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Editorial

One of the commonest fallacies connected with leprosy is the apparent improvement which often takes place under certain forms of treatment. The clinical signs are due not to toxines but to the reaction of the tissues to the bacilli in their neighbourhood. This reaction is an attempt on the part of the tissues to destroy the infection. If therefore the efforts of the tissues are reduced, as when the general health is depressed by intercurrent disease, or by excessive doses of drugs used in treatment, the clinical signs are likewise reduced. Therefore diminution of clinical signs, whether cutaneous or neural, does not necessarily imply diminution of infection; in fact, it often means the reverse. This may be best illustrated from the history of an interesting case. The patient had noticed signs of leprosy spreading for some months, first on the face and later on the body. He then had an attack of enteric fever. He noticed to his surprise and delight that during this attack the signs of leprosy disappeared. But as convalescence advanced his former signs of leprosy reappeared and were very much worse and more widespread. Later he was attacked by dysentry and then again the signs of leprosy diminished, only to show themselves once more in a far worse form.

Clinical appearances are therefore liable to be deceptive and should never be taken as a criterion of improvement if the patient is not in first-class general health. In cutaneous leprosy it is safer to rely upon careful and repeated bacteriological examination.

Likewise the deterioration of neural into cutaneous leprosy may often be accompanied by considerable restoration of sensation, which the patient and even the physician may misinterpret as a sign of improvement, whereas it is simply a sign of diminished tissue reaction to the bacilli inside the nerves and consequent relief of pressure on the nerve fibres. It should be noted that false signs of improvement are often caused in this way by excessive treatment which depresses the patient's health.

The reaction of the tissues to Hansen's bacillus is frequently accentuated by something of the nature of sensitization to these organisms. Certain drugs cause apparent improvement by desensitising the patient. Thus red and swollen lesions may become pale and flat and may even disappear. But bacteriological examination before and after fails to show diminution of the infection. This action is associated largely with small doses of the heavy metals, such as antimony, arsenic, copper, gold, etc. It is not unlikely that the recent popularity of dyes, such as methylene blue, fluorescein, etc., may in large measure be due to their desensitising effect.

It is not yet clearly enough realised that in leprosy, as in tuberculosis, no real progress towards recovery can be made through any yet known form of special treatment, apart from the sound general health of the patient. Given this factor, various forms of special treatment are useful auxiliaries, the best established of which are chaulmoogra oil and its preparations. Apart from this factor, any seeming improvement may either signify actual deterioration or, at best, desensitization.

Leprosy is a disease of very low toxicity. There is therefore nothing inconsistent between suffering from moderately advanced cutaneous leprosy and attaining good general health. For this, freedom from accompanying disease, suitable diet, and the right mental attitude are essential. Mass treatment and sole reliance upon drugs are likely in the long run only to bring discredit upon anti-leprosy measures.

Above all, in any endemic area, *treatment with a view to prevention* should be the motto of the anti-leprosy campaign. Leprosy is difficult to cure, but it is easy to prevent. In carrying out prevention the difficulty lies not in the nature of the disease, but in instructing and persuading those concerned to carry out a very few simple and inexpensive precautions.

Some Dietetic Factors in Leprosy with Special Reference to B Avitaminosis

JAMES A. K. BROWN.

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THE excuse that the diet of the peoples in the tropics suits them because they are used to it, has been adequately disproved (Leitch). Orr and Gilkes have traced the different physique and resistance to morbid conditions of the Kikuyu and Masai, to their different diets. McCarrison maintains that food is the paramount factor responsible for the contrast between the manly, stalwart and resolute races of Northern India and the poorly developed, toneless and supine peoples of the East and South. By feeding groups of animals on diets typical of the various tribes, he produced parallel physiques with corresponding resistance or susceptibility to infection. Magaw suggests three main forms of deficiency—shortage of food as a whole, shortage of available protein, shortage of vitamins; and that many millions of the inhabitants of the tropics live on the border line of starvation, that when harvests are bad they may suffer from actual starvation.

Avitaminosis B is one of the predominating deficiencies. Leitch refers to this particularly in Trinidad, Central Africa, Tanganyika, India, Straits Settlements and the Philippines. McCarrison stresses for India a diet rich in this vitamin, pointing out that a diet in which vitamin B is not wholly lacking though insufficient for normal metabolism, leads to poor appetite, failure to increase in body weight, oractual loss, alimentary disturbances, disorders of the skin, symptoms referable to the malnutrition of the nervous system, and to intercurrent infections, which latter may lend wide variety to the symptomatology. Balfour agrees that the diet of Southern India is relatively poor in vitamin B, and adds that the wide prevalence of disease, the main aetiological factor of which is B avitaminosis, e.g. beriberi and pellagra, is a measure of the serious shortage of this vitamin. On the other hand Cramer and Mottram suggest that the non-appearance of beri-beri does not guarantee that the diet is adequately supplied. Variants are described in which one of the factors is probably vitamin B deficiency e.g., Wright's A and B avitaminosis disease of Sierra Leone, and Moor's retrobulbar neuritis associated with sore tongue and mouth, and occasionally concurrently pruritus scrotum. Grunfelder has identified a condition in Palestine of diarrhoea with nervous symptoms, relieved by vitamin B 1, and Corkhill

refers to a pellagroid condition in the Sudan on a wholly millet diet, absent when the diet contained milk.

Leprosy is common in those countries where poverty and a low standard of living prevail (Muir). Rogers and Muir attribute the prevalence of leprosy in the Middle Ages to a deficiency of fresh animal and vegetable food. Muir and Santra, and Lowe, connect the high incidence of leprosy in some areas in India with dietary faults. Gupta says that where the standard of living is the poorest, the incidence of leprosy is the greatest. Whilst more than one factor may be involved, leprosy has disappeared from countries where the standard of living has improved, and remained where the standard has changed but little.

Had Hutchinson emphasised what fish eaters did *not* eat, he might have anticipated the present attention to diet in the treatment of leprosy. Rogers and Muir regard deficient diet as predisposing to infection, and precipitating lepra reaction. Muir has described thirty Chinese lepers in Calcutta, who with one exception recovered when the diet was improved and had then better health than they had had for many years.

The procuring of a plentiful and varied food supply is of extreme importance (Rogers and Muir, Muir, Low, Cruikshank). Lampe provides food free to the children in Surinam, not as a social measure only, but hoping that good nourishment will lead to improved health and resistance, and thereby to subsidence of the symptoms. Kiel writes " In view of the limited pathogenicity of the leprosy bacillus, it may be said that the development and course of the disease is not influenced so much by the virulence of the germ as by the capacity of resistance and state of immunity of the patient. These are in close relationship with the nutritional state especially during childhood . . . Leprosy is primarily a disease of poverty, and an increase in the standard of living automatically brings a retrogression of leprosy morbidity." Kiel has deduced a dietetic treatment, and illustrates his results by photographs of a patient of nine years, showing marked improvement in lesions of the face as a result of four and a half months dietetic treatment.

The traditional treatment of leprosy is being regarded less favourably. Lowe believes none of the medicaments used in leprosy have any specific effect. It is certainly doubtful whether injections of hydnocarpus preparations given casually to outpatients, without the control possible in institutions, is of any value at all, unless it be psychological. Attempts have been made to find alternatives, e.g., various dyes and mercurochrome, and Ryles maintains that brilliant

green is at least as efficacious as the usual medicaments. Lie, who maintained isolation was largely responsible for the disappearance of leprosy from Norway, gave up the usual treatment for dietetic measures. Rodriguez has shown that it does not necessarily follow: *the earlier the case the better the result*—as far as chaulmoogra oil is concerned, and Cochrane adds that it is more than ever being realised that the solution of the problem of treatment in leprosy will be found in the metabolic processes of the body.

The *general* importance of milk has been attested by Orr and Gilks, Bonin, McCulloch and others. Atkey has related the consumption of milk to the lower incidence of leprosy. Badenock and Byrom obtained clinical improvement in lepers with a rise in serum calcium when the patients were transferred to a hospital milk diet, commenting that the rise in blood calcium might have been due to increased intake, but the clinical improvement not simply to that, but to the other factors in the milk. (Milk contains both vitamins A and B). Cook insists that leprosy is a deficiency disease, discountenancing M. leprae altogether, and referring particularly to vitamins A and B. Lowe records pellagra in the Leper Settlement at Dichpali, Hyderabad, although it occurs in the ordinary population too. Wilson describes forty-two cases of " Red Disease "—a pellagroid—in Leper Settlements in Korea, rarely met outside and clearing up with pork and cod liver oil added to the diet. (Such meat contains seven to eight times the amount of vitamin B in beef muscle—Kemmerer and Steenbock). Mellanby associates A avitaminosis with conditions previously ascribed to B avitaminosis. Such evidence as there is seems to focus attention upon B and possibly A avitaminosis.

There are possibly analogies between beriberi, pellagra and leprosy. Their distribution is similar or overlaps. They have a long "incubation" period. The symptoms of chronic beriberi and nerve leprosy are those of a progressive peripheral neuritis, affecting both the motor and sensory nerve endings. In beriberi the earliest changes in the nerve endings have been described by Woolard, and Tsunoda and Kura, and are reversible. The earliest changes in leprosy are those detailed by Muir and Chatterji. The prodromal symptoms of leprosy, exemplified in the records following, suggest there may be earlier changes, but a description of these is not available because of the difficulty of diagnosis in the "prodromal" stage, and of obtaining the necessary material. Such changes as Muir and Chatterji describe are remarkable for their absence of Hansen's bacillus, and to account for

this they postulate ultramicroscopic forms, and modify their theories of the spread of infection.

Pellagra and leprosy are characterised by alternating attacks and remissions over a period anything up to twenty years. In pellagra the alimentary tract is characteristically involved; in leprosy anatomical changes are not so common, but functional disturbances are. In pellagra there is early mental depression and dementia is frequent; in leprosy dementia is rare and then usually coincident, but mental depression is common and may lead to acute melancholia. The first visible lesion in leprosy is usually a depigmented patch, with alterations in sensation, but no demonstrable bacilli, and indicates changes in the peripheral nerve supply. As the process extends to the skin, it is accompanied by a dermatitits, with the usual signs of inflammation, swelling, hyperaemia, and an exaggeration of the subjective sensations. The skin lesions in pellagra are symmetrical, but are not always limited to exposed areas. Shelley and Mellanby maintain that they are neurotropic, and Mellanby says that this must be given first consideration in settling the aetiology. In both diseases there are alterations of pigmentation in the affected areas, with thickening and finally atrophy and wrinkling.

Apart from the classical syndromes certain symptoms follow deprivation of vitamin B, namely—anorexia, loss of weight and interference with growth, lesions and functional changes in the alimentary tract, and oedema. The loss of desire to partake of the deficient food may be a morbid phenomenon, or an attempt by the organism to liberate by starvation and tissue wasting the body stores of the lacking vitamin (Kon and Drummond). Both B 1 and B 2 stimulate appetite, in the presence of each other. Limitation of both leads to impairment of utilisation of food before the loss of appetite; if only one factor is lacking the order of events is reversed (Griffiths and Graham). Peters regards the loss of appetite as secondary to the internal starvation, and a reflection from tissue cells which have lost their rightful powers of assimilation. Vitamin B appears to have a definite effect on weight and growth, and it has been shown (Dennett, Hoobler, Bloxsam, Summerfeldt, Morgan and Barry) that infants fed on diets rich in vitamin B gained in weight and growth considerably more than controls on normal food. Various lesions in the alimentary tract have been described, whilst atony and delay in emptying have been proved by Gross and by Rowlands and Browning. Farnum has shown a diminution of the total and free acidity of the gastric secretion in beriberi; Gross, a diminution of bile

pigments and the number of seybala in B deficient animals; and Cramer and Mottram that vitamin B greatly modifies food absorption and has an intensely stimulating effect on the functional activity of the whole digestive tract. The association of idiopathic oedema is less certain.

Rogers and Muir refer to abdominal disease in lepers, particularly incomplete digestion or stasis following on some present or former inflammation, and to chronic constipation, which latter is very common, due to " dilatation of the colon, chronic ulceration of the bowel, endocrine insufficiency, unsuitable diet and other causes," adding that regulation of the bowels by suitable diet is necessary, and that purgation is one of the favourite remedies in India for leprosy. Cochrane also stresses the importance of constipation, very often unrecognised. It is possible that an unsuitable diet may be unsuitable because of its subminimal vitamin content, and that the indigestion and stasis and even inflammatory changes may be due to this deficiency.

The following observations were made upon forty-one children and twenty-five adults, to see if the addition of vitamin B to the diet resulted in any marked improvement. Careful enquiries were made into the family histories, previous medical histories, and into the mode of onset. The diet of the patients was elicited, with special reference to vitamin B containing accessories. The sedimentation index was taken periodically, and the temperature and weight records carefully preserved.

Family Histories.	Children	%	Adults	%
Relatives infected and lepers in the compound	10	24.4	—	—
Relatives infected only ...	11	26.8	6	24
Relatives *not* infected but lepers *in* the compound	4	9.8	3	12
No source of infection known	16	390	16	64
Average percentages admitting knowledge of source of infection				51.5
Average percentages not admitting knowledge of source of infection				48.5

The difference in the groups may be due to their smallness; in the case of the children, contacts would be in a limited and more intimate circle. Stein's figures are 53.3% and 46.7%, and he uses them to show the danger of contact and the importance of isolation. The usual emphasis is upon the large proportion admitting contact. Assuming that the number admitting contact is less than the actual, there are still a large number of cases in which the prolonged intimate

contact, usually regarded as essential, is extremely doubtful, and especially such contact with an infective leper.

Previous Medical Histories.

