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Editorial

A question which frequently exercises the minds of those dealing with leprosy is the value of reactions, occurring either spontaneously or as the result of treatment. The loose use of the word "reaction" is largely responsible for the confusion which exists. By this term is meant the swelling up and congestion of lesions accompanied to a greater or lesser degree by febrile and other general disturbances. These signs may occur with great suddenness, last for a variable period, and almost as suddenly subside, leaving the skin as it was before. Such reactions may recur at regular or irregular intervals, when severe ulceration, especially of nodules, may occur. Bacteriological examination does not show an increase of acid-fast bacilli in the lesions as the cause of focal reactions, so that they are probably of a toxic or allergic nature. Reactions of this nature occur as a rule in patients who are in a weak state of general health, and they tend to weaken still further the condition of the patient. They are often followed by disastrous results, especially when the delicate structures of the eye are affected, or when sudden swelling of the ulnar or peroneal nerve results in trophic and other changes in the extremities. Such reactions are difficult to control, and their treatment often requires great skill and patience.

In carrying out the treatment of leprosy with hydnocarpus and other preparations, great care should be exercised to avoid reactions of this nature. Excessive injections or the administration of iodides in debilitated patients not infrequently set up reactions which are difficult to stop and cause the patient great harm.

On the other hand there seems reason to believe that in patients with sound physique, firm muscles and sound general health, the induction of slight, well controlled reactions of short duration, may be of benefit in causing destruction of bacilli and promoting recovery. The all-essential fact is that they should not cause deterioration in the general condition of the patient. The erythrocyte sedimentation test, when carried out regularly once a week is invaluable in regulating treatment along these lines, for it is easy to perform and

gives a delicate indication of the slightest deterioration in the condition of the patient.

The intradermal method of giving hydnocarpus injections has the great advantage that strictly localised reaction is brought about in a limited area, leading to local destruction of infection and producing at the same time a slight generalised reaction which is beneficial in dealing with infection in other parts of the body.

The *sine qua non* in leprosy treatment is a certain level of general health. Above this level the reaction to special treatment promotes improvement; below this level it only causes deterioration.

Conflicting reports reach us from different leprosy treatment centres. In some the patients have to be begged and bribed and run after. In others the doctors are embarrassed by patients clamouring for treatment and willing to walk any distance, wait any length of time and endure any pain they may be subjected to. What makes the difference? The most important thing is the way you set about it at the beginning. Whatever you do, never run after patients. Once you begin you have to keep running after them all the time. Make the patient feel that he is being favoured—not favouring the doctor. Once this, the right attitude has been established, skill, sympathy and common sense will do the rest. Compulsion should never be used. Once the right *rapport* has been established between physician and patient, the temporary withholding of treatment is all the punishment necessary to maintain discipline.

If the wrong relationship has, through a primary mistake been established, the only way is to start all over again. Stop treatment and begin again with one or two who are keen, if they can be found. Better results will be obtained by restricting oneself to a few such than by subjecting a hundred to compulsory injections. After all, the main part of the treatment is dependent on the good will and keen co-operation of the patient. No leper will ever be benefitted to any great extent under compulsion.

Cellular Reaction to *Bacillus Leprae**

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THE cellular reaction is of importance in all diseases caused by infective organisms. It is of peculiar interest in leprosy because of the low toxicity of the causal organism, *Bacillus leprae.* Due to this low toxicity the organisms can multiply to extraordinary numbers without causing very marked clinical signs, and without apparently interfering to any great extent with the general health of the patient.

If we compare leprosy with the sister disease, tuberculosis, the contrast is very striking. In the latter disease even a small infection sensitizes the patient so that an inoculation of tuberculin causes an immediate focal and general reaction. In leprosy the inoculation of leprosy bacilli causes no immediate focal and general reaction. Indeed the condition in leprosy may be compared with that in an advanced case of tuberculosis, in which the tuberculin reaction is negative; only, while such a tubercular patient is in a highly toxic condition and appears extremely ill, the leprosy patient shows few or no signs of toxicity, can go about his work in good health, and may even show but few clinical signs.

The disease of leprosy is not caused then by the toxins of the causal organisms, nor, except in the complication known as " lepra reaction " or lepra fever, is it due to sensitisation to the bacillus. The clinical signs and symptoms are caused by local cellular reaction to the bacillus, and it is the nature of this cellular reaction which I shall attempt to study in this paper.

Leprosy may affect most of the organs of the body, but it is the skin and the peripheral nerves that are most markedly involved, and we shall confine our attention to these structures.

Under certain circumstances such as in lepra fever, and when a severe temporary reaction takes place, the blood cells invade leprous lesions and phagocytose the bacilli. But under ordinary conditions the cell responding to the presence of *B. leprae,* in both skin and nerves, is the endothelial cell of

* Communicated to a Meeting of the Edinburgh Branch of the Royal Society of Tropical Medicine.

the capillary. It is difficult to say whether all endothelial cells respond, or whether, as some writers state, only certain specialised endothelial cells belonging to the reticulo-endothelial system are involved.

The multiplication of lepra bacilli which have entered the skin or nerves takes place in the intercellular lymph spaces and inside the cells. The degree of this multiplication, and the subsequent spread of the organisms throughout the tissues, are largely dependent on the degree of cellular response.

The reaction of the cells to the bacilli in their neighbourhood is threefold, *viz.*, increase of cells by division, ingestion of bacilli, and destruction of ingested bacilli. The more the bacilli multiply, and, therefore, the more bacilli there are in the neighbourhood of a cell, the more is that cell stimulated to respond. But apart from the number of bacilli surrounding it, the degree of response varies greatly in degree, and this variation is dependent on certain factors to be mentioned later.

Comparison of weak and strong response.— If the response is *weak* then cell-division is sluggish, and ingestion feeble, so that numbers of bacilli remain outside the cells and spread in the lymph stream; while the ingested bacilli, instead of being destroyed, multiply in the cytoplasm. These cells gradually become distended with bacilli, vacuolated and destroyed. The distended, vacuolated cell is the well-known " foamy " or " lepra " cell. In the nodules and other gross lesions groups of these cells are pressed together and may form a more or less uniform bacillary mass, cemented together by mucoid material called by the early leprologists " gloea." Between the typical lepra cells is a varying number of small round, lymphocyte-like cells, called by UNNA "daughter cells," suggesting that they constitute the young form of lepra cells.

If the cell-response to the bacilli is *strong*, then both cell-division and bacillary ingestion are active (Fig. 1). The cells are formed into compact cords round the capillaries (see Fig. 2), from the endothelial cells of which they take origin. These are the well-known " epithelioid cells " (see Figs. 3 and 4) of the so-called " tuberculoid " type of leprosy. The bacilli, instead of multiplying and distending the cells, are phagocytosed and destroyed; they are, therefore, few in number and difficult to find in such lesions. So active is the response in some cases that the cells, instead of dividing in the usual manner, form multi-nucleated giant cells, similar to the Langhan's cells in tuberculosis. This may be

carried one step further and, as in tuberculosis lesions, result in caseation, which, when extensive, may lead to abscesses in the nerves and ulceration of the skin.

We have described shortly the contrasting pathological results in weak and strong cell response to *B. leprae*. Between these two extremes we have all grades of cellular activity. Moreover the degree of reacting power may vary in any case from time to time. Hence the protean forms of leprous lesions.

The principal factors influencing the degree of cellular reaction are four in number, viz., (1) the age factor, (2) general health, (3) small infections with *B. leprae,* and (4) gross infection with *B. leprae.*

(1) *Age factor.*—It has long been recognised that young children are more susceptible to leprosy than adults. It is only recently that this important fact has been given due prominence, and its cause studied. The incidence among children in infectious contact is given as over 40 per cent., and conjugal infections as less than 5 per cent. It is generally recognised that a similar susceptibility of children also exists in tuberculosis. In the latter disease, the cause of this susceptibility is supposed to be that the child in a home infected with tuberculosis is liable to receive a greater degree of infection than the adult similarly placed. While increased liability to infection may partly explain the greater susceptibility of children (as compared with adults) to leprous infection, there is strong evidence that this is not the only cause.

When a suspension of killed *B. leprae* is injected intradermally in very young non-leprous children (leprolin test), it produces but little local cellular reaction as compa
a similar inoculation in older children or in adults. This suggests that the defensive mechanism against *B. leprae, viz.,* strong cellular reaction resulting in phagocytosis and destruction of bacilli, is weaker in young children than in adults.

The typical form of leprosy found in children who have been in close contact with highly infectious cases during their first years of life is of a peculiar nature. The skin lesions take the form of hyperpigmented macules with slight parakeratosis but without any clearly defined margin. Clinically these lesions are difficult to recognise, while histologically they show only a mild degree of cellular reaction, and but few bacilli. These lesions may appear and disappear from time to time, and they are often widespread over the body. It has been shown that these macules oftenred with into

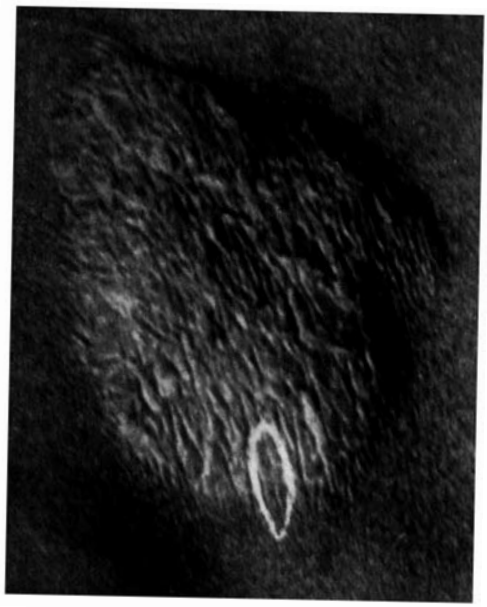


FIG. 1.

FIG. 1.—Macule of back in patient with high resistance (N_2). The white mark denotes material removed by biopsy, a section of which is shown in Fig. 2. The resistance of this patient had been temporarily lowered, but had been restored shortly before the biopsy was made.

FIG. 2.

FIG. 2.—Section from macule in Fig 1 showing skin and subcutaneous tissue. Note the sections of dense granulomatous cords round the vessels of the papillae, subpapillary plexus and hair follicle, which show white in the photograph; also the two thickened and granulomatous nerve branches in the subcutaneous tissue. The squares "a" and "b" in the latter indicate the areas shown enlarged in Figs. 3 and 4. o bacilli were found in the skin, but a few bacilli were found in the subcutaneous nerve at "a".

FIG. 3.

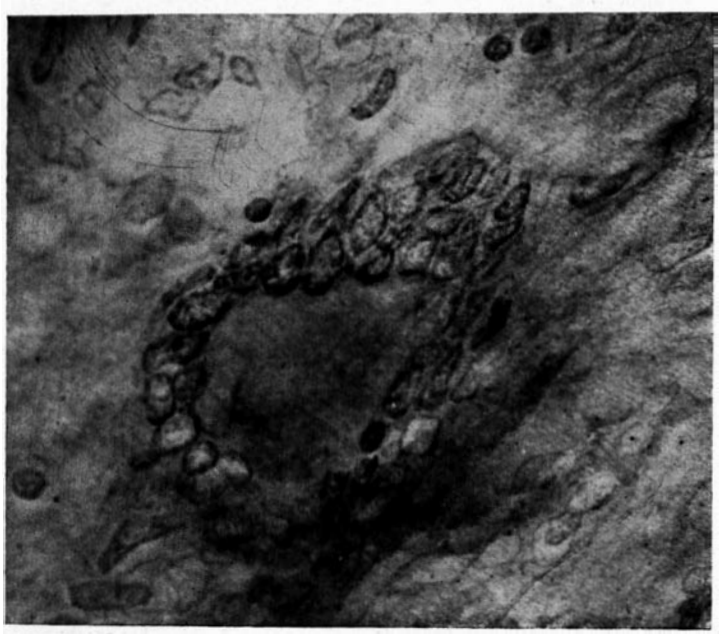


FIG. 4.

FIG. 3.—Section of subcutaneous nerve enlarged from "a" in Fig. 2. Note the few bacilli showing singly and in bunches; and the large, densely packed epithelioid cells.

FIG. 4.—Section of subcutaneous nerve enlarged from "b" in Fig. 2. No bacilli were found in this nerve. Note the giant cell and the dense cellular reaction.

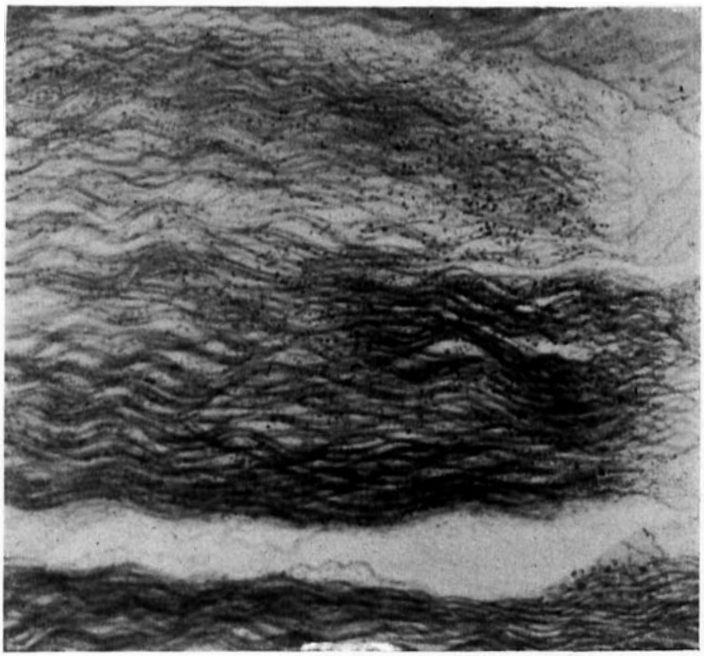


FIG. 5.

FIG. 6.

FIG. 5.—Section of nerve—low power—in case with low resistance (C_2). The section was stained by a combined Beilchowsky and Ziehl-Neelsen method. The dark dots are masses of bacilli lying between the nerve fibres. Cellular reaction is absent.

FIG. 6.—The nerve shown in Fig 5, further enlarged. Note the masses of bacilli between the nerve fibres and the absence of cellular reaction.

FIG. 7.

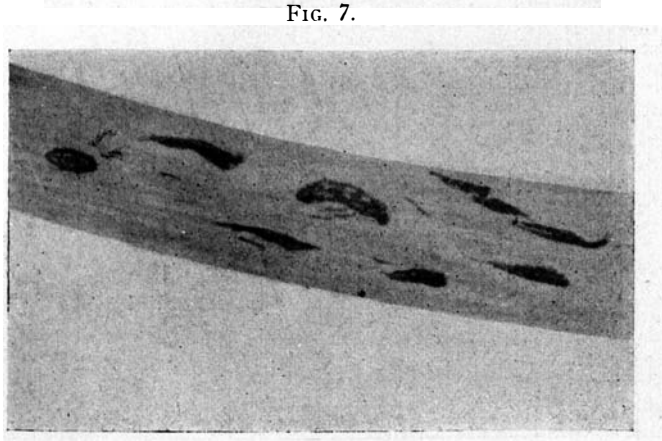


FIG. 8.

FIG. 7.—Section of superficial part of skin in a new lesion in a patient with low resist
papillary vessel with numerous bacilli, intra- and extra-cellular, but no signs of tissue reaction; "b" = epithelium, "c" = hair follicle.

