positive for M. leprae. Diasone was given in 1/3 gram doses daily and totalled 61 grams. Definite improvement after 8 months is shown in the illustration.* Skin smears still positive.

Conclusion.

Diasone is a sulphone drug which can be given orally in the treatment of leprosy with relatively mild toxic reactions in most cases.

The average tolerated dose is 2/3 to I gram daily, given in 5 gr. capsules during meals.

Oral medication is preferable in leprosy; hence diasone has an advantage over promin which was found to be too toxic for oral administration in leprosy, and is used intravenously at the National Leprosarium.

The objective improvement observed during the diasone treatment of leprosy is encouraging but further clinical evaluation is necessary before it may be regarded as a leprostatic agent.

* Omitted here.

NOTES ON LEPROSY SETTLEMENTS TANGANYIKA TERRITORY

А. G. МАСКАЧ.

THE ROLE OF SETTLEMENTS.

(1) To segregate infective lepers with a view to reducing the incidence of leprosy in the area served by the settlement.

(2) To provide a centre for training in leprosy work.

(3) To set a standard for treatment which would be generally adopted throughout the Province in which the settlement is situated.

The opening of a leprosy settlement makes the surrounding community leprosy-conscious, and is a valuable step in propaganda towards diminution of the spread of infection.

As regards training this does not only mean the tuition of

selected Africans in the treatment of leprosy. It entails special courses of instruction for any, e.g. Missionaries, who wish to take advantage of the special tuition. Medically qualified Africans of the Hospital Assistant class can be trained in the administration of settlements as well as in the general care of lepers.

Advantages of Provincial Settlements over Main Territorial Settlements.

(I) The difficulty of transporting lepers by rail is avoided.

(2) Patients will more readily go to a settlement in or near their own tribal area.

(3) Less admixture of different tribes in a settlement facilitates administration.

(4) There is less climatic change for the patients and less environmental change in agricultural and social conditions.

(5) They form local centres where Africans, chosen from nearby tribes and who will later act as orderlies for the treatment of leprosy, or who will take part on leprosy surveys, can be recruited, trained and sent out to work in the tribal areas to which they belong.

SITING OF SETTLEMENTS.

(I) Sufficient cultivatable land and good water supplies are essential if the costs of running a settlement are to be kept down. If plenty of fertile land is not available, it means that the settlement will be largely industrial rather than agricultural, and that foodstuffs will have to be imported. Plentiful water supplies are necessary, not only because of cultivation, but because the provision of bathing facilities is an important adjuvant in treatment.

(2) Climate has to be considered as it has an influence on leprosy. Lepers respond better to specific therapy when they are not exposed to considerable variations in temperature and high rainfall.

(3) Communications should be good all the year round to allow of supervision from the nearest Government station.

(4) Qualified medical aid should be available within a reasonable distance when the settlement does not have its own doctor and hospital. (Every settlement should have its own dispensary with a sick bay and its African medical staff, even though this is only of the hospital orderly standard.)

POPULATION.

A population of 500 constitutes a medium-sized settlement.

Populations of 1,000 and over require their own hospital and doctor.

Area required depends on the fertility of the soil when the settlement is to be self-supporting agriculturally. At Makete, where lepers are segregated with their families, four or five acres of land suffice for one family. In less fertile areas, e.g. in the Western Province, eight acres per family may be required.

The Planning of a Settlement has to be undertaken similarly to making a Sleeping Sickness Concentration. A preliminary survey of the land is essential, and food has to be imported in advance to be issued to the patients until the first harvest within the settlement has been gathered. A certain number of huts have to be built in advance; thereafter, newcomers build their own huts.

