

LEPROSY REVIEW.

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EDITOR - E. MUIR, M.D.

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The Association does not accept responsibility for views expressed by the writers. Communications may be sent to the Editor, at 131 Baker Street, London, W.1.

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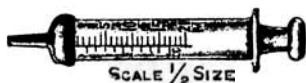
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Editorial

When one tries to interest the public in the leprosy problem a common objection that is raised is "Surely this is the responsibility of Government" (see the letter in our correspondence column). The idea is that if only Government would vote a few million pounds out of its budget leprosy could be stamped out in a comparatively short time. In trying to explain the impracticability of this proposal there are a few questions that arise:—What is Government? What is Government doing already? What are the limitations of Government action?

Firstly, what is meant by the term "Government"? Let us take for instance the Colony and Protectorate of Nigeria. Here we have 24 provinces ruled by indirect government; that is to say they are ruled as far as possible through the native rulers. There is established in each Native State in the Northern Provinces a Treasury which regulates the expenditure of that portion of the local revenue which is annually assigned to the Native Administration of each Emirate for its support and maintenance. There are also native treasuries in some of the more advanced States of the Southern Provinces.

Secondly, what is Government doing already for leprosy? In Nigeria it is calculated that there are some 200,000 lepers—about one per cent. of the population. The Government and Native Administrations support some 14 settlements and they give grants to several of the 7 or 8 Mission settlements. For instance, they give about £2,500 a year to the large mission settlement at Itu, and about the same amount to the Uzuakoli settlement. Nigeria is a comparatively poor country and there are many other public health problems of urgent importance on which money has to be spent. The writer in his recent visit to Nigeria was greatly surprised at the rapid rate at which education, road building and the general development of the country had progressed in the last 30 years since the Colony and Protectorate were formed.

Thirdly, what are the limitations of Government action? Leprosy like other diseases cannot be *stamped out*. Forcible segregation has been tried in the Philippines at a great expenditure of money, but has not proved capable of controlling leprosy. What has to be done is to study the disease and the local conditions which cause it, and thereafter

educate the people in the methods of prevention. A certain number of the lepers can be isolated voluntarily, but it would cost hundreds of thousands of pounds a year to isolate all of them, even if that were otherwise practicable. Leprosy is in countries like Nigeria what tuberculosis was in this country 30 or 40 years ago. Why is tuberculosis gradually diminishing in England? It is chiefly because of the educative programme of health authorities and others. In dealing with leprosy in Nigeria and other backward parts of our Empire the chief requirement is men and women with the missionary or altruistic spirit, who are willing to sacrifice themselves through long years to study the people and their ways of living and gradually teach them how to live healthier and better lives. Governments themselves can seldom furnish such men and women, but they fully appreciate and encourage the services of medical missionaries and others who have given themselves to this work.

There is a very definite responsibility on the shoulders of the British public, which they cannot shift on to the back of Government. We who claim to be a democratic nation have deliberately taken over or adopted a number of countries peopled by backward races. Anyone who adopts a child holds himself responsible for its education and well-being, and above all for its health. We are proud of these colonies and few would be willing to give them up. Surely then it is our duty to see that everything possible is done to free them from the living death of leprosy and the ignorance, superstition and insanitary conditions which breed leprosy.

* * * *

Mr. Kerr's article on occupational therapy should be of great value to those who are engaged in organising leprosy institutions along modern lines. His dictum—" *Faith, Oil, Work, but the greatest of these is Work* "—puts in a nutshell our present position with regard to the treatment of leprosy, and the hyper-orthodox doctor who puts all his faith in drugs will be left far behind. In connection with this paper should be read the review of Prof. Mills' paper on page 94; doubtless occupational therapy raises the "stimulation index".

For those who are over-occupied with the present, or are pressing eagerly into the future, a glimpse into the past has often a salutary effect. This number tells the tale of two of the "giants of old": Danielssen, the "Father of Modern Leprology" and Wellesley Bailey, who inspired a great world-wide movement to help the outcast leper. Each of

them—the scientist and the Christian philanthropist—was, in his own line, a man of faith and vision. For our modern struggle against leprosy we need the inspiration of both; science and philanthropy must go hand in hand if this scourge is to be mastered in the end.

We reproduce from *Leprosy in India* Dr. Lowe's masterly article on the *Macules in Nerve Leprosy*. This is a subject which has caused considerable confusion in the minds of many leprosy workers. Dr. Lowe's article clarifies the position considerably and will repay careful study.

We would draw the attention of our readers to the International Leprosy Conference to be held in Cairo in March, 1938. This will be the first conference of the International Leprosy Association, and we would urge all those who are engaged in leprosy work to join this Association and to do their utmost to attend the conference. Full information can be obtained from the Honorary Secretary, International Leprosy Association, at 131 Baker Street, London, W.1.

Gland Puncture—Its Value in the Diagnosis of Leprosy

H. v. R. MOSTERT.

Because of the difficulty in maculo-anaesthetic leprosy of demonstrating bacilli either in scrapings from skin lesions or in smears from the nose, it was decided to test the value of smears obtained by gland puncture in some of these cases. Blood examination had previously proved of no avail (cf. *Leprosy Review*, Vol. VII, No. 1, p. 6).

80 native male patients with palpable glands, *until recently* classified as maculo-anaesthetic cases of leprosy, were chosen. Gland puncture was done prior to any examination for early nodular retrogression, although signs of an erythematous rash in 7 of these case suggested this possibility.

Technique.

A few drops of saline in a small syringe were injected into a suitable gland. The gland was then massaged with the needle still in place. The fluid was thereafter withdrawn from the gland by suction, smeared on a slide, stained with Ziehl-Neelsen and examined for *Mycobacterium leprae*.

Result.

Of the 80 cases, *positive gland smears were found in 13 of these cases.*

On further *clinical* examination of the 13 positive cases all were found to be early cases of nodular leprosy. 8 showed *very early* signs of nodular infiltration of the face, characterized by a slight thickening and bronzing of the skin. In 6 of the 8 cases there was further evidence of an erythematous rash of the face, trunk and extremities. One other case showed signs of an erythematous rash only. Of the remaining 4 cases one had active macular lesions on the body and 3 showed no signs of activity at all on superficial examination.

In the 5 cases mentioned in whom there was no apparent evidence of nodular infiltration, subsequent scrapings from the skin of the face proved positive. Gland smears therefore served as a useful guide in enabling one to diagnose these early cases of nodular retrogression.

No evidence of nodular leprosy was found after further clinical and bacteriological investigation of the 67 maculo-anaesthetic cases with negative gland smears.

The following table gives a summary of bacteriological findings in the 13 positive gland smear cases:—

	—	+	++	+++
Gland smears ...	0	5 (3 scanty)	6	2
Skin Scrapings ...	0	7 (3 scanty)	6	0
Nasal Smears ...	4	9 (2 scanty)	0	0
Thick Blood Smears	6	7 (all scanty)	0	0

Bacilli were easily demonstrated from both gland and skin. In our investigation only one series of smears was required from either source. On the other hand positive nasal and blood smear results were only obtained after repeated examinations, bacilli in thick blood smears being especially hard to find. At a somewhat more advanced stage of nodular leprosy, however, bacilli are more easily found in the blood and positive blood smears are the rule (cf. Leprosy Review, Vol VII, No. 1, page 7).

The following cases warrant special mention in that they

tend to demonstrate that smears from the nose need not necessarily be positive in the early stages of nodular retrogression :

Case 4792 Native Male.

An old nerve case with active macules on the body, now tending to become nodular. There is an erythematous rash on the face, trunk and extremities and a few areas of early bronze coloured infiltration of the face. There is marked depilation of eyebrows.

Gland Smear (Left Inguinal) ++

Skin Smear (Right Cheek) ++

Nasal Smear — (taken monthly over a period of 6 months).

Blood Smear —

Case 6031 Native Male.

A maculo-anaesthetic case which is becoming nodular. There is an erythematous rash on the trunk and extremities, although *no* evidence as yet of infiltration of the face on *superficial* examination.

Gland Smear (Right Inguinal) + scanty.

Skin Smear (Right Cheek) + scanty.

Nasal Smear — (taken monthly over a period of 6 months).

Blood Smear + scanty.

Case 5882 Native Male.

An old nerve case with no signs of activity on superficial examination.

Gland Smear (Right Epitrochlear) ++

Skin Smear (Left Eyebrow) +

Nasal Smear — (taken monthly over a period of 6 months).

Blood Smear —

Case 6171 Native Male.

A few cutaneous macules on body. No evidence of nodular leprosy on superficial examination.

Gland Smear (Left Femoral) +

Skin Smear (Left Cheek) + scanty.

Nasal Smear —

Blood Smear —

CONCLUSIONS.

1. Gland puncture is of little or no value in the diagnosis of maculo-anaesthetic leprosy.

2. Positive gland smears are amongst the earliest indications of nodular leprosy, and are to be preferred to either nasal smears or thick blood smears in the diagnosis of these cases in the early stages. An erythematous rash on the body and infiltration of the skin are also early signs.

3. In *apparently closed* cases (cf. Case 5882 above), positive smears obtained by gland puncture serve as a guide to early nodular retrogression. Gland puncture is therefore of value as a *test of arrest*.

*Famous Norwegian Dermatologists

H. P. LIE.

The honourable president of the Organisation Committee of the Congress has done me the honour to invite some remarks about famous Norwegian dermatologists that I have known personally. I shall not give a deep analysis of their scientific work, but content myself by making a rapid sketch of their personalities as savants and as men, according to the image of them that still lingers in my memory.

Among the Norwegian dermatologists that I have known there are three who hold a position of capital importance, and who had a profound influence on the study of dermatology. They are D. C. Danielssen, Armauer Hansen and César Boeck.

The senior of the three was Danielssen, born in 1815. When I went to present myself for the first time after being appointed as assistant at the famous hospital of Lungegaard at Bergen, I was greatly looking forward to my first sight of the famous physician, already old, of whom I had heard so much but whom I had never seen. I anticipated a very dignified audience. Seated in his arm chair he gave me the impression of a very tall and strong man, and his long white flowing beard made me think of a patriarch. With great dignity, his face illuminated by a fascinating smile, his eyes clear and alive, he held out his hand and said: "welcome, my dear young friend." I had not been long with him before I found him most charming. That first impression was so strong that it always remained. On more intimate acquaintance one took account of all that he had accomplished in his long career, and understood that he possessed special qualities which had created strong personality and made him the recognised authority in many domains which he had become and continued to be even in his old age. In his fight for his ideas he was an adversary who knew how to make himself respected, and he was not always tender to those who sought to counter his plans. As a master he was excellent. Rich in ideas and initiative, he possessed interesting his assistants in the scientific questions in which he himself was interested, and towards the solution of which he was labouring. All his subordinates admired and loved him, for after the clouds of tempest came the radiance of the

*This is the first half of the translation of a paper read at the 9th International Congress of Dermatology and Syphilology at Budapest in 1935; the second half will appear in the next issue.

sun which quickly made one forget the claps of thunder. I have said above that he gave one the impression of being tall and strong, but in reality when on his feet he was small and slender. Moreover, he was troubled with a physical defect: he was lame. For this reason he disliked walking, especially in his old age, and always in the town he was known to all the world as he rode in his elegant little carriage.

But to get a complete image of Danielssen it is necessary to know a little of the history of his life. From early years he had conceived a strong desire to study at the University. But his family's poor circumstances—his father was a watchmaker—made this difficult, and at the age of 13 he entered as a pupil in the "Svaneapotheket" pharmacy in Bergen. There he took a keen interest in botany, a subject in which he always continued to occupy himself. But his scientific education took another direction. At the age of 17 he was obliged to leave the pharmacy on account of tuberculosis of the hip joint, which kept him in bed for a year and a half. But during this time the young man occupied his time in preparing for the entrance examination for the University. In 1838, when barely 23 years of age, he was *examinatus medicinae*, that is to say he passed the medical examination without a knowledge of latin. That language played an important role in all branches of scientific study at the University, but Danielssen showed clearly that he could make good without latin. He occupied himself with physiology and chemistry, and as assistant to J. J. Hjort, who later became chief physician to the section on skin diseases at the Rikshospital at Oslo (Christiania), he made a special study of cutaneous diseases. In the autumn of 1839 he returned to Bergen and with his usual energy set about studying leprosy. With difficulty at that time there had been found a favourable place for the study of this disease in the ancient hospital of St. Georges (St. Jörgen) which had existed for ages. This furnished rich material for study, but Danielssen suffered for want of a medical library. Fortunately C. W. Boeck, who in 1851 had become professor of medicine at the University, was one day in Bergen, from where he proposed to set out on a long voyage to study leprosy in Europe, Greece and America. The two doctors compared ideas and concluded a bond of friendship and collaboration which lasted till the death of Boeck in 1875. The first result of this collaboration, but also the greatest and most lasting, was the celebrated work of Danielssen and Boeck on leprosy: "*Om Spedalskhed*", with its large and splendid atlas, which was edited by the Norwegian State in 1847. It appeared in a

French edition : “ *Traite de la Spedalskhed ou Elephantiasis des Grecs*,” Paris, 1848. The historical part of this treatise was drawn up by Boeck, but it was the pride of Danielssen that the masterpiece—the atlas—was entirely from his native town of Bergen. This work was rewarded in Paris by the presenting of the Monthyon prize, the amount of which Danielssen and Boeck gave to the University of Oslo to be devoted to improving the study of skin diseases. As a supplement to this work Danielssen published in 1862 a remarkable book : “ *Treatise on the Anæsthetic form of Leprosy*.” Boeck and Danielssen published a further work “ *Collection of Observations on Skin Diseases*,” of which Danielssen edited the last number in 1892 in memory of his friend and collaborator, who had died before that date.

