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EDITOR - R. G. COCHRANE, M.D.

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The Association does not accept responsibility for views expressed by the writers. Communications may be sent to the Editor, at 29, Dorset Square, London, N.W.1.

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### Editorial.

E would draw the attention of our readers to the first of two articles by Dr. McKenzie, which we are publishing in this and the following number of the REVIEW. These articles are of importance to the ordinary worker for they demonstrate that the more valuable of the non-specific serological tests can be carried out in a home which is isolated in the African bush. We know something of the situation of the leprosy settlement at Peramiho and congratulate the author of the article on his work. This should be an encouragement to those in the most isolated institutions where the question of equipment is indeed a problem. The author's statement that the Sedimentation Index test is an index of debility, we think, is generally accepted, and further the delicacy of this reaction is rightly stressed. It is difficult to appraise the value of the Sedimentation Index correctly. The Calcutta School have emphasised the necessity for it in the control of leprosy, while others have been frankly sceptical. However, as a test of debility, it is of value, for of all handicaps in the treatment of leprosy, that of debility, whatever be the cause, is the greatest. Further comments on this subject will be reserved until the concluding article of this series has been published.

We have included in this number a short article on Leprosy in Ceylon, gathering the information from a report sent to us. This forms an introduction to the subject, which will be amplified after the Secretary's visit to that country.

The Secretary's address at the Centenary Meeting of the British Medical Association has been published, because it has been written from the standpoint of those who are treating cases of leprosy in England. While mentioning this subject, we would like to lay stress on the totally inadequate hospital care of the cases discovered in the homeland. The only institution in England is constantly full, and the patient who acquires leprosy and returns to England may find himself in a sad predicament. Many of these cases, on account of poverty, live under the most adverse conditions, being afraid of appearing in public owing to the social ostracism and shame attached to the disease. If the sufferer falls acutely ill or contracts another malady which needs hospital care, it is difficult or impossible to persuade the health authorities to cater for him. The contention that there are so few cases in England is not a plea for almost completely ignoring these poor sufferers, and the

knowledge that the disease is "not officially recognised" makes the horror of the scourge more real to the victim. It is because we have some knowledge of the difficulties of patients suffering from leprosy in this country that we have digressed in order to enter a plea for them. We are anxious to add to our meagre knowledge concerning the numbers and types of cases in this country, and would be grateful to any reader who can supply us with information on this subject. Needless to say, any communication sent to us will be treated with the strictest confidence.

The article by Dr. Moiser is another example of the excellent way the leprosy problem is being dealt with in Southern Rhodesia. We would remind readers that surveys revealing a low incidence of the disease are as inportant as those showing a high incidence. We have stressed on more than one occasion that the importance of a survey does not consist so much in the actual number of cases discovered, valuable as this information is, as in the number of the different types present, and in the age groups of those suffering from the disease.

Our readers will be interested to hear that the Medical Secretary of the Association is spending some nine months in India and Ceylon. The main purpose of his tour is once again to get into touch with the latest developments of leprosy treatment; for this purpose he has been stationed at the Leprosy Settlement at Purulia, Bihar, and is finding his stay both valuable and profitable. At the end of March, an important Conference was held in Calcutta, the chief object of which was to try and apply the recommendations of the First General Report of the Leprosy Commission of the League of Nations to local conditions in India. The Conference was of very great value and a report of it will be included in a future issue of the Review. During April, Dr. Cochrane conducts the special course of instruction at Dichpali, and in May he proceeds to Ceylon to carry out a leprosy survey and investigation in the Eastern Provinces. This contact with the field is of the utmost importance, as this is the only means by which the work at headquarters can be kept up-to-date.

We have referred elsewhere to the passing of Dr. Isabel Kerr and would appeal to any qualified medical man who is contemplating the Mission field to offer to fill the gap at this important institution. No work is more satisfying and no privilege is greater than to follow in the footsteps of the pioneers. Information concerning this or any other vacancy in leprosy institutions can be had from the British Empire Leprosy Relief Association.

# Some Non-Specific Serological Tests in Leprosy

ALAN MCKENZIE. continua a pag.

THIS paper is the account of an investigation undertaken to find out what assistance might be given in the diagnosis, prognosis and treatment of leprosy by such simple blood tests as can be performed where extensive laboratory facilities do not exist. The work was done in Songea, Tanganyika Territory—a small out-station staffed by a single Medical Officer serving an area of about 14,000 square miles and with a population of approximately 100,000. The remoteness of the station forbade the use of any but the most simple examinations.

The patients who were the subjects of this investigation are inmates of a colony about 20 miles from the government They were visited each week by the Medical hospital. Officer (myself). The medical equipment of the colony consisted of a small brick dispensary where treatment was given twice a week, and two huts which were used as hospital wards for those requiring more constant attention. Otherwise, the patients lived in native huts under the usual conditions of native life, tilling their own fields and producing the majority of their own foodstuffs. Rough and ready treatment of the various intercurrent diseases was given by a Mission Sister assisted by native dressers; and during my weekly visits I controlled treatment and kept notes of the cases. All the specimens used in this investigation were brought in to Songea for examination and if any special examination (such as the behaviour of the patients under iodide administration) was required they were admitted to the government hospital.

The material for the examination of controls was drawn from government employees and from patients within the hospital.

The following tests were used :---

1. The Botelho Reaction.

2. Rubino's Test. (This was perhaps too ambitious, as no incubator was available, but during the period the test was employed the temperature was barely below 80° F.).

3. The Serum Formalin Reaction graded as suggested by Dye with some minor modifications.

4. The Sedimentation Reaction performed in the manner Muir had used in his investigation of the Reaction among cases of leprosy in India. The Botelho and Rubino tests are described separately. The Sedimentation Index and the Serum Formalin Reactions are described together since it was subsequently found that more information would be acquired from their simultaneous study.

#### CLASSIFICATION OF THE CASES.

Early in this investigation, I found it impossible to apply to African natives Muir's method of classification. Accordingly on purely clinical grounds, I have worked out a system which differs from his in certain essentials. This classification creates a new group which comprises the papillary and interfollicular sub-types of his skin type and the ascending sub-type of his nerve types.

The assumption on which Muir's classification rests is apparently that anæsthesia implies *infection* of a nerve or its terminals. Clinically I have found it more satisfactory to consider anæsthesia as a result of simple *pressure* and that a clearer conception of the disease is obtained if we explain the production of anæsthesia in the three types of lesions mentioned above as being the result of fibrosis following on the resolution of a leprotic lesion or as a result of pressure from ædema within and just below the corium during the more active periods of the disease.

Muir states in LEPROSY (page 182) :—"(a) The more the skin is affected the less the nerves are involved and vice-versa; (b) Nerve lesions are associated with a comparative paucity of the number of bacilli in the body," but he goes on to state that "(c) consequently, the earlier lesions of leprosy are chiefly of the nerve type as there are few bacilli in the body at the outset. " This conclusion does not appear to me a logical sequence unless he is prepared to substitute for "associated with," " caused by."

Muir defines a skin lesion (p. 183), "as an area in which leprosy bacilli can be found " and a "nerve lesion is indicated by the area of skin in which bacilli cannot be found—but in which there is an anæsthesia." Later, he records these conditions as not infrequently present together in the same lesion and describes the formation and contraction of fibrous tissues in the centre of a resolving bacteriologically positive skin patch. When, however, he discusses the appearance of anæsthesia in these patches, he speaks of (p. 189) " the diminution of the number of bacilli being accompanied by infection of the sensory nerve endings according to the law of relationship between skin and nerve leprosy." Is it not more reasonable to assume that the nerve endings have been caught in the general fibrosis and their function deranged?

In describing the nerve ascending sub-type, Muir acknowledges its close connection with the superficial subtype of skin leprosy and gives an identical description of its histology and mode of spread. The separation of these lesions into their proper primary types appears then to rest, clinically and pathologically, on the delivery of bacilli in the tissues—always in such lesions a most difficult process.

Muir's law of relationship between skin and nerve leprosy, in conjunction with somewhat debatable indirect evidence has led him to consider infection of the main nerve trunks to be due to an ascent of the bacilli up the nerve and not as an embolic infection. Bacilli, however, have never been found in the nerve endings and the acceptance of such a scheme of infection should be delayed until every other possibility has been disproved, since it leads to such puzzling conclusions as are implied in the question : "Why the bacilli should enter these nerve sheaths more when there is a minimum of lepra bacilli in the skin and fail to enter . . . . when there are far larger numbers of bacilli is difficult to say."

In skin lesions of any of these three sub-types of Muir's, I have frequently found bacilli in the periphery of the patch and anæsthesia, if present, at the centre. These two conditions have occasionally been found together (Fig. 1) and on one occasion I found bacilli and anæsthesia in the same area of several patches. More generally it was found that bacilli during treatment quickly disappeared from the periphery of the patch while anæsthesia developed at the centre.

This phenomenon was usually associated with the reappearance of pigmentation at the central and anæsthetic portion. Although with continued treatment the patch, as far as anomalies of pigmentation are concerned, may be practically invisible, the anæsthesia may or may not disappear depending, I believe, on whether the nerve endings have been completely strangled by the formation of fibrous tissue during the resolution of the lesion, or are able to recover sufficiently to function again.

A similar sequence of events may occur during an acute exacerbation of the disease during which the patch occasionally swells up presumably from local œdema since no bacilli are found, and sensation is lost, to return when the swelling has once again subsided. To my mind, the following case is not explicable on any other grounds. P. 91. When first seen, confessed to a five years' history and presented herself for admission on account of recent swelling of some of the lesions.

On the face and body there were pale and highly raised patches whose edge was smooth and precipitous giving a keloid-like appearance. The centre of some of the patches tended to be slightly darker.

All the patches were completely anæsthetic. No bacilli could be found. There was also extensive anæsthesia on the forearms and loss of several fingers with many trophic ulcers. (Fig. 2). Three months later the patches had lost their keloid character and showed exaggerated skin folds, they were less raised above the level of the skin and their pigmentation in the centre was much more pronounced. There was now no anæsthesia to be found in any of the patches.

