LEPROSY REVIEW.

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Contents.

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

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Editorial.

LEPROSY REVIEW enters the third year of its existence, and we would at the outset, like to express to our contributors and readers our deep sense of appreciation for their support and encouragement. From a small magazine entitled "Leprosy Notes," which appeared in March, 1928, the quarterly publication of the Association has developed until it has reached a recognised position in both lay and medical circles. We have decided to increase the REVIEW slightly in size and alter the binding a little, so as to make it more attractive. This does not mean that the policy of the REVIEW has in any way changed. The aim will always be to supply a semi-technical magazine to workers—both lay and medical—which endeavours to keep them abreast of modern development. As it is anticipated that the new International Journal of Leprosy will appear this year it is perhaps wise to state again that LEPROSY REVIEW is in no sense a competitive journal. Just as the British Empire Leprosy Relief Association has a definite place, and cannot be absorbed into the International Leprosy Association, so we feel LEPROSY REVIEW fulfils a function which cannot be undertaken by any other journal.

This number of the REVIEW contains three most illuminating articles from three different quarters of the globe, one from the Southern Sudan, one from Hawaii, and a third from India. Dr. Cruickshank gives an admirable account of the situation in the Southern Sudan. With many of his views we are in sympathy, and he has rightly laid stress on the fact that many early cases do not need active treatment, because for years their lesions have shown no signs of activity. They are what have been called in this journal before, for want of a better term, abortive cases, and play a large part in leprosy prevention schemes throughout Africa. The method of prevention in the Southern Sudan we would commend to the study of those similarly situated. Such a complete system may not be feasible everywhere, but the ideal wherever possible, is to organise settlements on a self-supporting basis, as outlined in the article. Alepol given intravenously does tend to cause thrombosis, and it has frequently been stated that experience tends to show that this is not the best route of administration. While it is difficult to estimate the value of a given remedy in leprosy, the hydnocarpic derivatives still hold the field. Their position is not unassailable, yet few physicians would be willing to treat leprosy without their aid.

Dr. Wayson lays stress on the fact that patients who return to surroundings and circumstances in which they have previously developed leprosy, tend to relapse. This is seen commonly in tuberculosis and raises the question of efficient follow-up, where possible, and of insistence on maintaining the general health at a high level. This may be a council of perfection, but it cannot be too much emphasised that the maintenance of a high general standard of health is the best preventive against leprosy. In reviewing the past decade's work the conclusion cannot but be made that increased knowledge of the disease and its treatment has led to a brighter day of hope, and has given many a case complete freedom from the disease, while to others it has given a period of five or more years of renewed life and vigour, and that in itself is greatly encouraging.

We have reprinted the article by Dr. Muir, which appeared in the October number of "Leprosy in India" because it puts the present position in India so admirably. We would like to draw attention to the message of Lord Reading when he opened the campaign in India. It is hardly necessary to say that these words apply with equal force to the rest of the Empire. Unfortunately, the parent body is not in the same sound financial position as the Indian Council, and we would appeal to those interested in this scourge to make this fact more widely known to their friends.

Leprosy in the Southern Bahr-el-Ghazal, Anglo-Egyptian Sudan.

A. CRUICKSHANK.

THE district under review is just north of the French and Belgian Congo frontiers. Its population is 121,000, and consists solely of the Zande or Niam-Niam tribe. For medical work, it is divided into two districts—Tambura and Yambio. The whole area is a "closed district" because of sleeping sickness, but this disease only persists in the Tambura area, and is well under control—a few cases occurring sporadically annually. In the control of sleeping sickness, the whole population, man, woman and child is listed, and is inspected by a medical officer periodically; in highly-infected areas, as often as once monthly and never less than twice a year. This fact made the search for leprosy more easy.

YAMBIO DISTRICT.

In early 1929, I inspected the entire population of Yambio District—this took four months. The result was :—

No. inspected, 58,136.

No. of cases of leprosy, 1,556, or 2.8 per cent.

Towards the end of the inspection, the natives had tumbled to what we were after, and many of those affected hid themselves, whilst others scarified or burned or blackened their little patches in an endeavour to hide the disease. It was felt, therefore, that the total number infected must be a good deal higher.

The next problem was to find an area large enough to accommodate all these on the settlement system.

After much surveying, an uninhabited tract of bush country was selected, and an area of approximately 30 square miles allocated for the work. Roads were then cut, and watering places selected and cleared of heavy undergrowth to rid them of the tsetse fly. Temporary mud huts for the staff and a temporary hospital were erected.

A start was made by bringing in some 100 advanced and mutilated cases, who were only too glad to be looked after. These were housed, fed, and given special rations of meat and generally well-cared for. Gradually the reputation of the place grew, and slowly the cases we wanted began to trickle in.

On admission, the patient was weighed, his lesions charted, family history taken, given an identification disc with his serial number, and a hoe for cultivation purposes. Any near relative who wanted to stay with him was examined, and if infection free, listed in the " Relatives' Register " and given a differently shaped numbered disc. A plot of land, 1 to 2 acres in extent, with one hut built on it was then allocated. The relatives had to build their own huts on this plot. Two pounds of grain daily, a weekly ration of salt, and seeds for their private cultivations were given. The grain ration ceased when private crops were ripe.

The trickle of admissions slowly grew into a stream, and then into a flood. At one time 50 a day were being admitted, and as each case takes some 15 minutes to register, the task entailed can be imagined, and the hut-builders and road-makers were strained to the utmost to keep pace with the demand.

Within eighteen months of starting, 2,700 cases were admitted, housed and under treatment ; by then, resources

and staff could cope with no more, and it was felt wiser to cease admission and consolidate the position.

A second survey of the population was then made. The outlook by now had so changed, that instead of hiding their leprosy, natives were firing small areas of skin and trying to pass off the resultant hypo-pigmented scar as leprosy !

Including those already admitted, the total number of sufferers was 3,220, or 5.3 per cent. This total represents every person afflicted with leprosy in the area whose condition could be recognised by careful clinical examination. Therefore, in a year and a half, 84 per cent. of all the cases were under segregation, and this 84 per cent. included all known infectious cases (based on clinical and not bacteriological examinations).

The Settlement.

There is now some 40 miles of motor road to which all huts face (see sketch of layout facing p. 9) ; it is diagrammatic, as geometric precision had to give place to geographic irregularity. All buildings were constructed by local paid labour, chiefly inmates and their relatives. Red burnt bricks, hewn iron stone, doors, window frames, etc., were all made by local talent from indigenous material. Carpenters' and blacksmiths' shops are kept at full pressure and are staffed by patients.

Large communal plantations of cassava, pea-nuts, maize, sweet potatoes, rice and bananas are kept up by the inmates themselves. In addition, all of them except the mutilated cases are required to have private crops.

Administration.

The members of the various tribes in the district which enter the colony have their own section and elect their own headman. This tribal organisation is not interfered with. He is the representative of the outside paramount Chief. These headmen form the " Lepers' Chiefs' Court," and sit with great pomp and dignity to hear and settle the many cases of marriage tiffs, divorce and adultery, and petty breaches of the peace. The Medical Inspector deals with offences against the Settlement rules, while serious crime, which is rare, is dealt with by the Political Officer of the District. Women, boys and girls, form separate units, and each unit has its " Head-woman, boy or girl," and these " Heads " are responsible for attendances at injections, and must explain absentees and report desertions, etc.

Every morning of the week, bar Sunday, one unit (approximately 400) parades for injections, salt, and grain ration (the last-named only to new or incapacitated cases). The day following injection, each unit parades for one day's work on the communal cultivations. The other five days of the week are at their own disposal.

Apart from the salutary discipline of a day's work and the parade for treatment, the inmates live their ordinary normal lives, but have better housing conditions, regular issue of salt, a rare issue of meat should a hippo or two be shot, and issues of root crops during the lean times of the year. There are no modern Josephs among these people and no thought for the morrow. Now that the communal cultivations are bearing, apart from salt, all these patients are self-supporting. The tons of root crops from the cultivations are kept rigidly under control and only issued as occasion demands.

Treatment.

With such numbers, and a staff who have to cope with sleeping sickness and general medical work as well, mass treatment has been the only thing possible, and alepol by the intravenous route the method of choice, and doses up to a maximum of 10 c.cs. of a 5 per cent. solution are given by this route. The injections are given by trained native orderlies, many of them patients in the non-infectious stage.

Intramuscular, subcutaneous, and intradermal injections are substituted if the veins become thrombosed, but our experience has been that with care, intravenous injections can be continued at weekly intervals (with one month's rest after three months) for a year. We also find that intramuscular and subcutaneous injections, in spite of careful technique, addition of 1 per cent. novocain or other local anæsthetic, and vigorous after-massage, are definitely painful; sufficiently painful to induce many to absent themselves from injections, and this means loss of the highly-prized salt ration.

Locally trichloracetic acid is used. Ulcers are dressed with hydnocarpus oil. Where advisable, surgical attention is given and large pendulant nodules on ears and noses are removed.

If a case is seen to be going definitely downhill, alepol is stopped, and unless contra-indicated, a course of "914" given, plus tonics by mouth, and oil or fat added to the diet if such is available.

TAMBURA DISTRICT.

At the medical headquarters, Source Yubu, a large sleeping sickness settlement of over 1,000 patients has been running for some eight years. Leprosy work was started here in 1927, when 140 cases were admitted. At the end of 1930, a large settlement adjacent to the sleeping sickness one contained 2,123 cases.

A careful survey of the area revealed 3,300 cases of leprosy among a population of 61,000, or 5.5 per cent. The great majority of these are very early and very mildly infected cases.

In the entire area then, we have 6,500 cases, of whom 4,800 are segregated, and the remainder under observation in their villages and inspected at regular intervals. All infectious cases are under treatment, and when any case outside is found to have gone on to the infectious stage, or if the disease is appreciably advancing, it is immediately taken to one of the settlements and put under treatment.

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THE PRESENT SITUATION.

All who are suffering from leprosy in the district are now known and registered.

Approximately 75 per cent. of them are in settlements and under supervision and treatment.

The untreated 25 per cent. are in the non-infective stages of the disease.

In Tambura (Source Yubu) settlement,highly-infectious (chiefly C3) cases are further segregated by being completely separated from their relatives and housed in a special camp. In Yambio such cases are not specially separated. The incidence among relatives in these settlements is being carefully watched and the comparison of results in these two areas should yield instructive information.

Of those under treatment, 80 per cent. in Tambura and 65 per cent. in Yambio are of the earliest types—C_1 and N_1.

From careful analysis of all those segregated, it is obvious, especially in Tambura district, that in the majority of cases *leprosy is a self-arresting disease before any permanent damage (apart from slight hypopigmentation of the skin) has occurred. Untreated, only a small portion of cases go on to the later stages. The virulence of the disease here seems low, but the incidence very high.*

Is the incidence higher than usual only because it has been possible to make such a minute and careful examination of the entire population?

Is the virulence low because the resistance of the individual in normal years remains fairly high, due to a reasonably good and varied diet, although it is a diet too rich in carbohydrates, and too low in proteins and fat?

It is too premature in the history of these settlements to say with authority what the results of treatment are, but I venture to make the following generalisations :—

(1) The resistance of early, apparently self-arrested cases can be maintained.

(2) In many active early cases (I think of low virulence) the progress of the disease can be arrested or at least slowed down.

(3) In many advanced cases, chiefly C_2, N_1-C_2, nothing seems to prevent the onward march of the disease.

(4) In advanced cases—not necessarily mutilated cases—chiefly of the nodular C_3 type, treatment seems to have very little effect.

(5) In some N_2 cases with active trophic changes, the resolution of the disease can be hastened, often preventing further mutilation—this, in itself, is a great thing.

It must be admitted that a small number of spectacular "cures" have occurred, where either the nodules of a C_3 case have completely scarred up, or where a body almost covered with great red-raised coalescing patches swarming with mycobacteria has returned to almost normal, but I have yet to be convinced that this was due to treatment —I mean, specific treatment by the injection of hydnocarpus derivatives.