Among Danielssen’s other scientific works I shall content myself with mentioning his “ *Scabies crustosa* ”, published in 1844. In his old age he was indignant to find that certain authors designated this disease—*Scabies norvegica*. It is not confined to Norway, and it seemed to him an injustice to attach to it the name of his country only because he had been the first to observe and describe this disease.

As one would expect at that epoch Danielssen was an adept at humoral pathology, and to him leprosy was a change in the blood, a *dyscrasia sanguinis*, which was due to an accumulation of albumin in the blood. The blood sought to free itself from these harmful elements, and either deposited them in the skin where they formed tumours—*lepra tuberosa*—or in the nerves, where they produced *lepra anæsthetica*, and this ill state of the constitution was hereditary. Leprosy should therefore be combated by preventing lepers from reproducing themselves. They should therefore be isolated in hospitals; and thus all the leprosaria of Norway were built before the discovery of the microbe of leprosy. Danielssen was a witness of the triumph of cellular pathology and of bacteriology, but he doubted that it was really contagious. And he was persuaded that his doubt was well founded, because of the many times he had inoculated leprosy tissue in himself and several of his collaborators at the Hospital of Lungegaard with absolutely negative results. The last inoculation practised by Danielssen on himself is of such great interest that it is necessary to describe it in full detail. He inoculated himself subcutaneously with material obtained from empyema of the pleura of a leper. But it should be remarked that leprosy affection of the lungs is exceedingly rare, if indeed it exists at all. On the other hand, we know that tuberculous affections of the pleura are very common. It is

therefore very probable that Danielssen, instead of inoculating himself with the organisms of leprosy, actually did so with those of tuberculosis. The result of the inoculation was to produce a marked local infiltration without any generalised phenomena. This infiltration changed after a little into ulceration, which again healed up rapidly. If one remembers that Danielssen, in addition to having tuberculosis of the hip, also suffered from chronic pulmonary tuberculosis with haemoptasis, and had once expectorated a small piece of chalky material, there is little doubt in my opinion that he demonstrated "the phenomenon of Koch" prior to the discovery of the bacillus of tuberculosis by Koch.

It is very curious that, if we exclude the celebrated inoculations of Arning in the case of Keanu, there should have been only one undoubted positive result with inoculation of leprosy in man, that occurring in recent times. (*Un cas d'inoculation accidentelle du bacille de Hansen en pays non lepreux*. E. Marchoux. Int. J1. of Leprosy, Vol. II, No. 1, 1934.) If Danielssen is incontestably the founder of modern scientific research in leprosy, it is because he combined pathological with his excellent clinical examinations. These were, however, more macroscopic than microscopic. *Post mortem* examination of lepers was at that time new and caused an amount of distress and irritation quite understandable and excusable. In spite of all his remarkably and kindly powers of persuasion, Danielssen experienced great difficulties on the occasions of autopsies. But he was not a man to let himself be thwarted when he had determined to dig to the root of a problem. One day when he was engaged in an important case and was threatened with a knife by the relatives of the deceased if he made the autopsy, he called upon the prefect of police and persuaded him to provide a constable to be at hand during the operation. Thereafter he had no further difficulty with these examinations.

In the microscopic investigations of Danielssen there is a point of special importance. Already in his large treatise of 1847 he had described characteristic large cells crowded with brownish molecules which did not dissolve in acetic acid. These are the cells which later became so famous: *lepra cells* (Virchow), *brown elements* (Hansen), *leprous globules* (Neisser). For long Danielssen reflected much on the question of whether these cells with their granulation did not perhaps contain material specific to leprosy. And this was indeed the case, for these are what Hansen in the end proved to be *lepra bacilli*. But Danielssen was so uncertain of this fact that he submitted the question to

Rudolf Virchow when he came to Bergen in 1859 to study leprosy with Danielssen at the Lungegaard hospital. Virchow was of the opinion, however, that they must be a kind of fatty degeneration. Danielssen inclined towards the opinion of the great master; but in the end he regretted this very much: "perhaps I should have found the bacilli of leprosy if I had not let myself be convinced that it was due to fatty degeneration; no one should ever let himself be diverted even by an authority."

One should also mention another side of the work on leprosy done by Danielssen, viz. his endeavour to find a remedy for leprosy, then considered incurable. The results appear in the reports of the Lungegaard hospital from 1849 till his death. Though we may perhaps not agree that his results were due to the remedies he employed, yet it is no less certain that Danielssen has proved for long that leprosy is not incurable but that it yields to treatment to a considerable extent, a truth which seems to have been confirmed only in very recent times by those who have studied this disease.

Although famous as a doctor, Danielssen was also much distinguished as a zoologist, and he was for 40 years the heart and brain which directed the Museum of Bergen, and gradually transformed that scientific institute from a modest private collection into an establishment comparable with the best in Europe, and famous throughout the world. At this Museum there are now 10 professors working, the most of whom are engaged in the natural sciences, and it is only a question of time till it becomes the second university in Norway. Personally Danielssen occupied himself with zoology, sometimes in collaboration with the two famous zoologists—the most renowned in Norway—the Professors Sars, father and son. But here Danielssen turned his talent to most useful account by interesting the younger generation in scientific studies through his sincere friendship which endured even after he himself had attained old age. A striking example is furnished by the affectionate relationship between Danielssen and the celebrated polar explorer, Fridtjof Nansen, who in the beginning of 1880 became conservator of the Bergen Museum. When young Nansen planned his celebrated voyage to the North Pole in 1893 he would not leave Norway till he had taken a touching farewell of his old paternal friend then aged almost 80. And some of the last thoughts and wishes of Danielssen were towards the young and courageous explorer shut off by the ice near the North Pole.

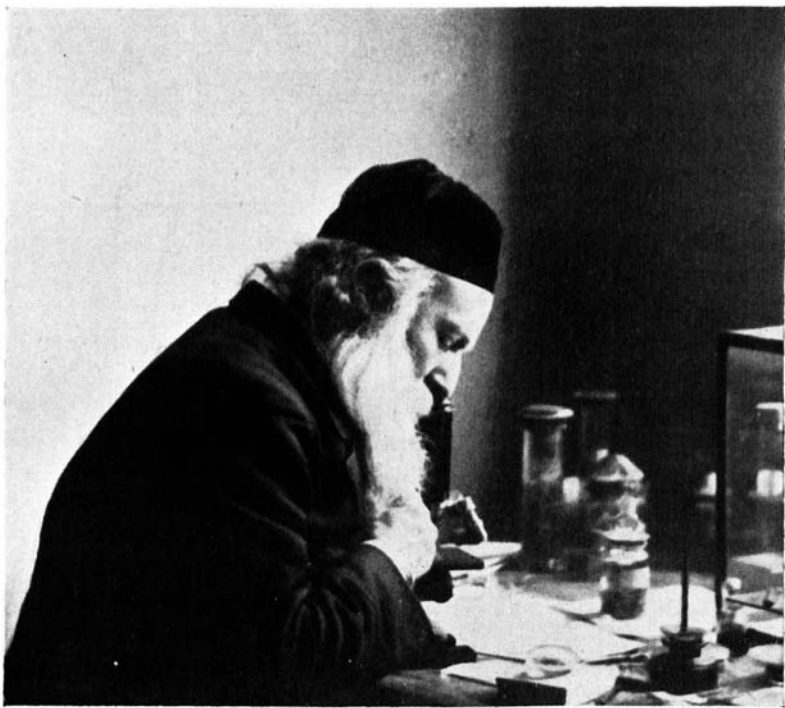
One is tempted to consider that all these activities I have related are sufficient for any one man however active and capable. But this is far from the case. Danielssen was a central figure in his native town, who interested himself in every form of enterprise and progress. For long years he was a member of the Committee of Management of the new theatre of the town, "*Den Nationale Scene*." And there also, as in everything else in which he was engaged, he made himself felt. He had a great influence as a critic, generally anonymous, of the theatre. He was in intimate relationship with the two Norwegian authors: Henry Ibsen and Bjørnstjerne Bjørnson, who during 1850 were the principals of the theatre at Bergen.

Danielssen interested himself also in politics. He was very radical for his time and he played a considerable role as member of the *Storting de Norvege* during a series of years filled with bitter political contests. He found himself in the extreme left and was one of the founders of the radical party. Till the end he maintained his radicalism and was fond of proclaiming that he was born on the 4th of July, the anniversary of the independence of the United States.

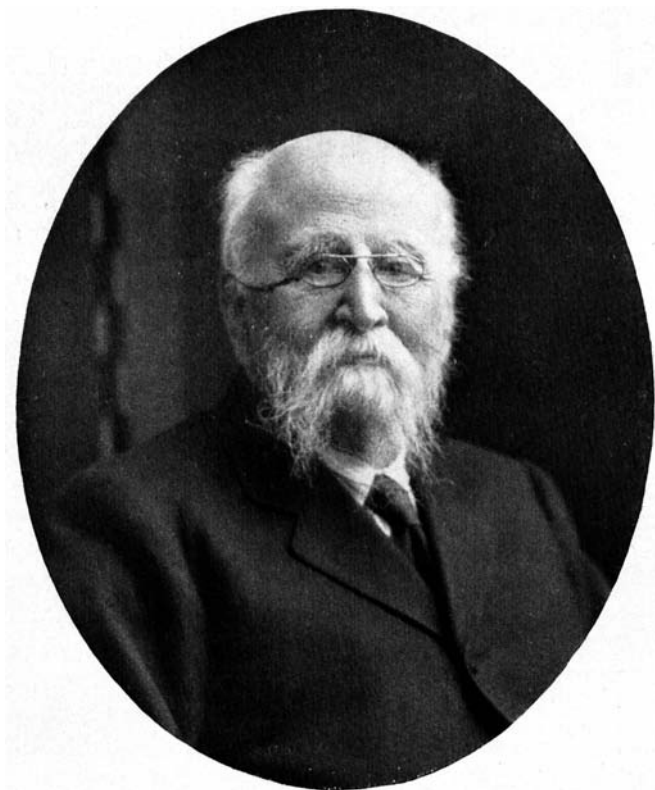
I must finish by stating that Danielssen was a doctor with a large general practice, perhaps the largest ever known in Bergen. But it is right to mention that he was one of those highly endowed personalities who possess the secret of remaining always young and find time for everything.

Danielssen died in 1894 at the age of 80 from pernicious anaemia, like his collaborator Boeck. This followed upon an attack of croupous pneumonia. In the end they pretended that he had died of chagrin at seeing that his theory about syphilisation, of which he had made himself a protagonist, was not as highly appreciated as he thought it should be.

At the autopsy they found, besides the old disease of his hip joint, marked tuberculous lesions of both lungs which had healed in the course of years. In the cicatrix of the inoculation with leprosy mentioned above there was nothing but scar tissue, and no sign either of leprosy or tuberculosis. Danielssen survived all his children; with one exception they all died of tuberculosis.



DR. D. C. DANNIELSSEN



MR. WELLESLEY C. BAILEY

Obituary.

MR. WELLESLEY C. BAILEY.

If Danielssen was the "father of modern leprology," Wellesley Bailey was truly the father of humanitarian work among lepers in modern times. His death in January at the ripe age of 90 carries us back 67 years to when he first began his work among lepers in the Punjab. From this has grown the Mission to Lepers, with an income of £76,000 in 1933. In India alone between 6,000 and 7,000 are gathered in the institutions of the Mission, and its work with that of the associated American Mission to Lepers, extends to China, Siam, Africa and other lands. Mr. Bailey was a man of strong character and initiative. He had the advantage of a fine physique and was a man of wide outlook, gifted with the qualities of leadership. The years which he spent in retirement followed a life of notable energy and activity. During the last year he had considerably weakened and was unable to take the daily walks in which he delighted. He became ill with influenza a fortnight before his death.

Mr. Bailey was born at Abbeyleix, Queen's County, Ireland, and was educated at Kilkenny College. He went to India when he was 22 with the intention of joining the Indian Police, but became interested in the work of a missionary friend with whom he stayed in the Punjab, and decided to become a missionary. He was a member of the American Presbyterian Mission in Punjab from 1869 to 1874 and in 1874 joined the Church of Scotland Mission, working as an evangelist and educational missionary in the hill State of Chamba.

All the time his chief interest was in working among the lepers, whose pathetic state, physical, social, and spiritual, aroused his keenest sympathy, and, returning to Ireland on his first furlough, he spoke to friends of the sad plight of the sufferers from this scourge. The Mission to Lepers had its beginning at an informal gathering in a Dublin drawingroom, with the modest aim of collecting £30 a year. Mr. Bailey went back to India, and, as funds became available, developed the activities of the Mission in different parts of the country. His wife's health compelled him to come home in 1882, and he settled in Edinburgh, where he acted as secretary and superintendent until his retirement in 1917. During that period leper asylums and lepers' children's homes were established in India, China, Japan, and other parts of the world. On his retirement he was appointed Honorary Superintendent.