FIG. 8.—Teased nerve fibres in a resistant (N_1) case. Bacilli are seen lying on the nerve fibres. The cells are those of Schwann's sheath. There is no sign of tissue reaction as the fibres were from the superficial part of the nerve bundle.

frank lesions in later life. " Juvenile leprosy " is a convenient term to apply to this type. In adults the early lesions tend as a rule to be more marked clinically and histologically, and they show a greater degree of cellular reaction.

We propound the hypothesis that effective cellular reaction to *B. leprae,* resulting not only in their ingestion but in their destruction, is the main protection of the body against the invasion and spread of these organisms. If this hypothesis is accepted there is considerable evidence that the greater susceptibility of children to leprosy is connected with weaker cellular reponse to *B. leprae* during the first few years of life, as shown by the weak cellular reaction to inoculated *B. leprae,* and by the type of lesions found in these cases.

(2) *General health.*—A similar weakening of cell activity occurs when the general health is depressed by predisposing or intercurrent diseases, or by any other cause. This, as in juvenile leprosy, is shown by the leprolin test, which shows a milder local reaction to injected bacillary suspension. It is also shown by the clinical and histological examination of lesions. The onset of diseases like malaria, kala-azar, dysentery and enteric is often followed by the flattening out or even disappearance of prominent leprous lesions, due largely to the diminution or cessation of cellular reaction to *B. leprae* present in the skin. The patient may appear to improve as far as his leprous lesions are concerned, while all the time the infection is increasing, uncontrolled by phagocytosis. When convalescence sets in and the general health again improves, cellular reaction is restored and the lesions appear considerably enlarged and more numerous as compared with their condition before the temporary lowering of general health.

(3) *Small infections.*—There is considerable evidence that, as in tuberculosis, small infections with leprosy in otherwise healthy subjects increase the resistance to the disease. This resistance shows itself in enhanced cellular reaction of the endothelial cells to bacilli in their neighbourhood. In such cases the tuberculoid lesion, with epithelioid and giant cells and but few bacilli, is common. In these cases the leprolin test gives a strong reaction, a large nodule, often with central necrosis, forming at the site of inoculation as the result of heightened cellular response to the injected bacilli. If this nodule is removed by biopsy and sectioned, an intense cellular reaction is found with giant cells present; in fact, a lesion similar in appearance to the leprous lesions present in the skin. In my experience in Northern India the majority of all cases of leprosy are of this type. This

is shown to be the case when a careful house to house survey is carried out in endemic areas, though the proportion may be much smaller if those attending a clinic or segregated in an institution be examined.

(4) *Gross infection.*—In contrast to the above, massive infection with *B. leprae,* or the presence of large numbers of these bacilli due to multiplication in the body (see Fig. 7), results in lowered cellular reactivity. When more than a certain number of bacilli have accumulated in the body a state of symbiosis is established between the endothelial cells and the bacilli, the latter being ingested and multiplying in the cells, which gradually become enlarged, vacuolated and destroyed. When the leprolin test is performed in patients with massive infection the result is generally negative, or only very slightly positive. In performing the test a piece of skin may be chosen where the infection is absent or only slight, and into this skin is injected an emulsion rich in *B. leprae* which has been heated to 120° C. for half an hour. If 2 or 3 weeks later the skin at the point of inoculation is removed by biopsy and sectioned, few bacilli are found present in the tissues, and only a mild degree of cellular reaction is seen. The bacilli, not having been ingested by the cells, pass up the lymphatics. In this case, too, the appearance of the leprolin nodule is similar to the lesions of short duration present in the skin.

We have thus four factors, three of which (*viz.,* tender age, debility and massive infection) diminish cellular reactivity to *B. leprae,* and one of which (*viz.,* slight infections) increases their reactivity. These factors may counteract, supplement or succeed each other. Thus temporary depression of general health may counteract for the time-being the increased resistance which has been acquired through small infections; but the state of increased resistance may be restored if the depression of health be not too severe or prolonged. The susceptibility of the first few years of life may be accompanied or succeeded by the low resistance attendant on a high degree of infection, and both of these may be supplemented by weak general health.

The ebb and flow and the interplay of these various factors and their effect on cellular reaction in the skin and nerves, account to a large extent for the multiformity of leprous lesions, so difficult to describe and explain.

So far we have referred chiefly to skin lesions, but the same laws and the same factors hold good in the peripheral nerves. When the skin is infected the infection not only spreads in the skin, but also passes up the supplying nerve

branches. In fact, there is reason to believe that under certain circumstances the nerves form a more fertile medium than the skin for the multiplication of bacilli. This is apparently due, at least in part, to the comparative paucity of endothelial phagocytic cells in the nerves as compared to the skin. The bacilli enter a nerve bundle and pass up it in the spaces between the nerve fibres (see Figs. 5 and 6), and are thus not in close contact with the endothelial cells of the vascular capillary in the centre of the bundle. Sections of nerve bundles often show cellular multiplication and destruction of the central nerve fibres; while at the periphery of the bundle cellular proliferation is absent, the bacilli are present in large numbers and the nerve fibres remain intact.

It is questionable if the skin is ever infected to any marked extent without the supplying nerves becoming infected too. We speak of skin leprosy and nerve leprosy, and in the former it may be impossible to find clinical evidence of nerve affection. But in skin leprosy microscopic examination of the nerves shows the presence of large numbers of bacilli. In this type of the disease the absence of clinical signs connected with the nerves is not due to the absence of bacilli in their bundles, but to the comparative weakness of cellular response to the bacilli which are lying between the nerve fibres. The swelling and tenderness of nerves and the sensory and trophic changes in their distribution are due not to toxins set free from the bacilli, nor to pressure of the bacilli on the nerve fibres; they are due to the mechanical pressure of the cellular granuloma, *i.e.*, of the cells proliferating in response to the bacilli lying between the nerve fibres. Thus, though in the low resistant case there is massive infection of the nerve, the absence of mark response accounts for the fact that neural signs are comparatively slight.

In the more resistant case, however, bacilli may be few or absent in the skin, having been destroyed by the strong phagocytic cellular response; at the same time the nerves are swollen and tender, the degree of resistance being sufficient to stimulate the endothelial cells of the central capillary of the nerve bundle to high activity against the bacilli present between the nerve fibres (see Figs. 2, 3, 4, 8). This can be demonstrated by making simultaneous clinical and histological studies.

Many theories have been advanced for the curious fact that neural signs and symptoms are so slight in cases in which bacilli are numerous in the skin, and so marked in cases in which the bacilli are comparatively few in the skin.

The above, if confirmed by other workers, would seem to offer a satisfactory explanation of this phenomenon.

Effects of varying resistance.—We have mentioned above that not only do the resistance of patients and consequent cellular activity vary in different individuals, but they vary from time to time in the same individual. During the periods of low resistance the bacilli multiply, spreading along the subcutaneous and/or subpapillary plexuses, and from these along the hair follicles, and the sweat glands and ducts; from the sub-papillary plexus they invade the papillae, and from the subcutaneous plexus they pass up the nerve branches.

In the nerves, during periods of lowered resistance, the bacilli tend to accumulate at points of obstruction, such as bends, constrictions or where branches are given off. In this respect they resemble the leaves and other debris carried along in the current of a river and massed together wherever they meet with impediments. When a period of low resistance is succeeded by a period of higher activity, the cellular response is most marked at these points of obstruction and bacillary accumulation. Thus we find the ulnar nerve most thickened in the lower half of the arm between the obstruction caused at the elbow, and that caused as it passes through the intermuscular septum. Similarly the great auricular nerve is commonly thickened between its bifurcation at the angle of the jaw and its bend round the sterno-mastoid.

Bacillary reservoir in nerves.—Because of their lower or more tardy resistance to *B. leprae,* the nerves tend to form a reservoir for these organisms when the skin by its greater cellular activity has purged out the infection. Thus the infection may remain bottled up inside a single nerve for a long period, unable to escape through its branches in the skin, or through its connective tissue covering, the cells of which also, like those of the skin, react to and destroy bacilli.

It is well known that in a resistant case a single lesion of the skin may exist for years. Bacteriological examination may fail to show any bacilli in such a lesion, and yet it continues as a clinical lesion. A possible explanation of this phenomenon is that from the supplying nerves bacilli are from time to time entering the skin, the cellular elements of which react to and destroy the bacilli as they enter. Thus the skin lesion is maintained. But if the skin is re-infected from the nerve branches during a temporary depression of general resistance, the cellular seal is temporarily opened, and the infection may be broadcast through the body and

enter other nerves in which it may again find sanctuary when resistance is restored.

It is probably largely on account of this neural reservoir that it is so difficult to eradicate leprosy from the body, and that relapses are apt to occur in cases whose skin and mucous membrane have become and have remained for some time, bacteriologically negative. On this account it is important in leprosy. as in tuberculosis, that in arrested cases the general health should always be maintained at a high level.

Leprosy in Fiji

(*Abstracted, with permission, from the Medical and Health Report of Fiji for* 1934).

The following is a report of the Central Leper Hospital, Makogai. (*See illustrations facing page 125.*)

After a number of years during which the Gilberts and Ellices have made inadequate efforts to care for their lepers, these are being transported to the leper island of Makogai early in 1935. New Zealand, Fiji, Tongo, Gilbert and Ellice Islands, Western Samoa, Niue and the Cook Islands co-operate in the island of Makogai in the Fiji group, where lepers receive treatment and care unsurpassed in the world, and where there is a measure of contentment impossible to understand by one who has not seen it. These participating groups are entitled to the highest credit for their foresight in co-operating to handle a situation which no one of them can do so well alone.

In spite of this fact, there is little accurate knowledge of the extent of leprosy in the South Pacific. No survey has ever been made in any group by men skilful in diagnosis and with adequate scientific equipment. On a recent hurried survey of Rotuma among a population of 2,500, Dr. V. W. T. McGusty by visual and manual inspection sorted out enough lepers with those already in Makogai to amount to over 2 per cent. of the population. About half of these are considered to be infectious. In the Solomon Islands on the savage island of Malaita, 100 miles long and 20 to 30 miles wide, which has been little explored, a survey was made from which a 1 per cent. infection with leprosy was estimated in a population of 44,000. In this group there are one to two Government medical officers and two Native Medical Practitioners. The finances of the Colony offer no possible hope of attempting to deal with the situation. As has been said there are no adequate facts concerning leprosy in the South Pacific. Probably also there is no place in the world where the etiology and epidemiology of leprosy can be so well studied as in certain small atoll islands in the South Pacific, which are almost isolated from communications so that the whole factors of the problem can be seen without extraneous complications. Here fresh cases are presenting themselves each year since the eighteen-eighties.

An outline for a leper survey of the Pacific is on file by the former

Medical Officer, who had six years experience at Makogai Leper Island, and who has inspected leper conditions in several other countries.

Statistics.—The eighty-nine admissions for the year include sixty-five cases from Fiji itself, sixteen from Rotuma, seven from Samoa and one from Niue Island. The nationalities are indicated in Table I, which also shows the varying types of disease among the admissions. A little over 50 per cent. of the cases were of the neural type; only two showed extreme deformities, and no case had reached the advanced cutaneous stage. This appears to represent a definite improvement, and is probably largely due to the growing realisation among practitioners and natives alike of the importance of early diagnosis and treatment.

TABLE I—ADMISSIONS 1934.

Nationalities.	N1.	N2.	N3.	C1.	C2.	C.3	*Total.*
Fijians	6	8	2	.	2	.	18
Indians	5	6	.	2	21	.	34+1*
Solomon Islanders	3	3	.	,	3	.	9
Rotumans	6	3	.	.	7	.	16
Samoans	1	1	.	.	5	.	7
Niue Islanders ...	1	.	.	.	.	.	1
Half-castes ...	.	.	.	.	3	.	3
Total ...	22	21	2	2	41	,	88

* One Indian admitted and later discharged as a non-leper.

Deaths.—Of the seventeen deaths, there were nine among the Fijians, three of Solomon Islanders and Indians, and one each from among the Cook and Niue Islanders.

Death rates for the past five years are as follows:—

Year	*Deaths*	*Rate per mille.*
1930	51	116.4
1931	39	84.2
1932	17	36.1
1933	34	74.6
1934	17	37.9

This appears to show a fairly steady improvement, particularly in view of the fact that it is the advanced cases who are left each year while the earlier cases tend to be discharged or, in the case of Indians, repatriated.

Causes of death are shown in the following list:—

Exhaustion from Leprosy	4
Nephritis (including Uræmia)	3
Septic absorption	1
Tuberculosis—	
(General 2, Pulmonary 1, Abdominal 1)	4
Cardiac Disease	3
Pneumonia	1
Hæmatemesis	1

It will be seen that eight of the deaths (including those due to exhaustion, nephritis and septic absorption) may be fairly attributed to leprosy and nine to causes apparently unconnected with leprosy.

DEATHS IN RELATION TO TYPE.

Neural—1	1
Neural—2	3
Neural—3	4
Cutaneous—1	0
Cutaneous—2	3
Cutaneous—3	6

The foregoing list, however, showing deaths in relation to the stage of leprosy, indicates that this cannot be taken entirely at its face value. It is hardly conceivable, for example, that leprosy played no part in the causation of death in each of the nine advanced and moderately advanced cutaneous or of the four advanced neural cases. The probability is that in every case the resistance to other morbid conditions is lowered by leprotic infection, although of course the converse may also be true, the disease causing death being the primary condition which had lowered the resistance to leprosy when encountered.

TABLE II.

Nationalities.	N1.	N2.	N3.	C1.	C2.	C3.	*Total.*
Fijians	14	45	15	6	39	23	142
Indians	21	39	7	13	92	12	184
Solomon Islanders	12	11	.	4	16	3	46
Rotumans	.	3	.	.	4	2	9
Chinese	.	.	.	.	6	3	9
Samoans	1	2	.	.	13	1	17
Tongans	1	2	1	2	1	.	7
Cook Islanders ...	3	10	4	1	10	.	28
Niue Islanders ...	1	1	.	.	.	1	3
Maoris	.	.	1	.	.	.	1
Half-castes ...	.	2	.	.	7	.	9
Europeans	1	.	1	.	1	.	3
Total ...	54	115	29	26	189	45	458
Percentages ...	11.8	25.1	6.3	5.6	41.2	9.8	...

Table II is of interest in showing the proportion of neural to cutaneous cases in the various nationalities. The only three with sufficient numbers for percentages to have comparative value are the Fijians, Indians and Solomon Islanders who give respectively 52.1 per cent., 36.4 per cent., and 50 per cent. of neural cases. This ratio is similar to that reported in previous years and as will be shown later, the Indians, in spite of their higher proportion of cutaneous cases, continue to give a much higher rate of improvement. It may be pointed out in passing that although the Fijians have a lower proportion of cutaneous cases than the Indians, 16.2 per cent. of their cases are in the advanced cutaneous stage as contrasted with 6.5 per cent. of the Indians. That is to say that the Indians, in spite of their apparently heavier infection, show a much higher rate of improvement, and a much lower proportion of cases advancing to the extreme condition. The explanation of this undoubted fact, supported as it is by records over a number of years, is probably not a simple one. The Fijian accepts his condition philosophically

and more or less fatalistically, settles down to the life here and is content to be separated from his immediate family provided he be with others of his own race. The Indian on the other hand actively resents the need, forced upon him by his disease, of isolation from his family, and is in most cases willing to seize every chance and carry out any method suggested to him of improving his condition so that he may be discharged and rejoin his own relatives. This psychical factor is in my opinion of the utmost importance. Evidence regarding possible differences in racial susceptibility is contradictory or at least inconclusive. It may well be that an investigation on scientific lines of the respective diets of the Indians and Fijians here would be of considerable value in explaining the differences observed and in pointing the way to further improvement.