The function the settlement has to perform in relation to the community has to be pre-determined. Generally speaking, if the incidence of leprosy in the Province is relatively low, more latitude can be allowed as regards the type of case admitted. Where the incidence or rate of open cases is high, only the most infectious types should be admitted, and every endeavour should be made to step up the discharge rate of disease-arrested cases. "Burnt-out" cases should be excluded-they are no longer suffering from leprosy. Their welfare comes within the province of the infirm and paupers in general. This is a matter for the Native Administration functioning as a Poor Law Authority. The incidence of leprosy varies in different parts of the Territory. From the preventative medicine standpoint, what is more important than the total number of cases in a given area is the percentage of open lepromatous cases amongst them, especially a high percentage of lepromatous cases amongst children compared to adults. The neural type may be regarded as for all practical purposes non-infective. An average type-distribution in Central Africa might be taken to be 5.10% lepromatous, 15% mixed and 75-80% neural.

As admissions are voluntary, it is most important that the conditions within the settlement are made as attractive as possible, and that the patient on entering should be made to feel at ease from the very start. Social life within the settlement should preserve the conditions of village life outside as far as circumstances permit, except that the standard of sanitation will be maintained at a higher level.

The idea is to segregate highly infective cases only. The great difficulty in dealing with primitive peoples, however, is to be able to isolate the patient away from his family. The African

(who does not believe in infection in the Western sense) is unwilling to be separated from his or her family unless for a very short period. There is the further problem of families left uncared for through isolation of their head. It is probably best to make a gradual approach to the ideal of segregating infective cases. Until the outside community has become leprosy-conscious segregation with complete families (if so desired) should be allowed. Later the further step can be taken of separating the infective members of the family within the Settlement, when the reason for this has been appreciated by those concerned. Conjugal infections are so infrequent that separation of husband and wife is rarely necessary, but uninfected children have to be provided for in a special area within the settlement. Children born in the settlement are a special problem. Generally they escape infection infective mothers within six months of birth, but after that period the incidence of infection amongst them (as shown say two to four years later) is liable to be high. Unless some form of guardianship amongst relatives outside can be arranged, the special provision for uninfected children within the settlement has to be borne in mind when the total area required for the settlement is calculated. The British Empire Leprosy Association finances a child adoption scheme which pays for the care of infected children isolated in special areas within settlements.

At Makete Leprosy Settlement the incidence of the disease amongst healthy children brought with infected parents has been surprisingly low. The reason for this may be certain Wanyakyusa customs. One is that the tribal hut is relatively large and is oblong in shape, and advantage has been taken of this to insist on large huts within the settlement; familial contact is thereby reduced. Children eat with the mother (although older boys eat with the father). If the father is infective, there is therefore less contact at the youngest and most susceptible ages. Youths leave home and occupy a separate part of the village. Water supplies are plentiful and the Wanyakyusa are cleanly in their habits under such conditions.

Also, during the last few years, more and more separation of the infective and non-infected within the family has been carried out.

The Administration of a Settlement should be a joint responsibility. The more people interested in it, the better for the settlement. Makete is an example of this. The District Commissioner, Rungwe, lives at Tukuyu, 12 miles away. He controls the finances of the Colony, and approves the admission

LEPROSY SETTLEMENTS

of patients recommended by the Medical Officer, Tukuyu. The latter visits the settlement at frequent and regular intervals and is responsible for its medical activities. A Toc H Leprosy Worker is in immediate control, and lives within one mile of the nearest patients huts. Discipline is maintained by the local Native Authority. a Chief visiting at regular intervals to hear disputes. Finally, each of the three villages within the settlement area has an Elder in charge of it. This combined form of administration works very satisfactorily.

Occupation, Education, Amenities, etc.

While agriculture is necessarily the main occupation, the teaching of trades and of handicrafts should be encouraged. Not only are the results of such occupations revenue-producing, but they are also necessary for the settlements own needs. Whatever the work of the various members, occupation should be regarded primarily as occupational therapy and for the production of the settlement's requirements. It should not be made subservient to producing as much as possible for sale outside in order to get revenue. Leprosy settlements have never yet become selfsupporting and must necessarily be a liability on public funds. The cost per head per annum varies from the surprisingly low figures of Shgs. 10/- at Makete to f_5 in some West African Agricultural Leprosy Settlements. The Oji River Settlement costs just over £2 per head per annum, and there expense is kept down by the scheme whereby all patients able to work must contribute a portion of their time in unpaid work in the Settlement.