*The Organization of Occupational Therapy

GEORGE M. KERR.

Leprosy has been described as the "disease of laziness." We are hardly warranted in attributing this human weakness as the cause, else the disease would be prevalent more universally. Laziness is certainly manifest as effect. A leper colony under the old regime was simply a Sleepy Hollow where men and women, torpid in body and soul, were cared for till they died. Broken in life and often maimed in body they were unfit for much manual labour. The Leper Home and Hospital of to-day has before it a different ideal. If it is to achieve its end Occupational Therapy must have a prominent place in its regime. With a treatment which is largely the injection of curative oil the advantage of wisely regulated physical activity is obvious. So also are the psychological benefits. Work is one of the divine amelioratives, and to be engaged for some hours daily at a task which absorbs interest and attention, as well as the physical powers, is a profound relief. These benefits are so manifest to our patients at Dichpali that there is never any reluctance to undertake appointed tasks, and we rarely have any malin-gering.

Our subject is the *organization* of this manual labour in a leper settlement; so we propose to state what is being done at Dichpali where, in the judgment of those competent to judge, we have attained some success in this sphere.

One distinctive feature of Dichpali, however, must be noted. Of our 700 patients all are treatable, without exception. An all-the-year-round daily average of six applicants for admission enables us to choose those patients likely to respond most speedily to treatment. Naturally a large proportion of these are in otherwise good bodily health.

For our 170 young people special arrangements are made. In their education we follow, as far as possible, what is known as the Project Method. Their reading, writing and arithmetic is centered in their larger gardens, the entire work of which they undertake. Since most of them come from the villages this course is of immense advantage to them in later life.

The remainder of our people, 450 men and 80 women, are all divided into work gangs and all the manual activities

*Paper read at the Mission to Lepers Conference in Calcutta, February, 1936.

of the place are undertaken by them. No "cooly" is paid. All service is entirely gratuitous. The names of the different work gangs indicate their various activities,—

The hospital staff of injectors and ward boys, made up of the smartest of our young men-patients, who are specially trained for their task by the nursing sisters.

The Cooking Gang composed of caste people who undertake the only communal cooking we have,—the preparation of a wheat *chapatti* daily for each inmate.

Two Cleaning Gangs, who have the roads and trees and flower plots near the main buildings under their care.

One Malarial Gang, whose service in oiling all the pot-holes in and around the Home has made very perceptible difference in the incidence of malaria.

Three Garden Gangs and four Farm Gangs, whose work we shall describe in fuller detail.

Four Spare Gangs, who when they are not on farm work are engaged in road making and jungle cleaning.

All the men are absorbed in one or other of these gangs and nearly all the women are attached to the Farm Gangs. When necessary, the choice of the gang in which any one patient should serve is left with the medical staff and, naturally, weak and ailing patients have lighter tasks assigned, if any at all.

At Dichpali we have no special industries. We attempted weaving but, in the judgment of the medical staff, the work was too sedentary, so we gave it up except that we still can do an occasional piece of cloth and the youngsters can weave our cot tape. Brass work also was attempted, but while it served for physical exercise it was, we found, too unremunerative. No building work is undertaken by our patients. We have wished but have never been able to introduce minor spare-time activities such as silk cocoon production, work which the women could very well do. Our main energies hitherto have been spent on horticulture and agriculture, since in our judgment these best suit our purpose.

A bell at 8 o'clock every morning calls all patients from the residential wards. All must come, either for treatment at hospital or their definite work. Normal treatment is given twice a week to different sections of the patients and on their day of treatment work is excused them, though frequently no advantage is taken of this privilege beyond the brief time of treatment. Till the bell rings again at eleven all work gangs are at their respective allotted tasks. Each gang elder is responsible for the presence and diligence of his gang during the three hours toil and the whole work is controlled by Indian assistants.

Our gardens are in the charge of a specially qualified man trained at our Mission Farm School and at the Lal Bagh, Bangalore. The Farm is likewise controlled by a trained overseer.

The gardens, extensive in size, are worked intensively. Over fifty different vegetables are grown, and in the orchard a wide variety of suitable fruit trees. A living interest is inspired in this work on the part of all who share in it, and every one in the place has personal concern in this side of things, since all fruit and produce are exclusively their own. Every Friday all the year round there is distribution of vegetables with any fruit in season. We consider this a valuable contribution to the dietary of the Home.

It is however in our farm that the bulk of our manual labour is utilised. The farm has forty-eight acres wet land and sixty dry. The larger part of these have been properly terraced and laid out, entirely by the patients. A small irrigation tank within our lands supplies the needful water for the wet cultivation, and it is supplemented by two large wells at which Persian wheel-lifts are installed. Our dairy farm with its fresh fodder fields and ensilage pits adjoins the farm proper and it supplies all the milk used in the institution. In these activities, apart from the two overseers, only patients are employed, but since some all-day and occasional night labour is involved two ex-patients serve permanently in the gardens and three on the Farm. These receive ordinary daily cooly pay, and apart from this there is no expense on labour.

One main crop is rice, and though as yet we have not managed to grow more than a six weeks supply for our big family we steadily increase year by year. Five acres of land are given to sugar-cane. For obvious reasons we are now doing the cane crushing by healthy coolies, but the patients do all the work up to that point.

The Agricultural Department of the State has recognised us as a Demonstration Farm. They provide a grant for plant and implements, and their officers are frequently in attendance with counsel and help. Under their direction we undertake some experiment crops and control tests in new strains of rice, sugar-cane and other crops. These do not involve any extra expense on our part and they are a source of abiding interest to our people, as well as of instruction to them and to the whole countryside.

Here we touch upon what we believe to be the secret of any success we have had in this organization of manual labour. That secret is two-fold. First, we have been able

to get our patients to realise that it is to their very obvious benefit to participate in more or less strenuous physical activity for a period day by day. Our people are all so eager to get better that they are open to conviction on this matter. "Faith—Oil—Work, but the greatest of these is Work." This familiar dictum in leprosy treatment is amply demonstrated at Dichpali. The exception proves the rule. There are always with us, from all over India, some twenty-five to thirty men, usually young men, in our private wards. These maintain themselves and pay a small sum for accommodation. No persuasions of ours have as yet sufficed to inspire these young men to share in regular manual labour. It is beneath their dignity, forsooth! A comparison of results among any same number of general ward patients shows that the period taken to arrive at the disease-arrested stage is invariably longer with the private ward patient. Laziness delays their cleansing.

The one other secret of success lies in the stimulation of interest in the work attempted. The next hardest thing to moving heaven is moving earth and in the laying out of garden and farm there is much sheer hard work. Anything, however, like wearisome tread-mill should as far as possible be avoided. This interest in their task is maintained by the introduction of innovations the value of which our people can easily apprise. Here, two items should be mentioned. First, *"Indore Compost" a humus composed of vegetable rubbish. From time immemorial the Chinese have used this preparation. A perusal of that book of absorbing interest, "Farmers of Forty Centuries" by King, makes it clear that, along with their immense canal system, the use of this material is the secret of the wonderful intensive cultivation whereby the crowded population of China exists. Sir Albert Howard, who for years worked at the Institute of Plant Industry, Indore, has in his "Waste Products of Agriculture" given us the scientific explanation of this compost and the simple technique of its preparation. The process is very simple. It consists in using the fungi and bacteria which occur in nature as agents to break down suitable mixtures of vegetable and animal wastes—the residues of the farm itself or dead leaves from any adjoining forest. By arranging these mixtures in the proper way and in the right proportions and by controlling by the simplest means, namely by watering and turning, the supply of moisture and air, these wastes are transformed in about 90 days into

*Directions for the preparation of Indore Compost may be obtained from Mr. A. D. Miller, Purulia, Bihar.

finely divided humus, rich in the foods required by growing crops. The process can be undertaken in shallow pits or low heaps. No buildings or expensive plant are required nor are cultures of the organisms concerned necessary as they occur everywhere. The universal adoption of this compost throughout India would have a revolutionary effect on its agriculture. Certainly it has worked transformation in our lands at Dichpali. We found ourselves with rice fields which were utterly worn out. The soil was of the poorest nature, large patches of it so salty that a white alum-like powder lay on the surface. Thanks to Indore Compost the larger parts of these fields are quite recovered and we had a bumper crop of rice this season.

Two years ago we made a control experiment. We divided a piece of land into three equal squares. Each had the same tillage and the same amount of seed of the same quality. On Plot No. 1, into which $1\frac{1}{4}$ " depth of Indore Compost was ploughed, 422 lbs. of rice with 138 bundles of straw was gathered. On No. 2 plot $\frac{3}{8}$ " depth of compost was mixed and 236 lbs. of rice with 106 bundles of straw were the results, while in Plot No. 3, which had no compost, only 60 lbs. of rice and 40 bundles of straw formed all the harvest.

Demonstrations of this nature are naturally of immense interest to our leper patients. It is something within their easy comprehension and experience. Ex-Dichpalites return to their villages with a new outlook on a subject which is so vital to most of them.

One other innovation which has stirred a live continuous interest in the manual labour given them is a system of deep drainage in our rice lands. From our irrigation tank there is a heavy seepage in the fields below. We therefore, along the middle of the fields, dug a trench 5' deep and, on broken brick at the bottom of it, laid a clay pipe of 5" diameter made cheaply by the local potter. The individual pipes are 18" long and loosely laid into one another, then the trench filled in. Since there is a fall on our ground away from the tank bund this drain, for seven months of the year, is always full of water which can be tapped anywhere in its course by a cistern through which the pipe flows. This seepage water can be used over again for any crops in the immediate neighbourhood of any cistern built in the course of the pipe. No harm is done to the land along which the piping lies and to retain this water-supply, which otherwise would be lost, is a great gain.

We claim no credit for originality in this simple device.

We merely give it as our experience that for a group of leper folk, from whom a few hours toil is expected day by day, this and similar useful innovations, which afterwards they themselves may introduce in their own home villages, are well worth the trouble involved. It is by such means as these that we may awaken intelligent desire and thereby save any organised manual industry in our institutions from degenerating into enforced labour, dull and unwelcome.

*A Study of Macules in Nerve Leprosy

With particular reference to the "Tuberculoid" Macule.

JOHN LOWE.

The Term "Macule."

The term macule (Latin *macula*, a spot) has been in use in dermatology for many years. The term is defined in a medical dictionary as "a small discoloured patch or spot on the skin not elevated above the general surface." Similar definitions are given in most text books of dermatology.

Among workers on leprosy, however, the term has been used with a wider meaning, and the Leonard Wood Memorial Conference on Leprosy suggested using it for "circumscribed areas of skin showing changes in colour, sometimes with slight elevation or depression." In this study we propose to use the term in a still wider sense to indicate any circumscribed area of the skin which shows colour changes, even if there is marked elevation above the general skin surface.

The Term 'Tuberculoid.'

This term has been applied by various workers on leprosy to indicate leprous lesions (usually macules or affected nerves) which show pathological and histological appearances which are more like the changes seen in the "tubercles" of tuberculosis than those seen in the ordinary lepromatous tissue.

In ordinary lepromatous tissue the granulomatous change is usually of a rather diffuse nature, and the characteristic cell is the "foamy lepra cell" in which large numbers of bacilli are present. Multinucleated foamy cells may be present, but not giant cells of the Langhan's type.

*Reprinted from *Leprosy in India*, Vol. 8, No. 3, July, 1936. The original article shows 35 illustrations, of which we reproduce only 9.

In the tuberculoid lesions of leprosy, however, the granulomatous change is typically much more focal, and the characteristic cell is the epithelioid cell with little or no foamy change. Bacilli are usually very few, and multinucleated giant cells of Langhan's type, sometimes very large with dozens or hundreds of nuclei, are often found lying inside the foci of granuloma. There is often a tendency to cell necrosis. The resemblance to a "tubercle" is very close.

The use of the term "tuberculoid" to indicate this type of leprosy lesion has been criticised by some workers, and certainly the term is open to objection; but it is understood by most workers on leprosy, and no other suitable term has yet been suggested to replace it. We therefore continue to use it.

Tuberculoid Changes in Leprous Lesions.

The presence of tuberculoid changes and necrosis in leprosy lesions of the skin and nerves in "maculo-anæsthetic" leprosy was reported in 1884 by Arning. Since then dozens of publications have appeared on the subject. The matter was demonstrated and discussed at the International Leprosy Conferences held in Berlin 1897, Bergen 1909 and Strasbourg 1923. The older literature of the subject is very well reviewed by Jadassohn, Klingmüller and Jeanselme in their volumes on leprosy. Recent valuable studies of the subject have been made by Henderson, Muir, Chatterji, Wade and various Japanese workers. The condition has for many years been well recognized by some workers and its chief clinical and pathological features have been established, although it is noteworthy that such an experienced and distinguished worker as Lie in Norway has in the past cast doubt upon the soundness of these findings and apparently thought that the condition was due to infection with *M. tuberculosis*. He states, however, that the condition is extremely rare in lepers in Norway, where indeed leprosy has now nearly died out; nevertheless the descriptions and illustrations of "maculo-anæsthetic" leprosy given many years ago by Danielssen in Norway are so very similar to the descriptions of "tuberculoid" leprosy given by other workers, that one wonders whether the apparent difference of opinion is not based chiefly on a difference of terminology.