Treatment.—It is impossible to overemphasise the value of general hygienic treatment coupled with treatment of concurrent diseases. If one had to make a choice between such general health measures and specific lepra therapy, one would unhesitatingly choose the former. Fresh air, suitable dietary, cleanliness and graduated exercise are indispensible as a preliminary to specific treatment and it is probably from these factors, which are more under the control of the patients themselves, rather than in specific treatment, which is more easily regulated, that the Indian reaps his advantage. Patients are encouraged to lead an open air life: sports are arranged and prizes donated from the Comfort Fund; the utmost use is made of patients with regard to Public Works and the produce of their garden is bought for Hospital use.

Specific treatment has continued on the lines recorded in the last Annual Report, the standard treatment being weekly intramuscular injections of iodised (0.5 per cent.) chaulmoogra oil. According to Cole, "Chaulmoogra-group oils to which 0.5 per cent. iodine is added become so viscous that difficulty is experienced in attempting to use them by injection." This is true unless the oil is kept at a suitably high temperature. Immediately prior to injection the freshly iodised oil is heated for an hour on a water bath and is then poured into a large warmed and sterile thermos flask. Small quantities are poured as required throughout the period of injections into glass beakers standing in basins of hot water. If this method be followed there should be no further difficulty owing to viscosity, the product being comparable with the iodised ethyl esters. The patients agree that this is the least painful injection they have so far received and they much prefer it to the iodised esters to which they formerly paid the same tribute. Results are at least as good as those of previous years. There have been only two cases of abscess formation resulting from nearly 12,000 injections, both occurring in patients suffering from furunculosis, and apart from these there have been no signs of non-absorption. The high temperature of the injected oil probably plays no small part in assisting absorption.

Chaulmoogra oil by mouth to the limit of tolerance, varying with different patients, has been continued. The addition of 0.5 per cent. iodine which was at one time thought to be an improvement, has been discontinued, patients finding it after a while less well tolerated than the pure oil.

Mercurochrome, as recommended by Muir, has proved a

useful addition to the small list of drugs such as antimony and sodium tartrate, ephedrine and dilester (E.E. of calophyllum bigator), utilised for the control of reaction.

Minor experiments have been carried out with certain of the aniline dyes as suggested by Ryrie, but with inconclusive and somewhat contradictory results. They are being continued into the New Year, however, on a larger scale and results will be assessed with care.

Only thirty operations, in almost every case of a minor character, have been required during the year.

Results of Treatment.—The appended table of statistics shows twenty-two patients actually discharged during the year. To this figure should be added a further seven cases who were "Boarded out" in December, but had to await transport until the beginning of the year. This gives twenty-nine cases passed by the Medical Discharge Board during the year as having been free from active disease for at least two years. In the following table these cases are classified according to nationality and type of Disease.

TABLE III.—DISCHARGES 1934.

Nationalities.	N1.	N2.	N3.	C1.	C2.	C3.	*Total*
Fijians	6	1	.	.	.	.	7
Indians	8	4	1	1	.	.	14
Cook Islanders ...	.	.	.	1	.	.	1
Solomon Islanders	3	1	.	.	.	.	4
Samoans	2	.	.	.	.	.	2
Tongans	1	.	.	.	.	.	1
Total ...	20	6	1	2	0	0	29

Table IV shows four hundred and fifty-eight patients examined at the end of the year arranged according to nationality and type of leprosy. A number of patients who had only been admitted three or four months previously were not included.

The combination of quiescent and arrested cases, which gives a total of the "inactive" cases in each stage is a much better criterion of real progress than the classification "improved," which is a vague term dependent on the personal predilections of the examiner. Early cutaneous cases show nearly as high a proportion of "total improvement" as early neural cases, but this is mainly due to the lesser degrees of improvement. Thus cutaneous 1 cases show only 38.5 per cent. in the inactive condition as contrasted with 64.8 per cent. of the early neural cases, while actual discharges are seen in Table III to have been ten times as many in early nerve as in early cutaneous cases.

Sex Differences.—The usual preponderance of male over female patients is illustrated in Table V, which gives three hundred and twenty-seven males to one hundred and thirty-one females. On the whole the females are less advanced, with a larger proportion of neural cases, and this fact is reflected in their slightly better response to treatment. Thus of the three hundred and twenty-seven male patients, 38.5 per cent. were neural in type and 64.2 per cent. showed "improvement", while of the one hundred and thirty-one females,

54.9 per cent. were neural and 71.7 per cent. were "improved." Progress therefore depends much more on the stage of the disease than on any differences due to sex, in spite of the fact that the more active and less restricted life of the men would tend to give them a better chance.

Produce.—The patients' gardens have done very well during the year, and the open-air exercise entailed in their cultivation is regarded as an important adjunct to specific treatment. About one hundred and seventy-five tons of cassava, bananas, &c., have been bought for Hospital use at £4 per ton—a valuable encouragement to the patients as well as providing a more nutritious diet than bought rice. Many of the patients keep their own ducks and fowls and there is quite a traffic in these, particularly at such times as Christmas.

The Hospital fowl-yard has been improved by the importation of more Silver Wyandottes, in order to prevent deterioration due to inbreeding. Nearly 12,000 eggs and 300 fowls have been supplied to the Hospital, a splendid addition to the normal dietary of the patients. Great credit to due to the native sisters who, under the direction of the Reverend Mother, are responsible for the care of the poultry.

Milk, meat and soap have been produced at Nasau for use at the Hospital and I have asked the Lay Superintendent to report on Farm Produce, Stores, &c. Details will therefore be found in an Appendix.

Chaulmoogra Trees.—The Chaulmoogra trees originally planted in 1926, but badly damaged by the storms of 1930 and 1931, have largely recovered and are now doing well. About a hundred of the Hydnocarpus wightiana trees are now bearing fruit, but so far there has been no sign of fruit on the Hydnocarpus anthelmintica trees, which have moreover a less healthy appearance. About three pints of oil, which appears to be of excellent quality, have so far been prepared, and specimens have gone forward for analysis.

Leprosy in the Cayman Islands

The following report on leprosy in the Cayman Islands by the Medical Officer is of great interest:—

"When did leprosy first make its appearance in the Cayman Islands, and to what extent has its incidence been since the introduction of the malady? Although there are no official records obtainable, from which information could be derived on the matter, I have been fortunate enough to become possessed of valuable data from some of the very aged, whose words can be authentically viewed.

About the year 1825 or thereabout, leprosy first made its appearance in the Cayman Islands in the District of Georgetown, Grand Cayman. The first person to show evidence of the disease was an old woman of African descent (Case 1), whose life was of such a solitary nature, as to render obscure any information about her, beyond the fact that she was a leper.

About the year 1835 the disease was again discovered in two brothers (Cases 2 and 3), who died in early adult life.

Within a short period following the death of lepers Nos. 2 and 3 the malady was again noticed in a man (Case 4), who as a boy had much to do with leper No. 1, taking food for her and carrying out other orders of friendliness at the instance of his mother.

No other case was heard of until the year 1860 when a man (Case 5), about 28 years of age presented manifestations of the disease. This man from his boyhood days resided at Georgetown, Grand Cayman. As a healthy child about 12 years of age he was partly adopted by Case 4, living in direct association with him, and sharing without restraint an affection most conducive to contagion.

Some years following the discovery that Case 5 had apparently contracted the disease from Case 4, the next one to show positive evidence of leprosy was a man (Case 6), who was a nephew and neighbour of Case 4. Tradition having handed down the tendency for Caymanians to live gregariously, there was free intermingling between these families, and it may be reasonably assumed that by reason of contact Case 6 contracted the disease from Case 4.

About the year 1877 a mariner (Case 7), residing at Grand Cayman, showed signs of being leprous. This man was a cousin of Case 5, and the two of them growing up together from early life were intimately associated. Becoming suspicious of his condition, he left the island in the year above mentioned, returning in 1910 a pronounced leper, without fingers and feet as evidence of the virulence of his infection. It may not be amiss of me to mention that this man posed in the U.S.A. as a frostbitten sailor, and under this limbless camouflage, peddled books and magazines earning enough money to provide for those days when he became completely disabled.

Approximately about the year 1888 the next in the District to show evidence of the disease was a young man (Case 8). This man was a nephew of Case 5 with whom he had dealings in common. This case was one of a virulent nature ending shortly in death.

In the year 1900 Case 9, residing at Georgetown, was the next to offer convincing evidence that the disease further lurked in the island. It is worthy of mention that this man was the nephew of Case 7 and was raised from infancy in the homestead of his leper uncle who was devoted to him to a degree that would have jeopardized him even under infinitesimal chances of infection through contact.

Soon after the above was discovered the disease next made its appearance in a man (Case 10), who was a cousin of Case 8 and nephew of Case 5. These parties lived in the same compound, helping each other without the slightest pretence at protective measures.

The next in order of sequence to show signs of affliction was Case 11, brother of Case 9 and nephew of Case 7. He lived with his leper uncle under similar conditions as his brother Case 9, hence what has been said with respect to infection through contact involving Case 9, might be applied without exception to Case 11.

In the District of West Bay, Grand Cayman, there are four cases that are distinctly remembered, occurring in two separate families, and there is no vestage of belief that the disease prevailed in that district to a greater extent. In that section the disease manifested itself in the family of a man about 40 years ago. Three in that family,

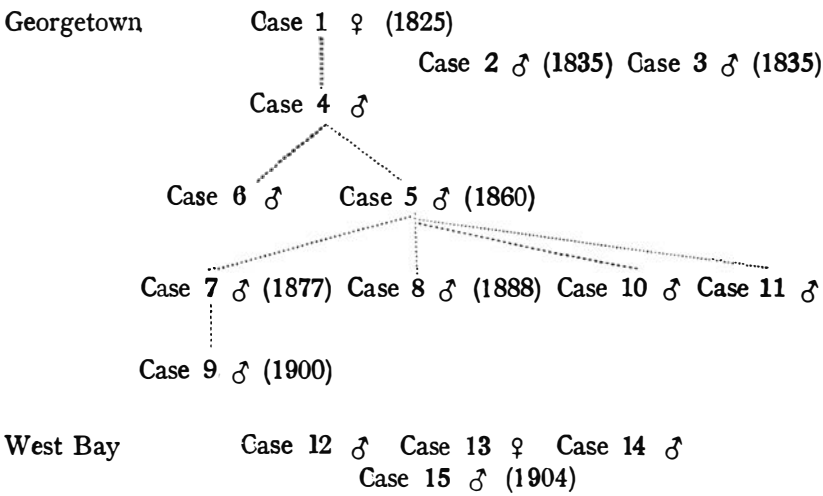
father, wife and son, Cases 12, 13 and 14, became lepers and died about 30 years ago.

About the year 1904 that district next furnished a male leper, Case 15, who died of the disease in 1908. From information received from an official source I am convinced that there is no case of leprosy existing in the Lesser Islands, but mention is made that about 40 years ago the death took place of a woman alleged to have been a leper and of whom very little was known.

Of the 15 cases identified over a period of one hundred years, there are two surviving ones, Cases 9 and 10, both over 50 years of age, and afflicted with the anaesthetic form of leprosy. Their presence today is of diagnostic significance as it appears definitely linked with the past, and ensures relative certainty of the exactness of early observations from which we can view a plane of incidence of long standing."

It is of interest that Case 1 apparently infected Case 4, who in turn infected Cases 5 and 6; the former infected Cases 7, 8, 10 and 11; Case 7 infected Case 9. With exceptions of Cases 1 and 13, all were males. The special danger of child infection is suggested as in the Case 4 being infected by Case 1.

The following diagram indicates the spread of infection.



(Dotted lines show course of infection).

REPORTS

Ndanda Leper Camp, Tanganyika Territory. Annual Report 1935.

M. THECLA STINNESBECK.

We started the year 1935 with 190 in-patients. During the year 40 old patients returned and 130 new patients were admitted.

The number of discharges was 78: 16 patients died, 31 ran away and 31 were discharged, 9 of them cured, the others were put off treatment. In December 1935 the total was 282 in-patients.

Many of the new patients were first treated for hookworm, bilharziosis, yaws etc., after which their general health improved.

Treatment. Hydnocreol and Alepol were given intramuscularly twice a week. The average dose given was up to 5 cc. hydnocreol and 5 cc. alepol 6%. Daily washings of the body with kerosene were performed.

Hydnocreol injections were given to 160 patients: 65 nodular, 54 mixed, 8 active nerve cases, 33 children, of which 5 were nodular, and 28 nerve cases.

Alepol injections were given to 165 patients, all nerve cases.

The age of the patients is as follows:

4	children	2-5	years	of age,
34	,,	5-15	,,	,,
100	adults	16-30	,,	,,
99	,,	30-45	,,	,,
63	,;	over 45	,,	,,

Duration of treatment:

37	patients	under 3	months,
59	,,	for 3	,,
73	,,	for 3-6	,,
156	,,	for 6-11	,,

The results obtained with these 288 patients, who were under treatment for at least 3 months are:

16 died,
22 worse,
42 stationary,
122 improved,
77 much improved,
9 clinically cured.

The detailed results according to the duration of treatment are:

	3 months	3-6 months	6-11 months
died	4	5	7
worse	4	9	9
stationary ...	8	19	15
improved ...	26	49	47
much improved	5	30	42
clinically cured	0	2	7

Deaths: 16.

6 deaths were due to leprotic cahexia,
4 ,, ,, ,, ,, pneumonia
2 ,, ,, ,, ,, hookworm
2 ,, ,, ,, ,, poisoning by native drugs.

Worse: patients 22:

1 slight nerve case,
14 advanced nerve cases,
1 beginning nodular case,
6 advanced nodular cases.

Improved: patients 122. The patients complained less of nerve pains, wounds closed, raised patches flattened, dry skin began sweating and their general health became better. 13 patients improved after severe lepra reaction.

Much improved: patients 77. In some cases the nodules had almost gone, anaesthesia partly gone, sweating sometimes returned and wounds closed. Many who were unable to do hard work are now working hard in their fields. Many helped in the building of the dispensary and are none the worse.

Clinically cured: patients 9. They were all nerve cases, 5 of them children.

It might be worth while to give a list of the results, grouping them under hydnocreol and Alepol treatment.

	Hydnocreol	Alepol 6%
died	10	4
worse	8	14
stationary ...	10	32
improved ...	65	57
much improved	46	31
clinically cured	8	1
	147	139
poisonings ...	—	2
under 3 months treatment	13	24
	160	165

Kerosene rubbing. 45 cases of nerve leprosy, who were under treatment with Alepol were daily rubbed with kerosene from head to foot for a period of 2-4 months. It was interesting to observe the raised patches flattening, some cases after 2 months.

I leave the comparative results of hydnocreol and Alepol treatment open to criticism. We obtained better results with Alepol this year

than the previous years. I suggest it might be due to the higher concentrated solution of 6%.

Bacteriological examinations. Only nasal smears were taken. We were astonished to get so many patients negative, who were positive the previous year. The positive percentage was diminished from 34.5 to 15%. I doubt about this good result. It is possibly due to faulty circumstances, for instance, during the dry season the nasal discharges might be less than during the cold and raining season. We will control the patients again.

The new dispensary with a large hall for dressing wounds etc., is almost finished. We have now a fine airy dispensary consisting of four rooms. The largest room is for the injections and is divided by a wall for the males and females, a laboratory, a consultation room and a smaller room, which is used for an office. I wish to renew my grateful thanks to the B.E.L.R.A., for the grant given for the building.

