

# LEPROSY INCIDENCE AND CONTROL IN EAST AFRICA, 1924-1952 AND THE OUTLOOK

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## HISTORICAL INTRODUCTION.

The writer's investigations on the treatment and epidemiology of leprosy now extend over the last forty years. A brief history of the development of modern anti-leprosy measures is advisable before dealing with their application to British East African territories.

In 1915-17 the writer established that early cases of leprosy only could be treated effectively by the injection of soluble hydno-carpates, in place of the thousand year old oral administration of the nauseating chalmogra and hydnocarpus oils. The new method of treatment, however, failed in advanced cases, which alone were discovered and imprisoned for life under the old system of " compulsory segregation."

In 1921-24 an intensive study of some fifty years literature on

leprosy enabled the writer to formulate a plan for finding and treating effectively the hitherto hidden early amenable cases as the essential first step in his plan to control and reduce the incidence of the disease. Many of the data on which this plan was based were recorded in 1922, and the full facts and deductions from them were published early in 1925 in the first (1925) and later editions in 1931 and 1946 of *Leprosy* (Rogers & Muir, pp. 1—137, History, Epidemiology and Prophylaxis).

The most essential points then established are (1) Child infections, usually through living in the same house as a case of leprosy, are of crucial importance;

(2) In 95 per cent of cases, in which the necessary data are recorded, infection was derived from close, usually house, contact with a cutaneous case or preferably muco-cutaneous but now classed as lepromatous, and only 5 per cent from nerve cases, probably mixed with lesions of the skin or mucous membranes;

(3) The highly infective advanced lepromatous cases form only one-fifth of the total number in India, and one-fourth in Nigeria. These only need to be isolated, at proportionately small cost, greatly to reduce the incidence of new infections. In South-East Nigeria these cases have voluntarily submitted to isolation in villages specially built for them, for the sake of obtaining the hydnocarpate injection treatment. The recent use of sulphones has greatly facilitated such isolation;

(4) Isolation of infective cases is not sufficient by itself, for the simple reason that this leaves in the homes of the isolated numerous infected children in the incubation stage. They will nearly all develop the first symptoms of leprosy within the next five to ten years. Many of these will develop into incurable, crippled nerve cases, others into infective cutaneous or lepromatous cases, who in their turn will infect other members of their households and so on indefinitely. This is the explanation of the failure of a century's use of compulsory segregation in South Africa even to prevent a steady increase in the incidence of leprosy (see *Leprosy*, 3rd Edition, 1946, p. 136, for chart demonstrating the success of the measures here advocated in controlling the disease in that country), but with the retention of compulsory segregation powers, which after some years rarely had to be enforced owing to the power even of the hydnocarpate injection treatment to attract numerous early cases voluntarily to seek admission to the leprosy institutions.

#### A SMALL SCALE TRIAL OF THE ABOVE PLAN AT NAURU ISLAND, S. PACIFIC.

The practicability of this plan under favourable circumstances

led to an unprecedented 40 per cent reduction in the incidence of the disease within three years, a two-thirds reduction in six years, and a fall to only one-seventh of the original very high rate of about 30 per cent at a recent date. (See Leprosy, 3rd Edition, 1946, p. 137).

#### LARGE SCALE TRIAL IN SOUTH-EAST NIGERIA.

The Owerri Province of South-East Nigeria was selected for a crucial trial as the most highly infected extensive area found in British territory by the British Empire Leprosy Relief (BELRA for short) a quarter of a century ago, with seven times the leprosy incidence of India. The successful results will shortly be recorded by Dr. T. F. Davey, who was in charge of the test for some fifteen years. It will suffice here to mention that the all-important child infections have been reduced from a high figure to only 2 per cent, and some of the forty odd out-patient dispensaries have been closed down for want of leprosy patients! The Nigerian Government have thus been led to take over the measures and rapidly to extend them over the twenty-two provinces with a population of 22,000,000. The greatest leprosy problem in the British Empire thus appears well on the way to being solved, with large scale financial help from the Colonial Development and Welfare Fund.