Two months later the lesions had not apparently changed, but small areas of anæsthesia were found in the central pigmented portion of some patches. (Figs. 2 and 3.)

If one admits that the lepra bacilli (excluding for the moment embolic methods of propagation) extend their sphere of influence slowly, and tend to confine themselves to the tissue where they have been planted, *i.e.*, bacilli planted in the corium of the skin continue to grow within the corium until a large "patch" is formed; and granted also that where the tissue is dense there is less probability of the bacilli multiplying rapidly, we can explain all the puzzles on the assumption that anæsthesia is a result of fibrosis of either a nerve ending or a nerve trunk, and that there is no need to assume, except in affections of a nerve trunk itself that there has been any direct nerve infection. A very small degree of inflammation and fibrosis in or about a nerve trunk may lead to severe trophic changes while, if anæsthesia in a skin patch is caused by fibrosis and starvation of the nerve endings from a resolving leprous lesion we should not expect to find bacilli.

The clinical observations which first led me to doubt the value of Muir's classification are briefly summarised below.

1. Depigmented patches especially in the limbs appear in the distribution of more than one cutaneous nerve.

2. The edge is usually well defined and bacilli are generally found there if it is raised, while anæsthesia is not found except towards the centre.

3. Trophic ulcers never appear in depigmented patches.

4. The changes found over the skin distribution of visibly involved nerves are quite different; rarely do they

show any considerable depigmentation but have a dry and atrophic appearance, while in these cases the anæsthesia accurately follows the distribution of the nerve and is co-extensive with the cutaneous change.

5. The behaviour of the depigmented patch under treatment is very different from the behaviour of a pure nerve lesion. This is most strikingly seen in cases which present both lesions. Thus the local skin signs may rapidly clear up while deformities progress.

6. I have seen a large number of cases of indubitably long histories, many over ten years, who show no signs of ever having suffered from involvement of a main nerve. These show no anæsthesia except within the visible patch, there are no deformities, muscle wasting, or signs of old trophic ulcers, and palpable nerves are not thickened.

In my classification, I divide the disease into three groups :--

1. Where the deep layers of the skin are affected and bacilli are found in large numbers. This comprises all nodular cases and Muir's sub-follicular sub-type of the skin lesion. Cases where anæsthesia is also found are labelled la, otherwise lb.

II. Where only the superficial layers of the skin are affected. Including the ascending nerve lesion of Muir and his papillary and inter-follicular sub-types of the skin lesion. The class is labelled IIa and IIb and IIc, according as there is anæsthesia only, bacilli only or both present in the patch, while if neither bacilli nor anæsthesia can be found in a patch but the history and appearance of the lesion justify a diagnosis of leprosy, the case is labelled simply II.

III. Here the main nerves are affected leading to regional anæsthesia, deformities and trophic ulcers.

### CRITERIA OF CURE AND IMPROVEMENT.

Group I.—Improvement is recorded on the general physical condition of the patient together with the appearance of the lesions. Skin smears are frequently taken and since few of this class have become bacilli-free stress has been laid on the appearance of the bacilli, especially with regard to fragmentation or beading.

Group II.—Little gross physical change appears to have resulted in the majority of these patients as the result of their disease. The finer changes in the patch itself appear to be the only reliable guide to progress. The margin usually at first raised becomes level with the skin; if it has previously contained bacilli these soon disappear and any suggestion

of **c**dema in the patch rapidly vanishes. Commonly though not invariably, repigmentation may occur in the centre of the patch and if this happens it is almost certain that the pigmented portion will be anæsthetic. This repigmented portion is not quite normal in appearance; the skin appears dry and atrophic and the skin folds sharp and more obvious than usual, suggesting a very fine crepe paper. If sensation is re-established in the patch the pigment tends to disappear in a peculiar manner leaving a mottled look to the old patch. This repigmentation appears to be the sequence of events in a fairly chronic case. In a more acute case with resolution the anæsthetic area is larger in extent than the area of new pigment, which is usually less deeply coloured while where the raised edge has healed quickly, a crushed paper appearance is given in contrast to the fine crepe paper of the central and more slowly resolving lesions.

Group III.-It is difficult to discover signs of improvement in this group, and if it be allowed that the trophic lesions, which are the signs of the disease, are due to pressure on the nerves, it will be seen that either an advancing leprous lesion of a nerve trunk or the resolution of a similar lesion and the consequent formation and contraction of fibrous tissue will both produce an increase in the trophic lesions along the distribution of that nerve. This is well seen in certain patients who have both Group II and Group III Although there may be remarkable improvement lesions. in the skin patch, often with complete disappearance of anæsthesia, deformities of the hand and absorption of the digits may progress rapidly, while the extent of the anæsthesia in the distribution of this nerve may remain as before or extend to the full area of distribution of the nerve.

### THE BOTELHO REACTION.

Araujo (1928) recorded the results of this test in 50 cases of leprosy and found that it was positive in only half of them. Le Cac (1930) found it positive in 72.4 of a series of leprosy cases and stated that a positive reaction was more often found in nerve than in nodular cases. Muir (1930) found the test of no practical value in making a diagnosis.

### Technique.

The following method of performing the test has been used :--

To 0.6 c.c. of 24 hours old blood serum in a small test tube, the following re-agents are added, the tube being shaken after each addition.

1. Liq. ammon. fortis, 1 drop.

2. 1 per cent. nitric acid in normal saline, 3 c.c.

3. 0.5 per cent. iodine in a 1 per cent. solution of potassium iodide, 0.5 cc.

A positive reaction was recorded when a precipitate appeared which did not at once disappear on shaking.

Among 36 patients 5, or 13.8 per cent., gave a positive reaction. Three of those giving positive results were Group I cases, and the other two were both mild Group II cases. Among 18 not suffering from leprosy, there were no positive reactions.

The test appears to be of no use as a diagnostic aid, the percentage of positives being so low.

#### THE RUBINO TEST.

Rubino first described the test that bears his name in 1926, finding it positive in 66 per cent. of 18 cases, while among 713 not suffering from leprosy, positive reactions were very rare. In a second paper, in 1927, he recorded 78 per cent. of positive results among 32 leprous patients.

Paullier and Errecart, in 1926, carried out the test among 17 cases, and five controls but found the results inconstant. Marchoux and Caro, in 1927, modified the reaction and claimed that it was then specific, obtaining among ten cases 100 per cent. of positive results as compared with 50 per cent. by the original method. Monacelli found that 12 cases in whom bacilli could be demonstrated gave positive reactions, while a pure nerve case was negative. All his 45 controls were negative.

Beltier found that with Marchoux's modification, the reaction was more sensitive;  $33\cdot3$  per cent. of positive results as against  $22\cdot2$  per cent.; but that among his controls the modified method gave  $17\cdot3$  positive results, while none was found when using the original technique. Luz, in 1929, found positive results in less than 50 per cent. of different types of leprosy. All his control cases, tubercular and syphilitic patients were negative. Amies, in 1929, found the reaction positive in 87 out of 97 active leprosy cases, while, in 126 inactive cases, it was invariably negative. In 287 controls, there were 16 positive reactions.

The method used in this series was that of Marchoux. Well washed, defibrinated blood, of a fat-tailed sheep, was made up to the original volume with 10 per cent. formalin and left for 24 hours. It was then rewashed in saline and brought to the original volume with saline; 0.2 c.c. of this suspension were added to 1 c.c. of the 24-hourold serum to be tested and well mixed. Sedimentation was carried out at room temperature (from 75° F. to 80° F.) in the absence of an incubator, in small pipettes, 1 c.c. occupying a space of approximately 4 inches. Readings were taken at half-hour intervals.

The sequence of events was usually as follows:—The suspension became gradually thicker at the bottom of the pipette and clearer above until there was a distinct upper margin to the deposit. Above there was a pale brown cloud reaching nearly to the top of the column above which the serum was quite clear. Later, the cloud settled down and the whole of the supernatant fluid became clear. Readings were taken at half-hour intervals and a record made of the time taken for the deposit to acquire a sharp horizontal upper limit. The cloud never settled under 24 hours.

In one case, however, the suspension rapidly aggregated into small particles (resembling a positive macroscopic agglutination) and settled with a distinct descending upper The supernatant serum was at once quite clear. margin. This sequence of events was completed in one hour. The test with this case was repeated both in a pipette and in a small test tube along with several other sera. The sequence was constant on each occasion and with either method. This latter case I regarded as the only positive result in the series. It occurred in an old Ib case that was considered cured, and had received no treatment for a year, when small, pale patches appeared over the trunk. There were no nodular lesions and bacilli could not be found, but the patient gave a response to the iodide-sedimentation test and to the iodide-serum formalin reaction and was recommended to undergo a further course of treatment.

### Results of the Test.

Forty-one cases were examined and the average time taken for the upper limit of the sediment to become sharp was 99 minutes. They were grouped as follows :---

Classification.	Number examined.	Average time of Sedimentation.
Ia	3	9 mins.
Ib	8	108 "
IIa	21	108 "
IIb	4	96 ,,
III	5	90 "
Total	41	99 ,,

Among controls, 11 apparently normal natives and nine hospital patients, there were no positive reactions; the average time was 87 minutes.

In my hands, therefore, the reaction has proved of no use, and though in performing it at room temperature, I have not complied with the requirements of the test, yet the occurrence of one positive reaction and the absence of any real difference in the time of the reaction between normal and specific cases suggests that this omission should not vitiate the experiment.

THE SERUM FORMALIN AND SEDIMENTATION REACTIONS.

#### The Serum Formalin Reaction.

The production of a gel on the addition of commercial formalin to blood serum was first suggested as a means for the diagnosis of syphilis. It was soon shown, however, that the gel occurred in several other diseases. Fox and Mackie (1921), applied it to kala-azar and Napier (1922), modified it by the simultaneous addition of phenol and further took into account the production of opacity in the interpretation of results. He found that a full positive reaction (the formation of a gel and the production of opacity) occurred also in tuberculosis and leprosy, and in two of his cases who were suffering from malaria and showed great numbers of parasites in the blood. Baretto (1926) recorded positive reactions with the formation of Napier's opacity in malaria, syphilis, leprosy, tuberculosis, and amœbic dysentery.