My hope to get 100 leprous children is not yet realized. It takes time till African natives have confidence in European treatment and entrust their children to us.

Bunyonyi Leper Colony, Uganda.

Report for 1935.

Dr. R. T. S. Goodchild reports:—

The year 1935 has been a successful one in that the general health and contentment of the leper population has been maintained at a high level. The epidemics common in the country have not affected the Island, with the exception of four cases of cerebro-spinal meningitis, one of which died. This disease has been prevalent in the surrounding district.

A certain number of new cases have been admitted and at the close of the year the total number of lepers resident on the Island was 502, of which 181 were men, 140 were women and 181 children under 16 years of age. There has been a certain amount of coming and going, as in previous years, between the Island and the lepers' own villages.

The children in the leper school now number 130, and a high standard of efficiency is maintained by Miss Langley and the native staff—untainted and lepers.

The programme of rehousing the whole population in permanent huts has had to be brought to a standstill for lack of funds. About a quarter of the total population are adequately housed in the huts erected in 1934 and in the first month of 1935. The remainder are still living in grass huts, of which many are in a state of partial or complete collapse. Unwilling as we have been to do so, we have been compelled to spend money on the rebuilding of 40 grass huts, as many lepers were literally without a roof to their heads. About 60 more are urgently needed unless the programme of building permanent huts of brick can be recommenced immediately. About 110 permanent huts are required as soon as possible.

Financially we have balanced the budget, but only at the cost of drastic reductions in expenditure on such items as meat for the lepers, and aid to crippled lepers for food. Of the £150 granted by the Native Administration about £50 was expended in continuing last year's building programme for the first six weeks of the year: the remainder has been used for vital services—repairs and upkeep etc. The £350 granted by the B.E.L.R.A., for maintenance has been used in current expenses—native staff, transport, customs, housekeeping and travelling. The £50 granted by the B.E.L.R.A., for building is about to be expended on building three permanent houses for senior untainted native staff. The remainder of the income of the colony is drawn from Mission sources.

The success of the colony as a public health measure is evident: very few cases of leprosy are seen in the district or in the Kabale clinics. The lepers themselves are in better general health and in many cases the disease is markedly improved. Our chief need, as may be seen from the above report, and is obvious if the Colony be visited, is for increased financial aid for permanent buildings.

Kenya Colony and Protectorate.

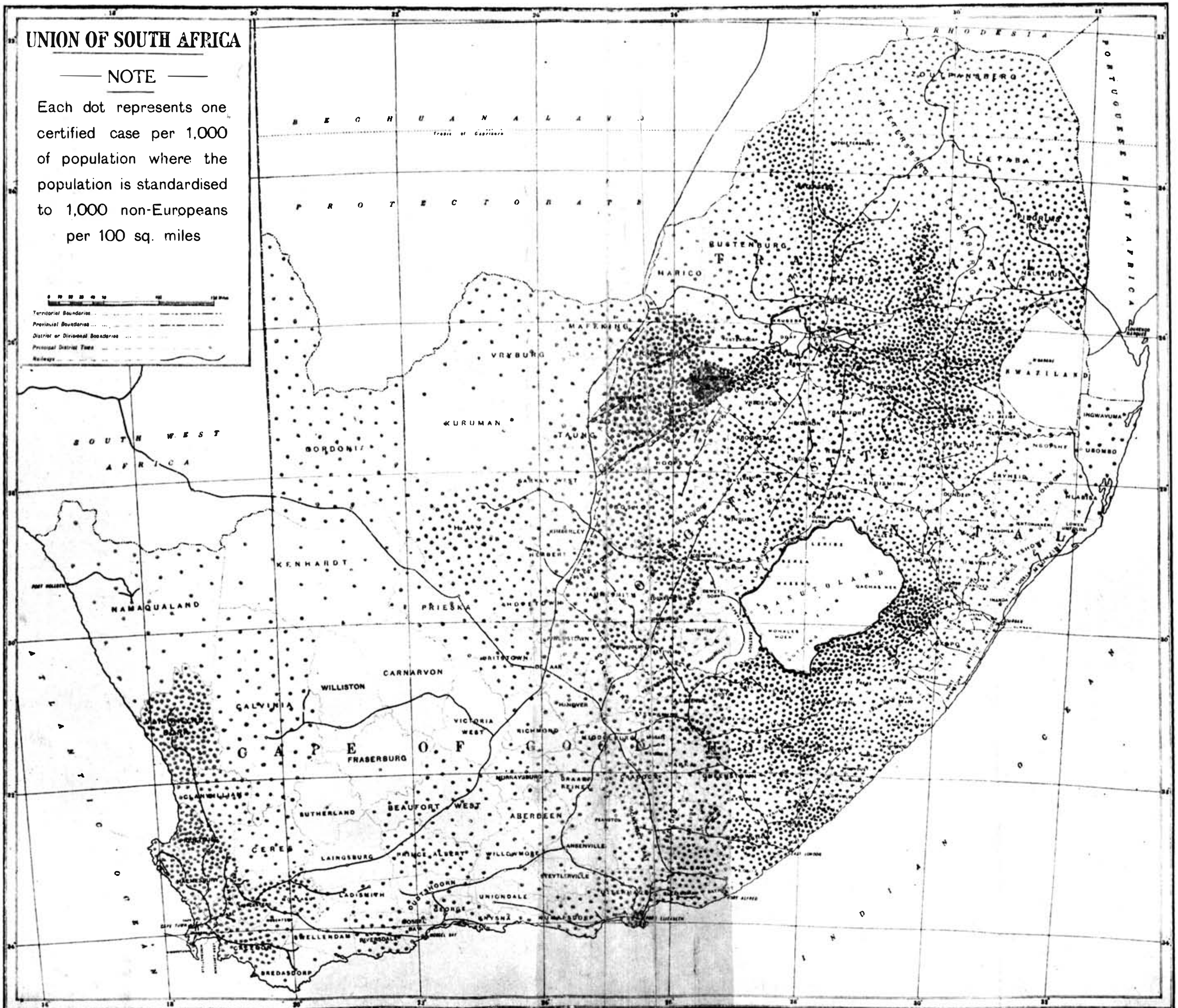
Medical Department Annual Report for 1934.

Three hundred and forty-five cases of leprosy were under treatment during the year. These figures, having regard to the facts that about another thousand cases were seen at out-patient dispensaries in one district alone, and that there must be many other cases which have never come to our notice, might be thought to give no indication of the amount of accommodation that we have at our disposal for the treatment of cases of this disesase.

To a certain extent it is undoubtedly true that the number of cases which we treat is determined by the accommodation at our disposal, but it is equally true, I think, that if there had been a startlingly large number of cases of this disease requiring hospitalisation we should by this time have had more beds at our disposal, for sooner or later, an irresistible demand is usually met at least to some degree. There has, however, been no such great demand for treatment. Against this fact it might, however, be argued that there has been no demand because we have been unable to show that we can do much to ameliorate the disease by specific methods of treatment, and to such an argument it might indeed be difficult to supply an answer, for very consistently the reports of Medical Officers concerned in the treatment of leprosy are to the effect that it is extremely doubtful whether specific therapy is of much value in more than a very small percentage of cases. Nevertheless, the prestige of European medicine as a whole is now so great among Africans that I feel sure that if the incidence of the disease were high we should see many more cases, while as it is, except in a few areas, the number of cases which apply for treatment is very small.

(Experience in India shows that in many places the incidence of leprosy was supposed to be low until special clinics were opened, surveys conducted, and propaganda carried out. These measures soon showed up a very high incidence.—Editor.)

LEPER SETTLEMENT, MAKOGAI, FIJI—(TOP) MEN'S COMPOUND (BOTTOM) WOMEN'S COMPOUND.


UNION OF SOUTH AFRICA
NOTE
Each dot represents one certified case per 1,000 of population where the population is standardised to 1,000 non-Europeans per 100 sq. miles
BECHUANALAND
PROTECTORATE
SOUTH WEST AFRICA
RHODESIA
PORTUGUESE EAST AFRICA
TRANSVAAL
ORANGE FREE STATE
NATAL
BASUTOLAND
SWAZILAND
CAPE OF GOOD HOPE
INDIAN OCEAN
ATLANTIC OCEAN
NAMAQUALAND
KENHARDT
PRIESKA
CARNARVON
WILLISTON
CALVINIA
FRASERBURG
SUTHERLAND
BEAUFORT WEST
ABERDEEN
CERES
LAINGSBURG
PRINCE ALBERT
LADISMITH
OUDTSHOORN
UNIONDALE
GEORGE
KNYSNA
SWELLENDAM
RIVERSDALE
BREDASDORP
CALEDON
VRYBURG
KURUMAN
GORDONIA
MAFEKING
MARICO
RUSTENBURG
ZOUTPANSBERG
LETABA
PIETERSBURG
VICTORIA WEST
RICHMOND
HANOVER
MURRAYSBURG
KIMBERLEY
HERBERT
BARKLY WEST
TAUNG
INGWAVUMA
UBOMBO
NONGOMA
ESHOWE
WILLOWMORE
STEYTLERVILLE
JANSENVILLE
PORT ALFRED
BRITSTOWN
VENTERSDORP
FRANKFORT

Union of South Africa. Annual Report of the Department of Public Health. Year ending June, 1935.

Tables G (i) and G (ii) indicate the position at the close of the year. It will be seen that a total of 2,144 patients were in the five institutions; 1,605 were probationally discharged; the number of cases in the institutions has decreased by 11 as compared with last year. While the number of Bantu patients still remains high, the European and mixed coloured cases have maintained a low level which was reached about five years ago after a period of consistent diminution. This is a very satisfactory state of affairs if it is remembered that the provisions of the Leprosy Repression Act of the Cape Colony, 1884, were by no means vigorously enforced until very late in the nineteenth century.

In the case of the Bantus, the high number of patients in our institutions is cause for neither alarm nor disappointment, as this is mainly due to early diagnosis. It has always been realised that the success of the Department's policy of compulsory segregation depended largely upon early diagnosis, but only since the establishment of medical schools in the Union has it become possible to ensure in a practical way the recognition of the disease in its earlier stages. The demonstrations arranged at the Pretoria Leper Institution for parties of students from the Universities of Capetown and Witwatersrand and the post-graduate courses arranged for district surgeons in connection with these universities, are probably largely responsible for the earlier diagnosis of the condition. There has been a reduction during the past decade of the average duration of the period between onset of disease and admission into an institution, from eight to six years, and with it a very considerable increase in the number of early cases admitted.

On account of these early cases our percentage of discharges has been maintained in spite of an increasing population of advanced cases of the nodular type; these cases, which ten years ago formed about one tenth of the institution population, now represent approximately 30 per cent. of the inmates.

The probationally discharged cases are kept under surveillance for a period of six years after discharge and the cases which have successfully passed through this period without recrudescence of symptoms now number 1,909.

In the report for the year ended 30th June, 1934, a map showing the relative incidence in the non-European population for the period 1900-1930 was included. In this map each dot represented one case per 10,000 of population, but as it was felt that those unacquainted with the uneven distribution of the population in this country may inadvertently draw erroneous conclusions, on the suggestion of Dr. A. Pijper, a member of the Leprosy Advisory Committee, it was decided to publish the accompanying revised map—opposite page 124—in which the population is standardised and each dot represents one case per mille per 100 square miles, thus a small comparatively thickly populated district with a low incidence, e.g. Capetown with an incidence of .069 per 1,000 p.a., will no longer compare unfavourably with larger but less thickly populated districts with a more or less similar incidence, e.g. Barberton and Pilgrims Rest in the Transvaal .068

and .076 p.a. respectively. The new figure for charting was obtained thus :—

$$\text{Incidence per 1,000} \times \frac{\textit{Area in square miles}}{100}$$

thus the incidence in Capetown for the period under review is represented by 10 dots, in Barberton by 98 dots and in Pilgrims Rest by 129 dots, giving a true representation of the relative incidence of the disease in that the spacing of the dots is similar in districts of similar incidence.

This map represents some definite features which at present are difficult to explain but which nevertheless call for a short discussion. The relative incidence of leprosy during the period under review was greatest in the thickly populated agricultural areas round the Cape and that part of the Union which lies to the East of longtitude 25. This appears in distinct contrast to the complete absence of cases in the Karroo. While the low rainfall may present itself as the obvious explanation for the absence of leprosy in the Karroo, the very low incidence in the Natal coastal belt does not bear out the converse as this happens to be the area of greatest rainfall in the Union.

The District of Klerksdorp is prominent for its very high incidence. It must be explained, however, that this is due to the establishment of a refugee camp in the area during the Anglo-Boer War. There appears to be no obvious reason why the Districts of Vereeniging and Waterberg, and, to a lesser degree, Ventersdorp and Piet Retief in the Transvaal should not conform with their neighbours. The southern districts of the Free State bounding on Basutoland present a similar problem; so does the sparsely populated Van Rhynsdorp District of the Cape with its high incidence, and in contrast the thickly populated area between the Swartberg Range and the South Coast.

It is also noteworthy that on this map there appears to be no association between leprosy and other endemic diseases which tend to undermine the constitution and lower the resistance of the population, e.g. malaria and bilharzia. At this stage it is difficult to explain these and other anomalies. It is probable that the issue is obscured by our having reviewed too long a period on the same map, as it is possible that a wave of infection has spread from the Cape into a virgin soil and that the crest of the wave is reflected at various points. Broadly speaking the one consistent feature appears to be association between the density of the population and the incidence of the disease, with the Natal coastal belt as a notable exception to this generalisation.

TABLE G (i).—LEPER INSTITUTIONS: PATIENTS THEREIN ON 30TH JUNE, 1935.

Institution	European.		Native.		Mixed Coloured.		Asiatic.		Total.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Persons.
Pretoria	65	33	403	248	66	40	3	3	537	324	861
Mkambati	—	—	116	105	—	—	—	—	116	105	221
Emjanyana	—	—	314	303	—	—	—	—	314	303	617
Amatikulu	—	—	222	145	—	—	—	—	222	145	367
Bochem	—	—	41	36	—	1	—	—	41	37	78
TOTAL.....	65	33	1,096	837	66	41	3	3	1,230	914	2,144

TABLE G (ii).—LEPROSY: CASES REMAINING IN THEIR OWN HOMES ON 30TH JUNE, 1935.

	Certified and Awaiting Removal to Leper Institution.	Home Segregated.	Probationally Discharged from Leper Institutions.		Total.
			Still under Surveillance.	Released from Surveillance.	
Cape (Prov. proper).	—	2	157	385	544
Transkei	7	2	530	530	1,069
Transvaal	1	1	517	486	1,005
Natal	—	—	308	396	704
Orange Free State UNION.....	—	—	93	112	205
	8	5	1,605	1,909	3,527

Ngomahuru Leprosy Hospital, Southern Rhodesia.

The following is abstracted from the Report for 1935:

No. on 1st January, 1935 ...	536
Admitted for treatment	116
Re-admitted for further treatment	14
Re-admitted for economic reasons	3
Discharged	114
Died	37
Deserted	2
Transferred to Mtemwa	1
Remained on 31st December, 1935	515

The total number of cases treated is 669, as compared with 635 for 1934.

Personally I have no doubt whatever of the value of iodised esters in the treatment of leprosy. I admit that there are a few cases who show no improvement whatever with the iodised esters, and they are not all cases of poor physique. Cod liver oil is of great help in cases of poor general physical condition.