BELRA funds (of which £45,000 were spent in 1952 in poor leprosy-infected African provinces under British administration) are now being utilised in extending their successful Nigerian measures to the very extensive British administered territories of East Africa, the most important remaining British leprosy problem. The main purpose of this paper is to record the anti-leprosy work, under great financial difficulties, during the last three decades, and the great efforts now being made by means of a striking combination of the resources of the East African governments, missionary bodies of various denominations, and of BELRA, with the valuable help of Toc "H" lay workers, to control and eventually greatly to reduce the incidence of leprosy in British East Africa within the next few decades.

#### 1. Anti-Leprosy Measures in the Uganda Protectorate, 1924-51.

1924. Uganda leprosy camps were reported to contain 551 cases.

1925. Practically all the known cases of leprosy had been found in the eastern districts of Teso, Lango and Mbale.

1927. The first Secretary of BELRA, Mr. Frank Oldrieve,

toured East Africa. There were altogether 924 cases under treatment.

1928. There were 889 cases under treatment in the Eastern, and 717 in the Northern area: a total of 1,910.

1929. Dr. Wiggins, a retired Colonial Medical Officer, returned to Uganda and established hospitals and dispensaries for leprosy treatment, with financial help from BELRA, including a hospital for infected children at Kumi, in the eastern Teso district, and a voluntary segregation camp at Kapisi.

1930. The children's hospital at Kumi was reported to be the "most pleasing feature" of the work. Dr. Sharp, C.M.S., had by this time established a voluntary leprosy colony on an island in Lake Bunyonyi, in the south-western Kigezi district, with the help of a Government grant.

Dr. Robert Cochrane, BELRA Medical Secretary, toured Uganda, made a valuable report and arranged for grants, the value of which were acknowledged in the annual Government medical report. He advised surveys of the incidence of leprosy, the provision of leprosy treatment centres, and the appointment of a whole-time leprosy medical officer. Finances for the last could not be supplied by Government.

1931. BELRA grants amounting to a total of £15,350 are recorded as having been received by the Uganda Government for anti-leprosy work during this year.

Surveys of areas in eleven provinces of Uganda in 1930-31 of a population of 2,141,147 revealed 8,158 leprosy cases recognisable by the native chiefs or 3.8 per mille. The true number is no doubt much higher (see Table, p. 51). They suffice to show that at that time the financial resources of both the Government and of BELRA were far too small to permit a full campaign against leprosy on the lines of the successful measures in Nigeria.

1932. This year's medical report states that "The demands for leprosy relief are becoming so great that it is impossible to satisfy them from the sum of money which is set aside for this purpose in the Protectorate estimates." It is further stated that in 1931 a leprosy survey "revealed the great extent of the disease in various districts of the Protectorate." Further, either enormously increased provision from Protectorate revenue or an organisation for the relief of leprosy, must be developed upon lines which differ from those of the past; for it is impossible to provide a larger grant than in the past. The Government annual grants for leprosy work at this period averaged approximately £3,000.

1934. The Buluba Mission leprosy colony was opened this year

in the south-eastern Busoga district, with supervision by the neighbouring Government medical officer. Land was supplied for crops to make the colony largely self-supporting, and "considerable improvement among those who received regular treatment" was noted. Alepol, (sodium hydnicarpate) was chiefly provided. The Nyenga mission settlement was reserved for crippled, uninfected nerve cases; a humanitarian work. This annual medical report also records the opinion that "it would appear that the successful control of leprosy resides in the establishment of colonies"; that is, for advanced infective cases, to diminish the danger to their households and other close contacts.

1935. "The results of treatment were encouraging, and 5 cases were discharged free of symptoms" under alepol.

1936-37. In the Bunyoni colony (C.M.S.) the treated cases showed 9 per cent. disease arrested, and 11 per cent. improved. Children up to about 2 years of age in the untainted home had risen to 36, and only one had shown early signs of leprosy.

1938. BELRA'S Medical Secretary, Dr. E. Muir, toured the Protectorate, and on his advice advanced cases were separated from early ones. BELRA supplied a Toc H lay worker, Mr. Lambert, who proved very useful.

1940-45. Second world war; no information available.

1947. Dr. Ross Innes arrived as Inter-territorial Leprologist for East Africa in general and began leprosy surveys. Further, 200,000 sulphetrone tablets were ordered for use in treatment.