The education of children must not be neglected, and two schools may be required, one for infected children and the other for healthy children.

Facilities must be provided for religious worship.

A market should be provided for the interchange of produce within the settlement, and a shop for the sale of small luxuries is always greatly appreciated.

A recreation ground will be required for the young, and a large hut as a meeting place for the elder members of the community.

In addition to the clinic where patients receive their injections there must be a dispensary for the treatment of general diseases, and here again provision must be made for treating in separate rooms infective lepers and the other members of the community who do not suffer from leprosy. A microscopist and laboratory facilities are very important.

A Court House for the hearing of all disputes should be

provided, and a system for the election of Elders qualified to decide disputes.

Finally, as bathing is both a prophylactic and a therapeutic agent (the latter through its tonic effect on the system) bathrooms fitted with showers should be available.

DISCHARGE OF DISEASE-ARRESTED CASES.

A local Examining Board should visit yearly or twice yearly to decide which patients can with safety be allowed to return to their native villages. Before discharge, a patient should be bacteriologically negative for at least one year, and he should be instructed to report at the Settlement or at a Dispensary once every six months to see if he remains negative. If the patients are contented in the Settlement, and they generally are if the Settlement is well run, there is rarely any difficulty in getting a relapsed case to seek re-admission. A good average discharge rate is 10% annually of treatable cases. There will always be a proportion of cases which do not respond to treatment and they form a more or less permanent population in the settlement. When a patient is discharged he should be given a certificate to show his Chief, stating that he is not infective to others but that he must report for examination at regular intervals. Unfortunately, it sometimes happens that as a result of rousing the leprosy-consciousness of a community the villagers refuse to have back among them a patient who has been discharged from a leper settlement. This is why the giving of a certificate is necessary, and propaganda may be needed as well. Some settlements have as squatters on their margin, numbers of discharged patients who have been refused admittance back into their native villages. Every effort should be made to avoid this, as if the patients think they cannot resume life in their own villages on discharge, they will not willingly seek admission into the settlement.

Individual versus Communal Agriculture. Whether a settlement is run on the lines of individual shambas or of communal shambas (separate shambas being set aside for cultivation by infectious patients) will depend largely on the character of the tribe comprising the majority of the inmates, and also on the fertility of the soil. Every settlement has its own problems which have to be solved, and it is for this reason that interchange of ideas and mutual discussion of difficulties between those in immediate control of different settlements is to be encouraged.

Makete settlement may be taker as a good example of the small-holder type of settlement in contrast to that where cultivation is on communal lines. Individual cultivation is more in keeping with the independent and industrious character of the local tribe, the Wanyakyusa, and every endeavour has been made to preserve the natural conditions of village life. Thus the inmates live in huts of their own construction built of bamboo framework with or without mud filling in the walls, and of the style to which they and their families have always been accustomed. More attention is paid however, to sanitary principles as regards ventilation and floor-surfacing, and each hut has its own pit latrine. Around the huts are banana groves, and behind is the cultivated shamba. The Wanyakyusa are a cattle-keeping community, and in the settlement most of the inmates have domestic stocks of some description. (There are some 300 head of cattle, 50 pigs and numerous goats and chickens). The site of the settlement is amongst undulating country at an average altitude of 4,000 feet. The land is fertile, well-watered, (tributaries of the Kiwira river flow through it) and there is an abundant rainfall. The settlement comprises three villages about half-a-mile apart from each other. The average population is about 1,500 living in 600 houses, of whom about 1,000 were under treatment during 1944. Open cases are about 12.5% of all cases of leprosy in the settlement. The supervision and control of the settlement are carried out by Mr. Lambert, a British Empire Leprosy Association Toc H Worker, with an African staff.