In Southern Rhodesia many early cases prove to be abortive, and are emphatically not suitable for admission to a leprosy hospital. In these cases, in my opinion, no specific treatment is required, unless the patient shows signs of becoming worse.

In fairly advanced neural and mixed cases, iodised esters have effected remarkable improvements, nodules, infiltrations, maculae and anaesthesia having been caused to disappear entirely.

A few advanced nodular cases have improved considerably, both in appearance and as regards microscope examinations, but I believe that the majority of such cases are hopeless. Being the main transmitters of the disease, they must be kept segregated.

From the point of view of the patient, it is almost imperative to give treatment by injections. It would be impossible to keep patients in hospital without treatment. They demand it: without it they would desert.

Travelling expenses for the Medical Superintendent have been made available, and most of the discharged patients have been

examined at the Headquarters stations of the Native Commissioners in the district, except at Gutu, which has yet to be done. Chibi discharges were sent here for examination, as opportunity arose, this method being more convenient for the Native Commissioner. Of 62 so examined, only 2 were brought in, requiring further treatment, a very satisfactory state of affairs.

The issue of Governor's Warrants for detention have been suspended—a great step forward.

Leprosy in Nyasaland.

The Director of Medical Services reports as follows:—

"There are in this country 12 clinics all administered by Missions, at which lepers are treated either as in-patients or out-patients or both. All of them receive money grants from Government in proportion to the number of cases treated.

Arrangements in regard to staff, housing and maintenance of patients at the various clinics vary considerably. Some have a doctor in charge, with a qualified nurse and native subordinates; the majority are in charge of a qualified nurse. Housing varies from daub and wattle huts to well-built red brick structures.. At some centres the lepers have been encouraged to grow their own food supplies; at others food is bought in bulk by the Mission concerned. One or two of the Missions have started schools for the lepers, and though the majority of them may not be able to gain much knowledge from the instruction given, it is of great benefit to them to have their interest aroused and their minds distracted from their unfortunate physical condition.

The numbers under treatment at the leper centres per quarter were on an average as follows:—

Bandawe 64. Domasi 25, Likoma 17, Likwenu 63, Livingstonia 7, Loudon 17, Malamulo 49.25, Malindi 31.25, Mkhoma 8, Mua 64.50, Mwami 39.25, Utale 97.50.

In addition to the cases maintained and treated by the Missions, 88 male and 18 female lepers were treated as out-patients by Government medical officers.

Newspaper Cuttings

Victories over disease. "It is not so many centuries ago, that leprosy was common in Britain. In the reign of Edward III. it was so widespread that an ordinance was passed insisting on the exclusion of lepers from London; and there were at that time at least two hundred "leper houses" in Britain. The horror in which this disease has, throughout history, been held may be gathered from mediæval records. We learn from these records that a person on being recognised as a leper "shall be approached by the priest and by him told of his condition and fate. Before he is outcast he may make his last confession in the church, and afterwards he is led out into the

churchyard as one dead. After being comforted by the priest, the earth from the churchyard is cast over his feet with the words: 'Be thou dead to the world but alive to God'; and all may pray for him then, even as he asks. Then the leper is led out into the open field and left alone." In Britain leprosy is a thing of the past; and few of our doctors have ever seen a case of this disease."

Where lepers grow their own food. "On the little-known coast of Pondoland at the mouth of the Umsikaba River, is one of the five leper institutions controlled by the Union Government.

Most of the food for the patients is grown or produced on the estate, the extent of which, fully 67 square miles, provides ample sustenance for the 2,000 head of cattle and 400 sheep. In fact the country has proved so suited to ranching that the herd has become a source of revenue to the Government through the sale of cattle, besides providing all the needs of the Institution as regards slaughter stock and dairy produce.

The mealie lands also produce revenue apart from the value of mealies required for local consumption. Finally the successful cultivation of several acres of land set aside for vegetable gardening ensures an adequate supply of green food all the year round, both for patients and staff. In recent years, however, much difficulty has been experienced in keeping the mealie-lands and vegetable gardens free of locusts.

By the adoption of the well-known Transkeian native council system the control of the natives is considerably simplified, as only disputes or complaints which the headman is unable to settle are referred, for final decision, to the able Superintendent. On the whole the patients seem well contented despite their afflictions. They are encouraged to work in the lands as far as their physical disabilities allow, in return for nominal monetary compensation or for certain privileges, the idea being that healthy manual labour is one of the best antidotes to the disease of leprosy."

Leprosy in Madras Presidency. The group leprosy scheme sanctioned by the Government was very useful in carrying out intense anti-leprosy campaigns. The group leprosy officers continued to carry on propaganda work in addition to the instructions they were imparting to medical officers on the latest methods of classification, diagnosis and treatment of leprosy.

Sixteen District Leprosy Councils were formed in the districts in accordance with the resolutions of the Calcutta and Madras Leprosy Workers' Conference held in 1933. It is a matter for gratification that the council at Salem has done much to stimulate public interest in the campaign to eradicate leprosy and the Government trust that the other district councils will emulate the good example set by Salem.

Lepers escape and hold town at bay. Bucharest. Maddened by hunger and cold, between 100 and 150 lepers, including nearly 150 women, who found themselves isolated in the Tichilesti Hospital, ran amok.

Making their escape from the hospital, they found their way into the neighbouring town of Isacea, where the townspeople, horrified

at the gruesome sight, rapidly quitted the streets and barricaded themselves in shops and houses.

The lepers advanced on the Town Hall, where they demanded food and fuel. The authorities promised that their demands should be met on condition that they immediately returned quietly to their quarters.

In the meantime a strong detachment of police was summoned and surrounded the malcontents and herded them back to the hospital.

120,000 lepers in Nizam's State? The Superintendent of the Leper Home and Hospital, Dichpali, in his report for the year 1935 says :—'With no foolish optimism we must face the fact that it is never likely that Hyderabad (Dn.) can be cleansed of its leprosy till the food of the people is more strengthened and their living conditions more hygienic.'

'No one can tell,' he says, 'how many lepers there are in this great State of Hyderabad,' but he roughly estimates them at 120,000 taking the proportion in the villages in an area around Dichpali as the criterion. He remarks that although this is staggering, it would still be stupendous even if it were half that number.

Lepers as carriers of contraband. An unusual method of carrying contraband silk has just been detected by the Calcutta Customs staff. The smugglers in this instance engaged the services of several men suffering from a virulent type of leprosy, and they had yards of silk tied round their waists. They appeared with the contraband material in prohibited territory, apparently with the object of begging alms, but the fraud did not take long to be detected, and as a result of a search a large quantity of silk has been recovered from their possession."

India. An interesting report of the anti-leprosy campaign initiated by the Leprosy Association in the small State of Mayurbhanj in Orissa, India, tells of the practical methods adopted. Careful surveys of 300 villages showed leprosy in over 30 per cent. "Propaganda was conducted by means of wall charts and distribution of leprosy pamphlets explaining the mode of infection, the nature and course of the disease, desirability of segregation and other preventive measures with special reference to local figures and facts. Lantern lectures were also delivered at important centres such as Baripada, Udla, Baisinga, Bangriposi, Sirsa and Joypur.

Two full courses of training on leprosy were held for a month each. The instructions consisted of a series of six technical lantern lectures on clinical stages, diagnosis, pathology, etc.

A leprosy clinic was conducted at Baripada twice a week and also served as a training centre. Laboratory work and preparation of special drugs for injection were systematically done once a week.

Seven hundred and ninety-three fresh cases were found in the three leprosy clinics at Baripada, Baisinga and Bangriposi and also in the State Leper Asylum. The total attendance of both old and new cases was 16,728, of which 11,640 were men, 4,555 women and 538 children.

The State sanctioned a grant of Rs. 6,425, for the anti-leprosy

campaign of which Rs. 6,156-2-8 was spent, leaving a balance of Rs. 268-13-4 at the end of the year."

Western Australia. "The Public Health Department of Western Australia, responsible for an area nearly equal to that of Western Europe and a population slightly below that of the city of Leeds, issues biennial reports which it presents to the Minister of Public Health. The latest, that for 1933 and 1934, was published recently and, though naturally not comparable with reports of fully-developed parts of the earth, contains matter of great importance to epidemiology. The actual population in 1934 was 234,913 males and 206,794 females, a total of 441,707. The birth-rate, which has been somewhat rapidly declining in recent years, was 18.30 in 1932, 17.95 in 1933, and 17.66 in 1934. The death-rate has increased in recent years, that for 1934 was 9.23, the highest in the past ten years, except that for 1929, when it was 9.34. The infant mortality shows an irregular fall, for the present decade it averages about 40. Maternal mortality is about the same as that of England, but its distribution is rather different. In 1933 the total rate was 5.21, in 1934 it was 4.87. Both these rates are above average. In 1934 the rate was made up of 0.90 septicæmia, 1.92 abortion, and 2.05 other causes. The high toll of abortion is noteworthy, for it is general throughout Australia of recent years. The matters of chief epidemiological interest in Western Australia are enteric, typhus (Brill's disease), leprosy and malaria. Western Australia is a vast territory, of which only a few small spots are developed, but civilisation is slowly pushing its way further inland There is, so far as is known, no native disease which the pioneers are likely to meet; their danger, which is enteric, they bring with them. In a civilised community the enteric rate is the measure of sanitation; in a developing country it is also a measure of pioneering, so, in Western Australia, increase in enteric may be merely an index of penetration. In 1932 the enteric incidence was the lowest on record, but 1933, with 81 cases, and 1934, with 87 cases, show advances. The economic condition of the state in the three years adequately explains the rise, which was general, apart from an epidemic of 27 at Boulder in 1933, and another of 19 in 1934 at Kalgoorlie. The Australian form of typhus (referred to in the report as endemic typhus, or Brill's disease) is apparently increasing, the notifications for the past four years being 52, 36, 51, 63. The Australian form is believed to be spread by rat fleas and has a low fatality, which is not increasing.

Leprosy, which is not a native Australian disease, is becoming a serious problem, but the apparent spread in recent years may not be genuine, but the result of greater vigilance. In 1933, some 39 cases were brought to light, and in 1934 the cases known were 45. The patients are mainly aboriginals, but two whites in Perth were found to be suffering from the disease in 1934."

Derby Leprosarium, Australia. "The Minister of Health expressed satisfaction at the action of the Federal Government in agreeing to contribute £5,000 to the cost of the institution.

One of the main reasons that it was decided by the State Government to provide the leprosarium at Derby, Mr. Munsie said, was

the cost and difficulty of transporting patients to Darwin. The Government's proposals involved an expenditure of £10,000 and the Commonwealth's contribution was the outcome of representations made by the Premier (Mr. Collier).

Referring to the Commonwealth's expressed inability to contribute to the cost of maintenance, of the leprosarium, Mr. Munsie said that this was not a serious matter, as maintenance costs would not amount to much more than that of transport now being met.

New Zealand. The report of the leper station at Makogai Island in the Pacific, which is under the jurisdiction of New Zealand "indicates that, since the opening of the station in 1911, till the end of 1934, of the 1,761 patients isolated on the island, 434 have died and 340 have benefitted sufficiently from the curative treatment to justify their discharge, in most cases on the condition that the patient must have been free from all signs of active leprosy, and bacteriologically negative for leper bacilli for two years, must reside in a prescribed area, and not engage in listed callings, and present himself for inspection by a Government medical officer every three months. The conditional discharges from Makogai station, already mentioned, do not include 420 Indians, who, although not yet entirely free of the disease, by treatment and care have been rendered fit, and have at their own request been repatriated to India, where the Indian Government will look after them."

Spain. "According to an Exchange Telegram from Madrid martial law has been proclaimed in Alicnate. Senor Portela, the Premier, stated that this step had become necessary to deal with the disorders created by the extremists who, among other things, had opened the gate of the leper colony and let the inhabitants loose."

Silver Jubilee Fund in India. "It is understood that the total allocation to the Indian Red Cross headquarters is Rs. 18,57,000 of which sum Rs. 1,00,000 is earmarked for distribution to hospitals in Delhi and Simla, Rs. 10,000 to assist hospitals bearing Her Excellency's name, and Rs. 3,13,000 for the British Empire Leprosy Relief Association, leaving Rs. 14,33,000 for Red Cross purposes."

China. "Four Chinese lepers in the C.M.S. leper hospital at Pakhoi, recently wrote a letter to a former missionary who was revisiting the city, enclosing a contribution toward relief work in Quetta (India). They wrote: 'We who know what suffering is and what Christian love and medical assistance mean, most sincerely hope that our Heavenly Father will soon provide the necessary means to rebuild the hospital there, so that those who are sick and needy will not be left uncared for. As an expression of our sympathy with the Quetta sufferers, appreciation of the Christly service of Dr. Holland and his faithful colleagues, and thanksgiving to God for our happiness to see you again among us, we, the patients, have subscribed $19.42 in local currency. On behalf of the patients, we, the undersigned, respectfully request you to kindly help us to forward the money to the proper quarters for the rebuilding of the hospital.'"

Lepers in Congo. "More than 100,000 lepers are to be found in the Congo. The Protestant Missions are doing more for them than any other body in Congo, but much remains to be done, especially in some areas."

Korea. "It is reported that there are more than 14,000 known lepers in Korea. Four thousand of these are being cared for in the public hospital on Little Deer Island, while over 1,000 are being treated in the two Christian leper hospitals at Soonchun and Taiku. The remaining 9,000, more or less, are at large, uncared-for, homeless beggars."

Father Damien. We quote the following from the 'Pacific Islands Monthly':—"On November 18 cables from London announced that the body of Father Damien, the Belgian priest who laboured for 16 years among Hawaiian lepers on Molokai Island will be taken to his native land, for reburial in the chapel of St. Joseph at Louvain. The President of the United States, Franklin D. Roosevelt, has authorised the conveyance of the body to Belgium in an American warship.

The life of Father Damien (Joseph de Veuster) is one of great self-sacrifice and simple heroism. Setting himself the task of ministering physical and spiritual healing to the unfortunate lepers, he toiled faithfully for long years in an atmosphere of filth and squalor, eventually contracting the ghastly disease himself. He died of leprosy among the other sufferers in that little settlement on Molokai which was described as a "pitiful place to visit and a hell to dwell in."

Born of middle-class parents on January 3, 1841, at Tremeloo six miles from Louvain, he commenced his community life at the age of 18 as a drawer of water and a hewer of wood. Owing to his ignorance of Latin and Greek his superiors decided he could not take holy orders. Damien, however, begged the Fathers to permit his brother, who was about to be ordained, to instruct him. This was granted, and he studied with such voracious diligence and made such progress that he was allowed to prepare for the priesthood.

Shortly afterwards a party of missionaries of the Society of the Sacred Heart of Jesus and Mary was making ready to leave for the Sandwich Islands (Hawaii). Amongst them was Damien's brother, then a priest, but he was seized by fever before the departure and Damien besought the authorities to let him take his brother's place.

He was sent, and in 1873 arrived in Honolulu where he was ordained, and given charge of an outside district on Oahu Island. At the dedication service of a new church at Maui some months later, Damien met the Bishop of Honolulu and appealed to him to be allowed to work among the native lepers at Molokai, the state lazaret. Receiving the Bishop's sanction, he left the same day, travelling on a cattle boat to the prison he had voluntarily chosen.

Housing conditions on Molokai were deplorable and the moral plight of the lepers was even worse than the havoc wrought by the disease. Damien commenced work immediately and finding the settlement unsuitable built a new one. He created a permanent water supply and made so many improvements in health conditions that the death-rate dropped perceptibly and the patients sufferings were eased.