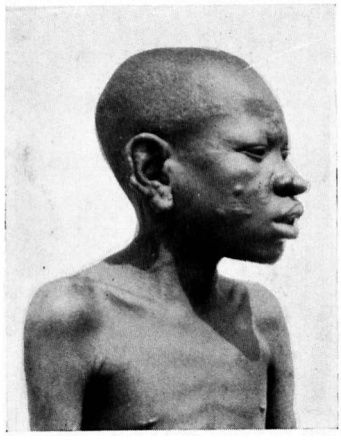
In the light of the foregoing remarks, I promulgate the following opinions regarding leprosy in this area :—

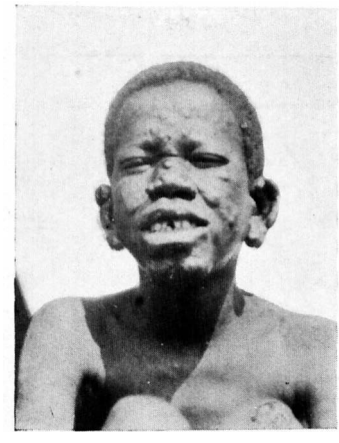
(*a*) That only definitely infectious cases should be segregated and given active routine injection treatment.

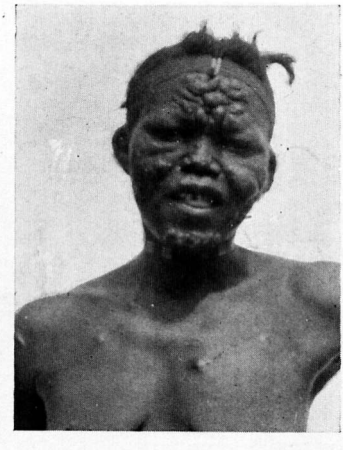
(*b*) That all early cases should be watched, and immediately signs of advance occur, be given active treatment, preferably dispensary treatment outside.

(*c*) That far more can be done both prophylactically and curatively by measures devoted to treating all other disease, by improving housing conditions and raising social standards and, above all, securing an adequate, varied and plentiful food supply—in short, by raising the resistance.

Though these are my personal conclusions, because so many observers all over the world have reported so favourably on hydnocarpus in early cases I do not feel justified in discontinuing treatment even in apparently

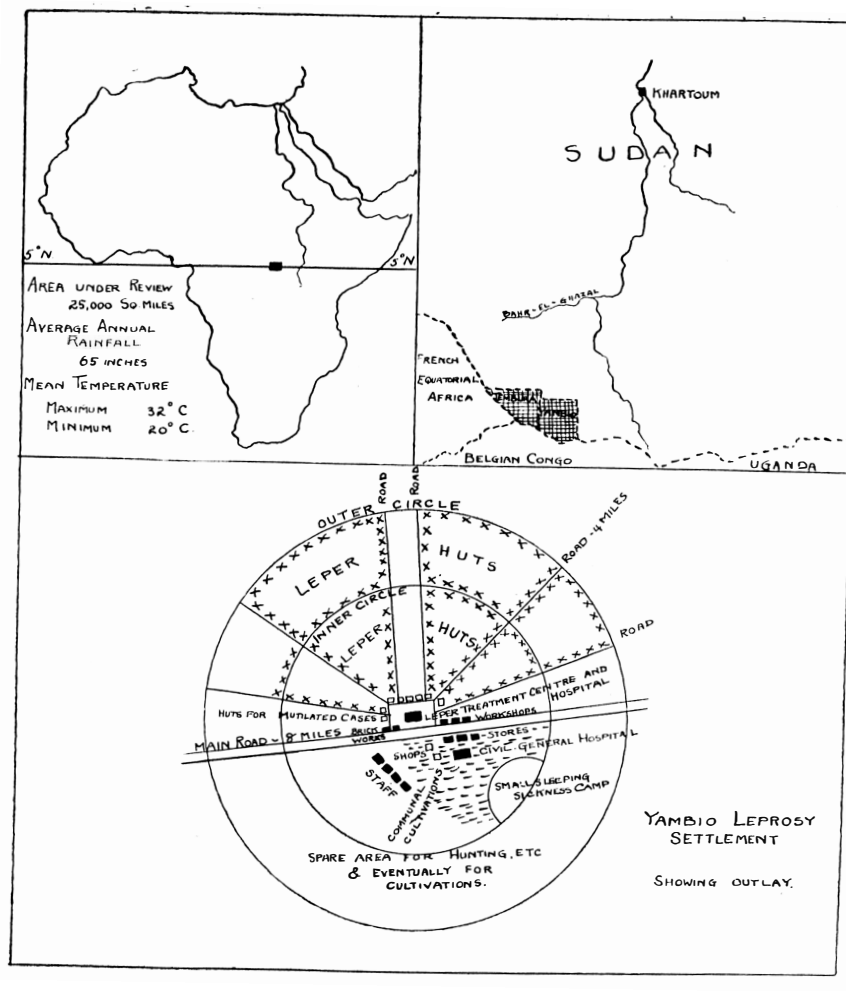






TYPICAL ADVANCED CASES IN THE BAHR-EL-GHAZAL PROVINCE S. SUDAN.

YAMBIO AND TAMBURA DISTRICTS, SOUTHERN BAHR-EL-GHAZAL, SUDAN.



arrested cases ; in order to gain further evidence, however, the cases here are being divided into the following groups :—

1. Segregated in settlements under full treatment.
2. Segregated in settlements with no treatment, but enjoying the better conditions and food obtainable there, where every minor ailment can be attended to, and where a modicum of exercise in the shape of work is insisted upon.
3. Under observation in their homes, living their normal lives with no treatment but subject to regular examination.
4. Living their normal lives at home but receiving weekly treatment at an out-station dispensary.

Conclusion.

For the type of African leprosy encountered here, alepol does not appear to exert any potent beneficial action, and its disadvantages—pain and a tendency to thrombosis of veins—have yet to be overcome.

The jump from the dark depths of leprotic despair to the heights of the possibility of a positive cure, in the last few years has been remarkable, and productive of the most excellent results in that it has stimulated efforts to find a rational treatment, induced the necessary confidence in the minds of the patients, raised the enthusiasm and hopes of workers and made the finding of the very earliest cases possible. The rebound from too much optimism to a more critical but still hopeful outlook will, we hope, promote the search for a still better treatment, which, when found, will be seized with avidity and tried out with enthusiasm by those of us who by the nature of their duties cannot devote their time to detailed research.

(I am indebted to the Director, Sudan Medical Service, for permission to publish these notes.)

Leprosy in Hawaii.

N. E. WAYSON.

(*By permission of the Surgeon-General, U.S. Public Health Service.*)

IT is obvious that the attainment of the ideal of medical science, the prevention of disease, necessitates the scientific application of control measures which are designed from a knowledge of the incidence, case and nature of the disease at issue. None of these fundamental criteria are well established with regard to leprosy. However, even though

these essentials were determined, the problem of prevention of the disease would be greatly influenced by the environment of the individual, and by his adjustment to that environment. His habitat, social-economic status, traditions, and other circumstances which are correlative with those of the community must be appreciated and considered in the formulation of pertinent sanitary codes and practices which will be successful.

In 1886, the advisors to the King of the Sandwich Islands (Hawaii) solicited information from the governmental authorities of India, and from other countries scattered throughout the world, concerning the prevalence of leprosy, the manner in which it was being treated and kindred matters. The natural history of leprosy was admittedly incomplete, and this effort to collect and assemble the observations which were available was made in order to apply such procedures as were current and adaptable under the particular local conditions.

Some progress has been made here, and elsewhere, by such a scheme, and perhaps more can be accomplished by a further summary of the conditions and methods used in different countries. This brief account of some of the circumstances which are relevant in Hawaii, is contributed with the desire to assist such progress.

Hawaii consists of a group of a large number of small islands. The archipelago is named from the largest island of the group. They are situated at about the same latitude as Bombay in India (20° north) and are about twenty-three hundred miles west and south of San Francisco, California (or at longitude 160° west). The topography of each of the larger inhabited islands is that which is similar in other areas of probable volcanic origin, with a central mountainous ridge, whose rather abrupt slopes to the sea are furrowed with many small valleys. The altitude of the highest peaks approximately 14,000 ft. The ridges have a general northwesterly direction. The area of the islands which contain practically the entire population, is 6,400 square miles, or about nine-tenths the size of Wales. The climate is mild with annual ranges of temperature varying from a minimum of 55° to a maximum of 85° F. The temperature and humidity which prevail throughout much of the year are somewhat depressing during the morning and early afternoon hours, but they are made comfortable during the late afternoon and evening by the trade winds. These winds are from the north-east, and greatly influence the rainfall as well as the temperature. The rainfall is heaviest during the winter

months, and in several sections there is no rain except during these months. The average annual precipitation varies greatly within a few miles. This is exemplified on one island on which there are 200 in. of rain annually on the ridge of the mountains, and 20 in. at the sea level, which is not over five miles away. The mountains are more precipitous on the eastern and windward side, and the rainfall is very different on this, and on the leeward slope.

The industries of the islands are almost entirely agricultural. The crops are those of cane sugar and pineapples. Relatively few of the Hawaiian or Japanese population are now engaged in the production of these crops on a commercial scale, though the Japanese were formerly so engaged. Recently imported Filipinos have taken the places of the Japanese. Commercial fishing is carried on largely by the Japanese, but the production is not much greater than the local consumption. A large proportion of Hawaiians maintain small farm holdings, or are employed in minor salaried positions or as labourers.

The standards of living amongst many of them are similar though better than those which prevail among like classes in the sub-tropics or tropics. The families of the last generation have apparently averaged about 4.8 children. The houses have been, and, in an unfortunately large proportion, are still crowded. These circumstances prevail among both those in rural surroundings, and in the urban districts. The main article of diet, and often the only diet, is that of poi. This is a paste made by steaming and pounding the root of taro (*Caladium colocasia*) mixing it with water and allowing it to stand, with consequent fermentation for periods of from a few hours to several days. It is very often eaten by sucking off the amount which can be scooped up on the fingers. Yams, sweet potatoes, and some fish is consumed, and a smaller amount of greens, such as the young shoots of the top of the taro, and various sea weeds which abound are also eaten. Green vegetables are not attractive to them, and both meat and milk is relatively costly, and consequently is not available.

The government is that of a Territory of the United States, with a governor appointed by the federal authorities, and a legislature elected by the local voters. Laws governing the franchise are provided in the " constitution " granted the Territory, and all Hawaiians, not specifically disqualified, were extended the franchise when the country sought annexation to the United States. Individuals who are not of native origin or citizens of the United States are not

eligible to the franchise. Thus, among the voters those of Hawaiian blood form an important part of the electorate.

The total population of the Territory in 1930 (U.S. Census) was 368,336, distributed over seven of the islands. Of this total 137,582 were on the island of Oahu, in the city of Honolulu, a modern metropolitan district, and 19,468 were on the island of Hawaii, in the city of Hilo. The remainder were gathered in small villages of at most a few hundred, in communities on or near the large plantations, and in scattered groups or families. In other words, 43 per cent. of the population might be classed as urban, and 57 per cent. as rural. The aboriginal people were Hawaiians, a Polynesian strain, and probably numbered between 125,000 and 130,000 in 1832. In 1880 their numbers had fallen to about 45,000. During the past 30 years (U.S. Censuses) their numbers have further declined from 29,799 in 1900, to 22,636 in 1930. However, during this period those who are of a known mixture of Hawaiian and Asiatic or Caucasian races have increased from 7,859 in 1900 to 28,224 in 1930, thus making the number of those of Hawaiian and part-Hawaiian race 50,860 in 1930, or an increase of more than 35 per cent. during the past 30 years. The racial elements which form the larger proportion of the population have been brought to the Territory as labourers. Among those who were imported between 1852-1886 were the Chinese, who in 1930 numbered 27,179 ; between 1880-1915 the Portuguese, who in 1930 numbered 27,588 ; between 1885-1925 the Japanese, who in 1930 numbered 136,631, or 37.9 per cent. of the whole population ; between 1910-1930 the Filipinos, who in 1930 numbered 63,052. Other races tabulated and classified in the 1930 census are Caucasian, 44,895 ; Porto Rican 6,671 ; Korean 6,461 ; Spanish 1,219 ; Negroes and others 780. Two striking facts are to be noted or considered in the above tabulation, namely : (1) that Hawaii has a population of greatly mixed races, the preponderance of whom are of recent asiatic origin, and (2) that the majority of the immigrants come from large endemic centres of leprosy. In other words, they probably furnish fertile soil for the development or dissemination of the disease.