Tuberculoid changes in leprosy lesions are reported most frequently by workers who have studied biopsy material, and in our experience it is a comparatively rare *post mortem* finding. There are, we believe, two reasons for this. Firstly, tuberculoid changes are seen in the less severe forms of



FIG. 1.

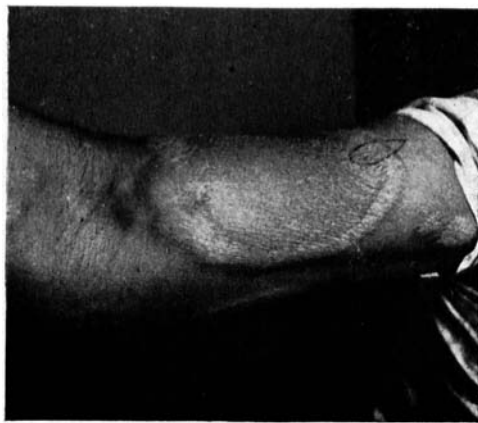


FIG. 2.

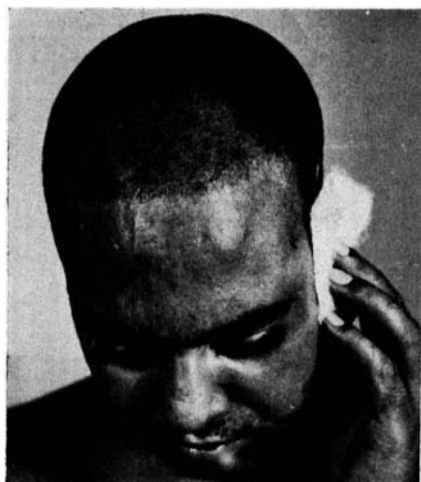


FIG. 3.



FIG. 4.

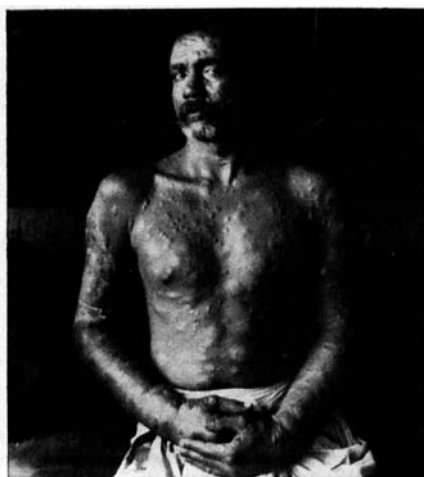


FIG. 5.



FIG. 6.

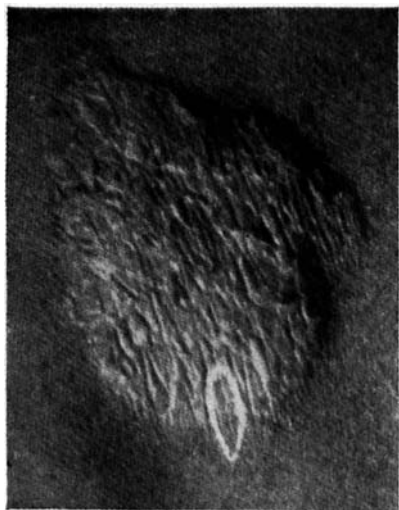


FIG. 7.

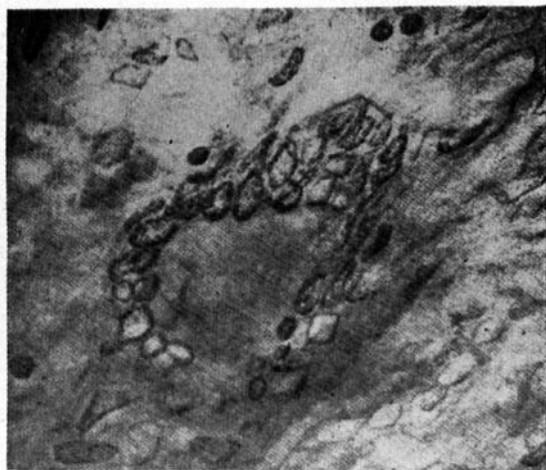


FIG. 8.



FIG. 9.

leprosy which do not cause death; and secondly, intercurrent diseases which may cause death in such cases of leprosy, also cause the previous disappearance of tuberculoid changes. Tuberculoid changes are, we believe, often only a temporary phase in leprous lesions.

For these reasons we believe that the study of tuberculoid changes must be made in biopsy material, and that the significance of the changes can only be determined by the observation of cases over long periods. Another important point in studying the pathology of the condition is that it is sometimes necessary to study several sections from one block of tissue, since a single section may not reveal certain of the characteristic findings of these lesions.

The Incidence of Tuberculoid Macules.

The present author, after working on leprosy for some years in South India and after seeing a little of leprosy in other parts of the East, came to work in Calcutta, and on seeing the work of the Leprosy Out-patient Department of the School of Tropical Medicine was at once struck with the great number of patients who showed macules. Most of these macules were what have been described in leprosy literature as tuberculoid macules. He formed the opinion that these cases of macular leprosy, though seen elsewhere in small numbers, are much more numerous in Bengal and particularly in Calcutta than they are in South India and many other countries, although they are reported as being common in Japan and less common in South Africa and South America.

The Macules of "Cutaneous" Leprosy.

Before going on to discuss the macules of nerve leprosy we will mention briefly the macules often seen in cases of "cutaneous" leprosy. These are merely local manifestations of a diffuse leprotic invasion of the skin, which is usually easily detected. The macule of cutaneous leprosy is usually seen on the trunk (see *fig. 1*). Its margins are rather ill defined, but there is a definite loss of pigment in circumscribed areas of skin, while the skin between the macules often shows leprotic changes. There is usually some erythema and thickening, but sensory changes are almost completely absent. Bacteriological examination shows many acid-fast bacilli and tuberculoid changes are not found. This type of macule is usually clearly distinguishable, clinically, bacteriologically and histologically from the macule of nerve leprosy and we will not discuss this type of macule any further.

The Macules of Nerve Leprosy.

Our description is based on a careful study of these lesions as seen in patients in Calcutta. Since there is considerable evidence to show that the clinical manifestations of leprosy differ in different regions, it is possible that our findings may not entirely agree with findings of similar studies made elsewhere.

These macules show themselves clinically in three main forms, but as we shall explain later we do not believe these to be three different clinical and pathological entities, but merely three different manifestations of the same pathological process, one form of macule often developing into the other form.

The three main forms we shall call: (a) the *flat pale macule*, (b) the *annular macule* with a flat centre and thick red margin and (c) the *thick red macule* or plaque showing thickening and erythema all over. The last two forms are those which have been described in the literature as "tuberculoid" macules. Muir has frequently referred to these lesions as "reacting" lesions. We class all these three as macules of nerve leprosy. Our reasons for doing so are given later.

Before describing the peculiar features of each of these three types of macules, we will briefly describe the features common to all three types.

Features common to all three types of Macules.

(a) *Appearance*.—The following are the chief characteristic appearances of these macules. They vary in size from about quarter of an inch in diameter to a foot or more in diameter. They may be round or oval but they are often irregular in shape. The margins are as a rule clearly defined but there are often tiny macules near the edge of large ones and the coalescence of several macules may occur. There is usually a very definite pigmentary change which nearly always takes the form of a partial loss of pigment, but a macule may be hypopigmented near the margin and hyperpigmented in the centre.

In addition the skin of the macule almost always shows a greater or less degree of depilation, the hairs either being few in number and feeble in the growth, or else being completely absent. Also impairment of the secretion of the sweat and sebaceous glands is often seen, and the skin becomes dry and scaly and desquamates (see *figs. 4, 7*). Sometimes the skin becomes so scaly that the lesions resemble those of psoriasis. Sometimes there is a "pebbled" appear-

ance (see *fig. 7*) or elevation of the hair follicles so that the lesion looks like a patch of "lichen spinulosum". These are the characteristic appearances, but frequently in India the clinical appearances of macules are masked by scarring due to local application of caustics or to scarification, two popular forms of indigenous treatment.

(b) *Sensory changes.*—There is practically always some change of cutaneous sensibility on the macules, the first such change often being a feeling of numbness accompanied by a sensation of tingling which patients often describe as "pins and needles" or as being "like ants' bites". On testing, various abnormalities of sensation may be found in various parts of the macules. The changes are usually most marked in the centre and less marked at the margin. The earliest change is often the impairment of heat and cold sensation, and often the sensation of pain is impaired (analgesia). Later the sensation of light touch is lost. There may be anæsthesia to light touch in the centre, and analgesia at the margin.

(c) *Nerve thickening in connection with the macule.*—One of the common findings in Calcutta is that of thickened branches of cutaneous nerves supplying the macules. These branches, normally fine twigs difficult or impossible to palpate, may be so much thickened as to be very easily palpable and often visible. There are frequently nerve abscesses in these cutaneous nerves.

(d) *The distribution of macules.*—It is commonly said that certain areas of the skin of the body (for example the scalp, the palms of hands, the soles of the feet and the flexures) are rarely affected in leprosy, and it is true that in "cutaneous" leprosy these areas show little clinical evidence of involvement although pathological and bacteriological examination may often reveal lesions. In the type of nerve leprosy which we are describing, these areas are far from being immune, and the macules may be found anywhere in the body; on the palm, the sole, the scalp, the genitals, the axilla and the neck. Macules are, however, very commonly found on the face, on the arms, the legs and on the trunk.

(e) *Healing of macules.*—Macules often cease to spread and become inactive either for long periods or permanently. While this healing of macules is common, the infection often spreads up the nerve branches to nerve trunks and in these sites the infection may continue active for a long time. The skin appears to have more immunity than the nerves. The healing of macules is illustrated in *fig. 6*.

Individual Features of the three main varieties of Macules.

(a) *The flat macule* (see fig. 3).—This type of macule may originate in either of two ways. It may start as a flat pale macule of small size and spread radially in its original form, or it may be found as the result of the subsidence of erythema and thickening in the “annular” and “thick” macules.

In macules of this type the sensory changes are often marked and the thickening of the branches of cutaneous nerves is often slight. Compared with the other types of macule, this type is very chronic and rather inactive. There is very little thickening of the skin or of the cutaneous nerves supplying it, because of the absence of the sub-acute inflammatory processes, which are seen in the other two types of macule, and this type of macule is often merely the scar left as the result of the subsidence of the inflammation in the other types of macule. Bacteriological examination by ordinary methods practically always gives negative results, and even by examining serial sections it is often impossible to detect bacilli. Bacilli if found are few in number. Sometimes, however, the macule does show a gradual radial spread, but in these cases there will nearly always be found slight erythema and thickening at the margin which means that it really belongs to the “annular” type.

The flat pale macule may show no change for many years. In some cases after a short or longer period of quiescence, signs of inflammation, erythema and thickening may appear and the lesion may assume the characteristics of the annular or thick macules. In many cases no such signs of activity are ever seen, and the macule may gradually fade though some sensory change is often permanent.

(b) *The annular macule* (see fig. 2).—Here a different state of things is found. This is definitely an active lesion, and there are signs of inflammation in the margin of the macule and in the nerves supplying it.

This type of macule arises in one of two ways. It may result from the occurrence of inflammatory changes in the margin of a macule which was previously of the flat type; or it may develop from the thick macule by the occurrence of subsidence of the inflammation at the centre while spread continues at the margin. The appearances of the macule are typically as follows. Round the margin is a narrow outer zone of depigmentation with little or no erythema and thickening; just inside the margin is the intermediate zone of thickening and erythema which varies considerably in width from about one quarter of inch to an inch or more;

this thickening may be very slight or very marked. In the centre is the zone where the thickening and erythema have subsided and it thus often appears depressed.

The sensory changes are usually most marked in the central zone, less marked in the intermediate zone, and least marked in the outer zone.

The results of ordinary bacteriological examination in this type of macule vary very much. Sometimes no bacilli, sometimes a very few and occasionally a moderate number of bacilli will be found near the margin of the macule. The number of bacilli never approaches the number seen in the lesions of nodular leprosy. Examination of serial sections of these lesions shows bacilli in many cases, usually very few bacilli, and often situated fairly deeply in the corium.

As we have said this condition is an active one. The macule or macules (for they are frequently multiple) may appear fairly suddenly and grow fairly rapidly, spreading at the margin and healing at the centre. The spread sometimes continues for only a few weeks or months, and then the signs of inflammation gradually subside and the macule assumes the appearance of the flat pale macule of the inactive type. During this healing process, the superficial layers of the epithelium become dry and wrinkled and are finally shed often in the form of scales. Sometimes however signs of activity will be present for years, or may disappear and later reappear and the macule may show several periods of activity and of quiescence which may extend over many years. We have seen patients with one or more large active macules, who have given a history indicating alternating periods of activity and quiescence of the macules over periods as long as fifty years. More frequently the macule after a time becomes quiescent and later the process becomes finally arrested. In some cases, however, the lesions take on the "cutaneous" form and there develops a diffuse infiltration of the skin and the macules fade. The latter development is not common.