Wade (1925) found that the serum formalin reaction corresponded in a general way with the globulin ratio of the serum proteids. As the ratio increased the serum formalin reaction became positive. He found high globulin ratios and positive serum formalin reactions in leprous and tuberculous subjects and in leprosy the globulin ratio was very much increased during reactions. He further suggested using the serum formalin reaction to detect incipient leprosy.

Dye (1926) used the serum formalin reaction in trypanosomiasis, constructed a notation so that the rapidity of formation of the gel could be numerically expressed. He found that in patients suffering from trypanosomiasis the reaction value fell during treatment. He applied his modification of the test to a short series of other diseases, and found it generally high in leprosy while in secondary yaws a medium value was the rule.

Dunscombe (1927), used the method of Dye over a

series of 38 leprosy patients, finding very variable reactions and concluding that the test was unreliable for diagnostic or prognostic purposes.

The Sedimentation Index has been investigated in a large number of diseases among dark-skinned peoples as well as among Europeans. It has been found to increase during the course of practically every disease and to a greater extent the more debilitating the complaint.

Marie Thomas (1925) showed that in quite healthy natives of the Dutch East Indies, the sedimentation index was the same as that of Europeans, but that the index was increased in malaria and hookworms and thus few natives would show a normal result.

Puxeddu (1924), first showed that in leprosy the sedimentation rate was increased. Iturbe (1927) found that among his patients the rate was higher in nodular cases than among those in whom anæsthesia was the main sign; that the occurrence of reactions and the commencement of specific treatment raised the index, while in apparently or practically cured cases the index approached the normal.

Labernadie (1927), Molinelli (1928), and Muir (1928), obtained similar results, and Molinelli found that there was no correlation between the sedimentation index and the duration or the severity of the disease.

Muir (1928) found that iodides given during the treatment of a case of leprosy increased the sedimentation index and suggested that this reaction might be used as a test of cure. In later papers, Muir (1929) and Isabel Kerr (1929), showed how the sedimentation index might profitably be used to control treatment and to avoid severe reactions.

### Technique.

For the serum formalin reaction, 1 c.c. of 24 hours' old blood serum was placed in a small test tube and 1 drop of commercial formalin added. Readings were taken after one hour, four hours and 24 hours. A record was made as to whether the serum was solid or half solid (half solid was recorded when the serum did not flow on violently shaking the inverted tube). The values were graded as follows :—

Solid in 1 hour or less		•••	 	 6
Half solid in 1 hour			 	 5
Solid in 4 hours			 	 4
Half solid in 4 hours			 	 3
Solid in 24 hours			 	 2
Half solid in 24 hours			 	 1
Unchanged in 24 hour	s		 	 0

The occurrence or not of opacity in the gel was also noted, but as it occurred with very great frequency, and when absent did not appear to be related to any condition, no record of this observation has been made.

Tests were made to prove the constance of the reaction. Several patients, whose condition was not changing, were examined daily for several days and the proportion of serum and formalin varied. Under these conditions, the value of the reaction did not change and it was found that a great deal of latitude could be allowed in the relative amounts of reagents without influencing the final reading.

Blood for the sedimentation test was drawn from a vein into a 5 c.c. syringe containing 1 c.c. of 5 per cent. sodium citrate solution and the syringe filled with blood up to 5 c.c. mark, well mixing the fluids.

It was carried back to the laboratory in a test tube and the examination was conducted about four hours after the collection of the specimen.

After the blood had been again well mixed it was drawn up into a glass tube 10 inches in length, marked in inches and containing within the marks approximately 3 c.c. of fluid. The lower end was sealed with a dab of plasticine, and the tube placed vertically in a rack. Readings were taken at the end of of  $2\frac{1}{2}$  and  $3\frac{1}{2}$  hours, of the distance the upper limit of the red cell mass had descended. The average of these two readings was taken as the index.

An examination of the day to day variations of this reaction showed less constancy than was seen in the serum formalin reaction, but the difference did not amount to more than 10 per cent. It was found, however, that if the estimation of the reaction was delayed for 24 hours after collecting the blood the index tended to become lower. It is, therefore, not a suitable reaction to be performed in a distant laboratory where the specimen has to be transmitted through the post.

For the sake of uniformity, the reaction was always recorded as above, but it soon became evident that by this method some of the higher reactions received values that were much less than the speed of sedimentation warranted if observed at more frequent intervals. The reaction, in my opinion, should be recorded at half-hour intervals in the case of very high reactions and the average of the figures of the first two readings multiplied by four taken as as the index.

#### Examination of Normals and Behaviour of the S.I. and S.F. Reactions among Patients Suffering from Diseases other than Leprosy.

Confining myself to my own series of cases which consisted of 40 normal subjects and 116 suffering from a variety of diseases, it appears that neither of these tests shows specific significance. They have been performed among a number of normal Africans and others suffering from various diseases. On the whole, the reactions show a distinct parallel trend; a large proportion of high serum formalin reactions being associated with a high sedimentation index. There are, however, groups of cases where the reactions markedly diverge.

With regard to the sedimentation index, it appears to be a very sensitive indication of the well-being of the subject at the moment of taking. It was high in all debilitating diseases and was usually higher in proportion to the length of time sick or to the gravity of the complaint. This interpretation differs slightly from that of the originator, Fahraens, who found the reaction "most distinct when accompanied by high fever." Thus in acute febrile diseases of short duration, such as malaria or the first manifestation of relapsing fever it rose, but not so high as in subsequent attacks of the same disease or in diseases where a high temperature had been maintained over some considerable period.

For example : A hospital dresser in good health had a S.I. of 5. Six days later he had an initial attack of relapsing fever and his S.I. rose at once to 36 while a patient who presented himself for treatment after his fourth attack had an S.I. of 65. After treatment, both these cases tended to return rapidly to normal.

It was very noticeable that in contra-distinction to the behaviour of the serum formalin reaction after recovery from an acute disease the S.I. fell much more rapidly than the S.F.

How sensitive this reaction is, was well shown by an examination of 26 normal subjects all of whom were well cared for natives in the employ of the hospital. An analysis of their reactions showed that they fell into two well-marked groups and the division followed the salary of the subject. The salaries of the first group were from Sh. 10 to Sh. 12 per month while that of the second varied from Sh. 24 up to Sh. 120 per month. All were apparently healthy and had ready and immediate access to medical treatment if unwell. The results were as follows, each group numbering 13 subjects.

		Average	Greatest	Least
		S.I.	S.I.	S.I.
Group 1		29.0	41	11
Group 2	•••	8.9	19	2

The difference seems that the first group were, on account of the high local cost of meat, of necessity largely vegetarians, while those of the second could and did eat meat three or more times a week.

The interpretation of the serum formalin reaction is apparently on somewhat similar lines, as it is positive in a majority of affections in which the sedimentation index is raised. Thus, among the normals quoted above, the average value in Group 1 was 1.0 (none having a reaction of more than 2) while in Group 2 the average value was 0.32 (only three presons having positive reactions). In the complete series of 40 normals, 12 showed positive reactions and in no case was the value more than 2. In acute febrile diseases, where the reaction tends to become positive, this change does not, as a rule, take place until some days' after the commencement of the disease.

Taking again relapsing fever: among cases of an initial attack of relapsing fever whose serum formalin reaction was 0 at the febrile period of the attack, in 6 of these the reaction rose within a week to values of from 2 to 5 and in two cases in which the stay in hospital enabled the reaction to be performed two to three weeks after admission, it had fallen again to zero.

In malaria I have not found that the reaction has risen after an attack, though I have not had the same opportunity for prolonged examination, but so far I have not seen a positive serum formalin reaction in a patient of proved physical fitness (such as a member of the Police Force or K.A.R.) during the febrile period or for short periods afterwards. Similarly, during an attack of blackwater fever, a patient had a S.I. of 60 rising on the third day to 70 while the S.F.R. was never above 1. A month later his S.F.R. was 0 while his S.I. was 40.

In chronic diseases on the other hand, the two reactions show decidedly similar variations, the highest S.F. reactions, where the serum gelled and became opaque within three minutes, were given by two cases of severe and chronic nontuberculous infection of bone, the S.I.'s being 76 and 78. Two cases of old tuberculosis gave (a) S.F. 6; S.I. 6 (b) S.F. 6; S.I. 55, while another case in which the first



FIG. 1. BACILLI FOUND IN EDGE OF PATCHES. RAISED ŒDEMATOUS-LOOKING ANÆSTHETIC SAME CASE THREE MONTHS LATER. ŒDEMA ANÆSTHESIA IN DARK CENTRE AND AT UPPER PORTION OF UPPER PATCH WHERE MARGIN HAS HEALED.

FIG. 2. PATCHES.

FIG. 3. OF PATCHES DISAPPEARED : NO ANÆSTHESIA.



TREATMENT CENTRE, PERAMIHO, SONGEA.



THE OLD DISPENSARY, PERAMIHO.

symptom of ill-health was a severe hæmopotosis showed S.F.R. 3; S.I. 45, two days later.

An even better example is that of a patient suffering from both secondary syphilis and gonorrhœa who, under energetic treatment, gave the following results :---

	D	ate		SĔR	57
May	6th,	1931	•••	5	66 S.1.
May	14th,	1931	• • •	4	55
May	25th,	1931		3	<b>50</b>
June	llth,	1931	•••	3	47

In uncomplicated syphilis after the acute secondary ymptoms have passed and also in yaws it is more usual to find that the S.F. reaction tends to be high in proportion to the S.I. Thus three consecutive cases of florid yaws were examined with the following findings :—

S.F.R.	S.I.
5	45
5	41
4	17

The following brief table gives the maximum values of the S.F. reaction and the S.I. index of the case selected, in a variety of diseases tested.