In a few cases the first symptoms immediately followed some illness e.g., yaws. The majority of the population, however, suffers from yaws, malaria, helminth infections, etc. etc., and the histories of the lepers, except in a few cases were not notoriously worse than those of patients seen in a general hospital. Having recognised the predisposing effect of previous illness, the question arises in a group of people, all of whom have had the diseases common to their country, and only the same degree of casual contact with infective lepers, what other factors determine the onset of leprosy?

Histories of Onset.

Certain subjective sensations were common to practically all cases; in many before the appearance of patches. They were referred (1) to the whole body; (2) to the site of a future lesion; (3) to a site in which a lesion had not as yet developed. They included paraesthesia—"crawling," "tingling," " burning," " irritation " and " a feeling of insects in the skin "; hyperaesthesia—pain in one place or all over the body on the slightest touch; paint—" biting " a gnarling or gnawing pain, pain in the course of the nerves akin to neuralgia or toothache, and pain in the deeper structures; muscle weakness referred to as " inability to grip," and occasional " cramps "; numbness and anaesthesia, both macular and acroteric. In some respects the sensations resembled the description of chronic ergotism—" itching and tingling, and a sensation of insects running over the skin followed by numbness and local anaesthesia " (Hale-White). Such prodromal symptoms may be dismissed as " general "; lesions do develop, however, in some of the areas to which symptoms are referred. It seems reasonable to conclude they are due to early pathological changes in the nerve endings, or to some altered blood condition, metabolic or toxic, or both.

Six cases emphasised muscular rather than sensory symptoms, four definite symptoms and irregularities referred to the digestive tract. Constipation and minor digestive disturbances ar e frequent, but were not mentioned more often in the present series, because such conditions are more or less ' natural,' and because leading questions were not asked.

Diets.

The staple diet resembled that of the ordinary population —yam, cassava, palm oil etc. etc. The vitamin B accessories

were okra, pawpaw, plantain and bananas, beans, groundnuts pumpkins and oranges. Maize was eaten, but when roasted over an open fire and the exterior charred, even the heat stable content of vitamin B must become considerably diminished. In the absence of exact quantitative determinations of various foods, any standard of comparison is arbitrary and relative. The diet was classified as " marginal " if it included a reasonable quantity of one or other of the vitamin B accessories daily; " inadequate " if it did not; and " adequate " if it contained more than the " marginal " diet. The cases in which data were obtainable were grouped as follows :—

	Adults	%	Children	%
Adequate	12	48	23	57.5
Marginal	4	16	8	20
Inadequate	9	36	9	22.5

On this basis the figures suggest more inadequacy among the adults, but the needs of the children are proportionately greater. Their real inadequacy is seen by comparison with the diet suggested for lepers by Kiel and by McCulloch's diet for the population of Nigeria, the former being an optimum and the latter a minimum. The absence of dairy produce makes the emphasis on vitamin B accessories more important than ever. This and the suggestion of Plimmer, Raymond and Lowndes, that in order to supply sufficient B 1, the diet must be composed of 60—80% of foodstuffs in the fresh state (vegetables and fruits), amounts impossible for man to consume, make it likely that those described as adequate may be doubtful, that in many cases the intake of vitamin B must have bordered on the minimum, in some cases not reaching it, and that when the accessories were out of season the majority were taking less than the minimum.

Sedimentation Index and Temperature Records.

It was thought that if a vitamin B deficiency influenced the invasion of M. leprae, vitamin B added to the diet would lead eventually to a general improvement reflected in the sedimentation index; those with extra vitamin B would take more active treatment than those without, with less temperature and sedimentation index reaction, and those with extra vitamin B not having active treatment would show a slower rate of sedimentation than those having neither extra vitamin B nor treatment.

The children were divided as follows :—

1. Those receiving vitamin B and injections.

2. Those receiving vitamin B only.
3. Those receiving injections only.
4. Those receiving neither vitamin B nor injections.

All had been having treatment up to November 30th, 1933; they were given a holiday in December, and in January 1934 treatment was resumed with Groups 1 and 3, and vitamin B was given daily to Groups 1 and 2. At the end of January it was seen that this was not an effective comparison. The children were of different ages and physique, in different stages of disease, with, therefore, different maximum dosages and different tolerations for the drugs. For the groups having injections the only comparisons that could be made were the percentages of the maximum given, and since the ages had to be guessed, the maximum and the percentage of the maximum could only be an approximation. The matter was further obscured by injections being prevented even when the S.I., or the temperature was favourable, by pain at the site of injection previously given. It was then decided to regard each case individually, and at the end of January no further active treatment was given.

Temperatures were taken morning and evening, and tables drawn up for comparison, for each month for each patient.

The preparations of vitamin B used were Marmite and an extract of rice polishings prepared by Messrs. Ferris Ltd., of Bristol. The latter was only used in a few cases.

The results did not show any definite improvement, but there is evidence that the S.I. is extremely sensitive. Children with a comparatively mild disorder, frequently run a much higher temperature than adults. McKenzie says that the S.I. is influenced by state of debility not amounting to actual disease, and that it appears to be a very delicate expression of debility. Iswariah and Naiv maintain that the S.I. does not give a reliable indication of treatment. Paras, Lagrosa and Ignacio state that it shows no regular correspondence with the course of the disease, except that a high index is the rule in reaction cases. The temperature of any patient and the S.I., which latter is more sensitive than the temperature, depend on a number of factors. In sanatorial work in England the exercise of every patient is regulated. Recurrent pyrexia can be controlled by decreasing exercise and increasing the periods of rest. With primitive people, and children especially, the problem is more involved, for intelligent co-operation is not available. The better he feels, the more the patient wants to move about, *and does.*

Weight Records.

The cases were divided into groups according to changes in weight after the exhibition of vitamin B.

Group A.—The cases in which the administration of Vitamin B concentrate was coincident with an improvement in the weight, and in which it was thought that the vitamin B concentrate was the factor responsible.

Group B.—Cases in which the vitamin B concentrate was associated with some improvement, but not so great as in Group A, and in which the vitamin B concentrate may have been the factor responsible.

Group C.—Cases in which the administration of the vitamin B concentrate was not associated with any improvement.

Group D.—Cases in which some complication or exacerbation of the disease seriously interfered.

	Children	%	Adults	%
Group A. ...	11	26.8	9	39.1
Group B. ...	3	7.3	2	8.7
Group C. ...	10	24.4	11	47.8
Group D. ...	17	41.5	1	4.4

Two of the adults did not have any Vitamin B at all and did not show any weight change. The following are the weight records of those in group A. In some cases the changes are proportionately small, in others large. Weight Records for the adults were not available before February as it was only then decided to include them for additional evidence.

' = 2 drachms Marmite daily
" = 4 " " "
* = 1 ounce " "
r = Rice Extract.

No. of Case	June 30th	July 31st	Nov. 30th	Dec. 31st	Jan. 31st	Feb. 28th	Mar. 31st	April 30th	May 31st
3	102		105	105½	110'	110¾'	113"	115	116
8	90¾		92	94¼	96'	96	96¼*	98*	106*
10		86	90	90½	106'	109'	111½*	111½*	109
11		85	86	86	91'	90'	95*	95½	97½
15	93¼		97	97	102'	107'	112"	112*	112*
17		84½	86	86	89½'	86'	89¼"	90	92
18	76¾		78¼	78½	79	79	83½"	85½*	85½*
23		67	67	67	65½	66¾	68½r	70r	72r
31	60½		64½	64	63½'	65¾'	68"	70½	66⅛
34	74		75½	76	76½	75½	79r	78*	80*
42		86	91⅓	93	94	94½	92¾	99¾*	99¾*
45						95	95	98¾*	107½*
48						126	125½	126	128½*
49						131	130	131½	135*
52						123	123	123	130½*
55						120	120	120*	122½*
62						151½	151½	153½*	156*
63						129	128½	129	134½*
65						127	127*	127½*	131½
67						115⅓	115⅓	116*	118*

The increased weights were not due to increased availability of food as they coincided with the period when food was becoming dearer and less varied.

If the children and adults are taken collectively, and Group D excluded, the percentages become—A 43.4; B 10.9; D 45.7.

Cases of particular interest.

The number of cases chosen was relatively small, because of the cost of the preparations used, and no special grant being available. Even so it is not possible to give details of all. In every case an attempt was made to ascertain the patient's own opinion, and one was surprised to discover a number of them maintaining that the " new medicine " was making them hungry.

The following cases were of special interest:—

Case 4. Brother probably sole source of contact. Diet inadequate. Pain referred to the left calf muscle and Achilles tendon. Had a history of digestive disturbances—no change in weight, but had nerve reaction. Patient believed that the Marmite was responsible for the decrease in his pain, but there was no evidence of this as he was being treated for nerve pain.

Case 8. Contact very remote. Previous medical history contained only colic and headache. Onset with pain and weakness in the leg muscles. Gave history of 'digestive disturbances.' There was improvement with Marmite, with increase in weight, no return of the 'digestive disturbances' and the patient said he felt better.

Case 10. Contact very remote. Previous medical history contained only yaws and influenza. The onset was with muscle pains, weakness and cramps. Diet was inadequate. At the end of November he seemed to be very poorly. His hair had lost its normal lustre, and his skin was a dirty brown colour, covered with a fine branny desquamation. He seemed to have given up all hope, and there seemed to be very little indeed. The large gain in weight was associated with other pronounced changes in his appearance. The improvement was almost dramatic. Cod Liver Oil and Thyroid Extract had failed. Patient's comments endorsed the obvious improvement.

Case 17. No contact. Previous medical history—Nil. Diet inadequate. Had symptoms referred to the muscles.

Case 43. Contact very remote, yet was a very acute nodular case. Diet inadequate. Previous medical history only contained malaria. After giving Marmite there was a small increase in weight, but the patient said he had more energy and felt a lot better.

Case 45. Contact remote. Previous medical history only contained yaws. Diet marginal. Had swelling of the legs in the wet season, pre-harvest period. He improved with Marmite, with increase in weight. Patient said he felt a lot better and was hungry.

Case 48. Contact remote. Previous medical history only contained yaws. Diet inadequate—improved with Marmite.

Case 50. Contact remote. Previous medical history—nil. Diet inadequate. Had symptoms referred to the miscles.

Case 52. Contact remote. Had oedema prior to the harvest. Previous medical history—nil. Complained of loss of grip. Improved with Marmite with increase in weight.

Case 59. Contact not intimate. Previous medical history contained malaria, and enlargement of the spleen due to malaria. Diet inadequate. Complained of indigestion, irritation in the skin, and oedema. These disappeared with Marmite, and he was very emphatic about the improvement, but no improvement in weight.

Case 60. Contact remote. Previous medical history—nil. Diet inadequate.. Complained of stiffness in the leg muscles, and after gripping with the hands lost the use of them.

Inferences are not limited to the above cases, but they emphasise some of the facts already discussed. Their contact with lepers was not intimate, but only casual. There was little in their medical histories except possibly Case 59, to suggest any marked debility; their diets were seasonal, and judged by an arbitrary standard were at the best bordering on the minimum requirements of vitamin B; they showed symptoms that occur with B avitaminosis, and with the exception of Cases 4, 50 and 60 (who were in a state of reaction). there was some indication of improvement when vitamin B was added to their diet.

DISCUSSION.

Theories are still being advanced which conflict with the more or less universally recognised one of vitamin B deficiency as the true course of Beriberi. Bernard, Matsumara, Cannon and others support an infective or toxic theory. McGaw, Chick and Bigland believe that there is some other factor in addition to avitaminosis. Susman suggests a blood-borne infection in pellagra, acting through the thyroid gland. Shelley believes the erythema is trophic, and the cause microbic or an intoxication. The Medical Research Council's Report suggests the possibility of maize containing a positive pellagra producing factor, operative in the absence of the pellagra preventative factor. Chick suggests pellagra is caused by a toxic substance derived from maize diets, which can be corrected by sufficient good protein or perhaps by sufficient vitamin B 2 accompanying the good protein.

Although many attempts have been and are being made to cultivate M. leprae, the lack of a susceptible animal for innoculation and the long incubation period, which may be anything from six months to five years, render the confirmation of apparent cultures by the usual methods extremely problematical. One of the most striking features of leprosy is its strict limitation to man, and the failure of attempts to transmit the disease to experimental animals. Jeanselme

concludes that so far only some multiplication of the organism in transplanted living tissue, has been obtained outside the human body, but no true sub-cultures apart from living cells. Only localised self-healing lesions have been obtained in monkeys etc., but no generalisation of the disease as in human leprosy. Douglas suggested that if it was desired to infect animals, they should be fed on a vitamin deficient diet. Kobashi attempted to infect mice, rats and guinea-pigs, and in summarising his results says that the injected leprosy bacilli were present in the internal organs more frequently and persisted longer in animals in a condition of avitaminosis than in the control animals. He believes that this confirms a close relationship between vitamins and a disposition to susceptibility to leprosy infection. This susceptibility can be increased by vitamin deficiency. It appears that vitamin B has the closest relation and vitamin A less, and that vitamin C has no relation at all. As the animals used were not ordinarily susceptible to leprosy infection, Kobashi believes that this shows the possibility of increasing susceptibility by avitaminosis.

Where lepers give evidence of contact, especially in childhood, the contact has often been within the limits of their own families. The emphasis is then placed upon the prolonged intimate contact that takes place (Lowe). Children are particularly susceptible. It is more likely that within a family circle the same dietary conditions will be found, and as suggestions have been made associating leprosy with avitaminosis B, it is interesting that Bray has shown, that adding vitamin B to the mothers' diet decreased the infant mortality, and that Bennett, believing that breast milk does not always contain the optimal quantity of vitamin B, suggests in the interest of the child that this should be added to the diet. This is of added importance when it is remembered that in primitive races children are breast-fed for anything from one to three years.