(c) *The thick macule* (see figs. 4, 5, 7).—This is, we believe, simply a more marked form of the same active process as is seen in the "annular" type of macule. The signs of inflammation are more marked and more extensive, the whole patch being red and thick, sometimes very thick the macule standing out a quarter of an inch above the general skin surface; and on palpation much subcutaneous thickening can also be felt and the thick mass has the consistency of cartilage. The macule feels hot, for the skin temperature

is raised above that of the surrounding skin. The patient may complain of a severe burning sensation. Occasionally the inflammation may go on to actual ulceration usually seen at the margin of the lesions (see *fig. 4*). Ordinary bacteriological examination in these cases sometimes shows no bacilli, but usually a few bacilli are found, and sometimes bacilli are quite numerous, though never as numerous as in "skin" leprosy. There is nearly always marked inflammation of the cutaneous nerves supplying the macule.

There may be only one such macule in the body, or there may be many, occasionally hundreds of such macules (see *fig. 5*). They often appear suddenly and spread rapidly for a time, and they may be so numerous and widespread that unless one is familiar with the condition the case may appear like one of a severe form of nodular leprosy (see *figs. 4, 5*). Clinical experience and careful examination will make it possible to distinguish this condition. The lesions, though they may be very marked and very numerous, are circumscribed, the skin between the lesions being perfectly normal, whereas in nodular leprosy the lesions are much more diffuse and the skin between the marked lesions shows slight leprous infiltration. In this condition lesions commonly appear in sites where leprous nodules are rarely seen (e.g. palm, soles, flexures, arm-pits, groins, genitals, etc.). There is nearly always marked nerve thickening which is rarely seen in nodular leprosy; in these lesions bacilli are few, while in nodular leprosy they are always very numerous. This condition rapidly subsides while nodular leprosy does not. These are the distinguishing points.

The thick red macule is usually only a temporary phase in the development of the lesion. After appearance the lesions spread for a time limited as a rule to a few weeks or months and then begin to subside. The subsidence usually begins at the centre of the macule, and at this stage the lesion has an annular form as described above. Usually within a few months, the signs of inflammation disappear from all the macules, and there are left the flat pale macules described above. This clinical improvement is accompanied by a marked diminution in the number in and finally a disappearance of the bacilli from the lesions. After acute inflammation, healing is often accompanied by marked scarring.

The condition of inflammation may recur but not very commonly; the acuter the inflammatory condition to begin with, the less appears to be the tendency to recurrence when it has subsided.

In a few cases, however, the appearance of these markedly inflamed macules is followed by the nodular form of leprosy with diffuse leprous lesions in the skin, but when this occurs, the macules fade though some anæsthesia usually remains.

Pathology.

We will describe only briefly the pathological changes seen in biopsy material taken from these macular lesions.

(a) *Flat pale macule*.—There is no change visible to the naked eye except the loss of pigment, and thickening of the fine nerves entering the patch of skin.

On section, however, various slight changes are found. The epidermis is unaffected except for the diminution of pigment in the basal layer. Immediately under the epidermis usually around the skin capillaries are seen here and there small collections of cells. Similar collections of cells are found round the hair follicles, sebaceous glands and sweat glands. Deeper in the corium are seen a few similar cellular foci. Deeper still the fine nerve branches may be seen cut in section and these show infiltration with similar cells.

The cells are chiefly of "epithelioid" nature. Occasionally a giant cell of Langhan's type may be found. There may be a few lymphocytes and leucocytes. In old macules healing or healed, fibroblasts may be found. Very occasionally one or two bacilli may be found in the granulomatous foci after prolonged searching in many sections.

(b) *The annular macule*.—In the central area the changes are similar to those seen in the flat pale macule but are usually more marked unless the process of healing is very well advanced. In the erythematous intermediate zone, the changes are much more marked (*fig. 9*). The thickness of the corium is greatly increased and the epidermis is somewhat thinned and stretched over the swollen corium. In the superficial layers of the corium, and round the hair follicles, sweat glands and sebaceous glands are seen masses of inflammatory cells. In lesions showing marked thickening these masses coalesce and there is often inflammatory œdema. The cell masses often extend deep into the corium, where also are seen cut in section the cutaneous nerve branches markedly thickened and granulomatous, and surrounded by inflammatory cells. By cutting serial sections it is often possible to trace the direct continuity of the granulomatous masses in the corium with the granulomatous masses in and around the nerves. It therefore seems probable that the round or oval foci of inflammatory cells often seen in sections are not really isolated foci, but are

cross sections of granulomatous cords arising from the superficial layers of the corium and extending up and around the nerve branches.

The cells are similar in nature to those already described in the flat pale macule, but the characteristic feature is the occurrence in or near the centre of the masses of *multi-nucleated giant cells* of Langhan's type (see *fig. 8*). These are found both in the corium and in and around the nerves.

Bacilli are frequently found in the granulomatous masses, nearly always few in number. They are usually found at the margin of cell masses and not in the centre near the giant cells. On a few occasions however we have found a few bacilli inside the giant cells. Bacilli are more numerous in the nerves than in the corium.

In the outer depigmented zone of the annular macule, the changes are similar but less marked and bacilli are frequently found, possibly more frequently than in the intermediate thick zone.

Thus in the three zones of this type of macule we get three different stages of the inflammatory process. In the outer zone there is apparently multiplication of bacilli with the early phase of tissue reaction. In the intermediate zone there is intense tissue reaction with giant cell formation, and the destruction of bacilli, and in the inner zone there is subsidence of the inflammation and healing. While this is occurring in the skin, the infection and inflammation is spreading up the nerves supplying the skin, and here the process of healing is slower and often less complete.

(c) *The thick red macule*.—In this form of macule the pathological changes are essentially the same as those seen in the thick portion of the annular macule, but the condition is more acute, the bacilli more numerous and the tissue reaction more marked. The same appearance of granulomatous masses with giant cell formation is seen, and the process may go on actually to caseation, and ulceration of the skin may occur.

When the inflammation subsides, as it nearly always does, healing takes place often with the formation of a considerable amount of fibrous tissue and scarring which may cause deformity and disfigurement in such places as the face.

Pathological changes seen in macules which become lepromatous.—In lesions in which this change occurs the following phenomena are seen. The number of bacilli increases and this change is accompanied by the development of "foamy" changes in the cells. The Langhan's giant cells disappear, and the focal arrangement of the granuloma

is lost, because of the development of the more diffuse lepromatous change.

The Nature and Causation of "Tuberculoid" Lesions.

We may state at the outset that we believe that these lesions are caused by the presence of the acid-fast bacillus *M. lepræ* in the skin. We will however discuss other theories regarding their causation which have been advanced by different workers at different times.

It has been suggested that these lesions are not due to leprosy but to tuberculosis of the skin. Workers who have advanced this view are those who, as they themselves state, have seen very few such cases and who have had little opportunity of studying the condition closely. In opposition to this theory we would quote the following facts which are in our opinion conclusive. In Calcutta about 40% of all the cases of leprosy and about 70% of all our cases of nerve leprosy show, or have shown, such lesions. We see several hundreds of such cases every year in Calcutta where skin tuberculosis is uncommon. Practically all these cases show other definite evidence of leprosy, anæsthesia of skin, and thickening of nerves supplying the macules, which is often very marked and which cannot possibly be due to tuberculosis. All attempts to isolate tubercle bacillus from such lesions by inoculation of guinea-pigs have failed even when acid-fast bacilli have been found in the inoculum. Some of these patients later show typical nodular leprosy.

Other workers have acknowledged that the lesions are due to leprosy, but, because of the scantiness of acid-fast bacilli in the lesions, have postulated that the casual agent is a non-bacillary, non-acid-fast form of the organism, possibly a filter-passing form. The only evidence in favour of the existence of a filter-passing form of the leprosy organism is the work of Markianos on the rat-leprosy organism, and this we have completely failed to verify. A few years ago Rodriguez reported the finding of non-acid-fast granules in leprosy lesions, but this has not been verified by us, or as far as we know by anyone else, and no further reports of such a nature have appeared. All attempts made by us to detect a non-acid-fast form of the organism have failed. Unna at one time considered that macules of the type we are discussing were due not to bacilli but to toxins of the bacillus acting through the nerves. Later he abandoned this view.

Still another explanation of these lesions of the skin is that they are of a trophic nature due to the leprosy lesions

of the nerves supplying the skin. Before we studied the matter closely we were inclined to hold this view, but we now find that this view is untenable as is demonstrated by the following observations. The skin lesions appear first and the nerve lesions appear later. The nerve lesions appear in the distal portion of the nerve and spread upwards. The skin lesions often do not correspond to the skin distribution of any cutaneous nerve or nerve trunk. If the skin lesions appear on an area of skin which is supplied by several cutaneous nerves of different origin (i.e. arising from different nerve trunks), the inflammatory change often spreads up into all these cutaneous nerves and nerve trunks. These facts we think prove conclusively that the lesion originates in the skin, and since several or many such lesions often appear more or less simultaneously in various parts of the body, it appears probable that the causative organism gets into the blood stream and is deposited in various sites in the skin of body.

In what form is this organism? We believe that it is the ordinary acid-fast bacillus.

When we first started a close study of these lesions, in very few of them could we find any acid-fast bacilli. Smears made by the ordinary "slit" and "clip" methods nearly always gave negative results. By examination of biopsy material we could find a few bacilli in perhaps 10% of cases examined. When, however, we began to examine lesions more thoroughly, searching for bacilli in not one, but, if necessary, in six or eight sections, the percentage of positive findings rose, and when as the result of a careful study we improved our staining methods, the percentage of cases in which we found bacilli rose to about sixty. We believe that careful examination will reveal bacilli in nearly all macules showing definite clinical signs of activity. The depigmented patch of long standing with no clinical signs of activity is often merely the scar of a previously active lesion, and in such scars bacilli will not be found; but in patches showing any erythema, thickening and extension at the margin, patient search will as a rule reveal bacilli. In such cases bacilli can also be found often in considerable numbers in the cutaneous nerve twigs of the macule, and in a few cases we find them in the nerves and not in the skin. This is we believe due to the infection being overcome earlier in the skin than in the nerves.

Although, in active macules, bacilli can usually be found, it is quite true that the number is very small to produce the marked lesions often seen. In nodular leprosy one of the

striking things observed is the enormous number of bacilli often found in lesions which are clinically very slight, yet in maculo-anæsthetic leprosy the reverse is found. How can this be explained?

It has been suggested that two different strains of the organism with markedly different virulence may cause these two markedly different forms of the disease. On this basis, however, it is impossible to explain why an infected person will sometimes show first the "maculo-anæsthetic" type and later the nodular type of the disease. For this reason most workers are agreed that the organism does not vary, but the soil in which it is planted varies markedly. The tissues of some persons have the power of reacting very strongly to very small numbers of the leprosy organism with a resulting limitation of the extent and severity of the infection, and in such persons the maculo-anæsthetic form of the disease is seen, while the tissues of other persons have not this power, and in such persons the disease tends to take the severer nodular form. In the cases which start with the maculo-anæsthetic form and later show the nodular form the reacting powers of the tissues are present at first and later are impaired or lost. This view is based partly on a study of the results of the "leprolin" test in patients in different stages of the disease. The nature of this reacting power of the tissues to the bacilli is not clear and cannot be discussed here, but it appears to be related to the phenomena of allergy and immunity.

We may summarize our views on the subject by saying that we believe that the different clinical appearances of the macules of maculo-anæsthetic leprosy are merely different phases of the same pathological process which is caused by a relatively small number of the acid-fast bacillus *M. lepræ* in the lesions, and by the resulting marked tissue reaction.

Our views on this subject are, we realise, somewhat different from those commonly held. The ordinary depigmented anæsthetic patch which we have called the flat pale macule is usually regarded as being in a different category from the inflamed patches of "annular" or "plaque" type which, because of the peculiar focal arrangement of the granuloma and because of the giant cells, are often called tuberculoid macules. Our clinical and pathological studies of some hundreds of macules have not supported this idea. In nerve leprosy in Calcutta we find practically no macules in which there is no evidence of present or past inflammatory change of "tuberculoid" nature.

The Relation of Inflammatory Changes in Macules and Nerves to "Lepra Reaction."

The term "lepra reaction" has not been very clearly defined. In common with most other workers we have in our writing used the term to indicate the acute or sub-acute "exacerbations" of the disease usually of a temporary nature, and have included under this term the "exacerbation" seen in cases of nodular leprosy with swelling of old lesions, appearance of new lesions, associated with fever, and also the "exacerbation" seen in cases of maculo-anaesthetic leprosy when the macules and nerves show the acute or sub-acute inflammatory changes we have described, but in which there is little constitutional disturbance or fever.

We doubt very much the advisability of using one term "lepra reaction" to include these two conditions which may be due to quite different causes, and which occur typically in patients in whom the clinical and immunological conditions appear to be very different. These "acute exacerbations" in cases of nodular leprosy though often temporary appear on the whole to be a bad sign, for they often recur and the patient often gets steadily worse. In maculo-anæsthetic leprosy the "exacerbations" are usually less acute and take longer to subside, but subsidence is often not followed later by recurrence, and quite often it is followed by a prolonged inactivity and sometimes by permanent arrest of the disease. During the "exacerbation" however there is frequently permanent damage to nerves and resulting permanent deformity.