			S.F.R.	<i>S.I</i> .
Blackwater fever	•••	•••	1	60
Unspecified peripheral neuritis	•••	•••	1	44
Liver abscess (amœbic)	•••	•••	2	<b>53</b>
Pulmonary and glandular		•••	6	60
Secondary syphilis	•••	•••	6	<b>53</b>
Late syphilis	•••	•••	3	
Florid yaws		•••	6	60
Old yaws	•••	•••	1	
Pellagra		•••	1	<b>46</b>
Uncomplicated ankylost omiasis	•••		2	<b>53</b>
Relapsing fever			5	
Chronic sepsis		•••	3	<b>48</b>
Chronic and nerve infection of be	one	•••	6	78
Bronchitis and Pneumonia	•••		1	69
*Trypanosomiasis	•••		6	80

\*It is interesting to note that in a fatal case of sleeping sickness who was under treatment by Bayer 205 for six weeks, the S.I. did not vary from the initial figure of 80, while the S.F.R., which on admission was 6 + + (the serum forming a gel in less than 10 minutes), fell to 4 towards the end. This may be due to the effect of the drug itself, as it was shown by Dye that Bayer 205 added to a positive serum markedly retards the formation of the gel. (An observation which I have confirmed, but in contrast to Dye's results have found a similar delay in other diseases). On admission, one-twentieth part of a gram of Bayer added to the serum of this patient reduced the reaction to 5. It seems reasonable to suggest, therefore, that since this drug is excreted very slowly the improvement of the reaction under treatment may be partially due to the direct effect of the drug on the blood serum.

From a consideration of these and many other cases, the following rules for interpreting the two reactions have been formulated.

Both reactions are lower in health as compared with disease. The sedimentation index is an accurate measure of the debility of the patient whatever the disease. The longer the ill-health and the greater its effect on the wellbeing of the subject, the higher the reaction. The serum formalin reaction is less sensitive in a majority of diseases. It is affected to a greater extent in the granulomatous diseases, *i.e.*, syphilis, yaws, leprosy (as will be shown later) and tuberculosis. It is also high in trypanosomiasis and has been found to be high in severe bone infections. Thus, in acute infections the S.I. is greater than the S.F.R., while in diseases where the S.F.R. is naturally high, if there is little debility, the S.F.R. may in proportion exceed the S.I.

(To be continued.)

### Leprosy in Ceylon.

(This article is based on a Report by the Medical Superintendent, Leprosy Asylum, Hendala. Published by permission of the Director of Medical and Sanitary Services.)

THERE is no doubt that leprosy is on the increase in Ceylon, if the number treated in this asylum can be considered as an index. The daily average sick here from 1925 to 1930 was as follows :—

Accommodation is only available for 508 inmates. There is, therefore, considerable overcrowding. Only two courses are available to remedy the evil.

(a) Prophylactic measures should be taken in hand as early as possible, or

(b) Increased accommodation should be provided for the increasing number of cases.

The former course is the more reasonable to adopt, as it is likely to result in more lasting benefit. Leprosy has been known in Ceylon for about three centuries and the only method of checking its spread has been through compulsory segregation and treatment.

A modest estimate of the number of cases of leprosy in Ceylon is about 3,000. Of these, only about 1,000 are known and are patients segregated in the two institutions. If the 2,000 estimated undetected cases were to infect one each annually, the rate of increase in the near future would be such that the problem of segregating them would only be solved at enormous expenditure.

A certain number of inmates are discharged on parole every year. Their addresses are taken and they are warned to report themselves every six months to the nearest Government Medical Officer, and those in Colombo to the Bacteriological Institute. This practice seems of doubtful benefit in the absence of treatment and regular bacteriological examination during the period of parole. The result is that these patients return to the asylum sooner or later, the disease having got worse.

Sir Leonard Rogers and others have indicated the general development of anti-leprosy schemes along the following lines :—

(1) A modification of rigid compulsory segregation by allowing non-infective cases to be treated at their homes or at clinics established for the purpose.

(2) Opening up of clinics in suitable centres where early cases, before they become infective, can receive treatment.

(3) As soon as a case is found, all the household should be examined for early cases and this is repeated every six months for five years.

Dr. Muir suggests the opening of outdoor dispensaries in all provincial towns in all endemic areas for the treatment of early cases as the most effective way of reducing leprosy.

Dr. H. Harold Scott states that in Jamaica enforced segregation has brought about a steady reduction so that the incidence rate is less than half of what it was 30 years ago and leprosy is now a rare disease. In Trinidad measures are inefficiently carried out; compulsory segregation with insufficient accommodation and a system which does not prevent a considerable number absconding have resulted in a steady increase in the incidence rate.

This is what is happening in Ceylon. He gives the following as the ideal method of prophylaxis :--

(1) Compulsory notification of cases by medical men and householders.

(2) Compulsory segregation.

(3) Detection of early cases by periodical examination.

(4) Prohibition of certain trades connected with food, clothing, etc.

(5) Removal of children of infected parents as soon as possible after birth.

(6) Control of immigration.

"In India, since 1925, the Indian Council of the British Empire Leprosy Relief Association has worked to replace the old method of forcible segregation by voluntary clinics, under doctors trained in modern treatment where early cases are kept free from active signs and infection and new patients are coming early instead of hiding the disease. Propaganda work in the villages in teaching how to prevent contagion and surveys are being carried out with resulting opening of new clinics and breaking down of the old belief that the disease is irremediable." (Muir).

Unna Junior traces the development of public opinion when sufferers were outcasts from society, through the First Leprosy Conference held in Berlin in 1897, when compulsory isolation was still demanded, and the Second Conference at Bergen where there was a tendency to milder measures, to the Third Conference at Strasberg, in 1923, when it was recommended that measures should be suited to different countries. Since then, many writers have endeavoured to show the futility of compulsory isolation which has the effect of causing patients to conceal their disease and thus become a danger to their neighbours just at the period when they are most infectious and most easily healed.

Norway is the classic example of the progressive eradication of leprosy through the systematic isolation of cases, not however, by forced internment in leprosaria. In 1856, there were 2,858 cases; at the end of 1908, 394; at the end of 1915, 235; at the end of 1920, 160; and on January 25th, 1929, 81 of whom 45 were in the Bergen Hospital. Segregation on liberal lines has, therefore, been sufficient to bring about a decline in leprosy which promises to lead to the total eradication of the disease.

Before suggesting measures to check the spread of leprosy in Ceylon, an idea of the endemicity of the disease as compiled from the inmates of the two asylums numbering 654 Ceylonese, will be useful.

	Provi	nce.		Number.	Rate per mille of Population.
1.	Eastern .		 	119	6.2
2.	Western .		 	<b>29</b> 0	$2 \cdot 4$
3.	Southern .	••	 	114	1.6
4.	Sabaragomu	wa	 	42	•8
5.	Central .		 	50	·6
6.	Northern .	••	 	18	•5
7.	Uva .		 	8	•3
8.	North West	tern	 	7	·1
9.	North Cent	ral	 	6	·1

From the above it will be seen that the Eastern Province is the most infected, and Western and Southern come next in order. Preventive measures adopted should be first directed towards these three Provinces and thereby about fivesixths of the cases could be dealt with.

The following measures are suggested as suitable for Ceylon.

1. Propaganda.

2. Leprosy census and endemiological survey with registration of cases.

3. Modification of compulsory segregation.

4. Leprosy clinics in all the Government Hospitals and outdoor dispensaries in endemic areas.

5. Examination of the households of cases of leprosy every six months for early cases and continue for five years.

6. Control of immigration.

7. Institution of a demonstration centre to stamp out the disease from a given area within a given period.

8. Appointment of a leprosy expert to initiate and superintend the above scheme.

Propaganda.—This may be carried on by means of pamphlets in English and the vernacular languages, detailing the altered conception of leprosy as a curable disease in its early stages, benefits of voluntary notification instead of hiding suspicious cases, and the methods of prevention of contagion by lectures illustrated by lantern slides in endemic areas. This should be of such a nature as to infuse confidence in the minds of people who should voluntarily co-operate with the authorities in the common object of stamping out the disease.

A leprosy census and endemiological survey with registration of cases.—All these could be undertaken at the same time. A skeleton idea as to how to proceed can be obtained by tabulating the addresses of the present inmates of both the asylums and of those on parole, and home isolation into areas in the different provinces. A house-to-house inspection should be initiated in these areas and every case found, registered. A Medical Officer who is well versed in the early diagnosis of leprosy, with a portable laboratory by which every case could be examined bacteriologically to separate the infective cases from non-infective ones, and the necessary staff, will be required.

Modification of Compulsory Segregation.—Compulsory segregation as carried out in Ceylon has not reduced leprosy. It is, therefore, now high time to try an alteration in the method. It is suggested that only the infective cases be compulsorily segregated. Voluntary segregation may be allowed in the case of non-infective crippled paupers, who should be housed separately. All the non-infective cases should be allowed freedom to follow their own occupations, provided they take regular treatment.

Leprosy clinics in all the Government Hospitals and outdoor dispensaries in endemic areas. The non-infective cases should receive bi-weekly treatment and advice free in these clinics. The patients attached to each clinic should be bacteriologically examined once in three months.

The households of cases should be examined every six months for early cases, and this should continue for five years. By this means, early cases can be detected and submitted to treatment before they become infective.

Control of Immigration.—From the figures for 1929, 15 per cent. of the cases of leprosy treated in both the asylums were Indian immigrants. These immigrants find their way into Ceylon with the coolies recruited in India, and when detected, have to be repatriated at Government expense provided their relatives who can take charge of them can be traced. The others become a burden to Ceylon. It is suggested that efforts should be made at the Mandapam Camp to prevent sufferers from leprosy passing over to Ceylon. There is a patient here who absconded, went over to his village in India and returned undetected and surrendered for re-admission.

A suitable centre should be selected to carry out prophylactic measures along the lines suggested, thereby to demonstrate the period within which leprosy could be stamped out.