Cooke says "Omitting minor manifestations of this disease, which it is difficult for modern medical knowledge to reconcile with the established views, we have sufficient and efficient reasons for doubting the correctness of the established views on leprosy. . . These serious difficulties justify us in trying to find some other angle from which to view the disease." He advances the hypothesis that leprosy is a deficiency disease, and that the acid-fast rods known as Hansen's bacilli are probably due to a metamorphosis of the tissues, changes of staining capacity which are the result of the disease and not the cause of it.

CONCLUSIONS.

1. Tropical dietaries are unsatisfactory and B avitaminosis is common. Leprosy is endemic where dietary insufficiencies exist. Faulty dietaries predispose to leprosy infection. Dietetics is becoming prominent in the treatment of leprosy, and in some cases in replacing traditional methods.

2. Analogies between beriberi, pellagra and leprosy have been suggested, and symptoms associated with B avitaminosis enumerated. Reference has been made in the records to cases of particular interest.

3. 48.5% of sixty-six cases of leprosy denied knowledge of possible sources of infection. Given " suitable soil," infection may take place with only casual contact.

4. The previous medical histories were very little different in the majority of cases from the medical histories of uninfected natives.

5. The prodromal subjective sensations may be due to earlier pathological changes than have been described, or to some altered blood condition, either metabolic or toxic, or to both.

6. The vitamin B content of the diets bordered upon an arbitrary minimum, in some cases not reaching the minimum. It is doubtful whether the ' adequate ' diets were adequate all the year.

7. 43.4% of the patients gained in weight when vitamin B was added to their diet.

8. In beriberi and pellagra, toxic, infective and deficiency theories have been advanced, and opinion tends to a composite aetiology. It is possible that a similar composite aetiology may exist in leprosy.

9. As deficiencies existing among lepers may be coincident, corresponding with similar deficiencies among the general population, it is hoped to continue the work, using preparations of both vitamins A and B, and comparing with a series of controls chosen from non-lepers At the same time it is hoped to eliminate any effect due to the haemopoietic factor in Marmite.

10. Since the suggestion has been made that the effect of injections of chaulmoogra oils is purely nutritive (Low), an investigation into the vitamin content of these oils and their preparations would be of value.

REFERENCES.

ATKEY, O. F. H., Int. Jour. Lep. II. 2. 193, 1934.
BADENOCH, A. G. and BYROM, F. E., Trans. Roy. Soc. Trop. Med & Hyg. XXVI, 3 253, 1932.

BALFOUR, M., Proc. Roy. Soc. Med. 27, 4--473, 1934.
BERNARD, N., Trop. Dis. Bull. 29. 609, 1932.
BIGLAND, A. D., Trop. Dis. Bull. 31. 5. 293, 1934.
BLOXSAM, A. P., Journ. Amer. Med. Assn. 93, 1929.
BRAY, G., Trans. Roy. Soc. Trop. Med. & Hyg. XXII 9, 1928.
BROWNING, E., Monograph of Pickett-Thompson Res. Lab. I.
BROWNING, E. and ROWLANDS, M. J., Lancet I, Jan. 28, 180, 1928.
BONIN, G., Nutr. Abst & Rev. I, 3, 1935. 1932.
CANNON, A., Trans. Roy. Soc. T. M. & H., XXIII, 263, 1929.
CHICK, H., Proc. Roy. Soc. Med. 27, 4, 473, 1934.
COCHRANE, R. G., Lep. Rev. V3 100. Leprosy Symp. Diag Tr. and Prog. B.E.L.R.A., 2nd Edn., 1934.
COOK, L., Leprosy Rev. IV. 4, 166, 1933.
CORKHILL, N. L., Lancet 225. 1387, 1934.
CRAMER, W. & MOTTRAM, J. C., Lancet II. 1090.
CRUICKSHANK, C., Lep. Rev. III, I, 3.
DENNETT, R. H., Journ. American Med. Assn. 92, 769, 1929.
DOUGLAS, S. R., Trans. Roy. Soc. Trop. M. & H. VVIV, 6, 557, 579, 1931.
FARNUM, M. B., Arch. Int. Med. 37n, 212, 1926.
GRIFFITHS, W. H. & GRAHAM, C. E., Proc. Soc. Exp. Biol. & Med. 28. 1086, 1930/1, J. Bio. Chem. 92. Proc. LXIII.
do. 97. Proc. VII.
GROSS, L., Jour. Path. & Bact. 27. 27, 1924. Jour. Physiol. 57, Proc. LX.
GRUNFELDER, B., Nutr. Abstr. & Rev. IV. 2, 1713, 1934.
GUPTA, U. P. do. II. 1, 558, 1932/3.
HALE-WHITE'S MATERIA MEDICA—Churchill—21st Edn. 1932.
HOOBLER, B. R., Journ. Amer. Med. Assn. 96, 625, 1929.
ISWARIAH, V. & NAIR, V. G., Trop. Dis. Bull. 31. 8, 551, 1934.
JEANSELME, Ed. 2 La Lepre Doin et Cie Paris; Bull. Trop. Dis. 31, 10, 754.
KIEL, E. G., Int. Jour. Lep. I, 4, 393.
KEMMERER, A. R., & STEENBOCK, H. Journal Biol. Chem. 103, 353, 1933.
KOBASHI, S., Int. Journ. Lep. I. 3, 354, 1933.
KON, S. K. and DRUMMOND, J. C., Biochem. Journ. XXI, 632, 1927.
LAMPE, P. H. J., Lep. Rev. III, 4, 147, 1932.
LEITCH, J., Dietetics in Warm Climates—Harrison & Sons, Ltd., 1930.
LOW, C., Trans. Roy. Soc. T. M. & H. XXIV, 6. 577, 579, 1931.
LOWE, J., Int. Journ. Lep. I, 3, 341, 1933. Trop. Dis. Bull. 29, 94, 1931; T.D.S. 31, 26, 1934.
MAGAW, J. W. B., Lancet, Jan. 11; 79, 1930.
MATSUMARA, S., Journ Amer. Med. Assn. 192, 1325, 1929.
MCCARRISON, R., Nutr. Abst. & Rev. II. 11—1, 1932/3.
MCCULLOCH, W. E., Rep. upon Diet in Schools—Gov. Printer, Lagos, 1933.
MCKENZIE, A., Lep. Rev. IV, 2, 49; IV.3, 99, 1933.
MELLANBY, E., Nutrition and Disease—Oliver and Boyd, 1934.
MORGAN, A. F. & BARRY, M. M., Journ. Amer. Med. Assn. 94, 1952. 1930.
MUIR, E., A Syst. of Bact. in Rel. to Med... Leprosy Vol. V, 345, 1930, Med. Res. Council.
Ind. Journ. Med. Res. 51, I 1927; Int. Journ. Lep. I 4, 407. 1933; Trans. Roy. Soc. T. M. & H. XXV. 2.87. 1931.
MUIR, E and CHATTERJI, S. P., Int. Journ. Lep. I 2, 129, 1933.
ORR, J. B. and GILKES, J. M., Med. Res. Counc. Spec. Rep. Ser. 155. H.M.S. Office, 1931.
PARAS, E. M., LAGROSA M., and IGNACIO., Int. Journ. Lepr. II. I, 1934, 123.
PETERS, R. A., Journ. State Med. Lon. 38.3, 1930.
PLIMMER, R. H. A., RAYMOND, W. H., and LOWNDES, J., Nutr. Abstr. & Rev. I, 3, 2447. 1932.
RODRIGUEZ, J. Lep. Rev. V 3, 102. 1934.
ROGERS, SIR L. & MUIR, E., Leprosy—John Knight & Sons, London, 1925.
RHYLES, C. S., Lep. Rev. IV. 3, 113, 1933.
SANTRA, I., Ind. Med. Gaz. 62. 442, 1927.
SHELLEY, H. M., Trans. Roy. Soc. Trop. Med. Hyg. XXIV, I p.9, 1930.
STEIN, A. A., Int. Journ. Lep. I, 3, 309, 1933.
SUMMERFELDT, P., Journ. Amer. Med. Asson. 98, 1593, 1932.
SUSMAN, W., Trans. Roy. Soc. Trop. Med. & Hyg. XXIV, I. 23.
WILSON, R. H., Int. Journ. Lep. I. 4, 505, 1933.
WOOLARD, H. H., Journ. Anat. 61, 283. 1927.

Leprosy in England

The following interesting item written by the Rev. R. J. E. Boggis, Torquay, appeared in ' The Times ' of December, 14, 1935.

" Although the will of Thomas de Bytton, Bishop of Exeter, who died in 1307, has not been preserved, the extraordinary full account of the executors is extant and gives a detailed conspectus of his very ample estate and of his numerous and varied legacies. His diocese comprised the two counties of Devon and Cornwall, and among the legatees were numbered as many as 40 leper-houses, whose benefactions ranged from 33s. (pre-War equivalent £32) at Tavistock and 30s. (£29) at Exeter and Launceston (evidently the largest establishments), down to 1s. (19s.) at Denbury and 6d. at Sancreed. Here is a revelation of the common prevalence of this terrible malady and also of the widespread efforts to care for the poor sufferers—as many as 17 lazar-houses in Devon and 23 in Cornwall, and the provision of separate hospitals in places so close together as Barnstaple and Pilton, or St. Madron and Sancreed and Mousehole."

Further enquiry from Mr. Boggis elicited the following complete list of the 40 leper houses in Devon and Cornwall, and the amounts of the benefactions :—

	s.	d.
Exonic versus Wondford	30	0
Okhamptone	10	0
Tavistok	33	0
Sutton	11	0
Plymptone	27	0
Clove	16	0
Modburi	16	6
Chadelyngton	2	6
Dertemuth	5	0
Tottone	27	6
Honeton	25	0
Teignemuth	18	0
Nyeweton ferers ...	5	0
Toffesham	2	6
Deveneburi	1	0
Barnum et Pylton ...	40	0
Lancetone	30	0
Tremeton	7	6
Sancto Germano ...	9	6
Liskpet	20	6
Dynmur	22	6
Bodminia	17	0
Lanford	14	0
Fowy	12	6
Ponsmier	15	0
Schiefstalle	12	6
Resureghy	20	0
Coygon	3	0
Truru	12	0
Argel	8	0
Helleston	15	6
Glas	9	0
Mousehole	13	6
Madern	6	0
Sancto Sancredo ...		6
Redruth	9	0
Sancto Brisco ...	12	6
Oldestowe	6	0
Medeschole	14	0
Expenses re above ...	23	1¼
Total ...	£29	4 1¼

Mr. George M. Doe of Great Torrington has kindly furnished the following account: ' One little chapel is situated in the hamlet of Taddiport or "Addiport" and connected with the Borough of Great Torrington by an ancient bridge across the Torridge. It is now used in connection with the parish of Little Torrington as a Chapel-of-Ease. Many towns have had these leper establishments, e.g., Plympton, Totnes, Plymouth, Tavistock, Barnstaple, Crediton and Honiton. Very frequently dedicated to St. Mary Magdalene and often separated from the town, as in the case of Taddiport, by a river or stream so as to make it an isolation hospital.

' In the register of Bishop Stapledon is recorded the institution of Sir Richard de Brente, priest, on the 2nd February 1311-12, to the chantry of St. Mary Magdalene— " juscta Ponlem de Chepyngtoritone."

In the register of Bishop Grandisson are two references evidently to this chapel.

> " Cantaria Capelle Beate Marie Magdalene in Parochia de Parva Toritone, to which Sir John de Mollonde, priest was instituted on the 29th December, 1344; the other Verig ";
>
> " Cantaria Capelle de Parva Toritone to which Sir Roger de Putteforde, priest; was instituted on the 15th May, 1349."

' In his will of the 8th June, 1418, Thomas Reymound left (inter alia) to the Leper House at Torrington the Sum of " 40d."

' In one of the lists compiled between 1540 and 1570 and now in the Public Record Office, relating to persons ejected from religious houses, is the following entry :—

> " Nicholas Newcourte, Incumbent;
> " Freechapel of Tadyport in Toryton.
> " [3.5]—39s."

' The Devonshire historian Risdon mentions an hospital at Little Torrington founded by the pious charity of Ann, daughter of Thomas Butler, Earl of Ormond, and wife of Sir James St. Leger, Knight; and Westcote states that at Tadiport is a hospital said to be built by Ann, daughter to Thomas Boteler, Earl of Ormond. Both these historians say that she endowed the hospital with allowance and maintenance for a minister of a chapel thereto belonging.

' In the year 1665 there seem to have been no lepers in

the hospital, and articles of agreement were made between the " Guardian " of the Hospital at Taddiport or Addiport of the 1st part; the Recorder and one of the Aldermen of the Town of Great Torrington of the 2nd part, and Joseph Coplestone and Ananias Nill, and the Church Wardens and overseers of the poor of Little Torrington of the 3rd part; for the Hospital, profits and revenues in the vacancy of lazaras or leprous people, to be equally divided towards the relief of the poor of the said town and parish. Provision was made for any lepers as formerly, if sent to the Hospital; and for the provision of a " Governor " and a " Reader " in the Chapel. By a deed in the same year, Tristram Arscott, the "hereditary sole and perpetual guardian" of the Hospital gave to the Mayor, etc., of Great Torrington, and the Churchwardens and overseers of Little Torrington, the Hospital and lazar house and messuages, etc., for such uses and purposes as to the rents and profits as declared in the articles named. (These two documents are fully quoted in the Report of the Charity Commissioners of 1823).

' All traces of the Mansion House and Lazar Houses have disappeared, though there are entries of them in the rental of the Magdalen Lands of 1729.'