His life was a busy one, full of rough hardships and privations. Often the colony ran out of provisions and Damien was the first to go short.

One day after years of toil as he sat instructing a group of lepers, a coal fell from the fire upon the palm of his hand. He did not notice it and felt no burn—and then he knew that the fearful scourge had come upon him. After much suffering he died on April 15th, 1889.

Father Damien and his work among the Molokai lepers was the subject of a vitriolic pamphlet vigorously penned by the great Robert Louis Stevenson in reply to an attack upon the Belgian priest by Dr. C. M. Hyde, a Presbyterian minister of Honolulu. On February 24th, 1890, Stevenson who was recovering his broken health in New South Wales, was shown a copy of the *Sydney Presbyterian,* dated October 26th, 1889, in which Dr. Hyde cast grave aspersions upon Damien's moral character.

After reading the paper, Stevenson leaped to his feet in furious anger, declaring that he must reply at once to smash the traducer of a dead man for whom he had conceived an ardent admiration. Next morning he wrote the famous defence in his room at the Union Club, Bligh Street, Sydney. It was the work of only a few hours and stands now almost exactly as it was in the first hastily written draft.

Stevenson wrote graphically of his own feelings and observations when he visited the leper station. In masterly style he soundly denounced Damien's detractor, handling words, as he expressed it, "to convey truth and arouse emotion." With the skill of a scientist, he dissected and criticised Rev. Hyde's letter and drew a portrait of the missionary as a noble hero labouring among the afflicted lepers.

By and by, after his letter had been published in England, Australia, and New York, Stevenson himself regretted its violence. He confessed that it was "barbarously harsh," and that he might have defended Damien equally well without inflicting pain on others."

Trinidad. "In the glamorous Caribbean Sea, a mile or two from Trinidad, lies a Garden of Eden inhabited by lepers.

It is in the island of Chacachacare, one of the most vividly beautiful spots in an essentially beautiful region. Chacachacare, Island of Lepers.

Green clad slopes receding into innumerable bays with water as clear as crystal and foliage of that intense quality of green that only the sub-tropics know; white builldings with red roofs against a background of coconut and royal palms, the pale haze of the Venezuelan mountains, just nine miles off, hanging on the skyline. Such is Chacachacare, the leper colony of Trinidad.

It is indeed hard to believe that living in this beautiful spot are men and women suffering from the most loathsome disease known to man. To combine ugliness, and leprosy is as intensely ugly as it is pitiful, with beauty is incongruous, but it is a very humane procedure here.

Years ago lepers were shunned as pariahs and unclean persons. In their own interests a humanitarian government stepped in and Chacachacare is one of the results.

The Colony of Trinidad maintains a settlement of no less than 425 men, women and children lepers at Chacachacare, in various stages of the disease. They are governed by a Chinese doctor who has made a life study of this dread disease. The settlement is spotlessly clean, there is no dust, no dirt, everything is washed and scrubbed with meticulous care.

But the inhabitants. Gone are one's first impressions of beauty, cleanliness, of the goodness that is nature, when the lepers come into view. Hopeless cripples, features horribly marred and distorted, sightless eyes, hands without fingers and feet without toes : a mass of bandages comprise what was formerly a man who had been something of an athlete in his early youth; bodies covered all over with huge, festering sores. And on every face a haunting look of hopeless despair.

Such is leprosy at its worst. There is no cure for these people; they are simply waiting, waiting, knowing that some day they will once and for all be relieved of their troubles.

There are others who, to the uninitiated eye, appear perfectly healthy and uncontaminated. But they also are victims, and they receive the very best medical attention in order that they might not get worse, or, in a very minor case, be cured.

Those who are able, are set to work on cultivation and around the institution. For such labour they get paid and are allowed to do what they like with the money; naturally it does not go into circulation on the mainland. The vast majority are glad of the work not so much because of the money it brings in but otherwise the time would lie only too heavily upon their hands, and time goes slowly when one awaits the end, a lingering, ugly, but inevitable end.

The lepers are afforded every possible convenience. They have their own gramophones, their own wireless installations, and even their own motion-picture show. Concerts, dances and amateur theatricals are also held on certain gala occasions for the less-affected sufferers.

There are two churches on the small island, one Roman Catholic, the other Protestant, and services are held regularly at each.

Looking after the women lepers are Sisters of the Dominican Order under the guidance of a Pole, who came to Chacachacare from Switzerland. It is a far cry from snow-clad hills to the burning sun of the sub-tropics, but she is only typical of many who have devoted their lives for the relief of sufferers of the dreaded leprosy. The sisters live in a small convent situated on a lovely promontory across the minute entrance bay, and as one leaves the island the last thing to catch the eye is their convent with its verandah-hidden facade of purple bouganvillea and scarlet hibiscus.

For the men there are cricket and football pitches and they manage to put up quite good games between the inmates. Pigs and goats are kept, the latter for milk and the former in case the supply of fresh meat from the mainland runs out.

In the event of a child being born in the settlement, an extremely rare occurance, the newly-born infant is taken away from the mother immediately and within two or three hours is in an institution in Port-of-Spain, Trinidad's capital. There every effort is made to free the child from any contamination it may have."

REVIEWS

International Journal of Leprosy, Vol. 3, No. 4. Oct.—Dec. 1935.

REPORT OF THE PHILIPPINE LEPROSY COMMISSION.

Of late there has been increasing evidence of dissatisfaction on the part of certain elements of the people with the present manner of leprosy control, with special reference to the system of segregation and conditions of parole. This led recently to a movement on the part of the Philippine Legislature to modify the system, in consequence of which His Excellency, Governor-General Frank Murphy, on July 23, 1935, appointed a commission to study and report upon the problem of leprosy control in the Philippines. The personnel of the Commission was selected to represent those concerned with the legislative, administrative and technical aspects of leprosy work in the Philippine Islands, and comprised a number of influential public-spirited members of the lay public.

The following are some of the more important findings of the Commission:—

(a) *Transmission of Leprosy.* For practical control purposes, the leper who is found by standard methods of examination to be bacteriologically positive must be looked upon as the source of the infection. On the other hand those found negative should be regarded, until conclusively proved otherwise, as being incapable of infecting others. The length of the contact period necessary to cause infection has not been definitely determined. Formerly it was believed that it was long, as measured possibly in months, but evidence is accumulating which indicates that the infection may be transmitted by relatively brief contact. Consequently, for the purposes of control, it is to be considered that any appreciable amount of direct contact between an infectious case and a susceptible person may cause infection.

(b) *Susceptibility to Leprosy.* It is accepted as a fundamental principle that children as a group are especially susceptible, and that the disease is ordinarily contracted during childhood. On the other hand, adults are comparatively immune, for while they may acquire the disease the occurrence of such cases is relatively infrequent.

(c) *Curability of Leprosy.* Treatment of leprosy by modern methods serves to delay its progress, and in many cases results in clinical improvement to a degree so marked that it permits the leper to return to normal life. However, there is as yet no conclusive proof that treatment will absolutely cure the disease in the sense of complete elimination of the germ from the body. It shortens the duration of the bacteriologically positive stage, and prolongs the duration of the negative stage, which may become permanent. Clinical cases which have never been positive may be prevented from becoming so by proper treatment. Likewise, treatment may prevent relapse in patients who previously have been positive but have become negative.

(d) *Recommendations.* It is recommended that group segregation be continued as a basis of leprosy control in the Philippine Islands; that the number of regional treatment stations in the Philippine Islands be increased; that regional agricultural colonies be established for the segregation of positive lepers who are physically fit to engage in agricultural work, and that one such regional agricultural colony be established in one of the provinces adjacent to Manila. That facilities be provided for the adequate observation of negatives prior to parole and follow-up of paroled lepers, and that the bill submitted for that purpose be enacted into law; that funds for the subsistence of segregated lepers be appropriated on a per capita per day basis, and that this sum be fixed at twenty (20) centavos per day per capita for 1936; and that the children of lepers be separated from their parents at birth, and that the necessary additional facilities for the care of such children be provided at Welfareville.

Two members of the Commission, Drs. Manalang and Chiyuto, put forward the following hypothesis regarding transmission :—

" Nature of leprosy : infectious.

Etiological agent : a microscopically invisible (virus) stage in the life cycle of Myco. leprae. The bacillus is a late manifestation of the disease.

Transmission : not hereditary; infection post-natal. Disease acquired by the susceptible through frequent and prolonged skin-to-skin contact. Therefore, primary lesions are multiple, not single.

Sources of infection : both bacteriologically positive and negative lepers (open and closed cases, respectively), and also the cured or paroled cases, are capable of transmitting the disease to the susceptible.

Susceptibility to infection : adults are immune; infection is acquired only in infancy or early childhood before reaching the age of three years; both sexes are equally susceptible.

Incubation period : relatively short; evolution long and very variable.

Curability : not curable as far as known at present."

These new orientations suggest a new alignment and certain revisions in our methods for the prophylaxis of the disease. Adult immunity, infant susceptibility, infectiousness of the negative and ' cured ' leper, and incurability of the disease are certainly fundamental in shaping control measures. However, there is as yet only a very small minority supporting the above revolutionary ideas, which are contrary to the rooted conceptions in leprosy.

In answer to these propositions is opposed the generally accepted view on adult susceptibility. A few of the citations are given as follows :—

Talwik, who surveyed the history of leprosy on the island of Oesel in Estonia during 1903-1904, found numerous cases of leprous maid-servants causing the infection of the housewife or the master of the household, or the opposite case of the servant becoming infected from a leprous individual in the household. He also records several

instances in which marriage or a love affair between a leper and a healthy person ended in infection of the healthy partner. In a recent report from Estonia, Spindler states that, contrary to the findings in other countries that the majority of infections occur before the twentieth year, the opposite is the case in his country; most of the infections there occur after the thirtieth year.

Blaschko and Kirschner thoroughly studied the spread of the disease in the Memel outbreak, which occurred in East Prussia and which was traced to five Russian servant girls entering the province between 1848 and 1880. From their findings an especially interesting occurrence may be cited. A leprous servant girl infected the father of the family in which she was working, and also three of the children. From this family the infection next spread to another family, in which the mother, three children, a female servant, and the second husband of the infected mother were attacked.

Another experience which may be cited is the introduction of leprosy into the island of New Caledonia. Grall recorded that it was brought by a Chinese who died about 1865 after sojourning for two years with a certain tribe. A woman of this tribe, an adult, was attacked one year after the death of the Chinese, or three years after the latter's arrival. From that time the spread was very rapid, and Ortholan reported that ten years later one-fourth to one-half of the population in certain districts had become leprous. From New Caledonia the disease invaded the neighbouring Loyalty group.

New Caledonia was later used as a penal colony for French criminals. Jeanselme reported that, from 1888 to 1898, 132 cases had occurred among Europeans, chiefly among the prisoners and especially among those under parole who mixed freely with the natives.

Regarding the desirable negative period prior to parole, the following recommendations were made:—

1. The preparole negative period should be one year, since the greatest number of relapses may be expected to occur within this period. The examination of negatives prior to parole should be once a month, at least. In order to avoid delay in effecting parole, the final examinations should be made twice a year as heretofore. In view of the great number of negatives to be examined, both under segregation and paroled, a permanent bacteriologist should be assigned to the committee which makes these final examinations.

2. To overcome one of the chief obstacles to a satisfactory follow-up of paroled patients, funds should be provided for their transportation to the place of examination.

3. Since many paroled patients live unsettled lives, parole officers should seek them out rather than depend upon their reporting themselves, and municipal authorities should be requested to report the presence of such patients living within their jurisdiction.

4. Systematic records of all lepers should be kept by the Bureau of Health, setting forth all data of interest covering the periods before and during segregation, and after parole.

With regard to the sterilization of lepers, the following may be quoted:—

"There seems no reason to doubt that compulsory segregation of all adult lepers outside of segregation institutions, and of all

male lepers in such confinement, would be a very effective measure to control the disease in a country, since young children living with lepers constitute the main source of new cases. However, this Committee realizes that it would be utterly impracticable to attempt to introduce such a general measure. In fact, it would not be desirable if it were possible, for in many cases the disease can be overcome to an extent that will permit the patients to return to normal life, which includes the fundamental privilege of parenthood.

" On the other hand, the situation is very different with those in whom the disease is incurable and who live in colonies. Though such people should have the privilege of married life if they so desire, they should not be permitted to procreate. It is true that this could be avoided by birth control if effectively practised, but that measure is clearly impossible among the poor and ignorant people from which most of our leper population is derived. Sterilization of the males would be the only effective measure.

" It is the opinion of this Committee that sterilization of the males under the conditions named might be seriously considered for adoption in our colonies, with the proviso that it should be strictly voluntary. It might be made a prerequisite to marriage, as in Japan and the asylum in Korea that has been mentioned. The introduction of this measure would then leave to the individual man free choice between on the one hand a celibate life in a dormitory or a house occupied only by men, and on the other home life—with, if desired, the privilege of adopting one or more children already afflicted with the disease, thus providing normal family life for three or more people. With added inducements such as a small farm or homestead, materials for a house and tools to work with, such couples might well become self-supporting, self-respecting normal citizens, neither a burden to the State themselves nor offering future burdens for the State to carry."

Regarding marriage of lepers, the following conclusions and recommendations are made:—

1. This Committee strongly endorses the view that, for reasons which pertain to all aspects of the leprosy work, the conditions of life in the segregation institutions should be made as nearly normal as practicable.

2. Family life, which involves marriage among lepers, should be permitted and encouraged among the classes of inmates for whom this is desirable in the institutions in which it is feasible—referring to the colonies and not the treatment stations.

3. The principal objection to marriage among lepers, namely the resultant birth of children to leper parents, does not outweigh the advantages of family life. However, because these children create problems for the parents, the State, and the individuals so born, the prevention of childbirth by sterilization of the male partners is suggested. This intervention should be strictly voluntary, and it might be made one of the conditions upon which permission to marry would depend.

4. Further requirements that should be considered as regards feasibility are: (a) that the partners should undertake to support themselves, wholly or in part, and (b) that they should adopt and

support a leper child from among those in the institutions, which would be advantagous to the families, the children and the State.

5. In this connection, consideration should be given the liberalization of the divorce laws in favour of lepers, in order to ameliorate the circumstances of both the segregated people and the families whom they leave behind.

Prof. W. I. Kedrowsky writes on *Modern Aspects of the Epidemiology of Leprosy*. He puts forward a 'working hypothesis for the scientific proof of which a number of links are still missing.' He writes as follows:—

"Lepers discharge myriads of acid-fast bacilli, and these in part are inhaled by people in contact with the patients, and in part are deposited upon surrounding objects. Most of the microbes that are detained by the oral and nasal mucosa undergo no further development and perish. By living in the human organism they have become so much individualised on account of their close relation with the cells and fluids of a particular individual that in another one, with his different biochemical and immunological peculiarities, they cannot become adapted. When adaption does occur it is exceptional and occurs very gradually.

The microbes that are deposited upon the surrounding objects also perish for the most part. However some—perhaps those that possess the highest vitality—adapt themselves to the new surroundings by making an abrupt and unexpected mutation, thus producing a new form with considerable resistance against harmful outside influences. The filaments of the actinomycoid species and the streptothrices, as well as the mycoids obtained from acid-fast cultures from leprosy and tuberculosis, are distinguished by a great capacity for growth and a striking resistance to desiccation. At a certain stage these actinomyces produce the so-called spores, or conidia, with which the branching filaments end. Any disturbance disseminates these spores in the air, and when they are inhaled by people they are detained by the mucosa of the upper respiratory tract.