1948. Government expended £4,500 capital and £1,000 for maintenance. Their out-patients numbered 576, a very small proportion of the Protectorate cases, as the section on surveys and incidence estimates will show.

1949. Since the introduction of the sulphetrone drugs Government expenditure has risen sharply. Dr. Ross Innes' surveys have led to many requests for admission by leprosy cases, mostly advanced ones.

1950. Sulphones, for choice D.D.S., are used, but "It is interesting to note that the use of hydnicarpus oil has increased coincidentally with the extended use of the new synthetic preparations."

Leprosy settlements are being expanded and new sites sought for in W. Buganda. Government and African Local Government expenditure in grants for settlements reached £15,326.

1951. Reports on the use of sulphones state that early tubercloid cases do not respond well to sulphones, and major tubercloid ones do best on a combination of sulphones and hydnicarpus

oil, but "burnt-out" cases with ulcers, bone changes and deformities, respond to no treatment.

Local settlements for infective cases, with out-patient dispensaries, are advised for the control of leprosy, as used successfully in Nigeria.

**Discussion.** The foregoing notes indicate that prior to the leprosy surveys of Ross Innes and others from 1948 onwards, insufficient cases had been isolated or treated to effect any decline in the incidence of the disease, largely through lack of funds. Useful experience of anti-leprosy measures had, however, been gained.

**Surveys.** Those of Ross Innes are shown in the table on page 51. They indicate that the total number of cases is approximately 80,000, or 17.8 per mille. Lepromatous ones were 22.3 of the total, or 17,800 cases which require to be isolated and treated—a formidable task.

It is noteworthy that he reported that "strong indications were found of effective control that had been exercised in the past by the Lake Bunyoni leprosarium (under the care of Dr. Sharp, of the C.M.S.) in reducing the incidence of leprosy," for only a moderate incidence was found where previously it had been very high. He further testified to the "incalculable" saving of new infections due to the "curative and segregation work" of the same institution, which he considers has reduced the incidence of leprosy in the district from 25-30 per thousand to 6.1 per thousand." (*Intl. Jl. of Leprosy*, 1951.)

Moreover, H. W. Wheate (*East African Med. Jl.* 1950, 27, 274) records a similar decline in the Teso eastern district, served by the Kumi and Ongino settlements. Both these, and the Bunyoni settlement, received material financial help from BELRA, and their good influence provides a hopeful augury for the greater success of the extensive anti-leprosy measures now being organised in Uganda by the Government, with BELRA and Mission help.

## II. Anti-Leprosy Measures in Kenya Protectorate, 1924-51.

1924. The number of cases in Kenya Protectorate is not known, but it is believed that the incidence is "not very high." It is difficult to establish leprosy settlements, but at four, with regular treatment, results "have been encouraging."

1925. Moogrol treatment was painful and unsatisfactory, so sodium hydnicarbate is being used orally and by injection.

1926. No site has been found for the proposed new settlement on the coast. Those at Malindi and Lamo are unsatisfactory.

1927. A survey of a population of 128,147 on the shores of Lake Victoria revealed 461 leprosy cases, or 3.6 per mille. BELRA is giving help, and the Secretary of BELRA, Mr. Oldrieve, toured East Africa.

1928. There were 547 voluntary admissions. Alepol "treatment is said to be very effective."

1925-36. The number of cases treated yearly rose from 373 to 528 with an average of 447. In 1934 about 1,000 cases were seen at dispensaries.

1937. Two small camps were reported to contain 241 cases only. A large percentage were long-standing deformed cases, in which treatment was unsatisfactory. The crippled, little infective, cases were to be repatriated and only the infective (lepromatous) cases were to be isolated, although in too small numbers appreciably to reduce the number of new infections. Large scale voluntary isolation of the highly infectious cases was not possible for want of funds.

1938-41. Annual medical reports not available.

1942-44. These very short war-time reports do not mention leprosy.

1945. "The appointment of a Special Leprologist for East African Territories is a welcome beginning, and a more humane and vigorous policy is necessary."

1946. Leprosy is reported to be relatively unimportant as compared with tubercle.

1948. Only 291 cases are under treatment. A wide survey is due and Colonial Development Funds are available, but sulphones are not yet obtained.