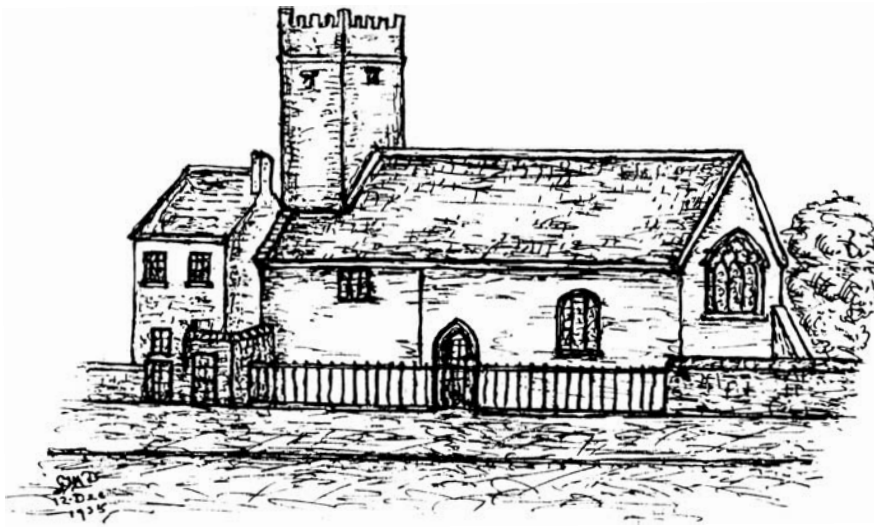
Mr. Doe has also kindly furnished a sketch and plan of the chapel which we reproduce here.

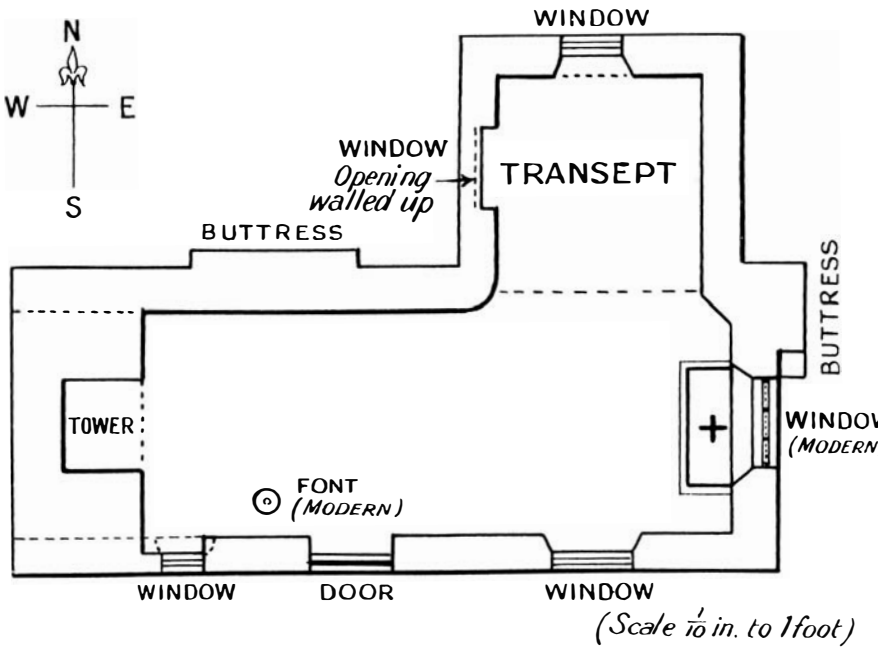
It would appear that leprosy, so common in this country in the middle ages, lingered on in distant parts of our islands such as Devon and Cornwall, Orkney and Shetland, after it had almost disappeared from the main portions of the land. Similarly, it lingered on in the fishing villages of Norwegian fiords long after it had become rare in the towns of Norway. In India we have found foci of leprosy in out of the way valleys of the Himalayas and in backwaters untouched by the flow of civilisation. For leprosy belongs to a certain stage of human progress and tends to linger on in places far removed when the country as a whole advances beyond that stage.

One of the problems which has engaged attention in recent years is the reason why leprosy, in spite of its frequent introduction from the dominions, colonies and dependencies of our Empire, does not spread and become a serious menace. In the slums of our cities overcrowding, underfeeding and insanitation, the conditions favourable for the spread of leprosy, still prevail. Some have suggested that this is because by a process of elimination our race has rid itself of susceptibility to the disease. In this way we have built up a

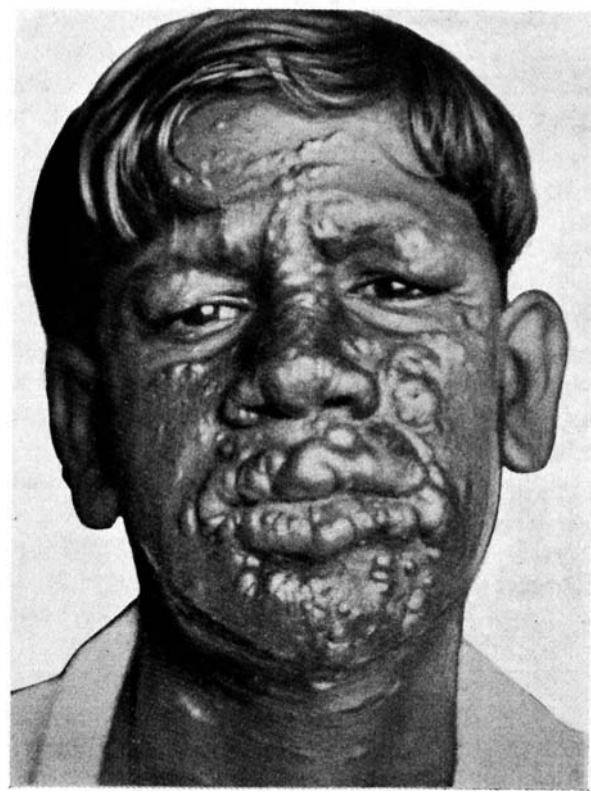
CHAPEL OF ST. MARY MAGDALENE,

AT TADDIPORT, LITTLE TORRINGTON, DEVON.





(Sketch and Plan by Mr. G. M. Doe).



Dermal Leishmaniasis, Resembling Leprosy.

See Review on page 96

comparative immunity to such diseases as measles, which is no longer the fatal disease that it was when first introduced to the virgin soil of the South Sea Islands.

But it is questionable whether leprosy was ever sufficiently widespread in this country to bring about such an effect. Many of the supposed cases of leprosy in the middle ages were probably syphilis and other disfiguring diseases. It was only when the treatment of syphilis by mercury was introduced that this disease was at all clearly differentiated from leprosy. Even today with all our modern methods, eminent physicians both in this country and India frequently fail to recognise leprosy. How much more likely was a mistaken diagnosis to be made in the middle ages.

For the last few years we have come to realise that the leprosy problem centres round the child. The first few years of life show low resistance to the disease, and while the majority of adult infections are comparatively slight and do not become infectious, child infections are much more serious and supply the severe cutaneous cases which carry on the infection from one generation to another.

It is probably in this fact that we find the best explanation of why the frequent re-introduction of leprosy into this country does not create a serious menace. The great majority of those who become infected during their sojourn in the endemic areas of our Empire, and return to this country suffering from leprosy, are adults and are therefore less likely to become infectious cases. Some are infectious, but they do not as a rule belong to the class that lives in our slums; they are chiefly males and are seldom likely to come in close contact with young children, the more so as they are generally people of education and are aware of the danger of spreading infection.

Hansen, when he visited the Norwegian leprous emigrants to the Middle West States of America, found that under the better sanitary conditions that obtain there they had not spread the disease to any of their associates. A few isolated cases of infection have occurred in this country in recent years, but our present stage of sanitation and civilization, though much room still remains for improvement, is well above the leprosy level.

Brazil Conference on Treatment of Leprosy

Abstracted and translated by Dr. J. W. Lindsay from *Revista de Leprologia de Sao Paulo,* June 1935.

From the 25th to the 27th of June, 1935, there was held the first conference of doctors who work in the various hospitals of the Leprosy Association of the State of Sao Paulo, Brazil, for the object of exchanging ideas upon the treatment of leprosy. There were present at the meetings Dr. E. Burnet, Director of the League of Nations' Leprosy Prophylaxis Section, and also Professor Edward Rabello, President of the Rio de Janeiro branch of the International Association of Leprosy.

At the first meeting papers were read on the use of methylene blue, the old remedy, more recently advocated by Montel, as inspiring from its results very high hopes both on the part of doctors and of patients. Montel and his fellow workers and others who hastened to experiment with the new method, drew such hasty conclusions, that others proceeding more deliberately, and with more careful examination of the results obtained by themselves, threw doubt upon the first reports, and even went so far as to condemn the method because of its very slight specific action, and because of its very evident secondary toxicity, thus disappointing the first high hopes in their general anxiety to find a specific remedy for the disease.

Some six lectures were given on the use of methylene blue at this conference, and the conclusions reached were very varied. None of the investigators, even the most optimistic, showed the same enthusiasm as Montel had done when, as proved by his marvellous results, he claimed that methylene blue is three times more active than chaulmoogra. Alongside of the very encouraging results obtained, especially the immediate results in the improvement of infiltrated lesions, cicatization of chronic ulcers, relief of neuralgias and " reactions," there have to be recorded also the late toxicity secondary to high dosage, with certain untoward reactions, asthenia, wasting and even one fatal accident. There was unanimity in recognising the affinity of methylene blue for the diseased tissue, which becomes impregnated with it at the very first injections; there was the same unanimity as to the fact that those lesions very soon get " disinfiltrated " of the remedy, recur with greater or lesser intensity, especially the tubercles and the infiltrations; but there was no unanimity

in admitting any definitely curative therapeutic action as superior to that of chaulmoogra.

The investigation of results obtained were on the whole not very encouraging. The question of dosage was fully discussed. The original method of Montel, who prescribed very high doses of the remedy was modified always with lesser dosage. The same impregnation of the lesions with the blue resulted with the smaller dosage, and there was better tolerance. In the treatment of the " algias " and " reactions " the results were more or less encouraging, although there were various inexplicable discrepancies in the reports.

The conclusions reached were as follows:—Methylene blue has great affinity for the diseased tissue: it impregnates it and produces degeneration of the Bacillus of Hansen as proved by Markianos and Lépine: this impregnation is due to an affinity for the tissues altered by the bacillary toxins, or to the fact that the blue being a " vital " colouring agent is deposited where the endothelial reticulum has been modified by the action of the bacillus or its toxins, and their presence has an inhibitory effect with the result that secondary toxic effects are produced. There are delicate questions of biopathology which careful and patient study may solve, and we consider that the remedy ought not to be abandoned. The careful selection of cases, the patient study of the visceral reactions to associated remedies, chaulmoogra, cholesterin, lecithin or the benzylic radical, are factors that ought to guide investigators towards the best use that can be made of the therapeutic agent in the fight against Hansen's disease, for which actually there are so few available remedies.

At the second meeting six papers were read and special attention was given to the treatment of the leprotic "algias" by methylene blue, and reports read of the use of rattlesnake anti-venom and of osmic acid. It was remarked how leprosy may cause, besides the multiform skin lesions, internal lesions of the most varied kinds, with a symptomatology equally varied. Among these may be mentioned as causing the greatest suffering to the patients, the " algias " of every kind, myalgias, neuralgias, ostealgias, which are not relieved or only very uncertainly by the ordinary analgesics.

Are these " algias " of a toxic nature? Or are they simply inflammatory, the result of the presence of the bacilli disseminated through the various invasions of the disease? We ourselves do not believe that they are due to

the irritation produced by the presence of the bacilli, having noted that the worse tuberose cases are those that are least subject to the "algias." They are evidently of a toxic nature, the same as the " reactions," the febrile attacks and the cachexia.

It is the want of exact knowledge of their nature that explains the failure of our therapeutics, and also explains the anxiety of the leprologists to discover a remedy that will relieve the patient of the most troublesome symptom of his disease.

Among the complications in the development of leprosy, the ocular lesions, because of their frequency, and their great risk to the patients and the danger even of blindness, are very specially attended to in the different leprosaria of the State, each of which has its own eye specialist. The lesions of the eyes are very varied, some of an acute nature, result of treatment given or of the evolution of the disease, some associated with the " reactions," others of a chronic kind of the eye itself or its appendages.

From the reports given it can be seen how very complicated is the treatment of leprosy in those hospitals, and what care is required in the carrying of it out for the good of the patients, and how on the scientific side they are quite on a par with the best known institutions of a similar character. Sao Paulo, in the opinion of Professor Burnet, is developing by itself one of the best leprological centres in the world.

Dr. Renato Braga reported on his treatment by methylene blue of 122 cases. Having found that the treatment gave the best results in advanced cases of leprosy, especially of the " tuberous " variety, the majority of his patients treated were of the kind described. While not sharing the optimism of Montel, he does not hesitate to affirm that the immediate results obtained with methylene blue are, although uncertain, really superior to those obtained with chaulmoogra and its derivatives. The favourable modifications observed in the advanced cases, especially of nodular type, in generalised infiltration and in oedemas and trophic ulcerations, were so apparent after the very first injections, that he feels he is guilty of no exaggeration in affirming that identical results could only have been obtained with a very prolonged treatment by chaulmoogra derivatives in whatever way administered, whether by local applications or intradermic injections.

Certain cases that had presented constant intolerance to chaulmoogra treatment were found to be more amenable to

methylene blue, and benefitted by it. The general practice of this observer was that of combined treatment by methylene blue and chaulmoogra, the latter in the form of gelatin capsules of the oil given by mouth in accordance with the tolerance of the patient. The idea underlying this method was that propounded by Marchoux and Millian, viz., that the blue may serve as a real vector for other antileprotic remedies of greater activity; or it may be that with its prolonged use more favourable conditions may be produced for a better and more intense action of other remedies, just as Boinet showed that methylene blue used in malaria favours a better fixation of quinine on the plasmodia.