"Why does the microbe need such a cyclic course in its development? First, in order to renovate its vital capacities, since by passing into another form it must considerably change its vital aims. Second, in order to lose the too-individualized qualities acquired by life in a diseased person, which interfere with its adaptation to a new one. It may be recalled that I infected the rabbit, not with the acid-fast microbe taken from the leprous nodule, but with acid-negative strains that had lost their former biologic qualities, i.e. their former individuality.

"Having penetrated the mucosa, the modified microbe is taken by the blood or lymph stream to the lymphatic glands and in general to the organs rich in reticulocytes and endothelium, by which they are phagocytized. This phagocytosis usually leads either to their destruction or to their further development within the phacocytes. Those organisms that are not destroyed, having reached a certain stage of dissemination and perhaps maturity, finally get to the skin, for which they have a certain affinity just as the organism of typhoid fever has for the lymphatic system, or the toxic of tetanus for the nervous system."

The following is a summary of an interesting article on Incipient Lesions of Leprosy, by Drs. Rodriguez and Plantilla :—

" Some leprosy workers believe that there are many frustrated cases of the disease which never develop marked cutaneous or neural manifestations and therefore are seldom seen in treatment centres and never in hospitals. To obtain direct evidence on this matter is difficult, as it needs periodic examination of many such cases, together with their contacts, carried on systematically over a long time—at least from ten to twenty years.

" We have had the opportunity of examining repeatedly two distinct groups of patients showing the earliest, bacteriologically negative lesions of leprosy, along with others who have been in contact with the disease, but as yet show no manifestation of infection. However, the maximum period that any of these cases has been studied is only seven years, so that our observations must be considered as merely preliminary.

" The first group, observed for seven years, consists of 336 children born of leper parents at the Culion Leper Colony, previous to 1924. They had been exposed to the disease for varying periods of time. We have also taken into consideration the studies by Chiyuto and Manalang on younger Culion children born after 1924 and now taken care of in Manila. In these children at Culion the chaulmoogra preparations, administered intramuscularly, did not prevent the development of bacteriologically positive lesions. Transfer of Culion born children to Manila when two years of age has apparently diminished greatly the number becoming positive. Nevertheless, Manalang and Chiyuto have found that almost all these young transferred children show lesions which they consider early manifestations of leprosy. These findings suggest that good hygienic care and proper food do not prevent the appearance of clinical symptoms, but do tend to prevent the infection from progressing to the bacteriologically positive stage—in other words, under these conditions many cases are "frustrated." However, final conclusions must await several more years of study of these cases.

" The other group consists of 225 "closed" cases of leprosy treated at the Cebu Skin Dispensary (out of a total of 563 cases seen there) who have been re-examined clinically and bacteriologically at least twice. The period of study varied from seven months to four years, the average about two years. Of these cases, 31 or 13.8 per cent. had become bacteriologically positive during the period of observation.

" The sex incidence of those becoming positive is practically equal, 13.6 per cent. among the males and 14.0 per cent. among the females, but interesting differences between the two sexes in the age distribution were noted.

" With regard to the type of lesion, the red macule was the one most apt to become positive. A sudden change in the area of localized anaesthesia independent of macules, either a rapid increase or decrease, was found to be of ominous import.

" The proportion becoming positive in the small group which had received treatment regularly was significantly less than in the larger group treated irregularly, although in some cases even prolonged intensive treatment did not prevent them from becoming positive."

Dr. Isamu Tajiri, writing on "*Leprotic Changes in the Lung*" comes to the following conclusions:—

"In a case of nodular leprosy bacilli enter the lung in more than one way, but chiefly by the blood stream, and there they produce small lepromata in the alveolar septa. These, however, do not grow to a size sufficient to be detected microscopically, as usually occurs in the liver. As for the macular or neural case, leprotic changes never occur in the lung except in nerves.

"The author has recently seen an article on lung leprosy published in India. In this is given an account of a patient whose sputum contained many acid-fast bacilli which when inoculated into guinea-pigs caused no infection, by reason of which it was concluded that the presence of the bacilli was due to lung leprosy. As is seen from the foregoing, the present writer is of the opinion that leprosy bacilli are scanty in the lung. It is believed that bacilli found in the sputum come from the upper passages rather than from the lung, since advanced cases of nodular leprosy always have leprotic infiltration of the pharynx and larynx and these often ulcerate."

Dr. H. C. de Souza-Araujo writes regarding the use of methylene blue in the treatment of leprosy:—

"Leprologists aware of these experiences, and familiar with the article on toxicity of certain proposed antileprosy dyes by Emerson and Anderson, will not use methylene blue and other dyes in leprosy."

Dr. Lie gives his personal experience in seeking for bacilli in *leprides*. Examinations were made of material from 10 cases, 4 of which were *tuberculoid* leprosy. His method of examination is as follows:—

"The pieces of skin are fixed in a 10 per cent. formalin solution, or in Muller's fluid. The first mentioned is the simpler and handier, and possibly the better for the demonstration of bacilli; the other fixative is more suitable for the examination of cell and tissue-structure. The pieces can remain in the fixing fluid for 24 hours, after which they are well rinsed in water and then hardened in alcohols of increasing concentration. If tissues are left in the Muller fluid very long they may become so hard that it will be difficult to obtain thin and good sections. The tissues are generally embedded in paraffin, though one may also use celloidin, which affords greater protection of the tissue structure.

"The sections are stained in carbol-fuchsin at 37° C. for 20 to 60 minutes, though there is rarely any advantage in staining for longer than 45 minutes. One first examines a few sections that have been stained for 20 minutes; if bacilli are not found in these the staining must be prolonged. After rinsing the sections in water decolourization and counter-staining is effected with Gabbet's fluid for 30 seconds or a little more, according to the thickness of the sections. They are again rinsed in water, cleared in xylol, and mounted in Canada balsam. The contrast colour is always somewhat faint, but that is of little significance for the finding of bacilli; in fact, a faint counter-stain is often preferable to a deep colour. However, if one wishes the contrast colour strengthened, one can add carefully a little Loeffler's alkaline methylene blue. Sulphuric acid is absolutely preferable for

work with leprosy bacilli, as it decolourizes them less than the other acids generally used. These organisms are undoubtedly somewhat less acid-fast than the tubercle bacilli."

Under the Editorial and Correspondence, the question of the *Infectiousness of Nerve Leprosy* is discussed. Degrees of infectiousness are classified thus:—

1. Those that have no active surface lesions and are definitely negative bacteriologically in the nose. In the skin there may be only areas of anaesthesia, or at most areas of moderate hypopigmentation, usually indefinitely demarked—" pure nerve cases." The danger from these is probably quite negligible. Some authorities would doubtless also include cases with more definite pale anaesthetic macules which are not progressive, and which do not react to potassium iodide if that is used. In this group will fall many ' abortive ' fully arrested cases.

2. Those with simple, active, progressing macules, hypopigmented in coloured skins; they may be flat and pale throughout, or they may have reddish margins, perhaps with very slight infiltration; there is typically more or less anaesthesia in these leprides and perhaps elsewhere. Lie and others hold that these cases are potentially if infrequently infectious, though bacilli cannot be found in smears from the skin or nose; they find that a few can usually be demonstrated in sections if sought with sufficient care.

3. Those with more marked and extensive skin infiltrations, typically showing abruptly raised edges; the infiltrated portion may be marginal, with central healing; or the entire lesion may be infiltrated; the surface is often irregular, " granular." This refers to the tuberculoid variety. Though, typically, cases of this kind are bacteriologically negative in smears, there is evidence that by and large the lesions contain more bacilli than do the simpler leprides, and that they may occasionally give (very sparsely) positive smears, especially when in a state of lepra reaction. For the present such cases are best looked upon as probably less free from suspicion than the preceding group, though far from the category of the cutaneous-type case.

4. Of a somewhat different clinical category, apparently, are the cases referred to by Muir as " juvenile " which when seen may be bacteriologically negative but are of particularly uncertain future. This may be the group with pale but reddish lesions which Rodriguez, in an article in this issue of the Journal, describes as prone to develop into the cutaneous form. This group needs more precise differentiation.

5. Administratively of a different category from the foregoing are those neural cases which, whatever their original clinical variety, have become bacteriologically positive though without becoming clinically " cutaneous," (i.e. with lepromatous lesions). Such cases, whether the positive smears are from the nose or skin lesions (tuberculoid), are obviously open and are to be dealt with as such.

6. Quite apart from the foregoing, so much so that they hardly come within the scope of the present discussion, are the secondary neural cases. These in the past have had lepromatous lesions which have subsided and left only neural manifestations. These cases are recognized (a) to be apt to have more bacilli in their residual lesions

than have the primary neural cases; (b) to have, frequently persistent residual nasal lesions; and (c) to be prone to relapse."

Infection Lepreuse des Rats par La Voie Oculaire, by E. Marchoux, V. Chorine and D. Koechlin. Extrait des Annales de l'Institut Pasteur. Dec. 1935—Tome 55, p. 632. (The Infection of Rats with Leprosy by the Ocular Route).

This study was undertaken because the face is so frequently first attacked by leprosy. This suggests that infection may take place through the eyes. If rat leprosy can be acquired by rats in this way, then the prescription is strengthened that human leprosy can likewise be acquired by man through infected droplets landing in the eye.

At the union of the lachrymal canal and the gland of Herder, there is a small follicle of lymphoid tissue, the only tissue of that nature found in the orbit. From this the lymphatics drain into the submaxillary and cervical lymph nodes.

Four young rats were chosen and a drop of suspension of rat leprosy bacilli placed on the conjunctiva of each. One died after a month and was found negative. Two were sacrificed after a year. The lymph node in the inner canthus was found enlarged to the size of a large haricot bean and full of masses of Stefansky's bacilli. The submaxillary and cervical glands were enlarged and full of bacilli, and there were a few bacilli in the axillary glands. The last rat was sacrificed 16 months after inoculation. It was the same as the other two, but the gland of Herder was completely degenerated, and the right axillary gland was rich in organisms.

This proves that Stefansky's bacilli can enter through the conjunctiva without lesion, and that they first multiply in the lymphatic tissue.

The authors mention Calmette's work which showed that tubercle infection could not be caused by instilling a tubercle suspension into the eyes of rabbits and guinea pigs; but then there is no lymphoid tissue in the orbits of these animals. In man, on the other hand, there is lymphoid tissue in the eyelids, and it is suggested that the bacilli first multiply in this and thence infect the forehead. On the other hand the infection of the eyeball is not primary, but secondary to generalisation of the disease.

Leprosy Control in Colombia, South America.

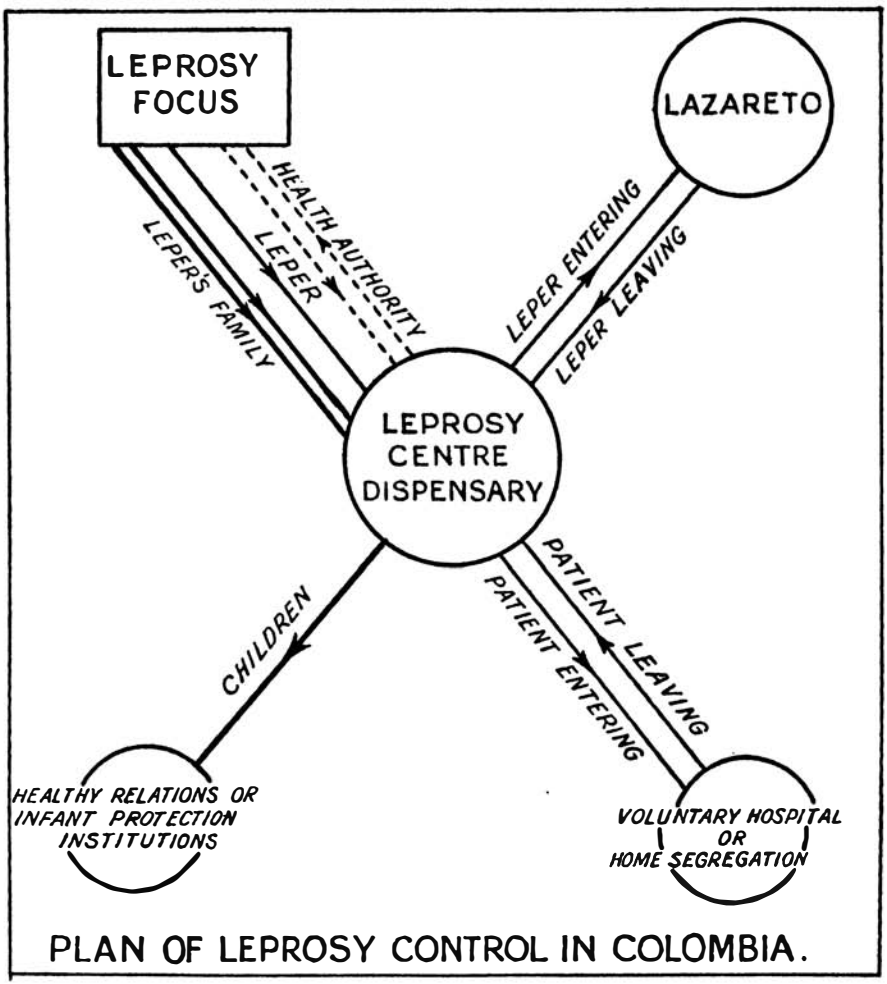
(Translated from Spanish by Dr. J. W. Lindsay.)

In the official report of the National Health Department for the years 1931-32, published in the " Boletin de la Oficina Sanitaria Panamericana " of September 1934, there occurs the following :—

" Campaign against Leprosy. There may be calculated to be a total of more or less 20,000 lepers in the country, which represents a co-efficient of 2.5 per 1,000 inhabitants, which is, indeed, an alarming state of affairs. Supposing that the majority were isolated and that the total of such reached only 15,000, the co-efficient would still be 1.88 per 1,000, which is perhaps nearer the real figure, seeing that isolation has been compulsory in Colombia for some 50 years. The

numbers of lepers, submitted to treatment in the three Leprosy Institutions up till August 1932, reached the figure of 4,443 of a total of 7,347, that had been isolated. From 1919-1931 there were admitted 8,216 patients, of whom 4,892 died, there remaining at the end of 1931, 7,554 cases.

" The approximate number of healthy children under 15 years of age, who live in the Lazareto de Agna de Dios in intimate contact with the patients is 1,338.



PLAN OF LEPROSY CONTROL IN COLOMBIA.

" During the last twelve years the actual annual increase of lepers has been 277 cases, and in the last ten years the nation has spent on the Leprosy Institutions an average of $1,626,763 annually, or some $246 per patient. When one considers the vastness and the importance of the problem, its solution appears to be beyond our powers, however good our intentions may be, but there is one very significant fact, which has rather changed the outlook, and that is that under treatment the majority of the new cases get cured, and within a certain period the infectious cases become non-infectious.

"In a group of 648 cases, specially treated in the Lazareto de Agua de Dios, there have been 24 per cent. of cures in four years. Experience has shown that the establishment of treatment stations for the voluntary treatment of incipient cases is more effective than compulsory isolation.

"On the other hand, it may always be impossible from the economic point of view to isolate more than a certain number of cases, because to isolate 15,000 cases properly, would require a sum of $3,690,000 per annum, about a tenth part of the whole national budget. At the present time, of the funds voted for the Public Health Department, 75 per cent. goes towards the support of the Leprosy Institutions alone.