Most of the people who have immigrated have come into surroundings, social and economic conditions and traditions, which were somewhat different from their own, and to which they were under immediate pressure to adapt themselves. Some of them may have brought leprosy to the islands. It is believed that the disease was introduced by

the Chinese, though this is not known, and probably cannot be definitely determined. The Hawaiian people call leprosy the Chinese sickness (Mai pake), suggesting that it was unknown among the aboriginal natives. The date of recognition of the first cases can likewise not be determined, but in 1865 the incidence in the islands was so great that the Hawaiian king was persuaded to establish an isolated settlement in which the sick might be compounded and segregated from the public. The Kalaupapa settlement was established in 1866 on a small peninsula (5,000 acres) on the island of Molokai, separated from the rest of the island by precipitous bluffs.

In this colony the patients live in accordance with the practices of the residents of villages of like size in Hawaii. They are provided by the legislature, through the Board of Health, with the necessary food, clothing, shelter, medical services, and entertainments, including cinema pictures, and they are allowed to operate their own automobiles, of which there are upwards of fifty. Facilities are also made available for religious worship, and prelates of the catholic and of several protestant beliefs are permitted to live in the settlement. The number of patients resident at any one time has varied from about 1,100 to 500. There are slightly fewer than five hundred at the present time. Approximately 7,200 have been segregated since the beginning of the colony.

The incidence of leprosy among Hawaiians was very high, and even as late as 1895 there were over 1,000 of them who were patients from among a population of about 40,000. An epidemic of such proportions, in which 2½ per cent. of the population is afflicted to such a degree that their disease is easily recognised would be apt to result in many cases which were not detected. It would appear likely also that most of the more susceptible individuals would be affected, thus leaving a comparatively resistant population. However, there would probably be many whose symptoms became prominent only after several years. There are at present about one in each hundred of the total Hawaiian population under supervision as active or quiescent cases of leprosy. The entire number of all races under supervision is about 800, or a little more than two per thousand of the general population.

The average number of admissions annually has been slowly falling for 20 years, but the number of established cases existing at any one time has not changed greatly during this period. One factor which may influence the declining

number and rate of admissions is the decreasing number of native Hawaiians. The highest rate of admissions is from among these people. The decrease in their total number is occurring through the operation of a high death rate amongst them, and through intermarriage with Asiatics and Caucasians. These latter mixed or part-Hawaiians have a much lower admission rate than the native Hawaiians. The economic and sanitary development of the islands and the increasing facilities of transportation and communication, with the accompanying changes in methods of living, may also play a rôle in the declining admissions. While the known rate of incidence is double that estimated to prevail in a number of countries in which leprosy is endemic, it should be recognised that large numbers of Oriental people have been rapidly imported. More recently the Filipinos have been coming at the rate of about 5,000 a year, and now represent about one-sixth of the general population. An increasing number of these Filipinos are found to have leprosy. Thus it is probable that both unrecognised cases and susceptible people are being brought to the Territory even now. Also the known incidence may approach the real incidence more closely than is likely in larger countries in which means of transportation and communication are less well developed.

In the consideration of the effects on leprosy in this community which may be produced by the biological and economic forces at work among the native Hawaiians, part-Hawaiians and newly arrived immigrants, it is interesting to contemplate the observations of the officers of the Board of Health concerning the gross birth and death rates, and the death rates from tuberculosis as they obtain locally. In their report for the past fiscal year, 1930, one finds that the birth rates among Hawaiians have fallen during the period 1926-1930 from 25.78 to 21.60; among Asiatic-Hawaiians the corresponding figures are 77.44 and 73.08; among Caucasian-Hawaiians, 65.30 and 62.57. The death rates during this period were: Hawaiians 30.09 in 1926 and 33.30 in 1929; Asiatic-Hawaiian 15.21 in 1926 and 18.61 in 1929; Caucasian-Hawaiian 14.72 and 17.28. The birth rate of the part-Hawaiians during the period was about three times that of the native Hawaiian, and the death rate but little more than half as much.

Since 1865, the laws of Hawaii have made it mandatory that cases of leprosy shall be segregated. To accomplish this it is provided that individuals suspected of having leprosy shall be reported by anyone having such information

to the Board of Health, which in turn must have the individual examined. The suspect is entitled under the law to have his examination conducted by three physicians at the expense of the government. One physician may be selected by him, another may be chosen by the Board of Health, and the third chosen by these two. Thus an impartial medical board is selected, and the opinion of the majority of these is final opinion. The individual may, however, elect to waive this privilege and accept the opinion of the official attending physician at the Receiving Station of the Board of Health, thus voluntarily submitting to certification. The number who come or are brought for examination and who waive the privilege of the more formal procedure is about 50 per cent. of those admitted.

Upon determination that the suspect is a case of leprosy, he must be certified and hospitalised if considered a menace to the health of the public. If, however, he is believed to be a closed and quiescent case whose presence at large is without danger to the health of the public, he may be certified, and placed under contract to continue at large subject to the direction, examination, and supervision of the Board of Health. A certification with such a disposition is determined only by a medical board of three physicians, which may be chosen as outlined above. But few cases are thus immediately released, since most of those who are submitted for examination are in need of hospitalisation. This is dependent in part upon the fact that leprosy is not usually suspected until it has become to some extent generalised, and is due, probably to a greater degree, to the delay of the patient, who very naturally postpones a procedure which may restrict his freedom and remove him from his home for a prolonged period.

If admitted to hospitalisation he is cared for at the Receiving Station, located in the environs of Honolulu. Here he is treated by physicians of the U.S. Leprosy Investigation Station, which is adjacent. These physicians are officers of the U.S. Public Health Service, engaged in studying the disease and methods for its control, and in co-operating with the local Board of Health in extending medical relief to the individual patient.

The period of observation and treatment in the Receiving Station, or hospital is, to a great degree, dependent upon the gravity of the affection, and the probability of recovery. Very few are transferred to the colony in less than a year after admission, and the mean length of their stay before such transfer, as determined by an analysis of a ten year

period, is 20 months. Those who desire to go to the settlement, or who are so crippled as to be permanently incapacitated may be transferred within six months from the time of admission. Those who refuse to remain under supervision at the hospital may be transferred at any time.

Close on 70 per cent of the cases admitted are those which may be classified as of the cutaneous type, of the second or third degree of involvement. This classification is determined by clinical appraisals. No attempt is made to group cases in accordance with the number of bacilli which may be found in a microscopic preparation, because of the fallaciousness of such a method. But cases which have recovered to such a degree, that they remain apparently quiescent clinically for several months, are carefully examined repeatedly to determine whether they are apparently free of bacilli in the skin and mucous membranes. If they are so regarded they may be released to out-patient status under supervision and control. Those who are released, and develop exacerbations or who fail to report for examinations are re-admitted to the hospital. The general care in this institution may be compared with that which is customary in sanitaria. All patients are well housed amidst modern sanitary and attractive surroundings. Not more than two individuals occupy a room in a cottage. The rooms are furnished with single beds, bedding, dressers and chairs, and the patient is permitted personal knick-knacks to make his room attractive. The cottages are of frame construction with broad porches, and several rooms, all of which have free openings to the outside, to broad corridors, and in some instances directly to the porches. The food is prepared by healthy attendants in a central kitchen and served in a semi-cafeteria style, that is, each patient comes to an appointed place to be served. All children under 15 years of age are given and are required to drink a cup of milk three times a day. Fruit, green vegetables and meats are served in abundance once or twice daily to all. However, it is exceedingly difficult to change food habits, and most patients consume large quantities of poi or of rice and meat or fish, and abstain from fruits or green vegetables. All necessary clothes are furnished, and ten dollars in cash annually for the purchase of incidentals.

The therapeutic measures which have been recognised as of presumptive value in the disease have been used at this hospital for many years, and research towards the improvement of treatment has been continuous. The close relation and control between the hospital and the Investiga-

tion Station have made it possible to appraise the value of the different remedies which have been evolved.

Between 20 *and* 30 *per cent. of patients* who have been admitted during the past ten years have recovered sufficiently to permit of their release under supervision. The majority of these should be classed as the neural type, which is so prevalent in India. Of those so released, very many have relapsed and been re-admitted, though they continued for several years under observation and treatment by specific remedies as out-patients. In other words, the return of patients to surroundings and circumstances in which they have previously developed leprosy has not been attended with continued quiescence of the disease, even with special therapy administered regularly for several years. On the other hand, patients who have had no special therapy, have become quiescent and remained so for equally long periods. The treatment of individuals as out-patients is more difficult of control than that of in-patients, and requires a follow-up organisation, to assure more than 30 to 50 per cent. attendance.

These evaluations have made it seem advisable to the Federal authorities to expand the facilities of the investigation station, and to the local authorities to enlarge and further equip the hospital. Expansion of the former will enable more intensive study of the nature of the disease, and of its mode of origin and dissemination; and an increase in the physical plant, armamentarium and personnel of the hospital will permit of greater concentration on the re-establishment of the general health of the individual patient, and on his rehabilitation in the community.

Greater provisions are being made to follow up cases of leprosy which have been released in order to assist their general welfare. During the past several years those who are released to out-patient status have been immediately given sixty dollars, and thirty dollars in each of the following two months, to assist them in re-establishing themselves. Such donations do not seem to accomplish the desired effect, and more recent efforts are being directed towards an organised division of follow up and rehabilitation.

The Histamine Test as an aid in the Diagnosis of Early Leprosy.

JOSE RODRIGUEZ AND FIDEL C. PLANTILLA.

IT is generally agreed that one of the greatest needs in leprosy work to-day is a reliable serological test which can be depended upon to detect the disease even in its earliest stages. Unfortunately, in spite of claims of some to the contrary, such a test does not yet exist. Until one has been elaborated, and since in the " incipient stage " the presence of M. Lepræ cannot usually be demonstrated on ordinary methods of making the bacteriological examination, we have to depend almost entirely on clinical methods such as the detection of the anæsthesia, palpation of thickened nerves and superficial glands, careful history-taking, examination of the external lesions as to appearance, location, etc., in order to arrive at a diagnosis in this stage. Naturally, the accuracy of the diagnosis must depend considerably on the experience of the physician making the diagnosis. The introduction, therefore, of any clinical test which will tend to minimise the influence of the personal equation should prove of value.

We believe that we have found such a test in the so-called " Histamine Test." When a dilute solution of histamine is pricked into the normal skin, a reaction takes place, starting in about 20 seconds with the appearance of a circular sharply defined local reddening surrounding the prick, and measuring, when fully developed, from 3 to 4 mm. in diameter. This is followed in another 15 to 30 seconds by a flush or *flare* which appears on the surrounding skin. It is of utmost importance to distinguish this flare from the local red reaction. The flare is of dark red or scarlet colour, contrasting with the brighter shade of the latter ; it has diffused and often crenated borders which may extend from 2 to 3 cm. from the centre of the reaction. Soon after the appearance of the flare, a discreet wheal forms at the site of the prick ; this is generally at its maximum development in 3 to 5 minutes, at which time it measures from 3 to 4 mm. in diameter and about 1 to 2 mm. in height. The wheal usually occupies the area originally covered by the local red reaction although in many cases the two do not coincide, the wheal being usually smaller than the localised red area.

The full reaction of the normal skin to histamine, consisting of the local redness or vasodilation, the flare, and the

edema or wheal has been called by Lewis the " triple response." Lewis has demonstrated that the triple response is a characteristic reaction of the normal skin following injury inflicted by such agents as heavy stroking, pricking, scratching, freezing, heating, electrical shocks, as well as by the introduction of irritant substances such as acids, alkalies, mustard oil, cantharidid, nettle sting, morphine, etc. Ultra-violet rays, ordinary sunlight, X-ray and radium emanations, bacterial poisons, certain chemicals such as dichlorœthyl sulphide, etc., give rise to more slowly developing reactions. He has also proved that the local redness and the wheal or edema is due to direct action of the injury or irritant on the capillaries, while the flare is produced by the dilatation of the arched arterioles and is reflex in nature, being dependent upon the integrity of the cutaneous nerves. The arteriolar dilatation is mediated through a purely local nervous reflex and does not depend upon a spinal reflex arc.