### LEPROSY REVIEW.

	Cey	Ceylonese.		Indians.		Europeans.	
	Males.	Females.	Males.	Females.	Males.	Females.	I otat.
Numbers of cases at the beginning of 1931 Admissions during 1931	404 113	107 22	72 34	14 9	=	_	597 178
Total	517	129	106	23	_	—	775
Deaths during 1931	26	10	5	2	_	_	43
1931	34	12	31	6	_	_	133
Total deaths and dis- charges	110	22	36	8	_	_	176
Remaining at the end of 1931	407	107	70	15	_	_	599
*Number of ex-patients living in Home Iso- lation	_	_	_	_	_	_	120
Number receiving treat- ment with chaulmoo- gra oil or its deriva- tives		_	_	_			366

I URES FOR YEAR 1931. Hendala Leprosy Asylum.

\*Total number living in home isolation in the Island, 195.

#### FIGURES FOR YEAR, 1931. MANTIVU LEPROSY ASYLUM.

	Ceylonese.		Indians.		Europeans.		
	Males.	Females.	Males.	Females.	Males.	Females.	Total.
Number of cases at the beginning of 1931 Admissions during 1931	113 48	32 6	15 9	3	=	=	163 63
Total	161	38	24	3	—	-	226
Deaths during 1931 Discharges during 1931	16 27	2	3 1	=	=	=	21 28
Total deaths and dis- charges	43	2	4		_	_	49
Remaining at the end of 1931	118	36	20	3	_	_	177
Number of ex-patients living in Home Iso- lation	2		_	-	_	_	2
Number receiving treat- ment with chaulmoo- gra oil or its deriva- tives.	ng treat- ulmoo- deriva- All the patients with the exception of 15 were treated with chaulmoogra oil by mouth; 142 patients received injections.						

# The Modern Treatment of Leprosy.

R. G. COCHRANE.

Being a Paper given before the Tropical Medicine Section at the Centenary Meeting of the British Medical Association, held in London, July, 1932.

THE subject which has been chosen is one of very great interest, and because the time at my disposal is relatively short, I shall only be able to deal with it in its essentially practical aspects, omitting any academic discussions.

The first question to decide when one is faced with the problem of the treatment of a disease like leprosy, is whether the case is one which will benefit from treatment. Modern developments have indicated that this disease tends to be self-healing. In the earlier years of the more recent treatments, stress was laid on the fact that many advanced cases were no longer dangerous to the public, because the disease had become naturally arrested, leaving signs (comparable to the pock-marks of smallpox) that the patient had suffered from leprosy, and that the disease had only left stigmata of its presence.

It has been borne upon me forcibly, especially as the result of work in Africa, that as in tuberculosis, so in leprosy, the disease may become arrested at any point<sup>1</sup>. One sees many instances of healthy adults with one or two isolated patches indicative of a leprotic condition, but which have remained stationary for years. In other words, they are selfarrested cases in the early stage, leaving the solitary scar of evidence of an infection which has died out. This aspect is of much importance to workers, for it is just as futile to treat the early arrested case as the late. In passing, I should say that no child or adolescent should be assumed to be in this stage without prolonged observation, but adults who have had early signs of the disease for a period of years do not necessarily need active treatment. Therefore, before one can discuss treatment it seems essential to lay down the signs of activity, and these were set down at the Manila Conference<sup>2</sup> (1931), as follows :--

### Signs of Activity.

"Active cases are those in which there are clinical or microscopical evidences of progressive or of recessive changes in lesions, with or without accompanying systemic disturbances. These evidences include the following: positive bacteriological findings in skin or mucous membrane determined by the usual methods; the presence of raised or erythematous lesions; increase or diminution of lesions in size or number; tenderness of nerves, with or without thickening."

Having determined the point that a given case is an active one, then the question of treatment arises.

It is axiomatic to state that before one can treat leprosy with any hope of success it is essential to treat any other disease or cause of debility in the patient. One, therefore, assumes that the patient has been examined for the possible existence of the various predisposing causes, and these have been or are being, treated efficiently.

The modern treatment of leprosy from the initial researches of Heiser, Rogers and others, has been based on the assumption that in hydnocarpus (chaulmoogra) oil, there is something which acts in a special manner, even though it is not generally held that it is a true specific for the disease. Just how this remedy acts can only be surmised, but the fact remains that no physician would be willing to do without the hydnocarpus preparations in the treatment of leprosy. The various preparations which can be used in order of preference are :—

(1) Iodised or creosoted esters.

(2) Alepol. (This is a special variety of sodium hydnocarpate of the lower melting point fatty acids.)

(3) Plain oil with creosote.

The choice of the remedy is chiefly a matter of expense and ease of obtaining it, and, therefore, in this paper, I shall deal briefly with the ordinary routine treatment of a case of leprosy, and then touch on the question of the important complication known as lepra-reaction.

If the case is an early pure nerve case, the procedure would be to inject subcutaneously or intramuscularly either 4 per cent. solution of alepol, or the ethyl esters of the oil. The choice of the remedy in such a case is not so important. The dosage to commence with is about 2 c.cs., going up by weekly injections to 12 c.cs. It will be found that it is inadvisable to increase the dosage above 12 c.cs. of a 6 per cent. solution of alepol, or 12 c.cs. of the oil or esters. I am aware that certain authorities state that it is not necessary to give more than 5 c.cs., but I think everything tends to show that the more of the remedy one can give within the above limits the better.

In addition to this general treatment, if the patient has erythematous or hypopigmented patches, these require local treatment. Erythematous lesions should be injected intradermally. This method will be described later. Hypopigmented patches should be painted with trichloracetic acid. The latter is applied in strength of 1:5 for the face or 1:3 for the body. Care must be taken to apply it carefully or scarring and keloid formation may result. If the patient suffers from nerve pain then ephredine<sup>3</sup> ( $\frac{1}{2}$ gr. in 1-oz. of water) or adrenalin, plus an alkaline (bicarbonate) mixture should be prescribed. If pain is severe, stripping the nerve sheath may be necessary. Morphia or opium should not be given unless unavoidable. Recently dilo oil (calophyllum bigator) has been tried in Fiji<sup>4</sup> with remarkable success. The method of controlling the dosage of the drugs will be described shortly.

#### Cutaneous Leprosy.

This, generally speaking, is much more difficult to treat, and if the case is at all advanced, the ultimate prognosis is poor. Lowe<sup>5</sup>, of Dichpali, has recently sounded a timely warning against unreasoned optimism.

The cutaneous case is usually taken to be one in which bacilli can be demonstrated by the usual methods, and is treated along the following lines :—

(1) Local.

(2) General.

(3) Treatment of complications.

Àgain the drug of choice is the esters; the method of choice is intradermal injections. For this a special needle with a guard 3 mm. from the point is used. The technique is as follows :—

An all-glass or record syringe is used with a fine needle fitted with a guard about three mm. from the point. This prevents the needle penetrating too far into the tissue. The skin having previously been painted with iodine the needle is then introduced into and not under the skin. The thickness of the skin varies in different parts of the body; where it is thin, the needle is introduced in a sloping manner, so as to form an acute angle with the skin. If it is thicker, then it is preferable to insert it at right angles. With a little practice, the technique is soon mastered and one finds little difficulty in injecting into the corium and not into the subcutaneous tissues. An amount of the drug is injected so as to raise a wheal of about one-third of an inch in diameter. If a large area is to be injected, it is completely infiltrated so as to produce coalescing "injection wheals." Some forty punctures are necessary to inject about 6 c.cs. of the It has been suggested that not more than 5 c.cs. esters.

should be injected intradermally. If a larger quantity than this is given, or if there are only a few lesions to be injected, then the balance can be given subcutaneously or intramuscularly. It has been the experience of leprosy workers for many decades that the case which can take large doses of chaulmoogra oil by mouth generally improves. I feel certain that while intradermal injections are of very great value, the remedy is absorbed so slowly that the general effect of the drug does not begin to be experienced for some little while, although the advantage of this method is that there appears to be an accumulative effect due to its slow absorption. In one case I am at present treating, I follow a routine of intradermal, subcutaneous and oral administration. The oil can be obtained in such a purified form that I find that even the most sensitive gastric mucosa will tolerate it; but it must be obtained from a firm which specially prepares the remedv.

The following, then, is a suggested routine for cutaneous cases. Weekly injections of iodised esters intradermally or subcutaneously. It is wise to give two or three week's rest after reaching the maximum dosage, and during this period if desired, hydnocarpus oil can be given by mouth. The initial amount advised is 2 mms., going up to a teaspoonful or more, according to the patient's tolerance. In addition, if there are a large number of lesions, it is well to paint those lesions which have not been injected with trichloracetic acid.

If the patient shows any signs of reaction or complains of weakness and lethargy, the injections or oral treatment should be stopped and a complete rest given and a tonic prescribed.

I have recently compared iodised with creosoted esters, and I find that the creosoted esters are considerably more painful and that the average patient in this country will not stand the injections for long, whereas iodised esters can be given with comparatively little pain.

With regard to the other remedies, many workers prefer alepol. This is cheaper and effective, but for intradermal use it is absorbed too rapidly for it to give permanent results. The optimum strength is a 4 per cent. solution, increasing gradually to a maximum of 12 c.cs. The initial dosage of anti-leprotic remedies in cutaneous cases is  $\frac{1}{2}$  to 1 c.c., increasing by  $\frac{1}{2}$  c.cs until a maximum of 12 c.cs is reached. In nerve cases the initial dose may be as high as 2 c.cs., increasing to 12 c.cs.

The controlling of the injections is a very important

matter, and the following are the indications that the dosage should not be increased.

(1) Appearance of fresh eruptions, especially the socalled rose-red nodules.

(2) A swinging of the temperature. This variation in temperature may be both above as well as below the normal line. In fact, I believe in mild lepra reaction there may be what I term a pyrexia below the normal line, that is, an irregular variation below the ordinary accepted normal temperature of 98.4.

(3) Rise in sedimentation index.