1949. Dr. Ross Innes, after making a survey, reported 10.2 per mille, and estimated the total number of leprosy cases at 35,000 in Kenya. (See Table.) Most cases are non-infectious and could be treated at home. Preliminary plans for a leprosarium at Itesio have been made for about 500 infective cases.

1950. Good results reported in the cure within 17 months of the non-infective and mild tuberculoid and early "indeterminate" cases by sulphones. Infective lepromatous cases also showed great improvement. The report adds that "There now seems to be little doubt that leprosy can be controlled, and possibly even eradicated, provided the necessary finance can be made available." Three leprosaria are required, each under a full-time medical officer.

1951. A new leprosarium has been begun at Itesio in the Nyanza province with the help of an experienced Toc H lay worker supplied by BELRA. D.D.S. treatment gives encouraging results with

remarkable freedom from toxic effects. Thiacetazone is also being tried.

**Discussion.** Prior to 1949 the Kenya annual medical reports indicate little progress during the quarter of a century in the adoption of modern anti-leprosy measures. However, during the few subsequent years the adoption of the more effective sulphone treatment, combined with the stimulus of Ross Innes' surveys in revealing the serious incidence of leprosy in the Kenya Protectorate, have led the Government to the conclusion that leprosy can be controlled, and possibly even eradicated, provided the necessary finance can be made available. At the present time a large leprosarium is being constructed near the Kenya border under the supervision of a Tox H worker provided by BELRA.

**Survey.** The results of Ross Innes's survey revealed an approximate estimate of 35,000 cases, or 10.2 per mille population. Infective leptomatous ones formed about 20 per cent. of the total; this indicates a total of about 7,000 which require isolation to prevent further infections from them, and to permit them to receive efficient sulphone treatment. The urgency of providing leprosaria for this purpose is shown by the statement of Ross Innes that he had only found 50-60 cases under effective treatment and some 200 others in two camps! The incidence in different areas varied from 0.9 to 32.7 per mille. Overcrowding and high humidity again favoured high incidence. This indicates the necessity of seeking out dry localities for the new leprosaria. This is being done and in 1953 it was reported by BELRA that the new one at Itesio already had 2,500 registered patients, most of whom were out-patients coming from as far as 15 miles away for treatment.

### III. Anti-Leprosy Measures in Tanganyika Territory, 1924-51.

**Early History.** When Tanganyika Territory was under German control before the first world war, by 1912, 3,800 leprosy cases had been isolated in 47 villages without adequate supervision or treatment, or the exclusion of the uninfected.

1924-29. The annual medical reports of the British Protectorate either give no information or record no data of interest.

1927. The BELRA Secretary, Mr. Oldrieve, toured East Africa.

1930. "The abolition of compulsory segregation, together with treatment by injections, has induced large numbers of early cases to present themselves for treatment." Moreover, the Native Authorities show keen interest and have rendered much assistance, and the help of various missionary societies is invaluable. BELRA has provided £300 for buildings, in addition to supplies of anti-leprotic drugs. The Government gave £4,000.

1931-32. Work was continued on the same lines and the Government acknowledged their indebtedness to the missions and to BELRA for help.

1934. Anti-leprosy work was restricted by world-wide financial depression, but was continued at three settlements and at treatment centres at medical stations. A number of non-treatment settlements remained scattered throughout the territory. These were presumably a remnant of the old unsatisfactory German ones above mentioned.

1934-37. The average total segregated cases in these years was 3,400, and the Government expenditure averaged £3,540, including drugs. No bacteriological examinations or classification of the cases was possible. Eleven settlements were under the Government and twenty under missions.

1938. BELRA'S Medical Secretary, Dr. E. Muir, toured the Protectorate and made a valuable report (see *Leprosy Review*, Vol. X, pp. 53-80). He urged the appointment of a whole-time leprosy officer for East Africa, "a generous grant towards the cost of a leprosy officer having been offered by BELRA."