The difficulty of classing these two conditions under one name "lepra reaction" is being realized by workers in other countries particularly in Japan where much maculo-anæsthetic leprosy is seen, and in Japan the term "erythema nodosum leprosum" has been used for "lepra reaction" of nodular type, and the reaction of macular type is regarded as being different. Hayashi has recently suggested that the term lepra reaction should be qualified by the addition of the words "neuro-macular type" or "nodular type" to make clear which condition is meant.

Wade has recently described "lepra reaction in tuberculoid leprosy" in cases showing macules similar to the "annular" macules we have described. He apparently regards the "reaction" as something superimposed upon the tuberculoid lesions, while we regard the mere presence of "tuberculoid" lesions as indicating at any rate a marked tendency to lepra reaction of the neuro-macular type.

The Classification of Cases with Macular Lesions.

In leprosy journals there has been much controversy regarding the classification of cases showing macular lesions of "tuberculoid" type, in the scheme of classification suggested in the report of the Wood Memorial Conference, which is in common use; and it must be admitted that the report is a little ambiguous on this point.

We may quote the five relevant passages from the report :

- (a) "Leprosy is a general disease; in no type are the lesions confined to a single tissue."
- (b) "Clinically there are many cases that for practical purposes may be considered essentially "neural". They frequently have visible (usually hypopigmented) lesions of the skin, but in typical cases bacteriological findings by the usual methods are consistently negative."
- (c) "The signs associated with nerve involvement tend to fall into two groups namely : (1) the macular which is characterized by disturbance of pigmentation, circulation and sensation in circumscribed areas, (2) acroteric."
- (d) "Classification. Main types :—
Neural—"all cases showing evidence of actual or previous nerve involvement, i.e., alteration of sensation with or without changes of pigmentation and circulation, trophic disturbances, etc. These are not accompanied by leprotic changes in the skin."
Cutaneous—all cases showing leprotic lesions of the skin."
- (e) "Definitions :—
Leprotic. It is suggested that the term "leprotic" be applied to those changes which present clinical or microscopic evidence of inflammatory process typically of granulomatus nature which are apparently caused by *M. lepræ* in them, in such lesions the organism can usually be demonstrated by the ordinary methods of examination."

The first three passages and the first sentence of the fourth passage justify the classification of cases showing even the "tuberculoid" type of macule as "neural" cases. The last two sentences of the fourth passage, and the fifth passage, are the sources of misunderstanding. On the one hand the tuberculoid lesion is definitely "leprotic" in the sense of the definition given; this would indicate the classification of such cases as "cutaneous". On the other hand in the tuberculoid lesion bacilli are usually not found by ordinary methods of bacteriological examination; this would support the idea of classification as "neural", although the scheme of classification is primarily a clinical and not a bacteriological one.

The spirit of the report and not merely the letter of certain sections should be considered. The letter of some sections is not in keeping with the letter of other sections, but

in our opinion the spirit of the whole section on classification leaves little room for doubt that tuberculoid lesions should be classified as "neural". One's clinical and pathological knowledge supports this idea. The cases showing macular lesions, even multiple lesions of the "plaque" type, are usually clearly distinguishable from the "cutaneous" cases as described in the conference report. The clinical features, the pathological features, the bacteriological findings, and the prognosis are different. Surely then we should not hesitate to classify these cases as being of "neural" type, even if a few bacilli are occasionally found in smears taken from lesions. We are glad to note that in the recent literature of leprosy the classification of tuberculoid leprosy as a sub-type of "neural" leprosy appears to be the rule.

We think, however, that the use of the term "neural" and "cutaneous" for the two main types of leprosy is partly responsible for the confusion which has existed. These terms were adopted by the Conference after long discussion and with some misgiving. We think that the old term "maculo-anæsthetic", and the term "neuro-macular", have much in their favour, for they do convey the idea that visible lesions of the skin may be seen in this type of leprosy; this idea is not conveyed by the term "neural".

SUMMARY.

1. The use of the terms "tuberculoid" and "macule" in connection with the lesions of leprosy, the occurrence of tuberculoid changes in leprosy lesions, and the high incidence in Calcutta of lesions showing such changes are discussed.

2. The clinical, pathological, histological and bacteriological features of the various types of macule seen in cases of nerve leprosy are described and illustrated by photographs. The finding of acid-fast bacilli in practically all macules showing signs of activity is reported. The marked tendency of macules to spontaneous healing is described.

3. The opinion is expressed that the various types of macule seen in nerve leprosy are merely different manifestations of an inflammatory process of tuberculoid nature, seen in different stages of activity and quiescence. All active macules of nerve leprosy are considered to be of tuberculoid nature.

4. The causation of tuberculoid lesions is discussed and the opinion is expressed that they are associated with marked reacting powers of the tissues of the affected patients to the ordinary acid-fast organisms of leprosy, and not to a special

strain of the organism to a toxin, to a filter-passing or other form of the organism, or to trophic nerve disturbance.

5. The occurrence of acute and sub-acute inflammatory changes in leprous lesions of the tuberculoid type is described. These have frequently been attributed to "lepra reaction". A contrast is made between these inflammatory changes which are usually followed by subsidence and often by arrest of the disease, and the inflammatory changes seen in "lepra reaction" in cases of nodular leprosy, which are often associated with a permanent increase in the leprous infection. It is considered inadvisable to describe both these conditions under the one term "lepra reaction" with no qualifying term to explain which type of reaction is meant.

6. The place of cases with tuberculoid macular lesions in the scheme of classification suggested by the Leonard Wood Memorial Conference is discussed. The opinion is expressed that in spite of the occurrence in them of changes which are leprotic in the sense of the Conference's definition, tuberculoid lesions are essentially part of the type of leprosy which has been described as "neural" or "maculo-anæsthetic" leprosy, and should therefore be classified as such. The clinical, pathological and bacteriological findings made in these lesions are different from those made in lesions of nodular or "cutaneous" type, and the prognosis of cases with macular lesions is very much better than the prognosis of cases with cutaneous lesions. Therefore the differentiation of tuberculoid lesions from "cutaneous" lesions is a matter of considerable importance.

Purulia Leper Home and Kindred Efforts on the Bengal-Bihar Frontier

E. MUIR.

The Purulia Home, the largest of its kind in India, was founded by German missionaries many years before the war. It is now staffed by a Clerical Superintendent (a missionary of the C.M.S.), one European and one Indian doctor, and two nursing sisters. It is situated in the Manbhum district of Bihar in a healthy, dry (though warm) climate. The patients live in three-roomed cottages with four in each room.

The male and female quarters are alongside of each other, separated by a wall. No married quarters are allowed. For leprous children there are hostels. There is separate accommodation for children under observation, i.e. in the intermediate stage between those with definite leprous lesions and those (children of lepers) who are free from all signs of the disease. The homes for the healthy children of lepers are a special feature. That for the girls is attached to the nursing sister's quarters, and that for the boys in the proximity of the superintendent's quarters.

Near the Home is an independent village composed of the healthy descendents of former inmates of the home. This is a flourishing village, and the good health of the inhabitants and their freedom from leprosy is a standing evidence against the old heredity theory of leprosy. The Home is supported by capitation grants from the Bihar Government and by grants from the Mission to Lepers. It is conducted on economical lines, the most of the work being done by the patients themselves. They build houses, cultivate the rice fields, and otherwise keep themselves healthy by occupational therapy.

A considerable amount of investigation into the nature of leprosy has been done in this institution especially in the last 15 years, the results being published in scientific journals. During 1936, 546 of the 795 in-patients received special treatment, as did also 1,243 out-patients.

The following statistics for the year give a rough idea of the extent and nature of the medical work:—

	<i>In-patients.</i> who received upwards of 3 month's treatment.	<i>Out-patients.</i> 456 who were examined after more than one year's treatment.	<i>Total.</i>
Much improved	6	23	29
Slightly improved	349	284	633
Worse	116	130	246
Left before disease arrested ...	20	267	287
Died	8	—	8
Disease arrested without deformities	8	11	19
Disease arrested with deformities	9	8	17
Hydnocreol Injections	19,789	23,394	43,183
Surgical Dressings	57,322		
Bacteriological Examinations ...	2,903	1,935	4,838
Sedimentation Indices	974	29	1,003
Hookworm Examination	1,011	—	1,011
Khan Tests	136	1	137
Eye, Nose and Teeth Treatment	2,057	478	2,535

Purulia is situated in an area of high leprosy endemicity in the bordering districts of Bengal and Bihar. Formerly this widespread area was forest land and inhabited by aboriginal tribes. The impact of the outside world has led to Hinduisation of most of the inhabitants, the majority of whom belong now to the lower Hindu castes. Aborigines are free as a rule from leprosy, and the disease is not generally common among the people of the Gangetic plains. It is among the semi-aboriginals who are emerging from the simple tribal life into contact with the outside world that leprosy is most common, and hence the frequency of the disease in this area. Another reason is the geographic situation and the porous nature of the laterite soil, which make it a region of frequent famines; as a break in the continuity of the S.W. monsoons causes rapid dessication of the land and the ruin of the main crop of rice.

The Purulia Leper Home is the largest of several efforts to combat leprosy in this area. There are four other smaller institutions at Bankura, Raniganj, Deogarh and Saldoha, the latter two being in the Santhal Parganas. At Bankura there has been a strenuous educational scheme in the past few years, an account of which appears in the Report Section of this number.

Within this leprous area lie the richest coal mines of India, centering round Asansol and Dhanbaid. For several years strenuous efforts have been made by the Health Officer of the Asansol district to cope with leprosy, an Anti-leprosy Association being formed with a dozen branches, in connection with which several clinics have been begun, from which patients are followed up with a view to the voluntary segregation of all infectious cases. Similar work is now being developed in the Dhanbaid Mines area.

The chief danger of the spread of leprosy centres round industrial areas such as coal mines. In these are gathered together, away from the restraining influences of their own community: the ignorant and insanitary semi-aboriginal common labourer, the Sikh mechanic from the Punjab, and the high caste Hindu clerk and overseer. The last two categories are ignorant of the danger of acquiring contagion from the first, and they often fall victims to this surreptitious disease. The authorities are now awake to this danger which it is hoped will soon be brought under control.

REPORTS.

Bankura Investigation and Control Centre.

The Report of 1935 shows steady progress of work.

"In 1934 a survey in different parts of the district revealed that more than 78% of the villages are affected with leprosy, 1 of every 6 families harboured leprosy cases and 4.1% of the population suffered from leprosy. In round figures there are about 45,000 lepers in the district, of which 40% are infectious ones. As regards the control work, the party in the same year organised no fewer than 41 Union Board Leprosy Relief Committees who isolated more than 100 cases of infectious lepers. In addition to the above work 11 Union Board leprosy treatment clinics were established where more than 650 lepers were treated. In 1935 the above work was expanded and extended all over the district. The result achieved during the year is really encouraging. The policy of the anti-leprosy campaign had, however, to be modified a little. In 1934 we organised leprosy treatment clinics on the line of one clinic to each Union Board, but experience showed that it was not possible for each Union Board to maintain a separate leprosy treatment clinic. It was, therefore, decided then to combine 2 to 4 Union Boards to form a clinic committee to run a leprosy treatment clinic for those Union Boards, the isolation and other work being left to each Union Board acting independently by organising its own relief committee as before. On the above lines 12 more clinics were opened during this year. Consequently at present there are 29 leprosy treatment clinics in the district, (6 District Board, 2 Missions, and 21 Union Board clinics) where more than 5,000 lepers are getting treatment. Organisation of Union Board Leprosy Relief Committees has also met with equal success. At the end of the year under review the total number of Union Board Leprosy Relief Committees is 133, of which 118 committees have been able to keep as many as 787 infectious lepers under isolation restriction. Though the number of isolated cases is not large, compared with the number of infectious cases in the district, yet it can be said that the people of this district have been made alive to the necessity of isolating infectious lepers.

"As the result of the Governor's visit and the request made by the then District Magistrate to the Government for pecuniary help an annual grant of Rs. 2700/- has been sanctioned for two years. It is hoped that the grant will continue if the work proves a success.

"The treatment at the clinics is conducted purely by voluntary services which it is true cannot continue for an indefinite period. So a scheme was put forward by Dr. Muir to make the anti-leprosy work of this district more permanent. The scheme has been accepted by the District Board. The acceptance of the scheme by the District Board and the sanction of the Government grant have made the anti-leprosy work of this district more secure. Some slight modification of the scheme was necessary which was done in consultation with the district authorities. So the present scheme stands as follows: All the 30 clinics of the district will be under the direct supervision of the District Board. All these clinics are grouped into 15 units. For each of these units there will be one fully trained assistant to look after and supervise the work of the assistants.

So the District Board will have to maintain 3 doctors and 15 assistants at a cost of Rs. 9,000/- approximately, which will be met from the annual budget of the District Board and the Government grant. The Union Board will contribute towards the cost of medicines on a flat rate of Rs. 32/8/- annually for each Union Board and will also bear the cost of the upkeep of clinic houses. The scheme is so balanced that with its operation the Union Boards will be relieved of the major part of their expenses under this heading and at the same time there will be no increase in the budget expenditure of the District Board. Leprosy survey was carried out on two different lines—to develop treatment centres and control work, and to find out the incidence of leprosy with many other epidemiological factors.”