This test has been tried by Lewis and his colleagues[2] on anæsthetic skin to which the sensory nerves have been cut surgically or interrupted by injection of anæsthetics. When the interruption produced surgically or by anæsthesia is recent, the reaction to the histamine test is complete in all its details, although the skin has already been rendered anæsthetic. But if sufficient time (six to fifteen days) is allowed for the nerve to degenerate or if the skin is anæsthetised locally, the flare is lost. Under the circumstances, the local red reaction and the edema appear as in the normal reaction of the skin.

Thus, the loss of the flare following a histamine test is a sign of degeneration of the sensory nerves supplying the skin tested, and possibly also of direct involvement of the nerve endings as in local anæsthesia.

Histamine or B-iminazolylethylamine is described by Lewis as " the amine produced when carbon dioxide is split from histidine, a substance occurring naturally in the body and a protein derivative." It was extracted by Barger and Dale[3] from the intestinal mucosa, and was later thoroughly studied by Dale and Laidlaw[4]. The histamine test as applied to the skin was first reported by Eppinger[5], and later elaborated by Sollman and Pilcher[6] and by Lewis and Grant[7].

The test.

In most of our tests, we have used a 1/1,000 dilution of the phosphate in normal salt solution. With stronge

solutions, a larger flare is occasionally obtained, but the reactions are not as constant as with the 1/1,000 solution.

A small drop of the solution is carefully placed within the suspicious macule to be tested, and another is dropped on normal skin at least 1-in. away from the border of the lesion for control. With a sharp pin, a prick is made through the drop into the skin underneath, taking care to exert just sufficient pressure to drive the point through the epidermis without causing any bleeding. The histamine solution is wiped off immediately and the pricks are closely observed under good, natural light.

The test is said to be negative when the complete response is elicited and positive when the flare is absent.

There are some individuals on whom the reaction is diminished : in a few, the flare is so faint as to be practically absent. When the response is weak and the skin tested is on an extremity, the flare may be brought out to its maximum extent and intensity by previously congesting the extremity with the help of a broad rubber band or the pneumatic cuff of a blood pressure apparatus.

Finally, it must be recognised that the reaction is harder to elicit on the dark skin of a Filipino than on white skin.

RESULT OF THE HISTAMINE TEST IN LEPROSY.

In the pale macule.

The flush is always absent in the depigmented macule of leprosy. When the histamine prick is made just outside the border, a flare develops on the normal skin but stops sharply at the border and does not extend into the macule. When the prick is made just inside the border, the flare is prevented from appearing even on the bordering normal skin.

A word of caution must be given at this point. The flare generally masks the local redness following the histamine test on the normal skin. When the flare is abolished as in leprous macules, the local redness becomes prominent and may be mistaken for the flare by the beginner. The area of local redness is sharply localised, circular in shape, bright red or pink in colour, extending at the most 2 or 3 mm. beyond the wheal, and tends to become cyanotic before fading. On the other hand, the flare is not definitely localised, the size is usually about 3 to 4 cm. in diameter, irregular in shape although it tends to be oblong with its long axis along the length of the member, and the colour is dark red. On fading, the flare becomes speckled but the colour remains the same from beginning to end.

The wheal in the macule is usually of the same size as that on the normal skin. Sometimes, the edema may be less ; at other times, the wheal develops faster in the macule, reaching its full development in two minutes while the wheal on the control skin is at its height in 3 to 5 minutes. The ultimate size, however, is almost the same.

The test has been applied on the macules of T. Flava and other types of pale-looking pityriases, on leucoderma, old scars, fading psoriasis lesions, etc., which may be mistaken for the pale macule of leprosy. In every case, the flare is present provided the individual is not unsusceptible to histamine, in which case, the flare is also diminished or absent on the normal skin.

In the reddish macule.

When the redness of the lesion is marked, only the wheal may be elicited, but when the colour is not so striking, the local redness may be seen.

When hyperesthesia is present, as is usually the case when the lesion is bacteriologically positive, the flare is not constant. In a few macules, the flare is present ; in the majority of the cases it is absent. If there is accompanying infiltration or edema so that the skin looks tense, glistening, and bright red in colour, the wheal is apt to be slight or absent.

Ths histamine test was tried in cases of dermatitis from various causes, active psoriasis lesions, tinea circinata and other ringworm infections, fresh scars and other lesions which may similate the red macule. When the inflammation in such lesions is active and there is considerable redness, the wheal is generally diminished or even absent while the flare is present, manifested by increased redness of the skin. It must be stated that when the redness of the original lesion is at all bright, it is next to impossible to distinguish the flare. When this is the case, the best way to perform the test is to prick the histamine solution just inside the border. In the non-leprotic lesion, the flare appears on the adjacent portion of the skin outside the border, whereas there is no such flare extending from the macule in early leprosy.

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Hydnocarpus Wightiana.

W. C. JOSEPH.

IT is with pleasure that I respond to the Editor's friendly request for a short article on the hydnocarpus tree and our methods of preparing the oil, which is now recognised as being indispensable in the treatment of leprosy, and is, for that purpose, being called for from even the most remote corners of the world. That the efficacy of the oil as a blood purifier was known to the *Ayurvedic School of Medicine many centuries ago cannot be gainsaid, as it appears as the principal ingredient in the various prescriptions handed down by the Rishis of old for the treatment of skin diseases in general, and of leprosy in particular. Although hydnocarpus oil was not a rare thing in Malabar, medical men of the past had always complained that the hydnocarpus oil that they wanted for their profession could nowhere be found. It was our investigation into the seemingly mysterious cause of this clamour that brought us to a realm of knowledge concerning the vagaries of the tree and the requirements of the fastidious Ayurvedic physician for whom alone we were then catering. This knowledge has been added to in recent years as a result of personal conversations and correspondence with some of the best known specialists in the West. We trust that this short note, based on our experience, will be of interest to readers of LEPROSY REVIEW.

The hydnocarpus wightiana is a fine, tall, and bushy tree—almost a spontaneous growth—growing along the western boundary of India from South Concan to Cape Comorin. It is met with more profusely on the laterite soil of the interior, and only rather sparsely in the loose, sandy coastal area. The twigs appear brownish and pubescent (rarely glabrate). Leaves average 8-in. by 3-in., and are alternate, shortly petiolate, elliptic to long lanceolate in shape, with acuminate apex. Flowers are mostly solitary, pale yellow with white corolla, and slightly fragrant. The fruit, globose in shape, grows to the size of an apple and has a hard shell with a rough, woolly surface.

* One of the Indian indigenous systems of medicine.

Seeds are numerous in a fruit, obtusely angular in formation and lie embedded in pulp. When the fruits are tender, the pulp has a cream colour and appears hard to the touch, but in ripe fruits it assumes a semiliquid form with a yellowish tinge. The only useful part of the tree is its oil. In its crude form, the oil used to be burned in taper lamps, which are now replaced by cheaper kerosene ones. But for the medicinal value of the oil, the tree would have been hunted down to extinction long ago by dealers in firewood.

Flowers begin to appear during July and August, but the fruits are not seasoned and ripe till several months afterwards. The season for gathering the fruits varies slightly in different places, but as a rule it may be said that the harvest begins by the end of March and lasts till about the middle of June.

The whole quantity of the seeds required for one year are gathered during the middle part of the season, taking care to avoid the earliest crops and also the last ones. The reason for confining the stock to the mid-season crops is this. The seeds collected at the beginning are not completely matured, and those at the end of the season are liable to be affected by the early rains of the monsoon, and by deficient sunshine. One of the peculiarities of this tree is that all the fruits do not become ripe enough for the sickle at the same time. Each tree presents fruits of varying ripeness, and it is not possible to differentiate between them while they are on the numerous slender twigs of a huge branchy tree. The fruits are, therefore, harvested indiscriminately in one lot, and the sorting is done afterwards under the supervision of experts. One has to be careful in this, as the admixture to any appreciable extent of undesirable seeds is likely to affect the quality of the oil.

Cleaning the seeds is an important matter to which special attention should be devoted. The pulpy coating found on the seeds has to be removed before they are dried and rendered fit for crushing. The method now in vogue amongst the villagers for doing this is most unscientific and slovenly. They bury the seeds as they are taken out from the pods in moist soil, till the pulp decomposes, and it is only after many days that these are taken out from the pits and dried. It is, no doubt, a little cheaper to leave the cleaning work to be done by the process of natural decomposition, but we know from experience that it is foolish economy to save a small sum in labour and sacrifice much of the properties of the oil thereby. The seeds should be thoroughly washed and dried at once. Unless

this is done, the seeds retain moisture for many days, and thus lose in quality, and the oil extracted from them invariably yields a higher percentage of free, fatty acids. Any attempt to reduce the acid value by other means may affect the therapeutic value of the drug.

After the seeds are well dried, they undergo a further process of sorting, under the direct supervision of an expert. As a result of this second inspection, sometimes as much as 15 to 25 per cent. of the stock goes out again as rejections. All the unseasoned and unhealthy seeds being thus carefully eliminated, the remainder are weighed and passed as fit for crushing.

Little need be said about the crushing, ordinary care in cleaning the machinery and utensils being almost all that is required in the process. One thing about which we are careful is that no excessive heat is applied at any stage of the extraction of the oil. We, however, expose the oil to sun's rays and open air for a few days, according to instructions we have received, and then allow it to stand undisturbed for about a month. It is then thoroughly filtered and after necessary tests, put up for sale.

Unlike dealers coming from Upper India, who have to content themselves with any seeds they can get in the bazaar, we are fortunate in the fact that our firm is situated in the heart of the hydnocarpus growing country, and, therefore, we have every facility for keeping a close watch over all the various details connected with the choice of the seeds. Selected areas are reserved as the field of operations every year, and it is possible for us to keep the produce on each tree under observation till the time for harvest. The long experience that our men have gained according to both the old and the new systems, which enables them now to lay their hands almost instinctively on the right sort of fruits or seeds, is an asset which we value the most.

The increasing demand during the past ten years of hydnocarpus products bears ample evidence of the growing popularity of our product. The pharmaceutical department of our company, whose turnover in the past under Ayruvedic patronage, never went above half-a-ton a year, has now to send out more than twenty times that quantity annually to different places in all the five continents.

It is interesting to note the difference of opinion between the Eastern and Western medical authorities. The Indian physician always holds that the older the oil the greater is its efficacy, whereas the Western doctor pins his faith on fresh supplies.

Leprosy in the Rhodesias.

R. G. COCHRANE.

THE total area of the territory named after Cecil Rhodes is 440,000 square miles, and is known as Rhodesia. The region south of the Zambesi is called Southern Rhodesia and that north of the river is Northern Rhodesia.

Prior to 1923 both areas were under the administration of the British South African Company, but in October, 1922, Southern Rhodesia voted in favour of responsible Government, and in September, 1923, it formally became a Dominion of the British Empire. Northern Rhodesia previously administered by the British South African Company, became a colony of the Empire in 1924.

Southern Rhodesia.

Covering an area of 150,344 square miles, and with a population of approximately 976,685 in 1926, it has many problems to deal with, and not the least of these is the question of leprosy. The Southern Rhodesian Government has done a great deal for leprosy during the past half-a-dozen years. In 1926, a special leprosy officer was appointed and took charge of the Government Leprosy Settlement at Ngomahuru. This settlement forms the chief hospital for the colony, and has accommodation for some four hundred patients. The colony is arranged in villages and the inmates are separated according to whether they are married or single, or whether they are natives of Rhodesia or come from elsewhere. In addition to this there is a central administration block with a laboratory, dispensary, office and operating theatre attached. Ngomahuru is well situated and well organised and in the report the Secretary furnished to the Government it was suggested that this should be developed into a central training centre for the country. In every country where leprosy is endemic there should be, if possible, one or more institutions where medical men, and others, should be able to go for courses of training; for much of the success of treatment and of preventive measures depends on the keenness and knowledge of the District Medical Officers and their subordinate staffs. In passing I should like to say that those who are situated in Northern Rhodesia or Nyasaland should if they have an opportunity on their way south, visit Ngomahuru. In view of the possibility of further development of Ngomahuru into a training centre the Association recently granted £550 towards a water supply.