1942. "Marked progress, under the supervision of Mr. Lambert, a Toc H lay worker sent out by BELRA, has been made in the reorganisation of the Makete Settlement at Tukuyu." There are 905 patients, systematic treatment and records have been instituted. 2,400 acres are under cultivation, fruit trees have been planted in large numbers, nurseries of hydnocarpus oil plants and palm oil established. There are 400 head of cattle, goats, pigs and numerous industries and handicrafts have been introduced." Moreover, new dispensaries have been built, nearly all by the patients, and ten miles of road opened. Administrative and Native agencies have helped "and Mr. Lambert's hard years at work are now bearing fruit."

1943. Leprosy reported to be widespread in the south, with 2,057 cases in the South Highland Province. There were now 1,122 cases being treated at Malote. Dr. T. F. Davey, Leprosy Adviser to the Government of Nigeria, paid a visit and gave advice. It is also recorded that Mr. Lambert's good work "has shed a ray of hope."

1944. The doctors and others who help in the leprosy work are flooded with leprosy patients, the majority of them beyond hope of cure.

The East African Governments have agreed to appoint a leprosy specialist based on Tanganyika. Lambert's work was flourishing, with 2,068 leprosy patients, "cultivation notably improved and

there are no idle hands." Only 12.5 per cent. are open (infective) cases. Sixty-five were discharged in 1944, and a total of 323 in the last four years.

1946. A census of Makete showed 1,461 residents, only 633 of whom showed symptoms of leprosy (a relic of German days), many of whom were not infective; they have been induced to leave.

1948. Dr. Ross Innes was now Inter-territorial Leprologist for East Africa; his survey of the Southern Highland and the Lake Provinces of Tanganyika revealed a leprosy incidence of 14.3 per 1,000 inhabitants.

Sulphetrone was introduced this year and supplied to all qualified Government and mission doctors, for treatment of patients under their personal control.

1950. A total of 4,468 leprosy patients in Government and mission institutions were under treatment by sulphetrone drugs at heavy cost. The much cheaper avlosulphones were largely used at a yearly cost per patient of only 14 to 16 shillings, against 300 shillings for sulphetrone.

In the meantime search for sites for new leprosaria had not yet proved successful, so it was decided to enlarge the Makete one to hold 1,000 resident patients in the high incidence Southern Highland Province. A sum of £100,000 was projected for the revised plan to develop three leprosaria within the next five years. The yearly maintenance grant was also raised to £11,920, and the total expenditure on drugs, chiefly sulphones, amounted to approximately £3,500.

1951. This year 1,227 cases under Government, and 3,779 under missions were treated, making a total of 5,006. Avlosulphones were increasingly used in spite of very disturbing reactions in the absence of resident doctors, but this was more than offset by its being very much cheaper than sulphetrone. Although sulphones are a tremendous advance, experience shows that a small proportion of cases are resistant to sulphone therapy.

Decisions have also been taken to develop the leprosaria at Chazi, Eastern Province, and at Kolondoto, Lake Province. Expenditure for maintenance of Government and mission institutions was £19,700, and for drugs approximately £6,000.

**Discussion.** Tanganyika was handicapped by having had to take over from the Germans after the first world war 47 leprosy settlements without care or treatment of the patients, and with many uninfected persons living with the patients. The first ray of hope resulted from the work of Lambert, a Toc H lay worker, in 1942,

as recorded above. In 1950 the use of the sulphone treatment allowed of further advance.

**Survey.** Ross Innes found an approximate total leprosy incidence of 80,000 cases, or 18.1 per mille. The infective lepromatous cases formed 22 per cent; this indicated a total of 6,600 requiring accommodation in leprosaria, but the medical reports reveal that in Government and mission institutions only 5,006 cases of all stages were receiving treatment. In 1952, however, 200 patients received their discharge certificates in one institution. Moreover a new one was under construction at Mkunya by a BELRA worker.

TABLE OF EAST AFRICAN LEPROSY INCIDENCE AND SURVEYS

<i>Protectorate</i>	<i>Estimated total population</i>	<i>Rate per mille of surveyed population</i>	<i>Estimated total cases of leprosy</i>	<i>Percentage of lepromatous cases</i>	<i>Estimated total lepromatous cases</i>
Uganda	5,000,000	17.8	80,000	22.3	17,800
Kenya	5,400,000	10.2	35,000	20.0	7,000
Tanganyika	1,600,000	18.1	80,000	22.0	17,600
Nyasaland	2,000,000	14.3	30,000	22.2	6,600
N. Rhodesia	1,600,000	12.6	20,000	20.4	4,080
<b>TOTAL</b>	15,600,000		245,000		53,080

#### IV. Anti-Leprosy Measures in Nyasaland, 1924-51.

1924-26. About 300 cases a year were treated by injection of moogrol (Chaulmoogra esters) at rural dispensaries, but it was doubtful if the cases had been diagnosed early, and the mission doctors had difficulty in getting the patients to continue the treatment long enough.