Leprosy in Columbia.

The *Revista de Higiene* of the Republic of Colombia, South America, is the official organ of the Departamento Nacional de Higiene—Public Health Department—of that country. It is published monthly in the capital, Bogota. The Volume, April to December, 1935, contains a good deal of interesting material.

Some time ago in his Message at the opening of the National Congress the President of the Republic, in dealing with the matter of the Health Services, pointed out the fact that the money voted for leprosy work alone far exceeded that allowed for all the other medical services together, malaria, hookworm, etc., and protested that something must be wrong. Investigations were made and it was found that “as the result of the financial affluence of the Lazaretos, these colonies had become centres of great commercial activity”, the quartermasters and treasurers of the establishments taking advantage of the laxity of the medical authorities and providing the statistics of the numbers of patients in residence on the colonies, or as drawing rations from them, as having been registered as patients. It was found that nearly 1,000 persons over and above the number of real leper patients were included in the returns, most of them people of whose existence as lepers the medical authorities were in complete ignorance.

On this discovery the Health Department immediately took steps to put an end to this abuse, a very rigorous examination of every person resident in the colonies, and of every person registered as receiving rations, was made; only those with “Leprosy” certificates were allowed to remain, all others being expelled and a strict “sanitary cordon” drawn round the places, thus establishing what is hoped will be a permanent and effective control over the patients inside, and the bogus would be “patients” outside.

The actual number of lepers in Colombia is unknown, as no complete census has been made. In the three existing lazaretos record is kept of the places from which the lepers have come, and this indicates how very universally widespread the disease is over the country. The total number of patients registered at the national institutions is given as 7,662 for May, 1935. The problem of the disposal of the children of lepers has hardly been faced in Colombia, and the extraordinary situation has now arisen that it is calculated that among the 7,662 lepers resident in the three lazaretos there are living some 2,000 children, children of the lepers, but not considered or diagnosed as lepers. Such an alarming state of affairs, the result of the ignorance and negligence of the responsible authorities, but now recognised and admitted in the light of modern knowledge, provides Colombia with the new problem of what to do with those 2,000 potential leper children.

Complaint is also made in regard to the defects and abuses prevalent in connection with the treatment of the lepers in the colonies. The supply of drugs and the application of them to the patients are "farmed out" by contract without any guarantee to the nation that the interests of the lepers are in any way considered. Treatment is more or less by the mass method. "All treatment is reduced to the weekly application of chaulmoogra injections in equal doses for all alike, without any consideration for the physio-pathological condition of the different patients, and without any previous study of the tolerance of each of the individuals submitted to the treatment. For the treatment of 1,095 lepers in one of the colonies there was only one professional medical man, but the patients were actually at the mercy of lay unqualified persons who had "contracted" to provide and apply the treatments!" Now recently the Health Department has intervened and made regulations prohibiting private treatment in the leper colonies by contract, and making the official treatment by qualified persons compulsory for all the patients.

Of the 754 "cured socially," only 200 have been followed up, and of these latter 62 (31 per cent.) returned to the lazaretos because of recurrence of the disease or physical inability to work. The remaining 554 have disappeared and nothing is known of their present condition, but it may be presumed that at least 30 per cent. of them have had recurrences that require their readmission to the colony. The Health Department tries to trace those that have disappeared, but most of them are lost, probably having changed their

addresses or even their names, so as not to have to go back to hospital!

Particulars are given of the Leprosy Prophylaxis Campaign in the Territory, Norte de Santander, of Columbia, by education of the people, regarding the main facts of the leprosy problem, by systematic visitation and inspection, by Health Commissions, of every inhabited part of the province, and by the establishment of Anti-Leprosy Dispensaries in every department. The Leprosy Commission visited every municipal area, remaining a fortnight or even six weeks, or as long as might be necessary for the complete inspection of the district and the establishment of a satisfactory control of leprosy. The Commission consisted of a qualified doctor, specialist in leprosy, and three trained orderlies, and they worked over the whole territory of our provinces, 33 municipalities and 40 districts, occupying a period in all of 22 months.

J. W. LINDSAY.

Leprosy in Palestine. Dr. Canaan writes as follows:—

“Rigid isolation of lepers used to be practised in the old and middle ages. There is much reason to believe that the segregation of lepers among the old Hebrews was regarded more in the light of religious ceremonial than as a hygienic restriction. Leprosy was looked upon as a disease inflicted by God upon those who transgressed His laws.

Recent experience has shown that Leprosoriums following the colony system, where these poor creatures are treated in a kind and brotherly way and where they enjoy many advantages and have several distractions is a much better system than the older one of the leper-houses. In the case of Palestine the conditions are so different, that the leprosorium plan is the better and more suitable one.

Ancient Disease.

Leprosy is one of the oldest diseases of the East. It was known to the children of Israel, and Moses, the great legislator of the Old Testament, gave specific orders to be followed by the lepers themselves. They had to live far from any human habitation. But in the Biblical description, one is immediately impressed by the absence of all allusion to the hideous facial deformity, the loss of feeling and the rotting of the members. If such conspicuous manifestations had existed they could not possibly have escaped observation. Furthermore the Levitical code prescribed that the several examinations of a person suspected should be made at intervals of seven days, thus enabling the priest to note the progress of the disease.

Ancient Documents.

The Hebrews brought this disease with them from Egypt where it was far spread. Engel Bey tells us that a papyrus which has been dated as far back as 4200 B.C. mentions this disease. The oldest Indian document mentioning leprosy was written 300 years B.C. and the oldest Chinese one 400 B.C.

The Roman soldiers returning from Egypt and Asia carried in the 1st century B.C. the disease to Italy, whence it spread through the Roman soldiers to most parts of Europe. But the greatest contamination of this continent took place in the 13th century A.D. probably through the returning Crusaders. In France, England, Germany and Spain every large town had a leper house. The total number of such houses has been estimated to be 19,000. The earliest in England was established in Canterbury in 1096. The representations of leprosy in the paintings of Holbein in 1516 give such an exact picture of the disease, that we have to assume special studies of this disease probably in the leper houses of Ausberg.

Order of St. Lazarus.

The European authorities of the 13th and 14th century had to issue special orders to stop the disease from spreading. Those affected who were segregated in the leper houses were treated in a better way than their brethren of the pre-Christian era. The Crusaders had a special order, called the Order of St. Lazarus whose first duty was to care for the lepers. This order, which has nothing to do with the Lazarites, was a religious and military order founded about the middle of the 12th century. The Biblical Lazarus was regarded as the patron. The Order established leprosaria in Palestine as well as in several parts of Europe. Despite the great help offered by the Order, a leper continued to be regarded as dead. The process of his isolation from his family was ushered by the usual ceremony of the dead. His matrimonial ties were severed. He was excluded from society and was not allowed to enter a church.

Lepers in Biblical times had to warn every passer-by from approaching their dwellings by calling the words 'lepers, lepers'. They lost all their rights. They passed a terrible and most pitiable existence. The New Testament describes graphically the way in which these outcasts used to implore Christ to help and to heal them.

Ostracized.

Up to about 40 years ago the lepers of Palestine had the same fate. They were cast out of their villages, had to live out in the fields. The Palestinians believed, like the Jews, that this disease was a heavenly punishment for sins. Many lepers used to sit on one side of the road to the south of the Jaffa Gate begging for alms. But at these times they never dared to follow and molest the passer by as a leper woman used to do some months ago at the New Gate. The fear and terror from the infection is slowly vanishing, even among the villagers.

The Arabic expression 'baras' comes from one of the many, but not the most important symptoms of this disease, namely the whitish discoloration of skin patches. The other expression 'djudam' is more correct, denoting only 'leprosy'.

One of the greatest blessings of the last century in the treatment of leprosy is the establishment of comfortably arranged and scientifically led leprosaria. While the incurable and those patients excommunicated from human society find here excellent treatment, loving care and a home, the early cases can undergo a thorough and scientific treatment and become symptomatically cured.

The Jerusalem Home.

The only institute of this kind in the Near East is the Leper Home 'Jesus Hilfe' in Jerusalem run by the international Moravion Church."

REVIEWS.

International Journal of Leprosy, Vol. IV, No. 3. July-September, 1936.

This number opens with a paper by Perry Burgess, President of the Leonard Wood Memorial. In it he gives his reminiscences of five months of travel in Japan, Philippines, Java, Malaya, Indo-China and China. We give a few quotations:—

"Segregation has been generally considered as the only means of eradicating leprosy, but with probably not more than two per cent. of the lepers of the world in isolation it must be quite obvious that segregation will never solve this problem." "One must admire the efforts being made in the Philippines, and if the Philippine government can continue to expend for this purpose the sums that have been spent in the past, reduced somewhat by the establishment of agricultural colonies now being proposed, this will constitute probably the most thorough experiment as to the effectiveness of isolating lepers from the well population that we have ever known. However, we are compelled to grant that after over thirty years of this heroic segregation there is no striking evidence that the number of clinically observable lepers has decreased."

"I would urge the building, in every country where leprosy is a serious problem, of at least one central institution, manned by medical officers with sound scientific background. These institutions may have few or many patients, but it is essential that there be enough for research. These centers should perform a three-fold service: first, carry forward investigative studies on the nature of the disease; second, make available to local doctors and institutions reliable information as to the best that is known with respect to treatment; and third, control the propaganda of the country to the end that it may be trustworthy."

Tracheitis and Bronchitis Leprosa is the subject of a paper by H. P. Lie of Bergen. After quoting from former writers he describes three of his own cases. In the second of these he found leprous infiltration in the larger and to a certain extent in the finer bronchi. About this case he writes:—

"The findings in Case 3 prove decisively that leprosy bacilli can enter the mucous membrane of the air passages without producing any reaction on the part of the tissue, when the upper protective epithelial layer is missing. Herein lies the explanation of why it is so extremely difficult—almost impossible—to determine with certainty the seat of the primary affection in leprosy, in contrast to the condition as regards syphilis and tuberculosis."

"The leprotic affection of the nerves in the trachea and bronchi is also of considerable interest, and has not, as far as I am aware, been recorded previously. It points strongly to the fact that the nerve infection originates in the most peripheral nerve branches and then advances, more or less rapidly, towards the centre along the nerves. There is no reason to assume that conditions should be otherwise in the skin, and consequently this finding in the nerves of

the trachea supports the assumption that nerve leprosy is due to an ascending leprotic neuritis."

His conclusions are: "Under certain conditions leprosy changes of considerable degree may be found in trachea and bronchi. Traumatic actions of various kinds seem to produce, or at least to promote, these leprosy changes. Leprosy bacilli may pass through the mucous membrane of the trachea and bronchi without producing macroscopic changes. This fact suggests an explanation for the rare occurrence of the so-called leprotic chancre, if it is found at all."

The paper is illustrated with well-produced photographs and photomicrographs.

J. N. Rodriguez of Cebu, Philippine Islands, contributes an article on *Significance of the Histology of Bacteriologically Negative Lesions of Leprosy*. Out of 102 cases of leprosy found on routine examination to be bacteriologically negative, 54 per cent. showed *tuberculoid* changes. Of the 44 remaining cases the specimens showed only round-cell infiltration in 40, while in 4 the changes were so slight that the specimens were considered practically normal. He confirms the opinion that cases definitely of the tuberculoid variety do not undergo conversion to the cutaneous type.

Clarence Mills, Professor of Experimental Medicine, University of Cincinnati, writes on *World Leprosy in Relation to Climatic Stimulation and Bodily Vigor*. His summary and conclusions are as follows:—

"As with other infectious diseases over the world, leprosy tends to be more severe and rapidly progressive in the regions of lesser climatic stimulation. It is almost universally true that those areas of the earth with a stimulation index of less than 3.0 are cursed with leprosy as a major public health problem. With an index above 6.0 the disease becomes distinctly more mild and less prevalent, while above 12.0 it continues to exist only by importation of cases. Where the stimulation rises to 18.0 or above, there seems to occur a spontaneous cessation of the disease as a public health problem.

"Leprosy, imported from the tropics into cooler portions of the earth persists only in those regions of benumbing cold where the real index of climatic stimulation falls to subtropical levels. Scandinavia and the maritime provinces of Canada, with their long cold winters, exemplify this depressing effect of prolonged cold on body vitality. The last wave of leprosy in Norway coincided to a remarkable degree with a world-wide period of subnormal temperatures and increased storminess. On the other hand there is considerable evidence that, when the disease spread with such virulence over Europe in the Middle Ages, the earth was under the influence of a major heat wave that sapped the vigor and vitality of population masses in temperate zones.

"These facts seem to have definite implications concerning the handling of the leprosy problem. As with tuberculosis, leprosy patients should be segregated, not where the disease is worst, but in the most stimulating regions available. Potential leper material,

such as the children of leprous parents, should also be transferred to invigorating climates if we would make progress in eradicating the disease. The use of artificial climatic stimulation by indoor air-conditioning methods needs careful consideration and trial by those attempting to bring the disease under control. One cannot stress too strongly the close relationship between resistance to infection and the level of general body vitality. Since the climatic environment so largely determines bodily vigor and vitality, it must be considered of fundamental importance in studying the biology of disease."