"It is quite as urgent a matter to fight leprosy, as it is to fight tuberculosis, syphilis and malaria, although these latter are more widespread and cause a greater number of victims, while tuberculosis is a hundred times more contagious than leprosy, and is responsible for 10% of the general mortality. We ought, of course, to follow the shortest and most economical road, but in order that the nation may continue voting 10% of its health budget for leprosy, it is necessary that the regional and municipal authorities should contribute their share.

"The Government ought to take the first step by letting the situation be known throughout the whole land.

"There is, indeed, a proposal at present before Congress with this end in view, and if the bill is passed into law, it will constitute one of the most valuable factors in the work of public health. Two objects will be attained, the co-operation of the provincial, or regional and municipal authorities, and the establishment of anti-leprosy centres or dispensaries, from which the health authorities will be able to reach the whole of the territory of the country, which up to the present has not to any large extent benefitted from the health services."

"Budgeting for Leprosy." "Bolatin de la Oficina Sanitaria Panamericana."—December 1935.

(Translated by Dr. J. W. Lindsay.)

In his message to Congress—July, 1935—the President of the Republic of Colombia, (South America), in reviewing the National Health services, drew attention to the very disproportionate amounts voted for the leprosy institutions, and the very meagre help given for the other branches of the medical services. He made a comparison between his own country and Brazil, where he considers things are much better mananged. He said:

"There is now no mystery about the way in which our Colombian race is undergoing an irreparable biological deterioration through want of proper nourishment, and the ravages of the tropical diseases, which are destroying it.

"In many places the finest specimens of our race, the colonisers of our territories, the founders of our cities are disappearing, and their place is being taken by a miserable crowd of anæmic, malaria-stricken planters of coffee. Isn't there any possibility of ridding our country of those diseases? How is it that Brazil has gradually

regenerated her even more mixed race, and is now saving the people from their endemic diseases?

"The reason is that for a long time now there has been practically a dictatorship in matters of Hygiene and Public Health, which has maintained itself above all considerations of the Law: and there the State has not hesitated to employ a considerable part of their external loans for the expenses of the National Health Department, while the scientific institutes work continually in the preparation of cheap remedies for combating tropical diseases.

"Here, on the other hand, the Republic of Colombia votes 80% —eighty per cent.—of its Public Health Budget of $2,000,000, to meet the expenses of leprosy institutions alone.

"The remaining 20%—twenty per cent.—goes for salaries of officials, public dispensaries, port medical authorities, infant welfare, anti-venereal, anti-anæmic, anti-alcoholic, anti-tubercular campaigns, for the Samper and Martinez Laboratory, and for the general expenses of the Public Health Department.

"It is a grim fact that in a land peopled by malarial subjects of the very poorest types, the attempt is made to fight malaria with the paltry sum of $18,000, hardly enough to pay the travelling expenses of the doctors who visit the affected regions.

"For the anti-venereal campaign there is voted the sum of $5,000.

"What is the use, then, of a Health Department, which is purely a medical bureaucracy without resources, which spends its time running about over the country, in order to become more convinced that it is full of disease, and that our race is exhausting its energies in the struggle against nature, and without any defence against disease?

"The Public Health Department is nothing more than a very expensive administrative department for leprosy institutions, and anything else it does is only a deception of the public, who imagine they are paying big contributions for the extermination of yaws, malignant fevers, venereal diseases, etc., and who are kept under the delusion by the incomplete statistics published by the Medical officials, as proof of what the State does for the Public Health.

"There are also certain anomalies that must be corrected, even at the risk of offending vested interests. For example, there is the fact that the maintenance of the Lazareto de Caño de Loro, where there are 350 patients, costs the Health Department $500,000 per annum, equivalent to a monthly cost of $120 per leper.

"Whatever the Public Health Department may be, it certainly is not an institution for curing the people of Colombia of tropical diseases, or making the country a healthy one.

"I call upon you, gentlemen of this Congress to seek some way in which the small Health Budget may be put to some better use, seeing that we cannot yet hope to meet all the national needs in this respect."

Leprosy in Equador, South America. Boletin de la Oficina Sanitaria Panamericana, February, 1936.

(Translated by Dr. J. W. Lindsay.)

"There is only one Leper Hospital for the whole of the Republic, that of the "Verde Cruz" of Quito, the capital, and there is not sufficient accommodation in it for all the patients. The question is under consideration as to the economic possibilities for the construction

of a Leprosy centre for the sea-coast districts, and the best place for it would be in the Taruma zone of the Province of El Oro. In other parts of that region such as Capiro, and Piñas and other towns there has been a considerable decrease in the number of cases. From June 1934 till May 1935, there were only seven cases in Guayaquil, and twenty in other towns of the coast."

The Leper Quarterly, (Official Organ of the Chinese Mission to Lepers) Vol. IX, No. 4, December 1935.

The report of the Second National Leprosy Conference is given. The following are the Resolutions arrived at:—

(1) "That the Public Health Authorities in China be urged to give fellowships to graduate physicians for the study of leprosy abroad, and that such fellowships should be given to physicians who are prepared to take up leprosy work on their return to China.

(2) "That the National Health Administration be asked to arrange for government subsidies through the Provincial, Municipal, or Hsien authorities as the case may be, to the extent of half the cost of treating patients in leprosaria or leprosy clinics.

(3) "That the Provincial and Municipal Governments be asked to request hospitals, clinics and health centres to undertake the treatment of suitable cases of leprosy in clinics, with a view to stamping out leprosy at its source.

(4) "That this Conference requests the Chinese Medical Association to establish a Council on Leprosy, as it is necessary to bring the problem of leprosy control before the medical profession as well as the general public.

(5) "That this Conference urges on the Central Government the importance of the National Health Administration setting up a Special Section on Leprosy.

(6) "That the Central Government be asked to introduce such legislation as shall prevent discrimination against cases of leprosy as compared with patients suffering from other diseases of a mildly contagious nature.

(7) "That the Ministry of Education be asked annually to hold a 'National Anti-Leprosy Day' with a view to educating the public on this subject.

(8) "That the Ministry of Education be asked to arrange for courses of instruction, both practical and theoretical, on the subject of leprosy, in medical schools."

The following are some interesting quotations from a paper on *Leprosy in Canton*:—

"The rich lepers often hide themselves inside their houses. They never expose themselves to the sight of outsiders. They live on, marry, and have offspring as ordinary people.

"The slight sufferers are often deceived by the wrong idea that leprosy may be given up by sexual intercourse with others. They attempt to remove the disease by going to prostitution.

"The poor lepers often give their children to other people as stepsons, servants or concubines.

"The lepers who acquire the disease from their far ancestors

can hardly be detected by their outside looks. Their children often acquire such a disease too. They often slip into prostitution of the lower class. The communication of leprosy through this channel is unnoticeable, and it becomes a great danger to the populace.

"It is an undeniable fact that many boat people become infected with leprosy. Although the exact number is unavailable, yet we can estimate that about three or four per cent. of the boat population are suffering from this horrible disease. The number is so enormous that a thorough scheme for preventing and controlling leprosy among them has become a very important problem of public health."

Fieberbehandlung bei Lepra. (Pyrotherapy in Leprosy) by B. Nocht. Archiv für Schiffs. und Tropen-Hygiene, Band 40, Heft 1, 1936.

Dr. Nocht visited the Philippines in 1934/35 and there carried out experiments in company with Dr. Velasco, to test the effect of fever-production in the treatment of leprosy. For this purpose he selected three preparations:—*Sulfosin, Anaesthesulf* and *Pyrifer*. The first two of these proved unsuitable and the experiments were therefore restricted to *Pyrifer*.

Six patients were treated with 3 to 4 series of 10 injections. In one of these lepra reaction was set up, but in the other five there was no sign of lepra reaction. These five patients were in good general health, and were not suffering from any complicating disease. In three there was apparent clinical improvement, and in two there was no change. During the fever following the injections there was slight swelling and rubifaction of lesions, which subsided as the fever passed off. After three months treatment they were still bacteriologically positive. Dr. Nocht regrets that it was not possible for him to carry on treatment longer, but considers that the results were promising and that further trials should be made.

Leprosy in India. Vol. VIII. No. 1, January, 1936.

In the Editorial comment is made on the article by Spindler on *Pathogenesis of Leprosy* reviewed on p. 96 of the last issue of Leprosy Review, as follows:—

"In this article the author reports findings in regard to the incidence of leprosy in the community and the susceptibility of groups and individuals to leprosy that are at variance with the commonly held views. Most workers are of the opinion: (1) that most adults are immune to leprosy and children and young people are often susceptible; (2) that most infections are contracted in the early years of life; (3) that such infections are more likely to be severe than those contracted later in life; (4) that there is little difference in susceptibility to leprosy between different races and families. Spindler however expresses very different views. He believes that a very important factor in the epidemiology of leprosy is an hereditary predisposition to leprosy which is seen in both children and adults of certain families, and that the factor which decides the disease or not and whether the disease takes a mild form or a severe form, is the closeness or other-

wise of blood-relationship to families with this hereditary predisposition to leprosy.

"This idea of hereditary susceptibility to leprosy is not a new one. Molesworth has advanced the view that leprosy died out of England because the susceptible stock died out with the production of racial immunity to leprosy. We recently read a statement attributed to an American worker that the white races are now practically immune to leprosy. Several workers have expressed the view that hereditary predisposition is possibly a factor of some importance, but Spindler apparently considers it of paramount importance.

"Spindler thinks that in countries where leprosy is highly endemic most of the susceptible persons are infected in childhood and that this explains the immunity of adults, while in Estonia with little leprosy and better hygienic conditions, susceptible persons are often not infected in childhood but in adult life. To this Spindler attributes the differences in the epidemiology of leprosy observed between Estonia and India for example.

"There is no doubt that leprosy is commonly spread in families to blood-relations, but this is usually attributed to close contact particularly in childhood and not to hereditary predisposition. All workers find that conjugal infection is rare, but this is usually attributed to the immunity of later years and not to the fact that there is no blood-relationship and hence no hereditary susceptibility. We do not think that studies of Indian conditions and of leprosy in families in India will support Spindler's contentions.

"In our last issue we published a study of leprosy in families by Dr. E. B. Christian. This study tended to show that in the families of lepers (i.e. in those who might be expected to have an hereditary predisposition to leprosy) the factor which influenced most markedly the incidence of leprosy was the age at which infection could have occurred, young children exposed to infection developing the disease more often and more markedly than older children or adults. This does not fit in with Spindler's theories. The theory of hereditary predisposition is difficult to reconcile with the finding that children of leprous parents if separated from the parents at or soon after birth, show in adult life a leprosy rate little or no higher than that of the general population. The whole question is very involved and accurate data on which to base judgment are difficult to obtain. The matter should receive further study but we doubt if the theory of hereditary predisposition being such an important factor in the epidemiology of leprosy can be reconciled with the facts."

S. N. Chatterji writes on *Early Manifestations of Leprosy*. He gives the following instructive list of injuries associated with early manifestations of leprosy:—

"A man was kicked on the right ankle while playing football, with pain and swelling of the affected part. When the swelling subsided a loss of sensation was noticed and later the part became erthematous. On examination anaesthesia and nerve thickening were detected.

"A fish bone pierced the thumb of a woman and was removed at operation. A few weeks afterwards anaesthesia of the right thumb was noticed and later erythema and nerve thickening were found.

"A woman was bitten by a snake in the right index finger; later anaesthesia developed in this finger and later still typical leprous lesions appeared in various parts of the body.

"A boy was bitten by a cat and later depigmentation and anaesthesia developed at the site of the bite and later still in other parts. Similar findings we have observed in cases of bites by dogs and foxes.

"A blow with a stick on a shoulder was followed by the development of an erythematous anaesthetic lesion with thickening of the supra-clavicular nerve.

"In the following case it seems clear that the injury simply provided the occasion for the detection of pre-existing leprosy. A man had a severe blow on the head, became unconscious and on regaining consciousness noticed paralysis of the left side of the body. On examination there was anaesthesia, muscular wasting and nerve thickening in the left foot and hand.

"Occasionally in such cases arises the question of workmen's compensation for disability owing to injury sustained while at work. The following is such a case:—A stoker on board a ship, while shovelling coal, hit his elbow against a metal bar. There was severe pain and he had to cease work. The pain took several days to subside and a few days later anaesthesia developed in the hand. A few weeks later he was sent to us for diagnosis and for an opinion regarding the question of the relation between the injury and the disability. He was found to be suffering from leprosy for he showed a thickened ulnar nerve and anaesthesia in its distribution. We expressed the opinion that the injury may have precipitated the appearance of symptoms of leprosy or may have aggravated slight symptoms previously present, but the injury alone could not have caused the symptoms without a previous, possibly latent, infection with leprosy."

Dr. K. K. Gupta writes on *Chloretone in Nerve Reaction*:—

"Chloretone is a white crystalline powder with the taste of camphor. It is trichlor-tertiary-butyl-alcohol. It is soluble 1 in 200 of water, 1 in 10 of glycerine, 3 in 2 of alcohol 90%, 1 in 50 of liquid paraffin, 1 in 12 of olive oil. It has local anaesthetic, antiseptic and hypnotic properties.

"Nerve pain among the leper patients is very common and often severe. Sometimes it is so distressing that patients remain sleepless for several nights. It is common in the limbs. In the majority of the cases the thickened and tender nerves can be palpated but in some cases these signs are entirely absent. Among the drugs advocated for the relief of nerve pain, ephedrine and intradermal injection of hydnocarpus oil esters are the most effective. Sometimes these remedies do not bring relief to the patients. We have tried injections of chloretone (gr. V dissolved in 1 c.c. of olive oil) given subcutaneously along the course of the nerve, the injection being given in several places. In some cases this procedure was found more efficacious than the administration of ephedrine. Except for slight œdema at the site of injection, no untoward effect was met with. We had no definite information regarding the proper dose but found gr. V dissolved in 1 c.c. of olive oil was sufficient to obtain the desired result.

It is too early to make definite statements regarding the superiority of this method of treatment over recognised forms of treatment. I shall be glad if any of the workers try this remedy and publish their results."

Tuberculoid Leprosy amongst Chinese. Copia. Exello Volumine Deliberationum IX=I Congressus Internationalis Dermatologorum., by Dr. F. Reiss, Shanghai. Six cases are described in detail and the paper is summarised as follows:—

"It appears evident from the reported cases that the clinical picture of the so-called tuberculoid leprides is not uniform and that there are 3 varieties observed in China. Discoid, solitary lesions closely resembling Sarcoid-Boeck or tbc, cutis luposa or verrucosa but not showing any lupomas by vitropressure. The nature of the granulation tissue is clinically easily demonstrated as of the nature of a yellowish infiltration not only along the border of the lesion but also in the centre.

"Solitary, and quite frequently, multiple annular lesions with raised papular margins and atrophic depigmented centre.

"Discontinuous serpiginous lesions of the previous type with the only difference that one part of the creeping zone is open.

"That the histopathological changes vary according to the cutaneous manifestations, the main characteristic feature being that the tuberculoid granulomatous infiltration is always well demarcated and that furthermore there is generally an atrophy of the epidermis present. The paucity of bacillary findings is emphasized but cases have been reported where, besides the granular form, lepra bacilli could also be traced.

"That tuberculoid-leprosy should be recognised as a special subtype and designated either with NT. occurring in the neural main types or with CT. when lepromatous changes are present."

Corrigendum.

We regret that an error was made in the chart which appeared on page 36 of the January issue of "Leprosy Review." The letters N1, N2, N3 and C3, C2, C1, appearing in the second column, should be reversed and should read, C3, C2, C1 and N1, N2, N3.