There are two dispensaries, but as yet no hospital. The keynote of the settlement is that all who can work must work, and this has resulted in a heightened morale. Even those who are crippled and who have lost most of their fingers and toes, are given work to do, although it may be only sweeping or weeding paths. For this they are paid a small sum of money. The fact that all inmates have work to do enables them to overcome the depressing feeling of being no longer of use and of being derelicts or outcast. The new cheerfulness thus gained aids them in combating their disease and attaining a better general physical state.

On admission to the settlement a newcomer uses his own money (if he has any) until he has cultivated sufficient ground to be self-supporting. If he has no money, or insufficient money, he lodges with one of the more prosperous residents. He is given bamboo poles with which to build his house. He is also given work to do for part of the day, and this pays for his food. When his house is nearly completed, he is given Shgs: 2/- as a reward. The house must have a minimum size of 1,500 sq. ft. and must have a pit latrine of a specified minimum depth. The newcomer is given a small plot of land, about one-fifth of an acre. On completing the cultivation of this he is given Shg. 1/-. Gradually thereafter, he is given other and larger plots which he cultivates under the advice and supervision of the Agricultural Overseer. The minimum amount of land considered necessary for any one household is five acres, allowing for resting part of it in rotation. Special provision is made for widows and for those who are crippled. The widows work on communal shambas, after the preliminary breaking up of the ground has been done for them. A certain number of communal shambas have to be maintained. These provide food for newcomers and for widows and cripples. There, also, crops are grown for seed purposes.

LEPROSY SURVEY OF SCHOOL CHILDREN IN BRITISH GUIANA

L. H. WHARTON.

It is generally accepted that the incidence of leprosy in children gives a fairly accurate picture of the leprosy problem of that country. In presenting the first report of a general leprosy survey of school children to be made in this Colony it will be necessary to give a short account of the topographical, climatic, sanitary, economic and general health conditions of the Colony, together with racial distribution of its peoples, so that the reader be able to have a comprehensive view of the problem.

The only British possession on the continent of South America Latitude 2-8, British Guiana has an area of 89,000 sq. miles, with a mixed population of approximately 360,000, giving an area density of 3 persons to the sq. mile. About 45% of the population is East Indian, 45% African, and 10% other races consisting mannly of Portuguese, Chinesc, Aboriginal Indians and Europeans. Approximately 90% of the population live on the Atlantic coastland of the Colony, in a strip of land 5 miles wide and 280 miles long. The Colony is bordered by Venezeula, Dutch Guiana and Brazil, all countries with a high leprosy incidence, so that there can be no complacency in leprosy control.

The people are mainly agriculturalists although some mining is done. Economically the average person is poor; housing apart from the city—Georgetown, New Amsterdam, and the larger villages is poor, and the standard of living and sanitary conditions are poor.

The climate is tropical, with two rainy seasons and two dry seasons a year. Average midday temperature is 80° F. in the shade, and the average rainfall 70" per annum. The inhabited area of the Colony is low, 4 ft. below sea level. A large section of the population suffer from secondary anaemia, probably due to malaria, hookworm, and poor diet, which is mainly carbohydrate, with protein content low.

The general School Survey covered the entire coastland, from Skeldon on the border of Dutch Guiana to the North West District on the Venezuelan border. It included all the towns, villages and estates. Several up-river districts with large communities were included. Trained personnel were used,, and a special Survey Card, as recommended by Dr. E. Muir, Medical Secretary, British Empire Leprosy Relief Association, was used for records. The children all attended Government Schools, and details of the survey were recorded for each of the three counties of the Colony, and are now presented as such. The time taken for the survey was 18 months, this included school vacations when the survey had to be suspended. The children came from the poorest homes in the Colony. The ages were between one and fourteen years.