For the investigation of any morphological and chromatic transformations of the bacillus in specimens obtained from patients after prolonged treatment with methylene blue, thirty different slides were examined, but no such modifications were observed, as would prove direct action of the remedy upon the bacillus of Hansen.

Although uncertain as to its mode of action, this observer, judging from the good results obtained in some cases, considers it justifiable to continue the use of the remedy, as well as to continue the study of the effects of other colouring agents in the hope of discovering some remedy more active and more constant in its results than chaulmoogra or its derivatives.

Dr. Flavio Maurano, of the Sanatorium Padre Bento, reported on 44 patients treated with methylene blue, and gave as his conclusions that :—

1. The intravenous injection of methylene blue in leprosy, according to the technique of Montel, did not prove of any efficacy, while there was noted evidence of toxicity.
2. In 25% of the cases observed by us, there was aggravation of the skin lesions, and in 18% of the general condition of the patients. The others remained indifferent to the treatment, with the exception of one case of the macular type in which the lesions disappeared.
3. In regard to the lepra reaction, in one case it disappeared, in 12% there was exaggeration, and in 10% attenuation.

In a series of 51 cases treated with methylene blue by Dr. J. Correa de Carvalho, of Colonia Aymores, the results were varied, but the conclusion arrived at was that :—

"although it may be that methylene blue cannot guarantee positive cures, nor challenge the supremacy of chaulmoogra oil in the treatment of leprosy, it ought, nevertheless, to figure in the therapeutic arsenal against the disease as an auxiliary in the great Leprosaria where the cases of nodular leprosy are numerous."

Drs. Edison Costa Valente and E. Luiz Marino Bechelli, of Colonia Cocaes, reported on the use of methylene blue in 37 cases of leprotic reaction, and its effect upon the cutaneous manifestations. It was found that the cases that were cured of leprotic reaction, or the ones that got relief were those treated with the higher doses of the remedy, from 25 c.c., up to 40 c.c., of 1% solution of Montel. The weaker doses, 15 c.c., to 25 c.c., did not have the desired effect, although in the whole series of cases about one-third of them had favourable results.

In the treatment of leprous " algias " by methylene blue, Dr. Luiz Marino Bechelli, of Colonia Cocaes, made observations of fifteen cases and reported that:—

1. Methylene blue is a valuable remedy in the therapeutics of leprous algias—in only one out of the 15 cases did it fail.
2. The best results obtained were with weaker doses of the solution, higher doses only being used when the first produced no effect.
3. Only a few patients suffered from complications such as loss of appetite, giddiness, salivation or rigors; some had reappearance of leprotic reaction, whereas others were greatly improved or cured of their cutaneous eruption.

Dr. Francisco Ribeiro Arantes, of Sanatorio Padre Bento, reported on " Accidents Observed during the Treatment of Leprosy with Methylene Blue by the method of Montel," with the following conclusions:—

1. Methylene blue has a beneficial effect upon acute febrile attacks in a small number of cases, its effect is temporary, and it is inferior in effect to other remedies used in similar cases (calcium, tartar E., hyposulphite, triplaflavin, fuadin, etc.).
2. Methylene blue has a more certain effect upon the pains or " algias " and especially those of " neuritis " in half of the cases treated by us (10) of leprotic reaction and pains; the pains were relieved and in some cases completely disappeared. In the cases where there was improvement with diminution of the pains, the acute attacks recurred at longer intervals and with less intensity. We are of opinion that smaller doses should be employed in these circumstances.
3. Methylene blue may cause the appearance of lepra reaction with or without pains in patients in whom up to then such complications had not been observed.
4. Methylene blue is not an innocuous drug and may give rise to slighter or graver phenomena of intoxication.
5. The complications of " toxic hepatitis " observed by us were in " mixed " cases, in which there was a " tuberous " element.
6. In these cases of " hepatitis " it was noted that there was no elimination of the blue in the faeces, which proves that it had been retained in the affected cells of the liver.
7. In the cases of proper tolerance, after proper dosage is reached,

the blue is eliminated in the bile, the faeces being coloured blue, with or without diarrhœa.

8. The sedimentation index showed notable variation.
9. The patient's weight showed variations in accordance with the accidents observed.
10. Methylene blue may cause death by atrophy of the liver.
11. Phenomena of intoxication are always apparent in the digestive apparatus, the liver being the first to show signs, and later the kidney, which are attacked after the appearance of the hepatic lesion.
12. Methylene blue by Montel's dosage is toxic and dangerous.

Dr. Joao de Moraes Junion, of Colonia Piripitinguy, reported on the treatment of the " algias " in leprosy patients, with special reference to the use of snake anti-venom. After giving a historical resumé of the treatment from the first reported cases of sudden complete cure of leprosy after rattlesnake bite, the observer refers to later experiments in different parts of the world. Of very special interest were the reported cures from the anti-venoms, prepared in the Butantan Institute of Brazil, and communicated by Vital Brazil.

The author had a series of 30 cases of "algias" of which seven would not yield to the other commoner treatments; these seven were used for the experiments. After an interval of eight days without any treatment, daily injections were begun of anti-venom, using the route advised by other experimenters, viz., the subcutaneous, and trying always as far as possible to inject the anti-venom into the painful part, or its neighbourhood. Two injections were given daily.

The results obtained were very encouraging. With the exception of one case the results were good. In the other six, 8 injections were sufficient to produce complete relief that lasted from 45 to 90 days. In one case the pains reappeared after 30 days of the beginning of the treatment, and never completely disappeared. In spite of this the author holds that the action of the anti-venom is more or less persistent, since, even in cases of recurrence of the pains, they have never been of the original intensity. No complications or disturbances were observed as results of the injections, neither general nor febrile reaction nor any accident of any kind. The use of anti-venoms has one drawback and it is that the continued use of them immunise the patients against any good effects of the same anti-venoms upon the leprous lesions, but this difficulty may be overcome by changing the type of anti-venom, using alternately the anti-venoms of different reptiles.

The latest contribution to the study of the effect of anti-venom upon leprosy " algias " is that of G. de La Plaza, M. Vegas and B. Gomez, in the Revista de la Poloclinica Caracas, Venezuela, April, 1935, who, writing of the use of the " Neurotoxin of Rattle Snakes," say :—

" The neurotoxin was used in 30 cases of " algias " in leprosy, with the following results: Cured 14 cases; improved 14 cases; failures 2 cases. The neurotoxin of rattlesnake in doses of 1/10 milligram exercises a markedly sedative effect upon the " algias " of leprosy, chiefly in the nerve or mixed varieties, and particularly in cases of " arthralgias " these painful complications of leprosy have been so rebellious to other therapeutic measures, that we consider the results obtained by us as very encouraging."

" Osmic Acid Intravenously for Acute Leprous Neuritis." Dr. Argemiro Rodrigues de Souza, of the Colonia Rodrigues, reported as having been perhaps the first to use intravenous injections of 2 per mille osmic acid for the treatment of the acute neuritis complication of leprosy. Series of 5 to 10 injections were given of 2 c.c., on alternate days.

The treatment was employed in 18 cases and with very remarkable results. There were no signs of intolerance in any of the cases, nor any disturbances. Neuben had given warning of cases of nephritis and diarrhœas, but the author had no such experience with his cases. The later results of intravenous osmic acid injections of 2 per mille in the 18 cases observed were always good, there being complete disappearance of the pains under the treatment.

" Thyroid Gland Disturbance in Leprosy, and their Treatment " were reported on by Dr. Argemiro Rodrigues de Souza, of Colony Pirapitinguy. In the case described, one of " mixed " leprosy, with maculae and erythemes, there were evident signs of hypo-thryoidism, obesity, mental apathy, and oedemas. Tablets of Thyroid Extract 0.30 grs., 3 times a day were prescribed and the effect was very remarkable. The oedemas rapidly subsided and the erythemas disappeared, and by the end of two months the patient had completely recovered from the symptoms described of hypo-thyroidism which had been the complication that had hindered any beneficial effects that might have been got from the specific treatment of the leprous condition.

Dr. J. Mendonca Barros, of the Sanatorio Padre Bento, reported on their treatment of ocular complications of leprosy. In acute cases of ocular lesions their method was :—

1. The suspension of all specific treatment, (chaulmoogra, etc.).

2. General desensitising treatment, especially auto-hœmotherapy.
3. Special symptomatic treatment as required.

The hyperplastic forms of keratitis, as well as the episclero-conjunctival lepromas were treated by excision and cauterization.

In a series of 16 patients treated with Solganol B., intramuscularly the results were not encouraging, only three of the cases showing any improvement.

"The Treatment of Ocular Complications in Leprosy." Dr. Francisco Amendola, of the Colonia Santa Angelo, reported on the results obtained in their hospital in the treatment of acute forms of eye complications, and in the surgical treatment of chronic forms. The conclusions arrived at were the following:—

1. The treatment of acute forms of eye disease is eclectic, depending on the general condition of the patient.
2. The hyperplastic lesions of the cornea ought to be operated on, as their development marks a pause in the process of the ocular trouble.
3. Iredectomy in ocular affection of leprosy is only indicated in cases where the iris itself is not markedly affected.
4. Canthorrhapy gives satisfactory results in cases of orbicular paralysis, especially when corneal lesions have been caused by permanent exposure of the cornea.

"Valuation of the Results of Treatment at the Sanatorium Padre Bento" recorded by Dr. Lauro de Souza Lima.

1. The actual results of special anti-leprotic treatment appear to be conditional upon a combination of circumstances, the chief of which is that of the general treatment of the case. It is considered advisable to institute such treatment systematically in all cases, as the general low condition of the patients may be as chronic as is the disease they suffer from.
2. We are not in a position to give a definite opinion upon the permanency of the results obtained, favourable or otherwise, because of the insufficiency of the observation period, and because a great number of the patients escape from our control with their transference to dispensary treatment.
3. In order that the Department of Leprosy Prophylaxis may be able in the future to pronounce upon the efficacy of anti-leprotic treatment, based upon the abundant material at its disposal, it would be convenient:
   (a) to perfect the clinical classification of the cases under treatment, so that it may be possible to indicate exactly the precise gravity of the disease, eliminating as far as possible the personal coefficient of the doctor, a thing which is not easy with the classifications at present in use, and without which statistics are liable to be deceptive.
   (b) to tabulate the methods of verification of progress attained, and the opinions of a valuation of the results by the

exact delimitation of what ought to be understood by the term " much improved," " unaltered," etc., as well as of the number of bacterioscopic examinations necessary.

(c) to tabulate, as far as possible, all treatment given.

" Routine Treatment of Leprosy in the Sanatorium Padre Bento " as described by Dr. Lauro Souza Lima. The chief principles followed are :—

1. The complete intelligent co-operation of the patient must be secured.
2. The uselessness must be admitted of treatment in cases in which there remain only the stigmas of a disease that has disappeared, whether in advanced cases or in the initial period of new cases. Such ought to be separated from other cases undergoing specific treatment.
3. The aim must be to raise the general condition and resistance of the patient to the highest level possible.

These principles must be followed in conjunction with all therapeutic measures of general treatment. As practical results obtained from the following of these principles, the following suggestions are made :—

1. To secure the intensification by all means within our reach, of the social life of the hospitals.
2. To secure the transference to a special hospital of cases that have remained stationary in the later stages of the disease, in order to avoid that their presence among " treatable " patients may not discredit the treatment.
3. To secure the transference for dispensary treatment of adult patients that have remained stationary in the initial period, but only for purposes of observation.
4. To secure the preventive transference of child patients that have remained stationary in the initial period for observation until puberty.

" Intradermic Infiltration, or ' Plancha ' Method, was described by Dr. Lauro de Souza Lima, of the Sanatorio Padre Bento.

" Experiments in the Treatment of Leprosy by Auto-hœmotherapy " were described by Dr. José Correa de Carvalho, of the Colonia Aymores. Of 15 cases treated by auto-hœmotherapy, 5 had their condition aggravated, while 10 showed considerable improvement. The treatment was considered worth trying in febrile eruptions.

Where South African Sufferers are Treated

(Abstracted from " The Compass," November, 1935.)

Amatikulu. The Amatikulu Leper Institution, which overlooks the Indian Ocean, was founded in 1902. A new housing scheme has been started and, when complete, it will have the effect of bringing every patient under the immediate care of the medical staff, which, owing to the large area over which the patients are scattered, at present is quite impossible. The new housing scheme will also add much to the comfort of the patients, of whom there are 354.

Bochem. The Bochem Leper Institution is closely connected with the Bochem Hospital, which was founded at an earlier date by the late Mrs. H. M. Franz, a certified nurse from Germany, who with her husband, the late Rev. R. Franz, started missionary work at the Berlin (Lutheran) Mission Station at Leshwane, Pietersburg district, in 1894. Their son, Mr. J. H. G. Franz, is the present Superintendent.

Botsabelo, Basutoland. The Leprosy Institute at Botsabelo was built in 1913 and occupied by over 600 patients early in 1914. If it is to be presumed that the means of finding the patients, i.e., through chiefs and headmen were the same in 1894-95 as in 1913-14, it appears that the incidence of the disease was trebled in a period of nineteen years.

In April, 1929, native inspectors trained in the diagnosis of leprosy were appointed to travel about on horseback searching villages for cases of leprosy, visiting especially the relatives of patients who were or had been in the institution, and keeping discharged patients under observation.

Since the appointment of these inspectors a great improvement has taken place, at first towards clearing the territory of advanced and infective cases, and later towards diminishing the number of all cases existing outside of the institution. The great majority of the new patients are in a very early stage of the disease. About 50 patients are discharged as " arrested " cases every year, and, owing to their more favourable conditions for treatment on admission, it is expected that the number annually discharged will go on increasing.