In addition to the work at Ngomahuru there are two other settlements in Southern Rhodesia. One at Mtoko, some 200 miles north-east of Salisbury on the main Blantyre-Salisbury Road. Owing to its proximity to Portuguese territory one would assume that leprosy was common in this area but until surveys are completed it is impossible to estimate the incidence. The Mtoko settlement is run on entirely voluntary lines whereas many of the cases at Ngomahuru have come in under the Leprosy Repression Ordinance. On his visit the Secretary was pleasantly surprised to find quite a large number of early cases ; in fact, in this settlement, although not so efficiently organised as the one at Ngomahuru, there were a proportionately greater number of early cases. This suggests that where voluntary methods are in force the early cases will come fairly willingly for treatment. The patients in this settlement live in the ordinary native huts and there is a trained native assistant in charge to give the injections and to attend to their needs. Recently, however, a British medical officer has been appointed to Mtoko, and the leprosy settlement will be under his charge. The present number in this settlement is about 260.

In addition to these two Government Leprosy Settlements there is one at Mnene which is organised and managed by the Swedish Mission. They have some 70 cases under their charge. The patients are housed in native huts and are given ground to cultivate.

Leprosy seems to be fairly generally distributed throughout Southern Rhodesia, although the incidence of the disease is not so high as in parts of Central Africa. From a recent survey of a limited area it is felt that leprosy is an important problem and should be effectively dealt with.

As a result of the Secretary's visit in the summer of 1930, certain recommendations were made regarding anti-leprosy measures. The first point which should constantly be remembered is that each country has to view the leprosy problem from its own angle. As far as Southern Rhodesia is concerned it was felt that the main points to keep in mind were :—

(1) Survey.

(2) Treatment of early cases and the isolation, as far as possible, of the " open " cases.

(3) Training of medical officers and others in the diagnosis and treatment of leprosy. This might also extend to native dispensers.

If measures of compulsion are contemplated it was suggested that the situation should be carefully reviewed,

lest any measures which are taken should act as a deterrent and frustrate their object. If any action results in the early cases hiding themselves, then it is unsound. Under certain circumstances, compulsion is a measure which may be useful, but it should be likened to a policeman's baton, remain hidden and only brought out in cases of emergency.

With regard to the first point, the question of a survey, this has been done to a limited extent. Dr. Moiser reported the results of a limited survey in LEPROSY REVIEW, Vol. II, No. 2, p. 52. It should be kept in mind that in preparing a survey of any definite area the chief aim is to examine as large a proportion of the population as possible without exciting suspicion. On account of the conditions prevailing in Southern Rhodesia, it was suggested by the Secretary in his report that it would be an impossibility to send all cases of leprosy to Ngomahuru, and that after surveys of chosen districts had been completed, it might be a useful experiment to endeavour to organise local dispensaries for the treatment of leprosy. It was pointed out that conditions at present were detrimental to out-patient work generally, and that as yet the natives have gained little confidence regarding general medical treatment. It was suggested however, that preliminary surveys should be carried out in a few districts, and after the discovery of an endemic focus some sort of organised dispensary work might be started. The scheme then which has been outlined for Southern Rhodesia is as follows :—

(1) Ngomahuru. Headquarters of the Leprosy Specialist, and training centre for doctors and dispensers, also centre for investigation and survey.

(2) A few small leprosy settlements in highly endemic foci, where infective cases from the surrounding districts would be treated. These would be under the periodic supervision of the Leprosy Specialist, who would advise, and in cases of special difficulty, would transfer patients to his own settlement.

(3) The gradual development of centres in suitable positions where native dispensers would be placed in charge, and to which cases from surrounding villages could come as out-patients.

The question will naturally be asked, what place is there for compulsion in the above scheme? It was recommended that the Leprosy Repression Ordinance should not be withdrawn. It is a useful ordinance so long as a certain amount of latitude is allowed, and the present system of encouraging cases voluntarily to present themselves for

treatment is continued. Cases in towns, and those who refused to undergo treatment, although urged by the medical officer to do so, might be compelled under the terms of the ordinance to submit to treatment. Compulsory powers should only be used in cases of emergency. If such latitude as indicated were allowed, and a scheme developed on the lines suggested above, as the benefits of the new treatment are realised, more and more cases will come forward for treatment.

Northern Rhodesia.

Unfortunately, owing to delay caused by illness, the Secretary was unable on his tour to do more than visit the capital of Northern Rhodesia, and meet the chief Government Medical Officers, and discuss the general leprosy position in the colony. It is known that certain areas of this territory, *e.g.*, Barotseland, are centres of very high incidence of leprosy. If, as there appears to be (*see* LEPROSY REVIEW, Vol. II, No. 4), about 1 per cent. of the population around Livingstone either suffering from leprosy or its effects, the per centage in Barotseland must be staggering. It is evident that some sort of survey should be organised in the various districts of Barotseland. This seems to be urgent, for no effective scheme for the combating of this measure can be contemplated without such a survey.

The British Empire Leprosy Relief Association has sent over £2,100 to the various stations in Northern and Southern Rhodesia, and supplies missionaries and others in this, as well as other countries in the British Empire with drugs and literature.

Investigation of Certain Serological Reactions in Leprosy.

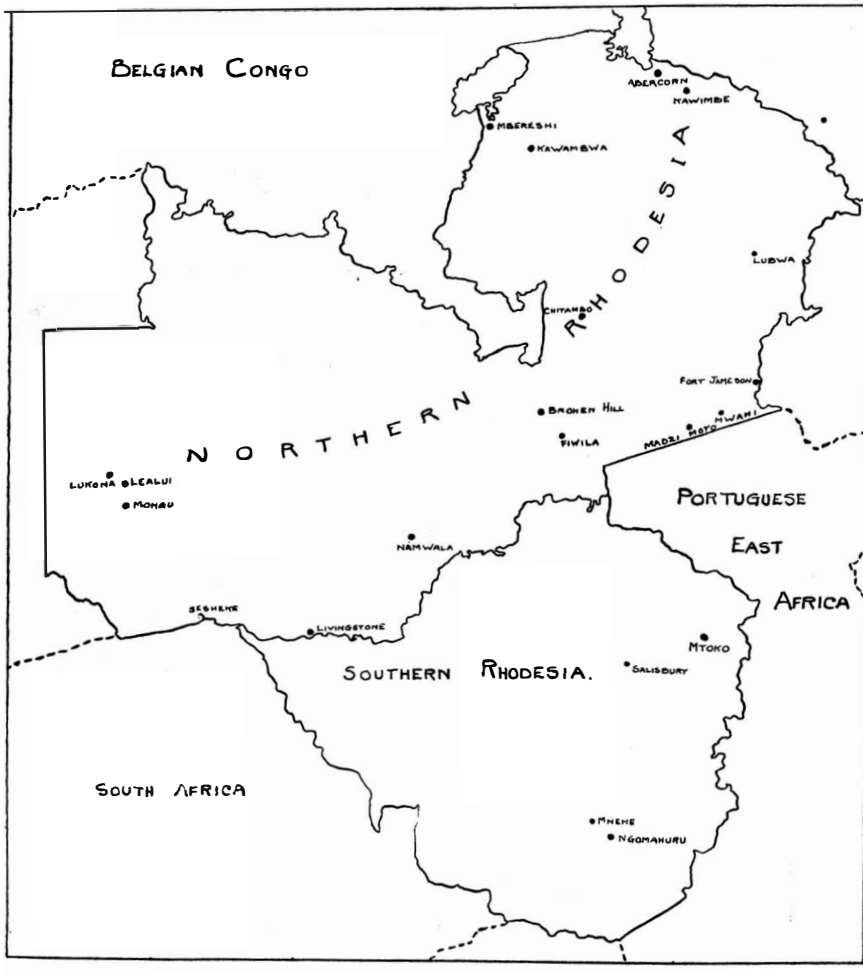
E. SLACK.

THE MULLER-BALLUNG'S REACTION.

THE following technique, as described at the sero-diagnostic laboratory, the Allgeneine Kvankenhaus, Vienna, for the diagnosis of syphillis, has been applied by me in the course of blood work in a few cases of leprosy.

The necessary ingredients are as follows :—

1. Inactivated serum, as in the Khan's Reaction.
2. Carbonated physiological saline.
3. Antigen.



Sketch Map of Northern and Southern Rhodesia, showing Main Treatment Centres.

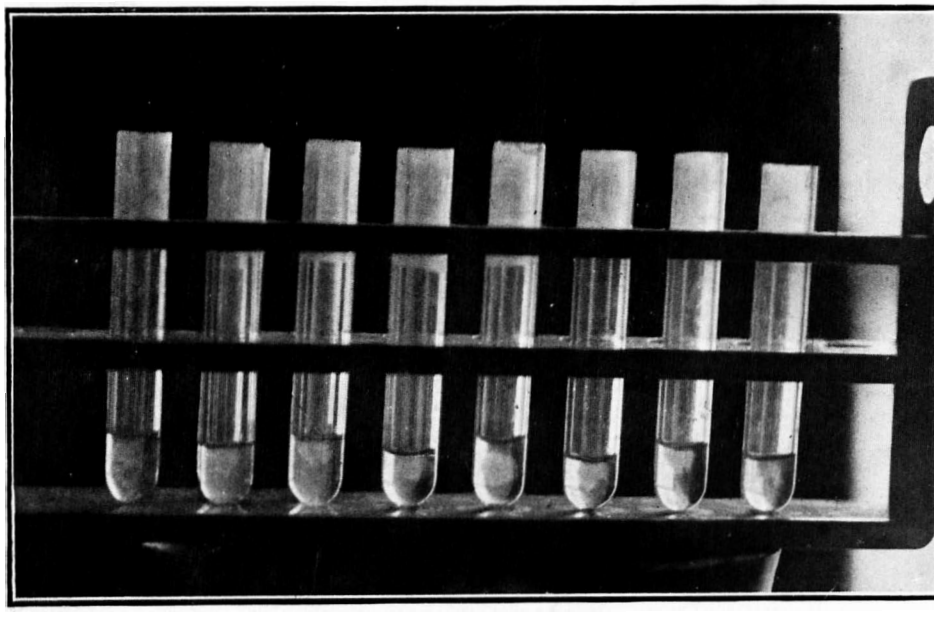


FIG. 1.
BALLUNG'S TEST ON CASES OF LEPROSY SELECTED FROM VARIOUS TYPES (N_1, N_2, C_1, C_2)—POSITIVES.

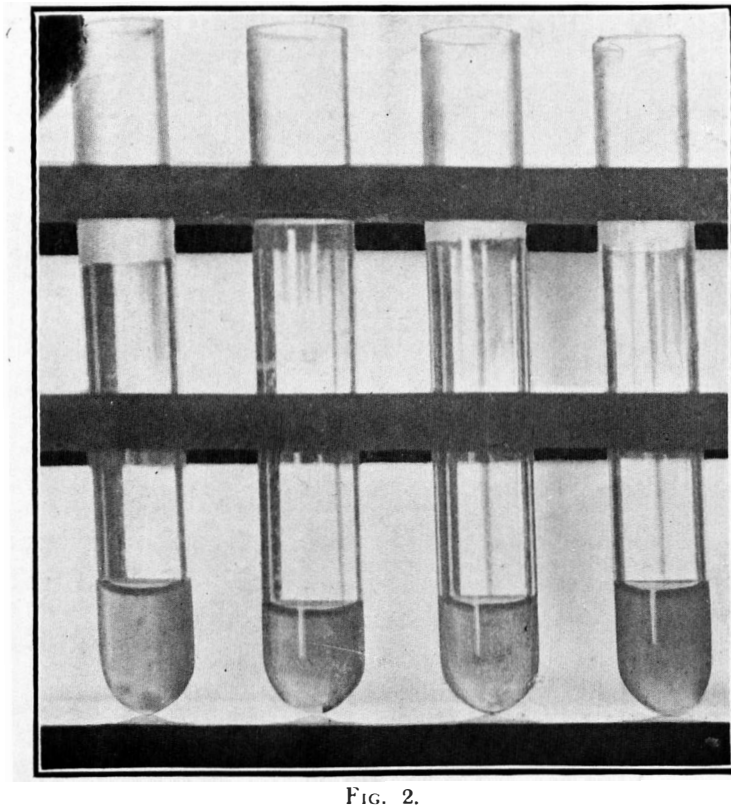


FIG. 2.
BALLUNG'S TEST.—CONTRAST APPEARANCE OF THESE NEGATIVE CONTROLS WITH FIG. 1.