1927. The Secretary of BELRA, Mr. F. Oldrieve, visited the protectorate and it is recorded that the activities of the missions as regards leprosy were greatly stimulated by his advice, and by small BELRA grants to each of the eight mission centres, in addition to the free supply of drugs for the leprosy patients.

1928-31. Leprosy cases treated in the mission centres averaged 555 yearly. Alepol (sodium hydnicarpate) had largely replaced the more painful moogrol injections.

1935. Admissions were the more advanced and crippled cases in which treatment was "disheartening," but at the centre at Malamulo early cases were treated with "considerable success."

1938. By this time 13 mission centres admitted leprosy cases, and Government supplied a subsidy of £900 a year to supplement mission and BELRA Funds.

1939. Dr. E. Muir paid a visit on behalf of BELRA, which did much to stimulate interest, and the Government hoped soon, in

spite of the war, " to put leprosy control measures on a sound footing in the near future."

1940-47. At this period the yearly number of the cases treated at mission centres averaged about 250, and at Government hospitals and dispensaries 300. The annual Government grants rose to £1,500, and in 1948 to £7,000.

1949. Owing to food shortage only infective and early cases were admitted for treatment, and sulphetrone was first supplied to a few centres for trial.

1950. By the end of this year it became possible to supply sulphones for all patients under registered medical practitioners; they only formed a fraction of the total number, but aroused new hopes.

In 1950 the Nyasaland Government accepted in principle the necessity for the provision of leprosaria on a large scale for the voluntary isolation and treatment of infective cases; together with the treatment of low infectivity ones as out-patients at low cost. Sites in low humidity areas were sought out for that purpose.

1951. This year's medical report states that the " enormity of the problem facing Nyasaland " is seen from the fact that less than 2 per cent. of the estimated leprosy cases are under active treatment, which, it is believed, will terminate the infectivity and arrest the disease. The scope for treatment is only limited by the quantity of drugs available. Funds have been asked for from the Central African Colonial Development Fund for epidemiological research on the distribution of leprosy, and the possibility of an attack on the disease through the Native Authorities.

**Discussion.** The foregoing notes illustrate the efforts during the last three decades of Government, missions and BELRA to provide modern anti-leprosy measures in a backward and poor country. Useful experience had been gained and important progress was made with the introduction of sulphone treatment.

**Survey.** As shown in the table, the survey carried out by Ross Innes led to an approximate estimate of 30,000 cases of leprosy among a population of 2,000,000, or 14.3 per mille. Infective lepromatous cases amounted to 23 per cent.; this figure indicated a total number of 6,600, only 1,000 of which were accommodated in institutions. Moreover, 82 per cent. of the cases lived in close contact with an average of four healthy children each: a tragic situation demanding the supply as soon as possible of available preventive methods.

## V. Anti-Leprosy Measures in Southern Rhodesia, 1924-51.

1924-25. A table of African hospital admissions shows no leprosy

cases in 1924, and only 14 in 1925, but gives no further information.

1926. One Government leprosy settlement with mainly voluntary admissions. Stimulated by reports from India of out-patient treatment, a trial clinic was opened under a missionary doctor.

The Superintendent of Natives is averse to enforcing provisions of Leprosy Repression Act and compulsory segregation "as more likely to defeat its own ends and lead to concealment."

1927. A Government leprosy settlement at Ngomahuru was opened with 63 admissions.

The first BELRA Secretary, Mr. F. Oldrieve, toured the province with facilities provided by the Government, who recorded that the "visit has done much to enlighten both official and public opinion." Early cases of leprosy are coming forward for treatment. The total numbers are unknown.

1928. In addition to the Ngomahuru settlement, voluntary treatment centres have been provided for voluntary treatment at Mtoko and Mnene under medical missionaries supported by Government funds. The response has been good and 50 per cent. of the patients are voluntary ones.