There are still so many aged, advanced and incurable cases in the institution, relics of the past, that the annual death rate is as high as ten per cent. The population of the institution, which passed through a maximum of 754 in November, 1933, is slowly diminishing and now stands at 720. It is expected that the decline in the population will continue. About 200 patients are now accepting the latest form of injection treatment, the intradermal, with great regularity.

In addition to the compounds where the patients live, a village of fifteen sandstone and thatched rondavels was built on the farm in 1932, about a mile away, for convalescent and early-stage patients. It is usually occupied by from 50 to 70 patients nearing " arrest."

Emjanyana. The Emjanyana Leprosy Institution is situated in the Encobo district of the Transkei, and has accommodation for about

900, but the present population is about 650. The extent of the institution's reserve is about 5.000 acres. The patients are accommodated in large compounds situated near the heart of the reserve, the male and female patients being kept apart, but allowed to visit each other under supervision. The institution aims at being as self-contained as possible. Large wattle plantations supply the fuel requirements, and the farm supplies the meat, milk and vegetables needed by the patients and staff.

The patients govern themselves. Patients breaking the rules are tried in patient's courts, and punishments usually take the form of fines, which are paid into the Patient's Recreation Fund. The advantages arising from this system of self-control are many. The patients are induced to take a personal interest in the management of the institution and to understand thoroughly the rules. Wrong-doers get little sympathy from the patients, for it is they who mete out the punishment. Friction between the officials and the patients is reduced to a minimum. The chief advantage of the system lies in the fact that the patients feel that they are co-operating with the Government in the management of the institution and they respect themselves as a self-governing community.

M'Kambati. The M'Kambati Leprosy Institution, situated on the coast in the Lusiksiki district, was established in 1920, to serve Eastern and Western Pondoland. The usual number of inmates is about 260, and the discharge rate, which fluctuates slightly, is in the vicinity of 25 per cent. Medical and nursing services are supplied on contract by the Holy Cross Medical Mission (Anglican), situated 26 miles inland. The medical officers' services are on a visiting basis, but the nursing sisters are in residence.

The patients are afforded a very generous measure of freedom within the confines of the 70 square miles comprising the leper reserve, and are encouraged and helped in their recreation and sport.

The system of government provides for the election of a Patients' Advisory Council, which body, further, is vested with certain minor executive duties. Employment is regarded as an essential to the promotion of contentment, and remunerative work, graded to the worker's capacity, is found for the able and willing. For the younger inmates there is a school, staffed from amongst the more educated of the patients.

Ngomahuru, S. Rhodesia. The Ngomahuru Leprosy Hospital was started in 1929, under the charge of Dr. B. Moiser as Medical Superintendent. Previously sufferers from leprosy had been cared for by the Morgenster Mission. The hospital has dealt with over 1,100 patients, of whom about 400 have been discharged to their homes as "arrested" cases. At the moment there are 550 native cases and two whites in hospital.

The grounds occupy about 9,000 acres. The patients are all domiciled in villages and attend at the central hospital for treatment. The whole system is voluntary, and it is a matter for gratification that absentees are rare.

REPORTS

Egypt.

Abstract from Report of Medical Department for 1934 :—

Leprosy is considered to be one of the oldest endemic diseases in Egypt. Measures for combating this disease on modern lines were started in 1929. At present no definite information exists as to its incidence throughout the country, a systematic general survey not as yet having been carried out. It is hoped, however, that this will be possible when the projected leper colony at Abu Zaabal has been completed.

Existing statistics of leprosy show that there are about 6,000 cases of leprosy in Egypt (Rogers), but this estimate cannot be altogether relied upon. Comparison between the old and recent statistics of the disease in other countries in which leprosy is also endemic would lead us to estimate the number of lepers in Egypt at approximately 10,000 cases, i.e., 7 per 10,000 of the population.

As leprosy is a chronic disease of low virulence the recorded death-rate from leprosy usually does not exceed the general death-rate in countries where it is prevalent. The measures at present taken against leprosy in Egypt consist chiefly in the treatment of lepers in special out-patient clinics. Five of these clinics were opened during the years 1929-1933. Four of them were instituted in the provinces of Sharkia, Gharbia, Minya and Girga each in the capital town of the province, but, attached to each clinic are several sub-clinics at various distances around the clinic which are served by specially designed motor ambulances. The fifth unit is in Cairo and was the first to be opened for the treatment of leprosy in this connection. To this out-patient clinic is attached a hospital of 50 beds which has recently been reserved for the isolation of female lepers. A colony intended for the isolation of all cases of leprosy, both male and female, has recently been started at Abu Zaabal, some 30 kilometres to the north of Cairo in a healthy situation in the desert far from human habitations where ample land is available for the future extension of the colony. Accommodation for 100 patients already exists and plans have been prepared for future extension as funds permit.

Below are quoted statistics of the four provincial units with their sub-clinics together with those of the two permanent institutions in Cairo and Abu Zaabal for the last five years. It is to be observed in connection with these statistics that they represent the incidence of leprosy only

in the localities in which these clinics are situated and cannot be taken as representing the total incidence of leprosy in Egypt:—

Number of patients examined	5,805
Number found negative	3,346
Number found positive	2,459

these are detailed as follows:—

Males	2,043
Females	416
Married	1,147
Single	1,312
Egyptians	2,454
Foreigners	5
Mohammedans	2,004
Copts	455

On enquiry:—

1,272 denied exposure to infection.
1,187 confessed contracting the disease from others.
653 stated that their illness was hereditary.
534 illness acquired from a non-family source.

On examining patients for the type of the disease the following were found:

273	skin.
916	nervous.
1,270	mixed.

During the year, two leprosy sub-clinics were inaugurated in connection with Tanta leprosy clinic; one in Mehalla-El-Kobra (January 7, 1933), and the other in Kafr-El-Zayat (February 6, 1933). Two leprosy sub-clinics were also inaugurated in connection with Minya leprosy clinic, one in Samallout (March 4, 1933) and the other in Abu Korkas (March 9, 1933).

These sub-clinics constitute a further expansion of the original scheme of automobile leprosy units which was brought into active operation in July 1933. This scheme has been financed entirely from economies in the existing organisation and has entailed no extra expense. These travelling leprosy units carried on their work throughout the year with great satisfaction both to patients and to the Section. It is proposed to increase the radius of action of each automobile up to 50 kilometres in order to meet the needs of leper patients in the more distant villages.

Although the permanent scheme for the provision of water and electric light has not yet been completed, the Leper Colony at Abu-Zaabal was opened to receive patients on June 3, 1933, and, at the end of the year, 81 lepers were undergoing treatment there.

The colony has been provisionally reserved for the

accommodation of male lepers only, female lepers being accommodated in Cairo leprosy hospital.

It is the intention of the Section ultimately to use this colony as a centre for the treatment of infectious cases only, who, on becoming negative will be discharged and returned to their homes for out-patient treatment in the local sub-clinics.

During the year, leprosy was, by Ministerial decree, placed in Schedule 1 of Infectious Diseases, a measure which will enable the Department to isolate such cases as are actively infectious.

In this branch too, the number of patients attending its units during the current year amounted to 1,639, being an increase of 352, (27%), over those of the previous year.

One medical officer from the leprosy branch was sent to Europe on practical mission for one year for the study of Tropical Diseases.

Strait Settlements.

The following is abstracted from the Annual Report of the Medical Department for 1934.

"The problem of how best to meet the pressing need for increased accommodation for lepers is engaging the earnest attention of the Government. Since modern treatment was introduced, lepers have sought refuge in the existing leprosaria in increasing numbers and the large number of applicants now seeking admission and treatment is proving a source of embarrassment to the administration charged with the task of accommodating them. If all cases admitted were in an early curable stage of the disease the possibility of early cure would to some extent mitigate the difficulty. But this is far from being the case and an ever increasing residue of advanced incurable cases is gradually accumulating. Of 234 lepers admitted to Pulau Jerejak Settlement in 1934 only 36 were found to be in the early stages of the disease, 50 were moderately advanced and 148 were advanced.

"The problem in Malaya differs in one important respect from that in most other countries. The vast majority of cases occur in Chinese, many of whom are immigrants who probably bring the disease into the country with them. Owing to the long incubation period, extending over many years, these immigrants may show no signs of the disease on arrival although infected in China some time previously. The disease in such cases only manifests itself some years after the sufferers have settled in Malaya. Efforts are now being made to examine all Chinese and Indian immigrants for signs of early leprosy and a certain number have been detected, rejected and returned to their country under the powers conferred by Section 56 (2) of the Quarantine and Prevention of Disease Ordinance. Even so a certain number of infected cases will gain admission and show signs later.

"Extensions to the Pulau Jerejak Settlement which now has 850 beds are being made in 1935 and the question of further expansion

to meet the requirements of the next five years is being considered in its relation to Malaya as a whole.

"It is pleasing to recall that the incidence of leprosy amongst Malays is remarkably low and the number of Malays who require segregation forms a very small proportion of the leper population. Of the 968 patients at Pulau Jerejak Settlement at the end of the year, only 29 were Malays. It is also noteworthy that leprosy occurring amongst Indians in Malaya is of a comparatively mild type and it is found that Indians respond more readily and with happier results to treatment than other races. There were 122 Indians out of the 968 inmates at the end of the year.

"It will, then, be realised that the problem presented is one which concerns chiefly the Chinese who account for 799 of the total 968 inmates at Pulau Jerejak Settlement; and this proportion probably represents reasonably accurately the relative distribution amongst races in Malaya. The nucleus of the problem is the previously infected, but not yet actively leprous, Chinese immigrant.

"Four hundred and twenty-two cases of leprosy were admitted to Government institutions during the year, most of them to leper settlements at Pulau Jerejak, Singapore and Penang. The number so admitted in 1933 was 489. The number of patients admitted to Pulau Jerejak Settlement has been steadily increasing in recent years from 180 in 1931 to 234 in 1934, due mainly to the increasing popularity of the institution and the reputation it has gained since the introduction of modern and expert treatment. An encouraging feature of the admissions last year was the higher ratio of early and moderately advanced cases received for treatment. A comparison with the cases admitted in the previous three years emphasises the improvement in the past year:—

	Early	Moderately Advanced	Advanced.
1931	—	2	147
1932	—	3	191
1933	12	21	165
1934	36	50	148

"It will be seen that notwithstanding the improvement in the type of case admitted there is still a marked preponderance of advanced cases for whom treatment can be of little avail and who will in future years swell the residue of helpless and crippled inmates."

Federated Malay States.

The following is abstracted from the 1934 Report of the Federal Leper Settlement at Sungei Buloh, near Kuala Lumpur.

"There were 1,104 patients at the beginning of the year as compared with 1,082 for 1933. This number had grown to 1,320 at the end of the year. The total number of those treated in the settlement during the year amounted to 1,695.

"It is gratifying to record that 163 patients have been discharged bacteriologically negative and free from any signs of active external lesions. While this figure represents a very satisfactory result of the intensive treatment carried out at Sungei Buloh, there are one or two important points that invite consideration. The first is that the

discharged patients were, when admitted, suffering from a mild or early form of the disease. The second is that the number of mild cases now admitted bears a smaller relation to the total admissions than formerly. There is therefore a steadily increasing yearly residue of permanent inmates which will swell, in future years, the numbers of advanced incurable cases. Furthermore, the percentage of discharges calculated on the total number resident may be expected to diminish as the residue increases from year to year. It is noteworthy that the percentage of Indians released during the year is very much higher than of Chinese. It appears that leprosy occurring in Indians in Malaya is of a comparatively mild type, and it is found that Indians respond more readily and with happier results to treatment. This find is all the more remarkable when it is recalled that a survey of the population of Madras carried out in 1930 showed that 0.85 per cent of the population showed signs of leprosy.

"There has been a remarkable fall in the death-rate in the settlement during the past four years. The death-rate was 70 per mille in 1931 and has steadily declined to 30 per mille in 1934. It is anticipated that with the increasing number of admissions of comparatively able-bodied patients the death-rate during the next few years will decline still further.

"There were seven births in the settlements during 1934 with no deaths. This is in marked contrast with the six deaths amongst the seven infants born in 1933.

"Treatment.—The routine treatment of leprosy has now been placed on a more satisfactory basis than formerly. The great majority of patients receive treatment with intramuscular or subcutaneous injections of ethyl esters of hydnocarpus wightiana oil. A total of 1,289 cases were so treated during the year. A total of 44,452 intramuscular injections were given compared with 24,374 injections in 1933. In addition 8,740 affected areas of skin were treated with intradermal injections. Care has been taken to ensure as great a measure of accuracy as possible in the assessment of results of treatment. The assessment has been based on:

(a) a scrutiny of each patient's clinical records and response to treatment during the year.
(b) a final examination of the patient's condition at the time of assessment; and
(c) the patient's own statement.

Of 1,104 cases treated through the year there were:

Improved	... ...	871 cases or 79	per cent.
Stationary	... ...	145 „ 13	„ „
Worse	... ...	88 „ 9	„ „

"In the early part of 1934 it was felt that although treatment with esters was the most satisfactory treatment that could be offered at Sungei Buloh, the results from this line of treatment could not be regarded as altogether satisfactory. During the year efforts were made to improve the routine treatment. Ninety cases were selected who had either become worse on treatment with esters or had for some reason found it unsuitable. They were again given esters after being specially examined before each injection. The dose was varied at each injection to suit the varying condition of the patient, the guiding principle being a drastic reduction in the dosage on the appearance of

any sign of temporary instability of health. It was found that very few of these cases were really stationary. There was clinical evidence of a constant minor ebb and flow of leprotic activity. In 15 of the cases treated it was deemed advisable to alternate the injections of esters with intravenous injections of fluorescein. At the end of the year 75 per cent. of these ninety cases, which had previously become worse on esters, had definitely improved and 25 per cent. remained stationary or were worse. This experiment is regarded as of great importance since it shows that the benefit to be derived from treatment with esters depends to a great extent on close individual examination of each patient and continuous and accurate attention to the dosage. It also throws doubt on the efficacy of mass treatment and indicates that such treatment may in certain circumstances prove actually harmful.