		Cas	es Exa	mined.	Numbe r	Cases I	ound.
District	County	/ Boys	Girls	Totai	Boys	Girls	Total
Georgetown	Demerara	a 4,491	4,795	9,286	11	9	20
East Bank	do.	1,063	932	1,995	8	10	18
East Coast	do.	4,857	4,264	9,121	8	4	12
West Coast	do.	1,297	1,125	2,422	3	_	3
West Bank	do.	1,138	928	2,066	1.	1	2
Demerara River	do.	306	303	609		1	1
Tuschen—Parika	Essequibe	o 247	190	437	1	1	2
Supernaam—Chari	ity do.	1,306	1,209	2,515	6	2	8
Leguan	do.	464	354	818		1	1
Wakenaam	do.	356	348	704		_	
Bartica	do.	167	179	346		1	1
New Amsterdam	Berbice	741	756	1,496	1	3	4
East Bank	do.	267	217	484		1	1
Canje	do.	659	591	1,250	1	2	3
Corentyne	do.	3,815	2,859	6,674	7	8	15
West Coast	do.	1,187	1,295	2,482	1	2	3
Morawhana	North V	Vest 30	35	65		-	
Mabaruma	do.	21	19	40			
mom LT			20.200				-
TUTAL		22,412	20,399	42,811	48	46	94

TABLE I.

The number of boys infected was 48, number of girls 46. This is unusual as the rate of male to female is in most countries 2 to I. It will be seen that most of the cases were in the 6-10 age group. The number of Africans infected was 58 against 36 Indians.

It will be seen that of 42,811 children examined 94 cases were found. With the exception of 3 cases all the children, who had early neural lesions, were treated at clinics as outpatients, and allowed to continue at school. The 3 cases referred to, 1 lepromatous and 2 more advanced neural, were admitted to the Leprosy Hospital Children's Homes.

The incidence is shown in Table II.

Т	лB	LE	Ι	I.

County		Boys	Girls	Total	Per Mille
Demerara	 	31	25	56	2.2
Esseguibo	 	10	16	26	2.1
North West	 	-		_	-
		48	46	94	2.2

The lower East Bank Demerara River was the area showing the largest incidence 9 per 1,000. This incidence is so high as to warrant a house to house survey from La Penitence to Meadow Bank, inclusive, if trained personnel can be made available.

An attempt has been made in Georgetown to examine contacts, by the Govt. Medical Officer of Health of Demerara. Owing to lack of trained personnel we have been unable to carry out house examinations in the homes of infected children, although child contacts from infected homes were examined at the clinics.

In the course of the survey we were able to recommend many children suffering from yaws, scabies, ringworm, hookworm; malaria, lice, and avitaminosis, to District Medical Officers for treatment.

The opportunity was used to spread information on leprosy to the general public, and literature on the subject in the form of booklets and pamphlets was freely distributed. We have made definite progress in convincing the public that the disease can be cured, and the remarkable results obtained in the children treated as outpatients has been proof of this.

We have to record that two teachers were found suffering from Neural Leprosy (N^1) , and reports were sent to the Director of Education.

It is proposed that the School Survey should become a permanent part of the Leprosy Public Health programme and we intend to obtain permission to examine children at secondary and denominational schools at the next survey.

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Conclusions :

- (1) It is not possible to make any definite deductions from one survey. Only by repeated surveys will we be able to make comparisons, and say whether the disease is under control or not.
- (2) It has brought to light 94 early cases which might not have been seen otherwise, until they were more advanced and difficult to cure.
- (3) It has served a most useful purpose in educating the general public in the disease, and gaining their confidence in coming early for treatment.

ERRATA

"LEPROSY " (ROGERS AND MUIR) Third Edition.

Will readers please note the following errata.-

I. p. 245. "Muir (1944) gave diasone intravenously, dissolving 0.3 gr. of the powder in I c.c. of sterile saline." This should read:—" dissolving 0.3 grammes of the powder."

2. p, 262. Lepromin (Mitsuda) Test. "Performing the Test:—I mg. of the dry powder is suspended in I c.c. of saline." This should read "I mg. of the dry powder is suspended in IO cc.s of the saline."