These photos were taken after 20 hours' standing, *i.e.*, after completion of test.

The composition of the physiological saline, which when used *must be at the temperature of* 17° C., is prepared thus :—

(*a*) 97 c.c., 0.9 per cent. saline.

(*b*) 3 c.c., 0.9 per cent. saline, to which natrium carbonate is added.

Now (*b*) is made thus :—

To 99 c.c. of 0.9 per cent. saline, 1 gramme natrium carbonate is added. From the resultant (*b*) give 3 c.c.

In order to prepare your *colloidal antigen*, the following is the method advised for the Ballung's Reaction :—

Take 2 c.c. of the alchoolic antigen in a test tube. Blow in 3 c.c. of special saline, and point actually on the wall of the tube quickly. Turn it twice over with the thumb. Let it stand ten minutes. Shake it twice. Wait two minutes. Take a dry beaker, and pour contents of tube into this beaker. Pour 25 c.c. of special saline into it (*i.e.*, the natrium saline). The *colloidal antigen* for this particular reaction is thus prepared.

Now suck up into pipette 5 drops of inactivated serum, and blow into No. " 1A " tube. Suck up 7 drops, and blow into " 1B " tube. These two tubes can, of course, only be used when there is sufficient serum from the patient's blood. If insufficient, then only one can be supplied. The object of the duplication of tubes is that it is easier to observe if a mistake has been made, and also it emphasises the difference between the strongly and the weakly infected patients. From each tube of serum, blow in 5 and 7 drops respectively when sufficient serum. Add 0.5 c.c. of colloidal antigen, and at once turn over with thumb against the end of the tube. When all is completed, put them all into water bath (55° to 56°) for 15 minutes. Then take out, and place in room temperature (20° to 24°), letting stand for three hours.

REMARKS ON THE BALLUNG'S REACTION.

In my limited experience of this test it is not till after seventeen hours that one is able to see what may be described as the typical " snowball " reaction. After three hours' standing one may see the contents only clear or semi-opaque, or else showing a flocculent appearance. The " snowball " in a typical positive case is suspended half-way between the upper level of the fluid and the bottom, as demonstrated in a photo that I recently forwarded to the Secretary of the Association. The negatives done from the Superintendent and myself show flocculation, but nothing of a definite formation. The other positives were the result of tests carried out on serums from cases, some of whom were

early, and some advanced. It is obviously necessary to do work on some hundreds of cases before a definite appreciation of its true value can be formed.

In conclusion, I have to add that it is necessary to purchase the alcoholic antigen for the respective tests from the makers, and up till now I have been using material brought with me from Vienna.

THE MEINICKE AND TRUBUNG'S REACTION.

Having arranged in front of you a series of small glass tubes with numbers greased on according to the number of patients you wish to be examined, with clean sterilised pipette draw off 4 drops (=0.2 c.c.) of serum, and blow into your new tube with numbers corresponding. After each has received the drops, blow the adherent drops into empty glass. Suck up saline and blow out in order to clean, care being taken in each case not to disturb the lower portion consisting of blood clot. Repeat the process till all the tubes have received their 4 drops.

PREPARATION ON COLLOIDAL ANTIGEN. IMPORTANCE OF CARRYING THIS OUT IN A HOT CHAMBER.

Proceed to the hot chamber (or oven), the temperature of which should be from 40° to 50° C., and make your colloidal antigen from the extract of alcoholic antigen, which latter article can be bought. The procedure is as follows :—

Take a 10 c.c. pipette, dry (and coloured for preference for the sake of distinction). Suck up 10 c.c. from a 3 per cent. saline solution and blow out into a clean glass " A." (Proportions taken are 1 c.c. antigen to 10 c.c. 3 per cent. saline.) Again, with a fresh pipette (with another colouring), suck up 1 c.c. antigen from the alcoholic antigen, and blow into glass " B." Quickly pour the " A " (saline) into " B " (alcoholic extract), and pour backwards and forwards. All this is done in the hot chamber (or paraffin stove). The colloidal antigen is thus prepared.

Returning to your table, on which is the rack holding the tubes with the serums to be tested, blow in 1 c.c. of the colloidal antigen into each tube as rapidly as possible, and *shake well.* Read against the bars of the window or the filaments of an electric globe.

Results can be classed as strongly positive, strongly negative, or weak, according to their degree of opacity. First reading after first hour, second reading after three hours. After forty-eight hours' standing, the positive clear up, leaving a sediment at the bottom.

Notes on Reaction.

1. There is no inactivation by means of a hot water bath in this reaction, in contradistinction to the Kahn and Ballungs Reaction, in which the serums are placed in hot water bath.

2. In the case of the Ballung, it is necessary to use *ice* when working in hot climates or laboratories to reduce the temperature of the saline to 17° C. On the other hand, heat in winter time, but up to the present time (end of winter) the writer has had to use heat.

. . . .

Since writing about the Ballung and Meinicke and Trubung tests I have devoted myself almost exclusively to the Ballungs, which, in my opinion, though not easier to do, gives the most decisive results. I have worked on the serums of 33 patients, and have tried to exclude as far as possible any syphilitic taint from that number. Results according to the Manila classification are as follows:—

Results, 1931. *To end of September.*

N1. All cases (numbering five only) of N1 (early) were feebly positive, the snowball appearing after 17 hours standing, but quite definite.

N1, C1. 75 per cent. of this class positive, two cases being strongly so, one weak, and one negative.

N2, C1. 66 per cent. positive, though weakly so.

C1. 30.7 per cent. positive.

C2. 83 per cent. positive.

Grants for Leprosy Work.

The Executive Committee of the British Empire Leprosy Relief Association have recently made the following grants:—

SOUTHERN RHODESIA.

Leprosy Hospital, Ngomahuru £175
To complete the cost of installing a new water supply.

TANGANYIKA.

Rev. A. B. Hellier, Kiwanda £75
This grant has been made towards the cultivation of Hydnocarpus trees.

UGANDA.

For distribution by Local Committee £500

Applications for financial aid will be sympathetically considered by the Committee, and all applications should, in the first place, be sent to the Director of Medical Services of the Colony concerned, who will forward them to the Secretary of the Association.

INDIAN SECTION.

Methods of Campaign against Leprosy in India.

(ABRIDGED.)

E. MUIR.

(*Reprinted from "Leprosy in India," April,* 1931.

IT is proposed to review briefly in this paper the principal methods which have been adopted in India during the last few years to deal with leprosy, to enquire to what extent these methods have met with success and to make suggestions for the future development of anti-leprosy work in India.

These methods have been found effective in India and have to a certain extent been used in modified forms as a basis for campaigns against leprosy in other countries. I, therefore, consider that this is a useful subject to put before a conference such as this, as it is held in a place where leprosy is highly endemic and is attended by delegates from other countries where leprosy is common.

The initiation of an active campaign against leprosy in India was due largely to the initiative, labour and foresight of Sir Leonard Rogers. During the few years prior to his leaving India in 1920 he did much work and published several papers on the treatment of leprosy. In founding the Calcutta School of Tropical Medicine and Hygiene he arranged that leprosy should be one of the subjects of research. This research has continued for the last ten years under the joint support of the Endowment Fund of the School and the Indian Research Fund Association, with the co-operation since 1926 of the Indian Council of the British Empire Leprosy Relief Association.

For a period of 50 years, between 1874 and 1924, the leading anti-leprosy work in India was carried out by the Mission to Lepers which had organised no fewer than 41 leprosy asylums throughout India and gave support to other ten institutions. These asylums fulfilled an excellent function in segregating some 5,000 lepers and in offering a retreat especially for those who had reached the more advanced and crippling stages of the disease. In them forcible segregation was not resorted to. There were also 41 government, municipal and other asylums almost entirely used as refuges for those who had been cast out by their relatives, and for the forcible segregation of those who made a living by

exhibiting ungainly trophic ulcers in the streets with the hopes of exciting the pity of alms-givers. In all there was accommodation for less than 9,000 inmates.

In 1920, the Mission to Lepers held a conference in Calcutta which was attended by their agents and also by Sir Leonard Rogers and others interested in anti-leprosy work. This conference excited a considerable amount of interest and was of considerable value in promoting the campaign against leprosy which followed. It also resulted in the adoption of methods of treatment of leprosy in many of the leper asylums where measures had not been previously attempted.

Due again chiefly to the initiative and enthusiasm of Sir Leonard Rogers and to the organising ability of Mr. Frank Oldrieve, the British Empire Leprosy Relief Association was formed in London in 1923, its objects being to rid the British Empire of leprosy. In 1924, Mr. Frank Oldrieve as Secretary of this Association, came to India and visited the various provinces, stirring up considerable interest in the anti-leprosy campaign. In January, 1925, the Viceroy, Lord Reading, issued an appeal which was as follows :—

> " I make an appeal to-day to India on behalf of the Leprosy Relief Association. I am confident that the object of my appeal cannot fail to commend itself to the sympathy both of the rich and the poor and to all classes and creeds without distinction in India. None, I feel, can be insensible to the terrible sufferings of those afflicted by this disease, or blind to the danger of the spread of this dreadful malady already so widely diffused in India. I have convinced myself by personal observation that wonderful work is already being done in India on behalf of lepers and for the prevention and cure of the disease. The methods of treatment hold out great hope of alleviation and even of cure ; but the work is limited in scope because it is cramped for want of funds. Contributions are urgently needed for the extension and support of institutions for the treatment of lepers and for further research connected with the disease.
>
> " I ask all classes to join me now in an earnest campaign to combat this dreadful disease. In the name of humanity I appeal to all thoughtful and sympathetic men and women in India to help this labour of mercy and to contribute funds for the consummation of this noble purpose."

Some 22 lacs of rupees were raised as the result of this appeal, and an Indian Council of the British Empire Leprosy Relief Association was formed in Delhi. After careful consideration the following memorandum was issued by the Executive of the Indian Council :—

"The main object of the Indian Branch of the British Empire Leprosy Relief Association is the eradication of leprosy from India. It was formerly thought by many that leprosy was confined to the comparatively few pauper lepers who beg for alms at the street corners, and that the only danger to the public lay in contact with these people. It is known that pauper lepers form only a very small fraction of the leper population and that the disease is common among all classes of the community. This is well illustrated by the following figures which give the occupations of the 950 out-patients who have attended the leprosy dispensary at the School of Tropical Medicine in Calcutta :—

Occupations.	*No. of cases attended.*
Servants	208
Merchants and shop-keepers ...	103
Clerks	155
Students	91
Professional men	226
Mechanics, etc.	50
Washermen and barbers ...	46
Food-sellers, milk-sellers, etc. ...	29
House-wives	29
Land-owners	13
TOTAL ...	950

"The pauper lepers were, many of them, respectable citizens until they were outcasted by their disease and driven to seek their livelihood by begging.

"It was formerly considered that the most appropriate method of dealing with lepers was to seek to segregate them forcibly in leper asylums and other institutions. But a brief glance at the extent and nature of the disease in India will show that any attempt to abolish leprosy in this country by such means is not likely to meet with success.

"While the number of lepers in India given in the 1921 Census is only a little over 100,000 there is good

reason to believe that the number is 5 or more likely 10 times that number. Lepers are often unaware that they are suffering from leprosy and even when they are aware of the facts they often do their best to hide their misfortune, because of their fear of social ostracism or loss of employment. Only the most obvious cases find their way into the Census figures.

" Figures collected by Col. Megaw, Director of the School of Tropical Medicine, Calcutta, from civil surgeons regarding the prevalence of leprosy in the jail population, indicate that nearly 1 per cent. of the prisoners in India suffer from leprosy. Making all allowances for the fact that the incidence of the disease in the whole community may be less than these, it is likely that about 4 or 5 per 1,000 of the population suffer from the disease. These figures, therefore, indicate that at least one million people in India suffer from leprosy.