" A further attempt to improve the quality of the treatment with esters was made by instituting an ' interval ' treatment with fluorescein or phthalic acid between routine courses of esters. Three hundred and ten cases were so treated and of these 84.4 per cent. showed improvement and 15.6 per cent. remained stationary or were worse. Other forms of treatment given to suitable cases were Tai Foong Chee which was taken by mouth by a number of decrepit and senile cases for whom active treatment was considered inadvisable. This is an old established remedy in which many Chinese sufferers have faith. Chaulmoogra oil has been given in capsules by mouth as supplementary treatment to about 20 cases. Solganal-B. Oleosum, a gold preparation in oil, was given to sixteen patients with leprotic ophthalmic lesions with encouraging results.

"General. The morale of the settlement has been good throughout the year and the patients have amused themselves with the usual games, entertainments and social activities. It is found however that the treatment forms one of the chief subjects of interest amongst the patients and overshadows the other attractions provided to occupy their over-abundant leisure."

North Rhodesia. FROM THE MEDICAL REPORT FOR 1934 :—

" One hundred and sixty-nine cases were notified during the year, and it will be seen from the following table of notifications that the Balovale district is still the most infected area.

	Cases.
Nkana	1
Broken Hill	2
Balovale	82
Choma	6
Fort Jameson	26
Fort Rosebery	12
Livingstone	11
Lusaka	12
Mazabuka	10
Mongu	7
	169

" It is impossible to state with any degree of accuracy the number of lepers in the Territory, but they amount to several thousands."

Dichpalli. NIZAM'S DOMINIONS, INDIA.

The following is quoted from the Annual Report of the leper colony for 1934, where 782 patients were treated as against 732 in the preceding year :—

" 190 patients were discharged, 130 left the Home without permission, and 552 were refused admission—some for want of accommodation and the majority because they were not suitable for treatment.

"The number of children under treatment was never so great as during this year, as the Dichpalli authorities never refuse admission to boys and girls.

" One very distinctive feature of the year was the never-ending pressure of application for admission. The resources in accommodation and maintenance were taxed to the utmost; 732 lepers had for some time during the year been under treatment as in-patients. The daily average attendance at the hospital was 425. In addition to this, the Dichpalli authorities had refused, sometimes most reluctantly, no fewer than 573 applicants for admission.

" Most of the Local Fund Committees of the districts have agreed to give an annual grant-in-aid to the hospital.

" It is very gratifying to note that during the year no fewer than 166 passed the exacting medical tests and went out on parole free from infection and symptoms of active disease. While there could be no certainty as to what proportion of them will remain so, the presumption is that the majority of them will not see further disturbing indications of the disease."

Burma.

Abstracted from the Public Health Administration report for 1934 :—

" No new leprosy survey was carried out during the year, as it was considered better policy to consolidate the work in the Minbu and Meiktila districts which had been already surveyed. A special officer was stationed in each district for this purpose. The colony which had been opened in Minbu in December 1933 progressed on satisfactory lines, and at the end of the year 34 lepers were residing in it. Its initial expenses were defrayed by a grant of Rs. 500 from the Burma Branch of the British Empire Leprosy Relief Association, Rs. 350 from the District Council, Rs. 100 from the Municipality and Rs. 50 from the Deputy Commissioner's Local Fund. There is a demand for increased accommodation in the colony, and its year's work can certainly be regarded as satisfactory. There are two classes of patients in the colony, private and public. The private patients are given only free treatment and make their own arrangements for food. The expenditure on the public patients is met entirely from the special leprosy fund. The clinics in the towns of Sagu, Pwinbyu, Salin and Sinbyugyun in this district did not meet with the same success. The distances that people had to travel to get to the clinic made it difficult to increase the numbers.

" In Meiktila district there were clinics in Meiktila itself, in Mahlaing, Wundwin and Thazi, and the Special Leprosy Officer's

energetic work resulted in satisfactory attendances. The leprosy problem in this district is a very serious one. The figure given in the 1931 census for lepers in this area is 1.31 per 1,000, but a survey of 19,249 people showed that the true incidence is 16.57 per 1,000. If this survey ratio is taken as representative of the whole district, which has a population of 309,999, it means that there are over 5,000 lepers in Meiktila district alone. The need for a leper colony is very great and for that reason a local committee consisting of the leading persons in the district was formed in September 1934 to raise funds and to establish a colony. It is disappointing to record that up to now the difficulties of securing a site have not been solved. Suitable sites are available near Meiktila, but the prejudice organised or otherwise, of the local villagers, against the establishment of a leper colony near them has held matters up. The Burma Branch of the British Empire Leprosy Relief Association is ready to help the colony with a grant and in fact has already handed over some money for the sinking of a well.

" In Monywa, the excellent record of the leper colony, which was established there in 1927, has been maintained and at the end of the year there were 60 resident patients. In Kengtung in the Southern Shan States, a colony is run by a Roman Catholic Mission; at the end of the year 82 patients were living in it."

Newspaper Cuttings

Leprophobia. The following is an interesting study in social psychology taken from the Manchester Evening News:—

" Although every effort has been made to kill it, rumour still persists that through the eating of bananas a case of leprosy has occurred in Manchester.

This rumour has been heard in various circles. It is always a variation on the same theme.

To-day I spoke to the man who, with his family, is said to have been the victim.

' The rumour has been going round for about three months,' he said, ' but I have been unable to discover how it began. At first it was to the effect that my three-year-old daughter had got leprosy as a result of eating bananas.

' Later it was spread about that my wife contracted it, and most recently that I myself had been taken away.

' All three of us are in excellent health, but the rumour has been spread to such an extent that it has been causing me grave concern. People are talking about it in the buses and everywhere. If I could find out where it originated I should take steps to stop it.

' I fear that it may be doing damage to the business and that people are avoiding me. A greengrocer has complained to me that the sale of his bananas has suffered as a result of the rumour, and I have even been approached by a wholesale firm dealing in bananas to ask me what steps I propose to take to put an end to it.'

Dr. Walter St. Clair McClure, Senior Assistant Medical Officer of Health for Manchester, said that it is quite impossible for infection to be carried by bananas or by any foodstuffs in the manner suggested.

'The whole thing is absurd,' he said. 'There is no case of leprosy in Manchester now and there has not been a case here for a great many years.' "

Leper Martyrs Body. President Roosevelt has authorised the transportation to Belgium, in an American warship, of the body of Father Damien Deveuster, "Martyr of Molokai," says the *Irish Independent* Brussels correspondent.

Father Damien went to Molokai. in the Pacific, to minister to the lepers, and himself contracted the dread disease. Preliminary steps in the process for the Beatification of Father Damien were taken in 1931.

The body will be taken to Antwerp, and thence to Louvain, where it will be placed in the St. Joseph Chapel belonging to the Order from which the Apostle of the Lepers started out in 1863.

The U.S. President's gesture is the result of a personal letter from King Leopold of Belgium, written at the request of Cardinal Van Roey.

The cottage in which Father Damien was born in the hamlet of Hinde, near Tremeloo, has been acquired by the neighbouring convent. Nothing has been changed in the house since the famous missionary left it.

Father Damien was the brave priest among the lepers of Molokai whom Robert Louis Stevenson defended against attacks in a letter which has become a classic. In writing it, "R.L.S." feared that he had transgressed the laws of libel, but he was prepared to lose every penny in the interests of truth and justice.

Solomon Islands. The decision of the Bishop of Melanesia to reopen the big leper colony of Quaibaita on the island of Mala, in the British Solomon Islands, early in the New Year, was announced in London.

The number of lepers on Mala is estimated to be at least 400, and there are 100 out-patients who are treated at a permanent dispensary on the island. The colony is to serve the whole of the Solomons.

Nigeria. Lepers in Nigeria.—An important development of work among lepers is taking place at Onitsha, Southern Nigeria. Some two years ago the Director of Medical Services in that area approached the C.M.S. with a request that the Society would form a leper colony. At that time the cost seemed to be prohibitive, but subsequently help came from various sources. The native administration has made a generous grant; £1,500 has been guaranteed by private donors, and the Mission to Lepers and the British Empire Leprosy Relief Association promised £500 each. The C.M.S. has a doctor in view for this post, and Archdeacon Basden is making all the necessary arrangements.

Australia. The question whether leprosy is infectious, contagious, or not is likely to be revived by a recent case in Perth.

Some years ago Matron Hopkis, who was thought to have contracted the disease while in charge of hospitals in the north-west of this State, returned to Perth, and later showed signs of leprosy. She was

placed in the lazaret at Woorooloo, which is about 35 miles from Perth. While there she was nursed for a considerable period by a nurse who, however, discontinued nursing a considerable time ago. This nurse has now developed symptoms which are stated to be those of leprosy, and she in turn has been taken to the Woorooloo lazaret.

Dr. Wu Lien-Teh, the Director of the National Quarantine Service of China, said, that this was his first visit to Australia, and therefore, he was not in a position to discuss the health questions of the Commonwealth. It seemed to him, however, that one problem which Australia had to face was that of *leprosy*. The Government appeared to have this disease well under control, and he did not think that it would ever be a really serious problem in this country.

Leprosy not hereditary. In 1887 the management of the Almora Asylum for lepers, where the system of separating the children from their leprous parents was launched for the first time in the history of the world, came to the conclusion that " lives of children brought up apart from their leprous parents, instead of being blighted by disease and suffering are now healthy, useful and happy. This decision was based on the success this system has acheived in that in a period of 25 years only once was it necessary for them to transfer a child from the Orphanage to the Asylum. Generally speaking the result has been satisfactory in all such homes.

But on investigation it was found that of all children born and reared during 30 years in the ' neglected leper colony ' of Tarn Tarn, two only escaped the taints, and even these were doubtful."

Pigs and Leprosy. We cull the following from the Qua Iboe Mission Report (Nigeria) :

" There were pigs searching about for food. We have not been accustomed to regard these animals as Epicureans, but here I am told they will even feed on dead bodies.

It appears that when a person dies of leprosy, the relatives do not bury the body, for fear the spirit will come back to trouble them. By throwing it into the bush, where it will be eaten by pigs or other animals, the spirit is supposed to go into the animals."

Carville Leprosarium. U.S.A. Dr. Danner stated that of the " 750 lepers admitted to the hospitals since 1921 a total of 171 have been parolled as ' symptom free.' He estimated that there were more than 1,000 lepers in this country."

Another Priest Victim. The Rev. Leo Lejeune, of the Marist Fathers, a missionary in the Fiji Islands, has caught leprosy of a very contagious form, a *Fides* message states, and has been transferred to the isolation colony on the island of Magokai.

Father Lejeune was born in Petitvoir, Belgium, in 1876, and has been in Oceania since 1901. For the past thirteen years he has had charge of the intellectual and moral training of the native teachers employed by the Marist Missionaries in that part of the Pacific

There are 525 lepers in the Magokai colony, Father Lejeune's

new home. It is an admirably equipped and conducted establishment, founded by the British Government, and staffed by the Missionary Sisters of the Society of Mary. There are fifteen European and American sisters and twelve native sisters working among the lepers. From time to time cures have been declared, and the fortunate persons sent back to their homes under observation. It is not impossible, therefore, that, under the care of a skilled doctor, Father Lejeune may be freed from the dread disease. Father Francis Xavier Nicouleau contracted leprosy while acting as chaplain at Magokai, and died there in 1928.

South Africa. " Mr. J. H. Hofmeyr, Minister of Public Health said : ' Our leper institutions in South Africa are not just segregation depots, they are primarily hospitals for the treatment of those suffering from the disease. Yet compulsory segregation remains the basis of the methods that are employed, and, primarily in the interests of the community, the leper has to be subjected to restraint and deprivation of liberty. That surely carries with it a debt to be paid by the community to the lepers, and for that payment the services rendered by the impersonal State can hardly be regarded as adequate. The segregation of the lepers tends to make us forget them. It is up to us to fight against that tendency, and make a conscious effort to alleviate their lot.'

' I welcome the part that Toc H is beginning to play as the keeper of the community's conscience in this regard,' concludes Mr. Hofmeyr.

The five leper institutions in the Union have during the past decade changed considerably in character. Whereas previously they were institutions primarily for the segregation of lepers, they are now hospitals for the treatment of those suffering from leprosy, staffed by five full-time and two part-time medical officers, four lay superintendents, three matrons, eight sisters, 25 European and 10 native nurses.

Each institution has a fully equipped hospital and provides facilities for research work, while at the West Fort Institution, Pretoria, all the necessary facilities are provided and a medical officer specally delegated for systematic research work."

China. " The China Mission to Lepers is an international organization which has a committee of all nationalities, and has existed here for some time. In the past it has carried on educational work, given treatment and conducted its affairs through a central office.

The idea to have a national leprosarium has recently gained favour here, and $80,000 and 100 mow of land were obtained for its erection. This leprosarium, adjudged to be the best of its kind in China, will be opened to the estimated 2,000 leprosy-stricken residents in the three municipal areas by the middle of October. Building construction is expected to be completed at the end of this month. It is designed to have accommodations for about 500 patients, but pending further expansion, it can only accommodate 100 lepers. The first unit which now occupies only 20 of the 100 allotted mow of land at Miaochongchen, Tachong, consists of 20 buildings : 12 cottages of the modern type, which makes possible the segregation of lepers, enabling them to lead a quiet home life."

The Shop. In the Leper Settlement of Tanu the patients are rationed by Government!