(4) Feeling of general debility with loss of weight.

(5) Breaking down and discharging lesions without apparent rise of temperature, though there is usually a subnormal variation.

Tuberculoid leprosy, which has recently been described by Wade <sup>6</sup>, is particularly suitable for intradermal treatment.

#### Treatment of Complications.

1. Lepra-reaction. This has been defined as a state or condition of the body produced by the breaking down of leprotic foci. It is very important to recognise lepra-reaction in the very early stages, and in this connection sufficient importance has not been paid to the temperature chart. Recently the question of normal temperature has been raised in medical papers In leprosy it is of utmost importance to take note of variations in the temperature chart below the normal line, as this may indicate commencing activity. If the patient is improving it is not necessary to reduce dosage, but if there are continuous variations below the normal line it is indicative of something unusual taking place, and treatments should be proceeded with cautiously. The temperature may rise without a corresponding rise in the sedimentation index test, indicating that this may be a more delicate sign than the S.I. test.

The treatment of lepra reaction is the stopping of injections, the giving of a purge and putting the patient on a bland diet, and the administration of Pot. Ant. Tartrate 0.02-0.04 every other day. Lepra-reaction may proceed for a very long time and nothing seem of any avail in reducing the fever. Recently 3 c.cs. of a 1 per cent. solution of Mercurochrome soluble 220 has been given intravenously for this condition with apparent improvement.

2. Eye Reactions. Generally speaking leprosy of the eye goes on progressively until blindness ensues. Complete loss of vision can be stayed for a very long time, and if

general treatment is cautiously undertaken, watching carefully for any flare up, no damage need be done. The local treatment is that of frequent bathing with an alkaline lotion. Atropine or hyoscine drops and ointment should also be used.

Before I close, reference should be made to some other remedies used. The gold preparations have, I am certain, a limited place in treatment. The tendency is to use too large a dosage and continue too long. I personally prefer Solganol B given intramuscularly in the following weekly dosage :—

First and second weeks	 	0.01	grams
Third and fourth weeks	 	0.05	· ))
Fifth and sixth weeks	 	0.01	,,

In using heavy metals it should be remembered that generally speaking small doses may be beneficial, large doses harmful.

The indications for gold therapy are :—

(1) The presence of leprotic affection of the eyes.

(2) The production of lepra fever by the usual methods of treatment.

Not more than two courses, with 21 days rest, should be given without a prolonged interval (three months) for fear of starting a reaction. One should remember that if a patient has had much fever he needs building up, and no drug should be given which tends to break down leprotic foci. Muir<sup>7</sup> has recently advised against gold treatment, but workers in Malaya<sup>8</sup> are confirming Hoffman's<sup>9</sup> view that it is of definite value.

I must apologise for dealing so superficially with this subject, but I have, in the time at my disposal, tried to indicate the general lines along which treatment should proceed. To-day the prognosis in leprosy is being more accurately evaluated, and the extreme optimism of the early days of the new treatment is being replaced by a more reasonable view, while the complete pessimism of the older workers is gradually being replaced by a brighter outlook. While admitting that there is much room for improvement, yet it can be said that the modern therapeutics of leprosy has altered completely the whole situation, and has brought relief permanently to many hundreds of sufferers, and made existence reasonable and comfortable for thousands to whom life otherwise would be but a living death. To have attained this in a matter of a few years is indeed an achievement, and one looks forward to further advances as the study of this long neglected disease is taken up more extensively.

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# Leprosy Survey of Gutu Province, Southern Rhodesia

Bernard Moiser.

#### PART I.

#### July 18th to 26th, 1932.

Geography, etc.

Gutu Province is a triangular area lying between 19° and 20° South and 31° and 32° East.

The altitude is about 4,600 feet at the west end, and falls to about 3,000 feet towards the east end.

The country is undulating, well-wooded and broken up by granite hills and kopjies. It is well watered by several rivers, most of them being tributaries of the Devuli River. (See rough sketch map.)

Climatic.

Average rainfall is about 30 inches per annum, most of which falls between November and May.

Sharp frosts occur during June, July and August, but the climate is hot during March and October. *Population*.

The total native population is estimated at 50,000. They belong to the Karanga tribe, an offshoot of the Bantu family. They are of short stature and poorly developed, polygamous, and live in small collections of mud and timber-thatched circular huts, scattered about.

There are no large towns. Their religion appears to be the worship of departed spirits. They are very unclean in their habits, and have no kind of sanitation whatever. *Occupation*.

Is almost entirely agricultural, the main crops being maize and millet of various sorts. They own large numbers of cattle and goats. Pigs, sheep and poultry are also kept. They do very little fishing, crocodiles being plentiful in the rivers.

#### ROUGH SKETCH MAP OF GUTU PROVINCE,

FORT VICTORIA DISTRICT, S. RHODESIA.



### Diseases.—General.

Eye troubles are exceedingly common, particularly large corneal opacities, hypopyon and even total destruction of the eye. Almost all of them are caused by injury by thorns and sharp pointed grasses in childhood. A few appear to have been caused by smallpox. Conjunctivitis and marginal blepharitis are also all too prevalent and cause much suffering. Phlyctenular conjunctivitis and cataract are not uncommon. Impetigo is also very common, especially amongst children and is sometimes caused by scabies.

Syphilitic manifestations are quite rare, absolutely contrary to the popular belief that the "natives are rotten with syphilis." This was also found to be the case in Chibi Province in 1930, and I am of opinion that it will be found to be true all over Southern Rhodesia, with the exception of the vicinity of the large mines (gold, asbestos, etc.). Gonorrhœa and soft chancres were not seen at all, but only males were examined and not all of them. There was no evidence of tuberculosis or malignant disease. Enlarged tonsils are very common.

A curious feature was the large number of people with small multiple umbilicated warts, particularly on the face. There was a good deal of evidence of epidemics of variola, especially in the Eastern Districts. Acne of the face was often seen, as was tinea versicolor of the upper chest and neck.

#### Leprosy.

Only six cases of leprosy were discovered, four being males and two females. Four of the cases were seen at Zinyemba, the first examination centre, near Gutu, and I am of opinion that none was aware of the nature of the complaint.

Two of these were man and wife. 'I'he remaining two came from different kraals and each declared that there were no similar patients at their houses. Mugo produced one case, who is now on his way to Ngomahuru for treatment. The last case was seen at a kraal between Devuli and Gutu —an old advanced female case, who also is on her way here.

Locality.	Total Number of Cases.	Males.	Females.	Age.	Type.
Zinyemba	4	1	_	12	$C^1$ v. early
	_	1		40	$N^{1}/C^{1}$
			1	40	N <sup>1</sup> /C <sup>1</sup>
	_	1		30	N <sup>1</sup> /C <sup>1</sup>
Mugo	1 1	1	_	35	N <sup>9</sup> /C <sup>1</sup>
Devuli	i		1	55	N <sup>2</sup> almost burnt
	]				out.

These six cases are summarised as follows :----

It will be noticed that no advanced cutaneous cases presented themselves; such cases must surely occur and it can only be supposed that they were unwilling to come forward. Six cases amongst 4,855 gives a figure of 1.23 per thousand.

The leprosy case incidence figure of 1.23 per thousand is of little value for the reasons given above, namely, that the proportion of the population examined is very small, about one-sixth, and advanced cases did not appear at all. It must be remembered, however, that nothing of this sort has ever been undertaken in Gutu before. The people are still very much afraid of the Leprosy Suppression Ordinance and it will take time to overcome this. The voluntary system of segregation is the one aimed at in Southern Rhodesia.

Details of Itinerary, Etc.

The party consisted of Mr. F. E. Fynn, N.C., of Gutu Province, who very kindly made the opportunity to accompany us, Dr. Leggate, Mtoko, in charge of the Mtoko Leprosy Hospital, my wife, myself, one native dresser and certain native messengers.

Gutu is considered a backward area, so disappointments were expected. 'The first was encountered at Gutu itself on the very first day for only some 80 men put in an appearance. Not a woman or child was to be seen.

It took Mr. Fynn some considerable time to discover that a report had been spread that women would be stripped for examination. The contrary had been especially stated, since no European female nurses accompanied us, as was the case during the Chibi survey. I had come to the conclusion during the Chibi survey that nurses were not necessary and were a possible source of error, since we have no nurses specially trained in leprosy work in Southern Rhodesia.

Mr Fynn at once sent out messengers to contradict the rumour, and later it was found that more women and children attended than men, but it became apparent that sick people were not putting in an appearance, and that we were examining only a small proportion of the total population.

Total population 50,000, examined 4,855 only, in an area more than half of the province, as follows :----

	Males	Fe- males	Children	Total	Leprosy	Syphilis
19-7-32 Zinyemba Dip Tank	83	228	218	529	4	4
20-7-32 Narira School	I —	_	18	18	0	4
Godzi School	-	—	72	72	0	8
Chinyika Dip Tank	87	80	110	277	0	0
21-7-32 (cold dull day, Mugo				1		1
D.T	101	77	77	255	1	2
22-7-32 Baro Dip Tank	183	261	204	648	0	0
23-7-32 Alheit Dutch Ref.						
Schl	105	35		140	0	0
Chingomge Dip	1					
Tank	72	131	188	391	0	0
24-7-32 Soti Dip Tank	119	91	71	281	0 1	aneurism
-					of	aorta
25-7-32 Devuli Dip Tank	272	460	270	1002	1	4
26-7-32 Gutu Dip Tank	205	580	457	1242	0	7
-			Ļ			-
			Total	4855	6	30

The weather happened to be very cold, far more severe than usual, with sharp frosts almost every night. Cornthrashing was also in progress everywhere, as well as the national ceremony of beer drinking, but I think that the order to natives to attend might with advantage have been made more unmistakable and stringent.

Southern Rhodesia has an estimated population of only a little more than a million. Wage earning males are all registered for taxation and other purposes. The people are well under control and it would seem an easy matter to register every obvious case of leprosy. Whether or not such cases could be persuaded to come to the hospitals for treatment is a different matter. But this is only a question of time. It will pay to go slowly and it is hoped that the second part of this survey of Gutu will produce much better results.