" If we take it then that there are a million lepers in India, which is not an exaggerated figure, it is easily seen that segregation of all could not possibly be carried out for the following reasons :—

" (1) Financially it would be impossible.

" (2) Any attempt to impose forcible segregation would drive patients, particularly those who are suffering from the earlier stages of the disease, to hide themselves, and as has been the case where such means have been adopted, only the more advanced and obvious lepers could be segregated.

" (3) The majority of the obvious lepers, who would form the bulk of the population of homes and asylums, are not highly infectious, and little would be gained by the segregation of such cases in preventing the spread of the disease, while little would be done for the cases most susceptible of treatment.

" Leprosy may almost always be diagnosed by clinical signs before it becomes infectious, and at that early stage it can be controlled by treatment at out-patient dispensaries, so that such early cases do not pass on into the infectious stage, but soon lose all active signs of the disease and remain symptom-free provided their general health is maintained. In this way (*a*) patients are induced to come forward at an early stage in the hope of recovery instead of hiding their malady till it becomes more advanced, more infectious and less remediable ; (*b*) thus the source of infection may be

shut off, as the number of infectious cases will continually tend to diminish, and the opportunities for infecting the next generation become fewer.

"It is then along the lines of establishing dispensaries for the treatment of all cases, but especially of early cases, that the strongest hope lies for stamping out the disease.

"The Indian Branch of the British Empire Leprosy Relief Association has put research in the first place and the training of doctors in the second place in its programme. These items, the expenditure of which is for the present being met from the Central Fund, are necessary if there is to be efficient treatment and the supply of efficient doctors to carry it out. The third item is the establishment of dispensaries for the treatment of leprosy without which the effect of the first two will be nullified. The money disbursed from the Central Fund to the provinces should be spent in such a way that efficient treatment centres may be established.

"In some cases the money may be spent directly on the establishment of such centres, in others it may be spent in employing a medical officer who shall be the expert for the province and who shall, after due training, set about establishing dispensaries and training doctors for running them.

"The fourth item is general propaganda, and for this purpose literature, charts, lantern slides and films are being prepared and will soon be available.

"In thus indicating the lines which Provincial Committees should follow in administering the funds at their disposal, the Indian Council has no intention or desire to minimise the usefulness of homes and asylums for the care of lepers. Such institutions have done in the past and are still doing most useful work in the interests of suffering humanity. In the speech with which His Excellency the Viceroy inaugurated the Indian Branch of the British Empire Leprosy Relief Association, he indicated the provision of assistance to such institutions as one of the objects to which the income of the Fund for which he appealed might be devoted. Had the response, generous as it was, to His Excellency's appeal been greater, some of the income of the Fund might usefully have been spent in the manner indicated. But the Indian Council feels obliged to advise His Excellency that except in so far as aid can be given as indicated above, to provide

or improve dispensaries at existing institutions at which medical treatment can be administered, the Fund cannot afford to assist them. The provision of homes for lepers must be a matter for local enterprise and local charity and can probably be most effectively carried out by local authorities."

The four objects, which this new organisation set before it, were therefore Research, Training, the Formation of Leprosy Treatment Centres and Propaganda. A fifth object was adopted later, which has proved of great importance, *viz.*, Survey.

1.—*Research.*—It was felt that, as the result of research already carried out, sufficient knowledge had been gained to begin work upon new lines throughout India; that treatment was already effective enough to attract patients and produce good results when efficiently carried out; and that the knowledge already available should form the basis of wide-spread propaganda. Further research was, however, urgently needed to improve and extend our knowledge of the nature of leprosy and of the methods of treatment and prevention. For this reason prominence was given to research. It was felt that this could be most effectively promoted by appointing a first-class medical officer to work at the School of Tropical Medicine in co-operation with those already engaged in leprosy research there. In this way, while research might be carried out at various leper institutions throughout the country there would be a unit strong enough and well enough equipped to take the lead and make distinct advances possible.

2.—*Training of doctors.*—Until within a few years of the forming of the Association leprosy had been looked upon as an incurable infirmity, rather than as a disease. Few doctors could diagnose any but the most obvious and far advanced cases and they knew still less about its treatment. Ignorance of the nature of leprosy and of the ways in which infection is spread had led also to dread of the disease, and few doctors were willing to undertake its treatment for fear of contracting the disease themselves.

In the report of the Indian Council of the Association for 1925, the following two statements are made :—

(1) That leprosy, as it is found in India, is capable of easy diagnosis by clinical signs in its early stages, and that patients, whose disease is diagnosed early and who undergo efficient treatment for a sufficient period under reasonably favourable circumstances, have every hope of recovery;

and, unless at any future time their general health is lowered they can look forward to continued freedom from all signs of the disease.

(2) That any treatment for leprosy will not go very far unless it puts in the forefront the necessity of raising and maintaining the general resistance of the body both by avoiding other debilitating diseases and by due attention to exercise, diet and climatic and hygienic conditions.

It was felt that if doctors were to learn how to diagnose, treat and prevent leprosy efficiently, the circulation of literature would not be enough. Thorough training under those who have considerable experience is essential if doctors are to deal with leprosy competently.

Four courses in leprosy have therefore been carried out annually for the last few years at the Calcutta School of Tropical Medicine, each course lasting two weeks and being attended by some 20 to 30 doctors, most of them sent by provincial Governments and States at the expense of the Leprosy Association. Obviously few of the thousands of doctors of India could be trained in this way, but many of those trained are themselves giving special courses, and in consequence many hundreds of doctors are undergoing training. Recently arrangements have been or are being made to have a course of six lectures on leprosy given in all medical colleges and schools throughout India to final year medical students.

It is felt that once the true nature of leprosy has been recognised by the medical profession in India, a very considerable step will have been taken towards its eradication.

The remaining three objects of the Association may best be dealt with together. They are *propaganda, initiation of treatment centres and survey.*

Branches of the Association were formed in most of the provinces and states of India but in only a few of these was any effective work undertaken. Many of them did not realise that leprosy was at all a serious problem and were also at a loss to know how to organise a provincial anti-leprosy campaign.

A survey party consisting of a specially selected doctor, who had had several years' experience of anti-leprosy work, and four assistants, was therefore appointed and sent to carry out sample leprosy surveys throughout India, spending about four months in each province. The object of this party was not to make a full survey of leprosy in India; at least 70 such parties would have been necessary to do

this within a reasonable time. But its objects were as follows :—

(*a*) To demonstrate the frequency of leprosy.
(*b*) To find out if leprosy was more common in certain areas and among certain communities than among others ; and, if so, to ascertain the causes of such increased frequency.
(*c*) To initiate model leprosy clinics and train doctors to carry them on when the survey party passed on to another province.

In short, the objects of the survey party were to demonstrate in each province visited the need of an active anti-leprosy campaign and to demonstrate methods of carrying it out.

Except in one or two places this plan has worked out satisfactorily. In 4 out of the 10 provinces and states visited, *viz.*, Bengal, Bihar and Orissa, the Central Provinces and Travancore, similar survey parties have been started. In Madras a special leprosy officer for the province has been appointed, and several of the districts have appointed special whole-time leprosy doctors for work in their own areas. The United Provinces, the Punjab and Burma are appointing specially trained doctors to organise anti-leprosy work in these provinces.

The methods of the survey party may be mentioned briefly. A suitable thana or police area in a highly leprous district is chosen and headquarters are established at the centre of this thana. Villages are visited and, with the help of the village authorities, leprous cases are sought out. Lantern lectures are delivered at night explaining the nature of the disease and the means which should be taken for its prevention. A treatment centre is started and held twice a week, the rest of the time being used to complete the survey by house to house visiting. In some of the centres as many as 200 patients had begun to attend within a fortnight and further survey was rendered easy by the help of the grateful patients who welcomed the doctors to their villages and gave them all help possible. Thus, not only was a census of leprosy taken, but incidentally treatment centres were initiated and a large amount of propaganda work was carried on. Doctors from the neighbouring villages have also been found to attend and in one place the civil surgeon brought a number of his medical officers to attend the clinics and learn the methods of diagnosis and treatment.

It is generally found that the survey of one thana occupies one month and when the survey officers pass on to another place the district authorities supply a doctor who had been trained in leprosy work to carry on the clinic. A list of lepers in various villages is supplied to this doctor and he is able to supplement the survey by noting down the names of new patients who appear for treatment.

This way of carrying on a campaign against leprosy is generally known as the Propaganda-Treatment-Survey or, for short, the P.T.S. method. Apart altogether from its value in training doctors and initiating permanent and practical interest in leprosy work, it has brought to light many interesting facts with regard to leprosy as it is found in India, facts which doubtless apply to a greater or less extent to leprosy in other countries.

A few of the more important facts are recorded here :—

1.—*Among semi-aboriginals.*—Leprosy like yaws and tuberculosis belongs to a certain stage in civilisation. In India we do not find leprosy among the aboriginals or among those who lead a tribal or nomadic life. Nor is it common *primarily* among the more highly civilised and educated classes. It is commonest among those who may be termed semi-aboriginals, those who are in the intermediate state between the aboriginal tribes and the more civilised people. Unfortunately the more easily adopted features of civilisation are often the less creditable, and are apt to be physically and morally dangerous when not counteracted and controlled by its less easily acquirable safeguards. The more or less harmless periodical drinking of home-brewed toddy prevalent among aboriginals is replaced by constant drinking of country distilled liquor among the semi-aboriginals. The strict marriage laws of the former are relaxed and venereal disease becomes common in consequence. The chiefly vegetarian diet regulated by wise tribal rules is wanting in the semi-aboriginal who tries to make up for deficiencies in his diet by eating offal and decomposed fish.

Where we get contact between the primitive and the more advanced, there, at the point of contact, we find leprosy. Thus when the aboriginal comes in contact with other castes we find this fact holds good. Villages may be divided into three kinds, those where a single tribe or caste lives by itself ; those in which there are two or more quarters with a different caste in each ; and those in which all the castes live together, their houses alongside one another. In the first kind there is least leprosy, in the third there is most.

That is to say the more mixing that takes place without the safeguard of modern sanitation the more likely is infection to occur.

Another illustration of this principle is shown when the aboriginal leaves his native hills and jungle and finds employment in commercial concerns such as tea gardens. Here his former isolation, which was one of his chief safeguards becomes impossible. The wise old rules of his tribe are relaxed and he falls a prey to various diseases regarding which he is ignorant of the means of prevention ; one of the principal of these diseases is leprosy.

The Ganges River flows from west to east, but, when it reaches the plains of Bengal it bends towards the south. In the angle of this bend is the plateau of Chota Nagpur. This plateau is inhabitated by various tribes of aboriginals. Santhals, Khols, etc., who are practically free from leprosy. But in the laterite slopes between the plateau and the plains, in the area between the aboriginals and the more " advanced " plain dwellers, we find an incidence of leprosy which is one of the highest in India, so that in the geographical as well as in the social and the industrial field the line of demarcation between the primitive and the more advanced marks the highest incidence of leprosy.

2.—Leprosy is also common among the depressed classes. By depressed classes I mean not only the so-called untouchables, but also those who suffer under depressing social customs and laws. In the western part of the United Provinces leprosy is uncommon. There the people own their own land and cultivate it themselves. They are a strong and comparatively healthy people. In the east of the United Provinces and in the neighbouring districts of Bihar the fields are cultivated to a large extent by those who are more or less in a state of serfdom, the land being owned by comparatively rich zemindars. As a consequence of this the diet of the people is defective. They feed on such poor food as lathyrus sativus. Among these people there is an amazingly high incidence of leprosy, though they live in fertile plains where famine is uncommon. The same holds good in Travancore where, in spite of the fertility of the land, the depressed classes are limited to a poor and unnutritious diet in consequence of the land laws.

3.—In *famine* areas leprosy is common. These areas are often those with laterite or black cotton soil, which because of its porosity dries up quickly if there is a break in the monsoons, the crops being destroyed in consequence. Such areas are found in the Bankura district and the eastern

and western divisions of the Central Provinces. Regions which are subject to occasional floods are also apt to be famine areas as in Orissa. In such areas leprosy is common, the general malnutrition lowering the resistance to the disease.