"Perhaps you will ask, if they are rationed by the Government, what do they want with money? The answer is, THE SHOP! This is an institution second only in importance, and not second in popularity, to the dispensary. Government rations are all very well, but housewives—and bachelors, too—like some relish, and the highly-flavoured native cooking requires a large variety of etceteras. So every Saturday, when the missionaries cross to the larger island for their Sunday rest and renewal, without which it would be impossible to carry on, they take with them a long list of special orders. In addition to the regular supply of tea, sugar and cigarettes, many odd things are specially commissioned. Chewing-tobacco, lime and betel-nut, dried beans, saffron, cedar-bark incense, books, khaki shorts (1 rupee per pair), shirts (price ditto), coloured paper for ear ornaments, are some of the items which have to be provided.

In its time the shop has been potent as a means of discipline. If the lepers proved quarrelsome or insubordinate, the ladies had only to announce, "The shop will not be opened on Tuesday or Thursday," and the rebels were quickly reduced to order—by their friends, if not by their own feelings."

Canton Conference. "The Second National Leprosy Conference convenes here Nov. 8 under the auspices of the Rev. T. C. Wu, general secretary of the Chinese Mission to Lepers.
Lepers.

On the committee completing arrangements for the conference are Drs. F. K. Chen, Daniel G. Lai, James L. Maxwell, F. Reiss, E. S. Tyau, F. C. Yen and Y. Y. Ying. The congress will continue two days, with a number of delegates from other countries remaining until next week for sight-seeing and visits.

Dr. F. C. Yen, president of the National Medical College of Shanghai and concurrently president of the Chinese Mission to Lepers, will preside over the main meetings. A general assembly will be held to discuss general and administrative aspects of the problem. Reports from different leprosaria throughout the country will be heard.

There also is to be a round-table discussion on various phases of leprosy control, such as survey, finance, discipline, new policy, industrial therapy, standardization of records, research work, training institute and resolutions on legislative problems.

Among the prominent doctors from other countries to be present are Dr. George W. Wright, official representative of the American Mission to Lepers for the Philippine Islands, and Dr. W. H. Wade, chief of the Pathological Department of Culion Leper Colony, Philippine Islands.

The first National Leprosy Conference held in 1932 in Shanghai proved such a success that it was voted at that time to hold a second one in Canton in 1935, and from all indications of the opening day, this one holds every prospect of surpassing its predecessor in its attainments."

REVIEWS

Rat Leprosy, by Dr. P. H. J. Lampe. Geneeskundig Tijdschrift voor Nederlandsch-Indië. Afl. 24 Deel 75, 1935.

Dr. Lampe summarises the results of his experiments as follows:—

" Infection experiments were made with 56 young white rats, either by percutaneous inunction of the skin of the belly shaved so close as to bleed slightly, or by subcutaneous injection into the root of the tail, with lymphnode-emulsions from r. concolor, r.r. diardii or r. norvegicus, which had been found in Batavia infected with rat leprosy, (see former announcement in the Geneesk. Tijdschr. v. Ned. Indië, No. 8, vol. 75, 1935). Some of the white rats were fed for 5 months after the inoculation on a diet deficient in vitamines (B_2, B_1 &$_2$ and A); some were given full diet. They were kept under observation for one and a half years.

" In rather over 90% of the cases the inoculation took, (so) quite regardless of the source of the inoculated material or the manner of inoculation.

Subcutaneous inoculation: method used in 36 rats. After 4 months, 3 out of six showed infection of the lymphnodes of the groin; after 5 to 10 months in 29 out of 30 there were both groin and axillary node infection, sometimes with a perinodular infiltration unilaterally in the groin and (or) granulation tissue at the site of injection; after the 8th (10th) month in 12 cases these granulations ulcerated.

Percutaneous inunction: method used in 20 rats. After 4 months 9 rats showed no lymphnode involvement: after 5 to 10 months, 9 out of 11 showed groin and axillary node infection, sometimes with a perinodular infiltration unilaterally in the groin; after the 12th (?) month in 3 cases there were " skin lepromata " at the site of inunction.

"*Smears.* There were severe and light infections of the lymph odes. Bacilli were found intracellular in epithelioid (?) cells and in giant cells and spread extracellularly. There was an enormous number of bacilli to be found in the skin lesions.

Sections. A great preponderance of the bacilli were found to be intracellular. There was a granulomatous infiltration of histiocytic cells with a powerful phagocytic action on the acid-fast rods; an indication of a tuberculoid tissue reaction was found (a few giant cells of the Langhans type). There was little exudative change, no softening, but some primary degeneration (pyknosis and cell necrosis). In the skin lesions the subepithelial zone was free; the cutaneous muscle was also free.

" The normal type seems to be infection of the lymph ode apparatus. of the subcutis (the nodes of the jaw are often not involved and those of the viscera but rarely). Sometimes there is swelling of the nodes or a perinodular infiltration, which may be accompanied by ulceration. At the site of injection there often develops a flat, extensive, not softened subepithelial granuloma, often accompanied by ulceration. At the site of inunction there sometimes develop isolated, reddish-brown coloured, flat thickenings of the skin with loss of hair, but without ulceration (" skin lepromata "), resembling cutaneous leprosy in man. Masses of bacilli are often found in the internal organs (and

sometimes in the apparently normal skin) in severe infections; sometimes there are very numerous miliary hearths (" rat leprosy sepsis "; no bacillaemia demonstrable).

" The *progress* of the condition is slow and often self-limited. An infection of the regional lymphnodes takes place, followed by a general involvement of the cutaneous lymphnodes and there is only rarely any perinodal process. At the site of injection there is but little "activity" shown and only in a part of the cases were slowly growing granulomata observed, which might ulcerate (cachexia of secondary infection), or might remain stationary, without regression, however. The same may be observed at the site of inunction with in only a very few cases the very slow development of " skin lepromata," which tended to remain stationary, without regression(?). The same appears to be true of the haematogenous spreading of the virus, which in but few instances quite exceptionally led to the development of miliary hearths in the internal organs.

" The *influence of the hypovitaminosis* was only probably in the case of the percutaneous inuncted rats (relatively moderate dose of the virus); it was only a shortage of vitamine B_2 that was accompanied by the development of cutaneous lesions.

" The *general physical condition* of the rats, judged by the weight curves, deteriorated in those rats that developed ulcerations, but remained good in rats even with extensive lesions so long as these did not ulcerate. The behaviour of the virus in general, far more closely resembles a saprophytic than a parasitic one (apart from possible immunological reactions). The semi-saprophytic behaviour of the virus of rat leprosy in the animal to which it is adapted, even in the case of heavy experimental inoculation, raises thoughts of relationships not seldom, perhaps even usually, met with in human leprosy."

Leprosy like Leishmaniasis. Indian Medical Gazette, Oct. 1935, p. 544.

Dr. R. O. A. Smith and K. C. Halder, make some observations on dermal leishmaniasis. Under the various forms which this disease takes they describe the *leprous type.*

" The nodules in this form of leishmaniasis have often been mistaken for those caused by Hansen's bacillus before a correct diagnosis has been made, but the case whose picture is herewith appended is more like a case of leprosy than any we have yet encountered. He was treated with antimony and iodides, and made an excellent recovery." See illustration facing p.71.

International Journal of Leprosy, Vol. 8, No. 3. July-September, 1935.

Pathogenesis of Leprosy by Dr. Spindler. This paper is summarised as follows:—

" My study of material collected by Kupffer and Talvik confirms the view that leprosy is only gotten by infection. Nobody gets leprosy who has not been exposed to infection by a leper, and nowhere does

leprosy appear without a previous case having been imported from a leprous region. That of all those who are exposed to the infection only a comparatively small percentage is infected must be explained on the ground that to acquire leprosy there must exist, besides the infection, a specially inherited predisposition. The hereditary nature of this disposition is shown by the fact that among blood relatives of lepers there are many more serious cases (lepra tuberosa) and fewer light cases (lepra maculosa) than among non-relatives." The writer comes to the conclusion regarding the *hereditary* nature of the disposition because of the greater prevalence and severity of leprous infection among contacts who are relatives of the infectious case, as compared with contacts who are not relatives. It is clear however to anyone reading the notes, that the related contacts were of a more tender age than the unrelated contacts, and the greater frequency and severity among the former group may be due to greater susceptibilitiy at a tender age, (acknowledged by most authorities) rather than to a " hereditary disposition."

Dr. Moiser, writing on *Tuberculoid Leprosy in Rhodesia,* summarizes what he regards as pathognomonic signs as follows:—

" The case is usually a 'neural' one; the edge of the lesion is sharply raised and smooth; the surface is rough, pebbled, 'micopapular'; the colour is a peculiar, characteristic purplish tint; there is little or no anæsthesia, and bacteriological smears from the lesions are negative."

He has found 6 cases of this type out of about 700 patients. This relative frequency is interesting, as in the Calcutta clinic at the School of Tropical Medicine, this type often reaches 50 per cent. or more of those appearing for first examination; in these however anæsthesia is generally a marked feature.

Dr. Gomes describes 56 cases tested by means of his complement-fixation test. He considers that the test is not absolutely specific, with which opinion we think readers would be inclined to agree.

Dr. Soule discusses the *Relationship of Human Leprosy and Rat Leprosy.* This paper is summarised as follows:—

" Patients with leprosy have been segregated continuously for the past twenty-nine years at the Culion Leper Colony, on one of the small isolated islands of the Philippine archipelago. The inmate population at the present time numbers about 6,700. Throughout this period the local rats have been intimately exposed to the human infection through scavenging in infected waste material from wards, clinics, dormitories and private residences, occasionally even by actual ingestion of pathological tissue from dead bodies or even sleeping patients, and by contact with the heavily infected soil. It has been frequently alleged that

the causative agents of human leprosy and of rat leprosy are identical. An examination of rats captured at Culion should reveal unequivocal proof of the validity of this contention as regards the existence of the disease in nature. Accordingly, 212 rats were trapped alive; 83.3 per cent were identified as *Mus norvegicus*, the remainder *M. rattus*. Of the former group 46 were old animals, 12 were half-grown, the others full-grown; all but 10 of the black rats were recorded as fully mature. No external gross pathological lesions were found, though each animal was scrutinized for alopecia and ulcerations, also for mutilations and for evidence of affections of the nose and eyes. Under deep anæsthesia the abdominal and thoracic walls, including the axillary and inguinal glands were examined, and the cavities were opened and their contents removed. No suggestion of broncho-pneumonia or nephritis (both cardinal involvements in naturally occurring rat leprosy) or other abnormalities were present in the gross or in sections examined histologically. Blood was withdrawn from the heart, direct smears and stained preparations were made, and the blood was cultivated on Petragnani's medium and rabbit blood agar. There were no macroscopic or microscopic findings suggestive of the presence of an infection with Stefansky's bacillus. This study would therefore indicate that, under what might be considered ideal conditions in nature, rats are not subject to infection with the causative agent of human leprosy. Comminuted human leprous tissue from a leproma and a broken-down nodule, and also acute reaction-pus, were injected into the skin and subcutaneous tissue of 23 half-grown rats (15 *M. norvegicus* and 8 *M. rattus*) in an attempt to transfer the human disease to the rodents. The possibility of immunity on the part of the local animals was controlled by including in the series injected 11 young rats caught on a neighbouring island; these controls suffered no untoward effect."

Dr. Mitsuda writes on *Langhans Giant Cell in Leprosy and the Stellate Body in Nodular Leprosy.*

He states "that when leprosy and tuberculosis attack the same organ we often find Langhans giant cells which contain bacilli of both kinds. Tuberculosis-like changes in leprous macules, tuberculoid macules and neural changes indicate the resistance of the body to the bacilli. The same histopathological changes can be seen in Mitsuda's skin reaction. Langhans giant cells may also be seen in the skin, testicle and epididymis in nodular cases. These differ from giant cells of the other type (a) in having a lower degree of foamy reaction, and (b) in the presence of one or more stellate bodies which can be stained with elastic-tissue or Bielschowsky's stain."

Leprosy in Morocco is described in two articles by Drs. Sainte Marie and Barneaud. The former himself knows of 330 cases in N. Morocco, but new cases are constantly being seen. He does not consider that in the present state of education an attempt at compulsory segregation would be

successful. Dr. Barneaud states that prophylaxis along educated lines is being undertaken by the authorities.

Dr. Rodrigues describes 5 cases of arrested leprosy in boys who were kept under ideal conditions. In spite of this 4 out of the 5 cases relapsed. Little-understood factors such as natural individual immunity, or varying states of infectiousness of the leprosy organism, may prove to be chiefly responsible for these results.

Correspondence

C/o U.M.C.A.
LIULI,
VIA SONGEA,
TANGANYIKA.
14th November, 1935.

To The Editor,
"Leprosy Review."

Dear Sir,

I beg to thank you for the 8lbs. Hydnocreol which arrived this month from Calcutta; we are most grateful for your kind help, not least for the "Leprosy Review" which comes regularly.

I wish some expert would be good enough to write in one number and explain what known connection there is between leprotic and T.B. manifestations, *e.g.*, in how far it is coincidence for a rather debilitated but otherwise healthy wife of an infectious leper to die of pulmonary tuberculosis, and for T.B. in general to be spreading in a district where leprosy is rampant.

Yours faithfully,

A. B. MOZLEY.

[Both leprosy and tuberculosis are predisposed to by any conditions, such as weakening diseases and deficient diet, which lower the general condition of the body. In both diseases infection is spread to a large extent by droplet infection and lack of sanitation. Leprosy is generally found at a more primitive stage of civilization than tuberculosis, but that is probably because leprosy has been in the villages for generations, whereas tuberculosis is of recent introduction. In other words, in African villages leprosy is indigenous and tuberculosis is exotic; but the soil is equally fertile physically, socially and economically, for the germs of both diseases. EDITOR.]