#### PART II.

Date.	Examination Centre.	Males.	Fe- males.	Chil- dren.	Total.	Leprosy.	Syphilis.
Aug. Ist	Dutch Ref. Mission Gutu	76	58		134	0	0
2nd	Nyanganga Dip Tank	118	245	194	557	1 Female N <sup>2</sup> C <sup>2</sup>	2
3rd	Mungezi D.T.	144	380	205	729	0	2
4th	Makore	131	233	255	619	0	1
5th	Nyamkono	238	474	530	1242	l Male N <sup>1</sup> early case	4 (2 con- genital)
6th	Zaywa	284	633	645	1562	1 Female N <sup>2</sup>	4
		991	2023	1829	4843	3	13

#### August 1st to 6th, 1932.

#### Diseases.—General.

The remarks under this heading in the report of Part I apply equally to Part II.

It was discovered that the "Multiple umbilicated warts" were merely small sebaceous cysts. Leprosy.

Only three cases were found, one male and two females. The male was an early case, showing small hypopigmented macules on the shoulders. He was quite ignorant of the nature of his disease. When shown the macules, he said that they were merely "skin marks," and that the natives often show such marks. He, of course, mistook them for the small areas of congenital absence of pigment, which are not uncommon. The two females were advanced cases, and obvious, and have since been admitted to Ngomahuru. The male is also on his way here for treatment.

Consideration of the Whole Survey.

	Males.	Females.	Children.	Totals.	Leprosy.	Syphilis.
Part I Part II	1227 991	1943 2023	1685 1829	4855 4843	6 3	30 13
Totals	2218	3966	3514	9698	9	43

CONSIDERATION OF THE WHOLE SURVEY.

It is thus seen that out of a total of 9,698 people examined, 9 cases of leprosy were discovered, giving a case incidence of  $\cdot 92$  per thousand. This is a very low figure, and no doubt below the actual figure. In the Chibi survey the figure was about 7 per thousand.

After consideration of all the facts and experience, I am definitely of opinion that leprosy is not nearly so prevalent in Gutu as in Chibi. There is no doubt that the natives do not know the signs of leprosy in its early stages. If, therefore, leprosy had been at all prevalent in Gutu, we should have seen many more early cases. The nine cases seen might be classified as *Early* 5, *Late* 4.

The four late cases might have been expected to remain away for fear of incarceration, but the five early cases being unaware of the fact that they had leprosy, had no reason to absent themselves.

Mr. Fynn also agrees. In his opinion, leprosy is not at all rife in Gutu, for his messengers who constantly travel about the province, do not come across cases. These messengers, by the way, do a month's duty periodically at Ngomahuru, so that they know something of the appearance of leprosy in all its stages.

A little incident of the survey is of interest in this connection. A messenger of the native department came to Mr. Fynn saying that he knew of the whereabouts of a case of leprosy and he would tell him, if Mr. Fynn would promise not to let anybody know who it was that gave him the information. The information was given, and the patient produced. Here was a case of definite hiding of a case and of fear on the part of a native department messenger to give information. I do not, however, think that such a case is the rule, and I believe that the fear of incarceration will rapidly pass away, and is, indeed, doing so already. Three of the nine cases have come to Ngomahuru quite voluntarily, and I believe that every single case will appear within the next week or two. There were unmistakable signs that the dread of what used to be nothing more or less than imprisonment is passing away. The system of allowing patients to have visitors (a separate compound is kept for visitors) of permitting non-infective cases to go to their homes occasionally, and of setting an afternoon a week apart for the clerk to write letters for the patients to their relatives and friends, all these are having their good effects. The patient in hospital is no longer considered as dead, as was undoubtedly the case some years ago.

To consider now the sex of the discovered patients. Of the nine, five were males and four females. The usual incidence is about three times as great in males as in females, so that it is evident that the males were absenting themselves.

The estimated population of Gutu is about 50,000, of whom we saw one-fifth. Females put in an appearance more freely than males. Assuming that, had we seen the whole population, we should have discovered not less than 20 female cases.

Adding three times as many men would give a figure of 80 cases, for the whole population or a case incidence of 1.6 per thousand. The correct figure is probably higher than this, in the region of 2 to 2.5 per thousand. This, of course, is mere surmise, but I think it is not far from the truth, and consider that this is a useful figure.

I trust it may be possible to carry out further surveys in the future, and in the light of experience I would recommend that :—

1. It should take place in August or September, not later, not earlier.

2. At least two days should be spent at each centre, to allow time for some treatment and for late comers.

3. The Native Commissioner be asked to bring his tax register.

4. As many native department messengers as possible be employed, mounted on bicycles.



Gutu Leprosy Survey, Southern Rhodesia. Dr. Leggate examining Natives in the Shelter at Chingomba. 23rd July, 1932.



GUTU LEPROSY SURVEY, SOUTHERN RHODESIA. SOME OF THE NATIVES AWAITING EXAMINATION AT BARO, 22ND JULY, 1932. THE STATION IS SHOWN ON LEFT.



Reproduced by kind permission of the Mission to Lepers.

A WARD FOR WOMEN IN THE "I-HAI-EN" HOME, MEGURO, TOKYO, UNDER THE AUSPICES OF THE MISSION TO LEPERS.



Reproduced by kind permission of the Mission to Lepers. The Government Leprosy Asylum on the Island of Shikoku, near Oshima, Japan.

# Anti-leprosy Movements in Japan.

(Address (abridged) delivered at the China Leprosy Conference held in Shanghai, Oct., 1932.)

#### A. Oltmans.

WHILE the leprosy problem in general is the same wherever the disease prevails to any large extent, at the same time it has its special features in every individual country and hence cannot in every particular be effectually dealt with along the same lines and by exactly the same methods. This statement is applicable very decidedly to the leprosy situation in Japan. It even applies to Japan proper as compared with Korea and Formosa.

The history of the importation and earliest development of leprosy in Japan lies shrouded in mystery and myth as is the case with that of all highly infected leprous countries the world over. Indications of its existence appear as early as the fourth century A.D., again in the eighth century in connection with a famous empress and again in the sixteenth century with the religious activities of the Roman Catholic Church in Japan. But none of these early endeavours seem to have had any permanent effect and there is no regular stream of influence coming down from pre-Meiji times against the ravages of the disease or even in the way of checking up on the actual situation.

Positive anti-leprosy movements by the government in Japan may be said to have begun with the issuing of a "Law for the Prevention of Leprosy" in May, 1907, which was put into effect in 1909 and amended in 1910 and 1916. The first regional Leprosarium called "Zensei Byoin" (Perfect Life Hospital) was also erected in 1909 and was soon followed by four others throughout the country. To these has now been added the "Ai seien" on Nagashima in the Inland Sea, the first Federal Leprosarium in Japan. A second one is in process of erection at Kusatsu in Gumma Province.

But all these government institutions were preceded by private leprosaria for the space of about 25 years. Of these private institutions there are at present eight in operation.

Some years ago there was also organized a "Japan Mission to Lepers" and three years ago there came into existence the "Leprosy Prevention Association" which, according to the latest statistics, has now a membership of about 650.

The Task.

What is the actual task that these various anti-leprosy movements are facing in Japan, and how are they addressing themselves to this task? The answer to the former of these questions must necessarily be somewhat vague.

Firstly, as to the total number of patients at present in Japan proper, neither government statistics nor the opinions of individual experts speak with any great certainty. The latest government census (March, 1930) registers 14,261 patients. It must be borne in mind that the gathering up of these statistics is done in Japan under the direction, not of the medical, but of the police department. This fact at least suggests the possibility of considerable inaccuracy in the results obtained chiefly in the direction of an underestimate. Add to this the considerable number in the initial and non-infective stage of the disease, in many cases the patients themselves not being aware of its existence, also the presumably large numbers that are intentionally hidden from investigation, the numbers of roaming and begging sufferers who are difficult to check up, and one can fairly state that the number of sufferers from leprosy in all stages of the disease is probably between three and four times the official estimate. In fact, government authorities in the Hygiene Department and Japanese leprologists give the total number as between forty and sixty thousand. Taking the latter figure the percentage would be about 0.1 per cent., but this figure is probably too high.

The distribution of the disease throughout Japan is rather remarkably even with the exception of the Northern Island (Hokkaido) where the cases are very few, owing largely to the fact that it is for the most part sparsely inhabited, while the severe winter climate may also have something to do with it. The Island has no leprosarium of any kind, but there is a government one on the Mainisland side of the Straits that separate it from the Hokkaido.

As for beggar patients, officially they are non-existent, but in reality this is not quite the case. They do appear now and then at prominent places on the streets and especially on occasions of local festivals and at certain favourite spots, viz., on the way to the Kiyomasa temple in Kumamoto. But on the whole Japan may be said to be quite free from this very obnoxious feature. Incidentally it may be stated that such a situation in a really leprous country has its disadvantageous as well as its advantageous side.

Some of the difficulties inherent in the task are peculiar to Japan. One is, seemingly strange, the advanced degree of modern civilization to which the country on the whole

has attained. This may seem paradoxical, because one would naturally conclude that with every step forward in civilization, the task of coping with diseases of every kind, leprosy included, would become easier. While this is true in a general sense, and especially along the line of scientific research and the application of the best methods of treatment, such advance in modern civilization brings added difficulties. One of these is that the more enlightened a community or nation becomes, the more it is inclined to guard against exposure of its ugly sores. The degree of shame for having a leprous member in a family is in direct proportion, as a rule, to the degree of enlightenment and social standing of such a family. It is for this reason that a very large percentage of patients in the hospitals are from the poorer classes of society. This, by the way, suggests the necessity for devising some means for inducing patients from the better class of society to avail themselves of better treatment for the cure of their disease than they can get by isolation at their own homes, and most of them do not get any.