REVIEWS

Leprosy in India (April, 1946) 18, 37.

In the Editorial Notes a review is given of possible new remedies in leprosy (see also Lep. Rev. 16, 4). Besides the drugs reviewed in Lep, Rev. *aspergillin* is also dscribed. This is derived from the Aspergillus group of fungi *A. fumigatus* and *A. flavus*. Its effect in limiting the growth of cultures of M. tuberculosis suggests the possibility of its usefulness in tuberculosis and leprosy. Streptomycin from *Actinomyces griseus* has been found effective in considerably diminishing, though not entirely inhibiting the growth of tuberculosis in inoculated guinea-pigs, and more effective than promin. The low toxicity of these drugs is of great importance.

Dharmendra and I. Santra publish an important Study of the Course of the Disease in Leprosy. The study was made in a rural area with 42 villages and a population of 10,000 persons. In a survey made in 1937, 424 (4 2%) cases were found, of which 96 (22.5%) were lepromatous. In March, 1946 the total number of cases in the area was 494 (4.9%), of which 75 (15.2%) were This is partly accounted for by an intervening lepromatous. famine during which " a large number of deaths occurred amongst the patients, specially of the lepromatous type, leading to a fall in the number of cases, more marked in the lepromatous cases. Later this fall was more than made up by the detection of a large number of new cases, specially of the neural type, the number of which is actually higher than in 1937, although the cases of the lepromatous type are still below the figure for 1937. It is considered that this increase in the number of recorded cases has been caused by two factors; firstly, because of the thorough re-survey several previously existing but undetected cases were recorded, and secondly, the famine conditions had resulted in a large number of fresh cases in the area." Other interesting points in the report are as follows:-

"Anongst the 68 lepromatous cases, clinical improvement was seen in about one-third, although they did not become bacteriologically negative. In the remaining cases, the discase either remained stationary or became worse. Only about a quarter of the cases have taken treatment. In the neural cases, the improvement seen does not appear to be related to treatment; in many cases there has been improvement without any treatment, while in others the disease has progressed in spite of the treatment. In the lepromatous cases, however, improvement has been seen more frequently in the treated than in the untreated cases. The study confirms the prognostic value of the lepromin test. In the lepromatous type a few cases had a weak positive reaction, and improvement has been seen more frequently in these cases than in the larger group of lepromin-negative lepromatous cases. In the neural cases improvement and subsidence was more frequent in the larger lepromin-positive group than in the smaller lepromatous type was confined to the lepromin-negative group.

Amongst the neural cases definite improvement and complete subsidence was much more frequent amongst the group having only patches, than in the group having sensory changes in the extremities, with or without patches. The average duration of the disease in the neural cases under observation has been 18 years, the shortest period being 9 and the longest 50 years.

The change in type from the neural to the lepromatous has been seen only in about 2.5% cases. The lesions of the neural type most likely to change later into the lepromatous type are the small rather ill-defined flat patches with little or no definite sensory changes, and with a negative lepromin reaction."

Treatment of Tuberculoid Leprosy with Methylene Blue and Glucose is reported on by N. Figueredo and S. D. Desai. Previously methylene blue injections had caused fever and weak-

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ness. By using methylene blue with pH 7, and by adding glucose, these two complications have been eliminated. Methylene blue 1% in 10 c.c. doses with an equal quantity of 50% glucose is given twice a week into the vein. Of the 45 cases treated for 2 to 6 months, 36 showed complete subsidence of raised lesions with disappearance of bacilli in cases in which they were found before treatment and 8 showed slight improvement, only I showing no change.