In writing the next paper *The Occurrence in Leprosy of Positive Serodiagnostic Tests for Syphilis* six different authors collaborate:—

"A total of 59.3 per cent of the 50 sera from leprosy patients that were examined in the investigations of this committee showed positive serological reactions. Of these reactions 53 per cent were obtained with the complement-fixation tests, and 62 per cent. with flocculation tests. The percentage of positive tests is somewhat higher among patients with advanced leprosy, and in those showing numerous organisms in the lesions. It is still impossible to say whether the anesthetic, nodular, or mixed forms of leprosy yield the highest percentage of positive reactions. It seems apparent that yaws is not the cause of many positive serologic reactions for syphilis among lepers in the United States. There is a marked discrepancy in the results obtained with comparable specimens of blood sent to various serologists. Up to the present time no evidence has accumulated to indicate that a disease caused by an acid-fast bacillus will give positive flocculation or complement-fixation reactions for syphilis. It would seem logical to suggest that the entire question of the etiology of leprosy is in need of re-investigation."

Dr. Nina Ermakova contributes a valuable and well-illustrated paper on *The Central, Sympathetic and Peripheral Nervous Systems*. He quotes the contributions on this subject by various previous observers down to the work of Lie.

"In the cord Lie observed an ascending degeneration of the bundles of Goll and Burdach, and in the posterior roots there were degenerative changes and atrophy of individual fibres. In the inter-vertebral ganglia there was vacuolization of the ganglion cells, which contained large numbers of bacilli. The changes in the peripheral nerves Lie connects inseparably with the skin lesions. The dissemination of the bacilli, in his opinion, proceeds from the periphery toward the centre, and in none of the cases could the opposite be demonstrated. However, though he regards the ascending character of the neuritis as the rule, he is very reserved as to final conclusions, emphasizing the importance of carrying out investigations in the early stages of the disease, when the picture of the early development of the pathological process must appear more clearly.

"This process, according to Lie, is concentrated in the nerve sheaths. Here he observed round-cell infiltration, with thinning and destruction of the neuro-fibrils and subsequent substitution by connective tissue. In the individual fibres there could be noted destruction of the myelin sheaths and swelling of the axis cylinders. Leproux

neuritis is characterized, not by the destruction of the myelin sheath and the axis cylinder, but by marked thinning of the fibres. In spite of the fact that he had studied a large number of cases, Lie does not give a precise differentiation of the nerve changes in the nodular and maculo-anaesthetic types of leprosy."

His own study was made in 20 cases, of which 18 were nodular and 2 neural cases. His conclusions are as follows:

"In the nodular form of leprosy the peripheral nerves as well as other organs and tissues involved by the leprotic process show lesions characterized by the presence of numerous bacilli, and lepra cells containing bacilli, lipoids and hemosiderin. The maculo-anaesthetic form of the disease is characterised by the appearance in the nerves, as well as in other organs affected, of ordinary round-cell infiltrations containing small numbers of bacilli and hemosiderin. These bacilli are found in the nerves, evidently in larger quantities than in the skin lesions. In the ganglion cells of the intervertebral and sympathetic ganglia in nodular leprosy there occurs vacuolization of the cytoplasm, and quite large numbers of the leprosy bacilli are present in these cells. In the maculo-anaesthetic form no vacuolization or bacilli have been noted in the cases studied.

"In the nodular form the granuloma, which is rich in foamy cells that are but slightly or not at all capable of further differentiation, undergoes organisation very slowly, which explains the slow deterioration of the nerve trunks and the very slow increase of clinical manifestations on the part of the nervous system in this form of the disease. In the maculo-anaesthetic form the rapid invasion of the depths of the nerve trunks by the inflammatory infiltration, with subsequent rapid destruction of their fibres, is accompanied by the early appearance of clinical manifestations referable to the peripheral system."

He found no signs characteristic of leprosy in the brain and spinal cord.

La Lèpre à Madagascar is the subject of a brief paper by Marcel Advier. Official reports during several years enumerated 6,000 cases and he estimates that there are yet well over 3,000.

Gordon Ryrie describes the use of *dettol* by subcutaneous infiltration of a 30% solution in severe ulcerative reaction, with apparently highly beneficial results.

In the correspondence pages there is a discussion on a questionnaire: (a) whether tuberculoid leprosy should be classified with the neural type; (b) whether tuberculoid leprosy ever changes into the frank cutaneous type; (c) whether the reverse transmutation ever takes place. The opinions given by contributing authorities vary considerably. One of the chief difficulties is the definition of the terms used.

Leprosy in India, Vol. VIII, No. 3. July, 1936.

We reproduce in this number an original article by J. Lowe. An article by Dr. D. P. Dow describes the *Late*

Results of Nerve Decapsulation in Leprosy. He analyses 18 cases in which this operation had been performed. In the light of the results seen after 6 to 8 years he feels "justified in resorting to surgery only in cases of nerve abscess, and only exceptionally in these cases is it necessary to decapsulate the nerve. The best results are generally obtained by exposing the abscess, removing the caseous material, and closing without drainage. In all other cases of nerve enlargement, the practitioner will be well advised to cling to the less spectacular, but in the long run more satisfactory form of treatment, by medical means, for he will find that nerve decapsulation does not realise the hopes raised, and its end results are apt to be anything but satisfactory." A previous article is referred to appearing under his joint authorship with Narayan in the April, 1935, number of the "Leprosy Review".

Leprosy in India, Vol. VIII, No. 4. October, 1936.

An article appears under the names of J. Lowe and S. N. Chatterji upon *Some Causes, other than Leprosy, of Loss of Skin Sensation, Paralysis and Deformity.* We hope to reprint this in a later number of this journal.

R. G. Cochrane writes on *Leprosy in Children in Ceylon.* He examined a number of children with early lesions in 1933 and re-examined them after an interval of $2\frac{1}{2}$ years. Out of 61 children re-examined, 54% showed improved or stationary patches; in 13% they were very much improved or had entirely disappeared, while in 17% they had become worse.

An article by the 1931 Census Commissioner for India is reprinted. From this we quote the following:—

"The census figures are mainly important as an indication of distribution. On the day after the 1921 census, Dr. Muir asked 30 lepers who knew they were lepers, if they had been returned as such, and found that only two had been so returned. The census figures have also been used to estimate the actual number of lepers by computing a figure for the whole of India on the basis of the ratio found to exist in limited areas between the census figures and the numbers obtained by expert survey. This method is also liable to be highly erroneous on account of the very great variations shown in the ratio of census to expert survey returns for different areas. The figures resulting from survey are always higher than the census figures but the difference seems generally to vary from about 10 times the census figure downwards over large units. In very small units the excess is sometimes much greater, and a municipality in Malda district (Bengal), that of English Bazar, had a census figure of 3 and a survey figure of 67. On the other hand, the Census Superintendent for Bombay regards the inaccuracy of return as varying according to the incidence of the disease. He writes: 'The leprosy

returns in the Bombay Presidency vary in accuracy probably within two-thirds to one-tenth of the truth, the accuracy depending more than anything on the incidence of the disease in particular areas. Where the disease is widely prevalent it is not properly reported. Where it is only occasionally found there is no doubt the Census statistics are nearer the truth. In the Ahmednagar District the medical authorities believe that the Census statistics of leprosy are about two-thirds correct. In Bombay City the statistics are believed not to be more than one-tenth correct.' The 10 to 1 ratio is possibly the commoner; in one thana of Bengal a survey figure of 274 was returned against a census figure of 30, though three or four times the census figure seems more usual in that province, and in a taluk of Hyderabad State 538 against 53, but Dr. Lowe estimates the total number of lepers in the Nizam's Dominions as 60,000 against a census figure of 3,738."

Revista Brasileira de Leprologia, Vol. IV, No. 4. December, 1936.

Treatment of Leprotic Ulcers by Intra-arterial Injections by Dr. Renato Braga of Sao Paulo. After having obtained very good results by the use of intravenous injections of methylene blue in the prompt cicatrization of leprotic ulcers, the author decided to make experiments of intra-arterial injections of methylene blue in the treatment of ulcers among the patients of the Aymoré Colony. Some had used intra-arterial injections of mercurochrome 1%, but he in his first two cases used intra-arterial injections of methylene blue 1%, but later found the best injection formula in Goinard's preparation of Hydroalcoholic solution of gentian violet 1%. The author considers that the vaso-motor changes produced with periarterial sympathectomy from the interruption of the periarterial sympathetic, are exactly the same as those produced with intra-arterial injections from the simple stimulation of the periarterial sympathetic, *viz.* such modifications of the circulation and nutrition as favour the reparability of the ulcerous lesions. The author gives details of the successful cure within two or three months of seven very bad chronic cases of leprotic ulcer and concludes that his observations justify him in claiming the method of intra-arterial injections as the most effective and safest therapeutic measure hitherto known for the treatment of such cases.

Histopathology of the Mitsuda Reaction. Progressive and Comparative Study of the Tissue Reactions produced in the Different Clinical Types of Leprosy, by Dr. Salomon Schujman. The author has been especially interested in the investigation of the "leprolin" test in cases of tuberculoid leprosy, in connection with which he and other Argentine leprologists (Fidanza, Fernandez and Balina) have recently

been making some special studies. He noted that all the work hitherto published on the "leprolin" test had been in connection with the cutaneous and nerve types of leprosy, and so he proceeded to investigate it in a series of 40 cases of tuberculoid leprosy in his hospital at Rosario. He found that the test is positive in 100% of tuberculoid cases, with no exception, as in the nerve type of leprosy. This positivity in the totality of tuberculoid cases was later confirmed in a series of 50 cases investigated by him in the "Conde Lara" Institute of Sao Paulo, Brazil, as will be seen in the latter part of this article. He found that the test is *intensely* positive in 90% of tuberculoid cases. The intensely positive cases show a papular varying in size from a maize grain to a filbert, of a reddish colour, later turning yellowish, and then acquiring a lupus appearance, very similar to the papules and tubercles observed in real tuberculoid leprosy. The histological appearances were found also to be exactly similar, and by the side of the follicular foci were found large zones of necrosis and caseosis, similar to the condition observed in leprous neuritis of the caseous type.

The histological changes found in cutaneous cases were of a very different appearance from those found in the tuberculoid cases, whereas the pure nerve cases gave a very intense positive reaction to leprolin, with histological changes exactly similar to those produced by leprolin in the tuberculoid cases. This latter phenomenon makes the author take the view that the achromic maculae of nerve leprosy may be secondary to previous tuberculoid lesions, or that they may be trophic manifestations due to lesions of the tuberculoid type in the nerve trunks.

[Some of the findings in this paper confirm those appearing in the article on page 83, Vol. 5, No. 2, April 1934, of the Leprosy Review. Ed.]

The Problem of Leprosy in Argentina is described by Prof. Pedro L. Balina in the inaugural lecture of a leprosy course at the International Leprosy Centre of Rio de Janeiro on 13th July, 1936. He describes something of the activities of the Argentine leprologists of recent times from 1906 up to the present date in (1) intensifying the instruction in leprosy in the Medical Schools; (2) laying special responsibility on the dermatologists for keeping the sanitary authorities cognisant of the leprosy conditions; (3) bringing every influence possible to bear on the Government authorities in favour of an organised national campaign

against leprosy; and (4) educating the people, the inhabitants of the country, in intelligent ideas on the subject of leprosy, and the responsibility of the public to co-operate with the authorities in their campaign. The official figure given at the present time of the number of notified lepers in Argentina is about 3,000, but the author believes that the real number would reach to between 7,000 and 8,000. With the present population of 12 millions, the leprosy co-efficient in the Argentine would be a little over $\frac{1}{2}$ per mille. The geographical incidence of the disease is as follows: 88% of notified cases live in the territories situated in the basins of the great rivers: 11% in the far inland regions to the west of the rivers: 1% in the hilly districts towards the Andes. All the ordinary clinical types of leprosy are found, including the tuberculoid. About half the cases examined in recent years have been bacilliferous and half non-bacilliferous. Eight-tenths of the cases were from the poorer indigent classes of the population, two-tenths from the well-to-do classes. Abscess of nerves is very rare and pemphigous forms extremely rare. J. W. LINDSAY.

Correspondence.

The Editor,
"Leprosy Review."

Dear Sir,

At the Group meeting last night it was decided that we should very much like to develop the point Mr. V. R. Hackmeyer, one of our members, raised privately about it really being the duty of the various Governments concerned to tackle this problem. Until such time however it is the Christian duty of the General Public to do its best.

Perhaps we can best make our point clear with one or two analogies. Slum clearance for instance can only be effectively solved by the State, and private efforts at building houses, through charity, would definitely be wrong. Again, think of all the various State services on which in 1928 £338,500,000 were spent on social services (British Industrial Future, p.245), and imagine private charity trying to attempt it. Such things as Unemployment Insurance, National Health Services, Council Houses etc.

In our opinion it is our duty to do all we possibly can to help the lepers, but we owe them the duty of informing the general public that we are only asking for their help till such time as the Government undertakes the work itself.

Perhaps these thoughts may be of some help to you in your splendid work.

Yours sincerely,

R. HUNT, *Secretary*,
Trowbridge Group, Toc H.

9th February, 1937.

[This question is dealt with in the editorial. Ed.]