Another difficulty in a country like Japan is the determined opposition of the government authorities to outside clinic work for leprosy patients, which in some other leprous countries has in recent years made such rapid strides, and has apparently brought such splendid results. Here again the degree of practical difficulty is in direct proportion to the degree of social advancement. While all leprologists will agree that outside clinics must necessarily lack the important elements of continual oversight and observation, the regulated diet and other physical and mental health features attainable in the hospitals, yet, as hospitalization of all patients is manifestly impossible, it is greatly to be regretted that there are thousands of patients without treatment who might be treated at a comparatively small expense in out-patient clinics.

Still another difficulty that may here be mentioned is the lack of knowledge and training among local physicians in the detection and treatment of patients in the initial stage of the disease. This is proverbial, though probably not unique, to Japan. Such lack prevents the detection of early cases that might be discovered by the local physician and then reported to the proper authorities. Every medical school in Japan ought to provide the opportunity for the student to become acquainted with the leprosy problem. The same holds true in regard to the training of nurses for this particular branch of work.

The "Law for the Prevention of Leprosy" already

referred to in its various sections is quite definite and comprehensive even to the matter of government aid in the erection and maintenance of leprosaria. But, as we all know, the *making* of a law is one thing, and usually not very difficult, but its proper enforcement is another thing, and not such an easy matter.

According to recent official statistics obtained, of the 14,261 patients registered there are 3,638 in the six government hospitals and 632 in the eight private hospitals, a total of 4,270. That leaves just about 10,000 registered patients without hospitalization. Add to these the unknown numbers of unregistered ones and a conservative estimate would lead to the conclusion that for each patient in some hospital there are *ten* outside. It is impossible in many cases to enforce the law on patients not isolated in hospital and for many others there is no hospital provision. Still, notwithstanding this regrettable fact, it is distinctly gratifying to note the progress made in anti-leprosy movements in Japan, especially during the last two decades. This progress has been almost entirely along government lines. Nearly all the private hospitals were established before the first of the government hospitals, and that the former were a spur and an inspiration to the initiation and prosecution of the latter is an undisputed fact.

The figures received from the six government hospitals in preparation of this paper show that the total annual expenditure on these hospitals amounted to just about one million yen.\* Each of the five Prefectural Hospitals is maintained by eight to ten adjacent Prefectures together with at least one sixth of the total expense from the Central Government. The new Federal Hospital (Ai-sei-en) is, of course, entirely maintained by the latter. The expense works out to about 75 sen per day for each patient. The total of 1,000,000 yen does not include new buildings but it does include ordinary repairs.

One of the most pleasing and encouraging features of the anti-leprosy work in Japan is the sympathetic and helpful attitude of the government towards the private hospitals. The various sums of money received by these hospitals from Prefectural and Central Government budgets totals from fifty to sixty thousand yen annually, not counting special amounts granted for the erection of new buildings or the enlargement and improvement of the plant.

Until quite recently the entrance of patients into the Prefectural Hospitals was almost exclusively under the law

\*1 Yen (at par) =  $2/-\frac{1}{2}$ . 100 Sen = 1 Yen.

of compulsory segregation. But with the establishment of the new Federal Hospital (Ai-sei-en) on Nagashima voluntary segregation is now allowed and this example is being followed in the Prefectural hospitals as well. The advantages of this change need not be enumerated, but they are of prime importance. In order to facilitate voluntary declaration of the diseases popular lectures are arranged, often with moving pictures, in leading cities and towns with the object of acquainting the people with the needs of the work, the various methods used, and the real inside condition of the hospitals. The result is a much wider and more intelligent interest in the problem as well as an increased participation in helping forward the cause.

Along this line of work both the "Japan Mission to Lepers "and the "Japan Leprosy Prevention Association " specially concern themselves. Neither of them aims to set up or maintain under its own auspices any leprosy hospital. They are chiefly for the purpose of anti-leprosy propaganda and for aiding cases of special need. The spread of literature and the holding of public meetings are the two main lines of activities of both these associations. It is being increasingly recognized that the hope of ridding Japan of leprosy has little or no chance of being realized with the means and methods thus far used. It is true that there are positive evidences of a decrease in the number of cases throughout the country during the last two or three decades. One of these evidences, and probably the most reliable, is the decidedly diminished percentage of patients discovered among the young men at the time they are examined for military service. By inference it may be fairly concluded that a somewhat similar decrease in numbers has been going on among the female population. The writer ventures to surmise that this decrease is not mainly due to the segregation and hospitalization of leprosy patients in recent years, but rather to improvements in living Better enforcement of hygienic laws, use of conditions. more proper foods, better homes, more care in avoiding contacts with patients-these things are doubtless largely the causes of the decided decline in the numbers of patients. This is the more evident when we consider the fact that the paroling of patients as "symptom free" or, according to the new nomenclature, "arrested cases" is an almost unheard-of thing in Japan proper.

In the answers to a very recent questionaire sent to all the hospitals, government as well as private, the total number of paroled cases amounts to only 31 for an entire year and of these 20 are reported from the new Federal Hospital

(Ai-sei-en) alone, due doubtless to its policy of voluntary entrance which naturally leads to the entering of early cases that are amenable to effective treatment over a very short period. The Japanese leprologists as a rule do not favour paroling patients and the authorities in the Department of Health seem to stand behind this policy. Apparently the two main reasons for this policy are strong misgivings as to whether any real patient ever becomes entirely free of the disease, and lack of accommodation outside the hospitals and colonies for so-called "burnt-out" and "arrested" cases that have ceased to be infective. With these ideas and conditions in mind it would seem an unwise and even dangerous procedure to thrust such patients back upon society where they are certainly not wanted and where most, if not all, of them would simply become a burden and a nuisance to the people among whom they would dwell. That this is not an imaginary, but a very real situation, is verified by the experience in Korea where so many patients have been paroled out of the private hospitals. This phase of the leprosy problem, namely, what to do with the paroled patient, is becoming one of the most acute and most difficult questions to solve. In Japan proper a solution of the question is not even sought, but if ridding the country of leprosy is really a definite aim to work for, then some solution of this most difficult phase of the work will also have to be seriously considered. Without the earnest attempt at a solution to this question, the task of extirpating from any country this dreadful scourge of leprosy will be most seriously hindered and retarded—nay, it seems to the writer that it could never wholly accomplished. Separate colonies for these be paroled patients, under conditions that would make selfsupport wholly, or at least in great part, possible, point out one way of possible success. Small attempts at this have here and there already been made but hardly enough to gauge the result.

Another feature of anti-leprosy work, and a very important one which is still largely neglected, is the proper care of the children of sufferers from leprosy. Only 29 such are reported in connection with all the government hospitals, and the total number connected with the eight private hospitals is not much larger. On the other hand, there are over 100 children reported among the hospitalized patients, 85 of whom are in government hospitals. This is a sad state of affairs because by early and proper treatment all these 85 children might have been saved from falling victims to the disease. The well established fact of the non-hereditary nature of leprosy gives us this confidence in the possible salvage of all such children if taken from all leprous contacts and surroundings in their infancy. The anti-leprosy movement should address itself much more earnestly to this branch of the task, and we are glad to be able to state here that small beginnings have been made.

What is the outlook of the Anti-Leprosy Movement in Japan? Naturally to this question widely differing answers would be given. Those most pessimistic about the outlook I venture to say, are those who know the least about the real situation. At the same time, experts are aware of the fact that the predominant note of leading leprologists in the world has recently been one rather of warning against too optimistic a view of the situation and of the outlook for the future. We in Japan also take this to heart. While rejoicing in many signs of real progress, we do not wish to be blind to the gravity of the task still ahead nor to the many difficulties that must be overcome in order to realize what may truly be called a great success.

(The full address will be found in the Conference Number of the Leper Quarterly, December, 1932. Published by the Chinese Mission to Lepers, 20, Museum Road, Shanghai.)

# An Appeal to Our Readers.

To all our readers, many of whom have encouraged us by kind letters of appreciation, we appeal. Please give us accounts of your work or send us short articles. Many workers feel that they have nothing to contribute, but in every settlement there are lines of well-tried treatment which have not been made known because they are considered too insignificant. We would remind our readers that this journal is especially for those out of touch with the most recent work, and who are endeavouring to do what they can for sufferers, sometimes under almost impossible conditions. Therefore, all and every type of article, dealing with subjects from the best type of housing to the best line of treatment of ulcers, will be acceptable. So far the editorial staff has not needed to issue an appeal for articles, but we find that our file entitled " Incoming Articles" is lamentably thin, and we trust that this request will not fall on deaf ears.

# Obituary.

#### DR. ISABEL KERR.

'I' is with great regret that we heard of the passing of Dr. Isabel Kerr on December 20th, Mrs. Kerr will ever be remembered 1932. as one of the pioneers in the new treatment of leprosy. In 1907, when there was no hope of physical alleviation for those who suffered from leprosy, Dr. Isabel Kerr with her husband, the Rev. G. M. Kerr, started to house the numberless outcast victims of the disease who came to them pleading for shelter. 'The work was commenced by the erection of a few rough huts, and continued with patience until an institution of the first rank was developed. The needs of Dichpali were adapted to the changing situation, so that what was once a home for hopeless cripples was transformed into a haven of hope for those in the early stages of the disease. It was always an inspiration to visit Dichpali, but to see it to-day, with the hundreds of happy, expectant faces, fills one with joy and hope, and makes one feel that the conquest of the world's most dreaded scourge is not for those who are gloomy and pessimistic, but for the eager and vigorous, for it is a saving work, rescuing virile young men and women from a living death. As one contemplates all that has been done, not only for sufferers in Hyderabad, but throughout India, we respectfully acknowledge the great contribution of Mrs. Kerr and prayerfully trust that, as with the passing of other great pioneers, her death will be a clarion call to others to take up the flag where she perforce had to lay it, and implant it higher up the mountain slope.

To Mr. Kerr and his daughter, we tend our heartfelt sympathy, and with them we cherish the memory of one, who, by patient, loving, unostentatious labour, accomplished a work which will ever be remembered and admired as long as leprosy exists in the world.