4.—The *diet* of the people has a very important bearing on the incidence of leprosy. I have already mentioned the faulty diet of semi-aboriginals, the insufficiently nourishing food among the depressed classes, and the fact that leprosy is common in famine areas. Among the rich, leprosy is not uncommon due to over-eating and self-indulgence. Among the very poor it is common because of malnutrition. Milk is scarce, due to the smallness of the cattle ; a whole village herd may not give more than two or three pints of milk in the day, and in many places there is no milk to be had at all during six months of the year. In other places vegetables are not available, due either to the infertility of the soil and the lack of moisture, or to the ignorance and lack of enterprise of the inhabitants. Food, because of its lack of taste and nourishment, is either eaten in a semi-decomposed condition or is fortified with chillies and other pungent spices to an extraordinary extent.

5.—*Predisposing Diseases*.—It is clear from what I have written above that leprosy is predisposed to by unsuitable food and noxious habits. To no less an extent are predisposing and accompanying diseases accountable for high incidence. Helminthic infections, malaria, syphilis and other endemic diseases affect the incidence of leprosy to a very pronounced extent.

The general debilitating effect of a warm, moist climate is also of importance.

6.—Recent surveys which have been carried out among labourers in industrial concerns have shown an incidence rising to as much as 6 or even 12 per cent., while a common average figure is round about 1 per cent. This high incidence is accounted for by the following factors :—

(*a*) Coolies are commonly recruited from semi-aboriginals among whom leprosy is common.

(*b*) Other healthy coolies tend to be infected by these.

(*c*) Absence of public opinion to regulate the habits of people who have been collected from various castes and religions ; hence promiscuousness and all its evils.

(*d*) The incidence among coolies working under regulated conditions is apparently high on account of the fact that they can be examined systematically, though in the villages of Orissa and other parts of India 2 or 3 per cent. would not be an exaggerated figure.

7.—Among school boys also leprosy has been found to be common. As examples the following may be mentioned : Out of 1,097 boys examined at Villupuram in the Madras Presidency no fewer than 41 (3.7 per cent.) were found to have leprosy. The general population of this same town showed 1.42 per cent., but it was impossible to subject the general inhabitants to as close an examination as the school boys. In East Godavari, 1,513 school boys were examined, showed 22 (1.5 per cent.) as suffering from leprosy, while 5 per cent. of the factory hands in the same town showed signs of the disease.

8.—The following are some of the factors which favour the spread of leprosy :—

(*a*) The semi-aboriginal and depressed classes acting as servants in the house of the higher castes often infect the children of their employers who have not recognised the fact that their servants are suffering from leprosy.

(*b*) The inhabitants of famine areas where leprosy is common often migrate in famine years to the surrounding more fertile areas. In this way leprosy is gradually being spread to areas formerly non-endemic.

(*c*) The railway train and more recently the motor bus are responsible for the spread of leprosy both because of contact in these vehicles, and because they encourage lepers to travel long distances when formerly they travelled on foot or in bullock carts. Some of the most infectious cases show so little outward signs of leprosy that they are unlikely to be recognised as lepers by those with whom they come in contact.

(*d*) Pilgrimage favours the spread of leprosy, as pilgrims are not particular as a rule about those they come in contact with, and the hardships of the journey tend often to lower the resistance to disease. Many of the famous shrines are surrounded by large numbers of lepers who doubtless spread the disease to other devotees.

(*e*) Among the patients whom we have treated in Calcutta are school-masters, students, merchants of all classes, servants, &c. In fact, very gruesome tales might be written about the histories of some of these, who were highly infectious cases. Many of them had held what amounted to strategic positions for the spread of leprosy.

(*f*) Market towns are often hot-beds of leprosy, and through them leprosy is spread to remote villages by those attending market.

(*g*) Marriage is another common source of infection. A frequent history is that a bride comes into a village or group

of villages where leprosy has been unknown. She has a leprous infection, but signs show only after the birth of the first child. From this one case scores of cases may develop within two or three decades in the village and in other surrounding villages.

(*h*) Leprosy is also known to have been spread by exiles of war, returned soldiers, freebooters, and others.

(*i*) Lastly the joint family system is responsible for the spread of leprosy. A house is built of sufficient size for a man and his family. But when this family grows up and the sons marry and three or four families have to be accommodated in the same space, we have the crowded conditions most favourable for the spread of infection. The writer found fourteen families under one roof, each family in a room six by eight feet in area. In one room the father and sons were lepers. It is easily imaginable how the disease could spread in such a community.

I have given the above short summary of leprosy survey work in India to show how many factors enter into the spread and continuance of this disease. I think it will be obvious from what I have said that any scheme which is to be effective must take cognisance of such factors as those I have mentioned. Survey and propaganda must take their place alongside of diagnosis and treatment. Also we cannot hope for the thorough eradication of leprosy until the people have been educated to a certain extent and till the standard of living has been raised. Treatment must be made available to all in clinics scattered all over the country; and these clinics must be conducted by doctors who have both skill and keenness. Patients must be followed up to their homes by doctors or voluntary workers and contacts must be examined. Propaganda work founded upon the results of local investigation is the best method of teaching the people how to prevent leprosy. The above and similar methods are, I am persuaded, the most suitable for India, and I trust that readers belonging to other countries will find in this paper hints which may be of practical value in carrying out anti-leprosy campaigns in other countries also.

This article was written for presentation at the Leonard Wood Memorial Conference held at Manila in January, 1931, and was prepared before the Report of that Conference was issued.—EDITOR.

Literature.

The following publications can be obtained from the Association :—

Leprosy Review, Vol. II, No. 4, October, 1931. Issued quarterly by the Association. Price 2s.

Leprosy, Its Prevention and Control. By Dr. R. G. Cochrane.

Leprosy in India, Vol. III, No. 4, October, 1931. Issued quarterly by the Indian Council of the Association.

Reviews and Notices of Books.

China Medical Journal. September, 1931. Leprosy Number.

This is the second special Leprosy Number of this well-known journal which has been issued. It is full of interesting reading, and it is very difficult to pick out any one article among a series of good ones. In an article by Sir Leonard Rogers, it is pointed out that the cost of running an institution in Australia is £200 per head per annum. This is in marked contrast to the statement made by Dr. Wilson in his article, in which he gives an account of his institution and mentions that the cost per head per annum is only $44.00 gold, or approximately £8 per annum. This comparison supports the plea of Sir Leonard Rogers for self-supporting leprosy colonies, and the one run by Dr. Wilson, in Korea, is an excellent example of such.

A note by Dr. Reiss on the application of Gouin's reaction to leprosy is of interest, but his conclusions seem to apply chiefly to the more advanced stages of leprosy. Dr. Muir's article, which appeared in LEPROSY REVIEW, Vol. 1, No. 4, p. 4, emphasises the fact that the clinical diagnosis of the disease is much more reliable than any present laboratory method, and the results that Dr. Reiss shows seem to bear this out. There are several articles of value dealing with leprosy in the various provinces in China. Dr. Heimburger and Dr. Fraser describe the routine treatment, the former that used in Tsinan and the latter in the out-patient department at Swatow.

This whole volume of the *China Medical Journal* is a valuable symposium on leprosy and its treatment. There are one or two criticisms which we feel we have to make. The first is, that while extracts from the Leonard Wood Memorial Conference Report are reprinted, there is no indication of how, or from where, to secure the full report. A more serious criticism is that the most important step of the year is not even mentioned, that of the formation of the International Leprosy Association. We feel that the significance of this is not underestimated by those interested in leprosy in China, and, therefore, it is the more regrettable that there should be such an omission from so important a publication as the *China Medical Journal.* Lastly, it was suggested by the Manila Conference that as far as possible, the word " leper " should be omitted from medical writings, for it was felt that if we could get away from the frequent use of this term, which carries with it a sense of opprobrium, we should be able to educate the general public more readily. This was the case in tuberculosis, when the word consumptive ceased to be used. We see little attempt to adopt this suggestion in the special leprosy number of the *China Medical Journal.* This number should be in the hands of all those who are interested in leprosy, and we congratulate the Editor of the *China Medical Journal* on this, the second successful, leprosy issue.

The Prescriber. Vol. XXV, No. 11, November, 1931. Price 2s.

A feature of this well-known publication is the reviews which are published under the head of Therapeutic Progress. The subject dealt with in the November issue is that of leprosy. The whole year is brought under review, and the first prominence is rightly given to the important work of the Leonard Wood Memorial Conference. A resumé of the report appeared in Vol. XXV, No. 6, p. 231, of this journal. The whole field of leprosy is reviewed in an admirable and concise manner, and the most important articles and events of the year are noted and summarised. To those who have no time to peruse larger journals, this resumé will be of great value, as it will be to the general practitioner who cannot, in the nature of things, keep in

touch with all branches of medicine. He will find in this review of the chief leprosy articles written during the year, enough to remind him of what is being done, which will enable him to keep his knowledge fairly well up-to-date.

In this number of *The Prescriber*, there appears also an article on Brazilian drugs used in leprosy. This contribution should be of interest not only to the botanist, but also to the physician and pharmacologist, who are constantly on the look-out for fresh remedies which can be applied to leprosy. As effective drugs are not infrequently found to be contained in indigenous plants, such study should not only be encouraged but should be followed up and pursued. We commend this number of *The Prescriber* to all who are interested in the progress of leprosy during the past year.

R. G. C.

Report of the Indian Council of the British Empire Leprosy Relief Association for 1930.

A considerable section of this report deals with the work of the Survey Party which carried out surveys and initiated propaganda and treatment work in Delhi, the United Provinces and the Punjab. As before, the results of their labour reveal the unreliability of the census figures regarding leprosy, a special diagram being given to indicate the discrepancies revealed in eleven areas. With regard to the survey investigation, it would be interesting to study the question of the relative seriousness of cases discovered among healthy adults who show only slight signs of neural leprosy (A_1 or N_1). Many of these individuals may be naturally arrested cases, and, therefore, may not need to be considered either in treatment or in prevention schemes. The suggestion that such cases exist has never been adequately determined. The tendency on the part of the sufferer to hide his malady, and the ignorance of others in the early stages of the disease, that they are really suffering from leprosy, is ample vindication of the emphasis which is being laid on educational propaganda. The Association has already produced and distributed a variety of material for that purpose, and more is in process of preparation.

Special reference should be made to the report which deals with training, no less than 104 doctors attending the courses arranged, the majority of whom were deputed by the provincial and state authorities throughout India.

As regards research, an item of interest is the opportunity provided by the Lister Institute in England to Dr. Henderson when on leave, for the study of tissue culture methods. In the department of treatment the method of intradermal injections of esters was extensively carried out. Cases with symmetrical lesions showed more improvement on the side receiving the multiple punctures than on the side which was left as a control. The report contains a valuable list of the articles published by Dr. Muir and Dr. Henderson respectively during the year under survey.

It is highly desirable that a work so deserving of public support should be freed from the handicap of inadequate income. This report should be read by all who have anything to do with treatment or prevention schemes, as India is the only country carrying out survey, propaganda and treatment work in a really extensive manner.

F. W. R.

More from the Primeval Jungle. ALBERT SCHWEITZER. A. & E. Black. 6s.

This fascinating volume resumes the story of Dr. Schweitzer's work in French Equatorial Africa, after his return in 1924. The principal task which then awaited him was the restoration of some of the old buildings, the construction of new ones, and finally the removal of the hospital to an entirely new site. The account is modest enough, but it would surely be a very obtuse reader who failed to appreciate the real devotion and the perseverance necessary to overcome the obstacles involved. The book is enlivened throughout by touches of humour. The author's likening of a day's work at the clearing to the movements of a symphony, beginning with a very pronounced lento and proceeding through moderato, adagio and scherzo to a vigorous finale is in a delightful vein. The difficulty of working among primitive people is very graphically illustrated. The risks run by patients in procuring water from a dangerous source, in preference to walking a slightly greater distance, during a dysentry epidemic, is characteristic of the mentality dealt with. In other respects, the people of Equatorial Africa show themselves to be deficient.

References to leprosy confirm the belief that the disease is more prevalent than is generally supposed, but the author remarks that, in his judgment, it had increased during the period of his absence.

There is not a dull page and readers will be grateful for such a sincere and revealing picture of a work which can only be described as heroic.

F. W. R.