Dharmendra describes a family of 28 persons belonging to three generations, having among them seven neural cases of leprosy but no lepromatous case. However the history showed that they were exposed to infection by lepromatous type neighbours while staying in Rangoon before the evacuation of Burma. Twenty-six of them were tested for resistance and of these 25 were lepromin-positive, including two who had been born after leaving Burma and therefore, presumably, had missed the contact with infection. I he only lepromin-negative member (male, aged 19) showed no signs of the disease, which is considered an anomalous finding, although there are many possible reasons why contact might have been less,

International Journal of Leprosy, Vol. 13, December, 1945.

This is the Fourth Special War Number and Volume XIII of the Journal. A Foreword by Dr. Wade explains that the contents of this issue consist of articles and manuscripts prepared for publication at the end of 1941. These, which were preserved intact from the ravages of the Japanese, are now published as the annual volume for 1945.

The Fate of the Bacilli in Incubated Lepromatous Tissues and the Question of Microscopic Growth, by John H. Hanks.

This article, which should be read in full, records the results of incubation of cubes of lepromatous tissue by various methods and on different media. The technical account, which is too detailed for summary, discusses the pitfalls encountered in bacillary sampling and counting, methods of calculating possible bacillary growth and the influence of various tissue cultures. The author summarises as follows:—

"The impression of earlier workers that leprosy bacilli seem to grow in vitro in small bits of lepromatous tissue has been confirmed by use of the direct smear method. However, when a method was developed for complete disintegration and suspension of the tissues and for actually estimating the numbers of bacilli recoverable from the tissues, it became evident that growth did not occur. The conditions which were studied included incubation of tissues on a standard solid medium, in liquid media particularly well adapted to the growth of small numbers of other acid-fast bacteria, and in tissue-culture solutions suitable for the cultivation of fibro-blasts or of blocd monocytes. They also included incubation in the presence of added carbon dioxide and oxygen. Several procedures which have been thought to promote growth have been found simply to increase the erroneous impressions which result from nonquantitative microscopic methods. Other sources of error are pointed out. It is concluded that the supposed microscopic growth of leprosy bacilli must be attributed to reliance on methods which are incapable of dealing with an unusual combination of misleading circumstances." In short "Note on the Numbers of Baclli which may occur in Leprous Nodules, the same author gives a small series of calculations on the hacillary content of a cubic centimetre of lepromatous module. One

In short "Note on the Numbers of Baclli which may occur in Leprous Nodules, the same author gives a small series of calculations on the bacillary content of a cubic centimetre of lepromatous nodule. One of his figures gives a total of seven thousand million bacilli in a cubic centimetre of nodule, and 'the total number in a lepromatous individual would require representation in astronomical terms'."

Leprosy in Trinudad, by E. Muir. This is a short account of the inception of modern leprosy control methods in Trinidad. The author, who made a special study of the problem at the request of the Trinidad Government, outlines the anti-leprosy campaign undertaken by him there on the well known P.T.S. (Propaganda-Treatment-Survey) System.

An official Phillipine memorandum on *The Problem of Home Isotation of Lepers* gives a detailed study of the dangers attached to the policy of segregation in private houses. It stresses the illusory nature of the resulting freedom, the difficulty of medical aid to the patient himself, and above all, the fact that the home is the essential breeding ground of the disease. The memorandum is important as a considered and experienced statement on leprosy policy.

Outpatient Clinics Operated by the Chiengmai Leper Asylum by H. J. McKean, is an interesting account of a system of voluntary clinics. Ex-patients from the Asylum are persuaded to set up on their own local clinics, and the total expense involved is the actual price of medicines and injection equipment. The system might well be considered for adoption elsewhere.

A Further Note on Inoculation of Monkeys with Human Leprosy Material after Splenectomy, by R. G. Cochrane, K. P. Menon, and C. G. Pandit, Inoculation of Monkeys with Human Leprosy Material, by R. G. Cochrane and K. Ramanujain.

These articles continue the report on the inoculation of splenectomised monkeys under various conditions. The authors make no claim that they have reproduced the disease in monkeys, but they have obtained in different cases bacillary dissemination, some erythematous lesions of an unidentified type, and very interesting lepromin results. This experimental series is both significant and promising.

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