Release on probation of non-infective cases as potentially cured has encouraged early cases to attend for treatment.

1929. The Government settlement has been placed, for the first time, under a residential medical officer, Dr. B. Moiser, with experience of leprosy in West Africa. The appointment has been more than justified and alepol has been used with satisfactory results in treatment.

1930. A survey by Dr. Moiser of 6,814 people revealed 55 leprosy cases, or 5.1 per mille, including 27 early non-infective ones, most of whom were unaware of their symptoms. The policy of the Government was declared to be to eliminate leprosy, to separate healthy children from contact with the infected, and to cure early cases; all progressive measures based on recent advances in the control of leprosy incidence. This year 135 cases were discharged as being no longer infective.

1931. Leprosy incidence was reported to be at the rate of 2 to 5 per mille. BELRA supplied £550 for a water supply, and £200 for other purposes.

1933. The Government policy was, without repealing the leprosy laws, to make the leprosy institutions resemble voluntary hospitals, where early cases could be treated before reaching a highly contagious stage, and most discharged without mutilation and re-examined every six months.

"The Colony is greatly indebted to BELRA for grants and for the satisfactory methods of treating leprosy, with the aim of eradicating the disease."

1934 and 1935 also record the appreciation of the Government for grants from BELRA.

1936. Dr. Moiser records his opinion that there has been some decrease in the incidence of leprosy. This year 213 leprosy patients were "discharged with their disease arrested."

1937 and 1938. Moogrol continued to yield good results. Cases discharged with their disease arrested numbered 155, or 13.9 per cent. of the treated.

1939. This year Dr. Moiser reported the discharge with disease arrested of 170 cases, or 57.8 per cent. of those treated.

Dr. Muir paid a visit as BELRA Medical Secretary, and found a large proportion of lepromatous cases, as in Nyasaland.

1940. Dr. Moiser reports very satisfactory results from treatment with sufficient doses of up to 10 cc. of moogrol two or three times a week, but little effect from small doses. Infants have been weaned after one year of breast feeding, and in eleven years not one was admitted with leprosy. One good result of the voluntary system of segregation is that discharged patients readily return for further treatment when necessary.

1941-44. During these war years the very brief reports give no information regarding leprosy; there was no medical officer at the Ngomahuru settlement.

1946-47. A new medical officer was appointed and the settlement re-organised.

1948. The sulphone treatment was introduced on a small scale in the preceding year and good results in Europeans were noted this year, which completely altered for the better the outlook of the patients. Desperate need arose for more accommodation. Sulphetrone was being used mainly, but lepra bacilli were still present.

1949. The number of European patients has been reduced owing to the good results of sulphetrone treatment; fewer Africans from Ngomahuru, where 250 lepromatous cases are under sulphetrone, and neural and lepromatous cases are nearly equal in numbers, with a total of 886 cases. The dosage had to be reduced on account of many severe reactions and anaemia.

1950. Both sulphetrone and D.D.S. are giving excellent results in neural and active tuberculoid cases as well as in lepromatous ones, but progress is slower in the last class. Steps are being taken for the earlier release from the leprosaria of non-infective cases, with continued out-patient treatment, and for making a comprehensive survey.

1951. "The atmosphere at both hospitals has been completely changed by the new drugs." Improved recreational facilities, and a school, attended by 100 children, have been a great success.

Smaller doses of sulphones cause much less reaction, but lepra bacilli can still be found in severe cases after two years' treatment. Patients come from neighbouring territories; 58 patients are under observation for discharge.

**Discussion.** The outstanding point in the foregoing notes is the successful use of full doses of moogrol by injection by Dr. B. Moiser, a retired Medical Officer from Nigeria, but small doses failed to benefit the leprosy patients. It is noteworthy that in 1936 he recorded his opinion that there had been some decrease of the disease where he worked. Between 1948 and 1951 sulphone treatment affected a change for the better.

**Surveys.** I have found no record of any such extensive measure. As Southern Rhodesia has a less hot and humid climate than other parts of East Africa, the use of the successful Nigerian method of campaign should prove effective here.

## VI. Anti-Leprosy Measures in Northern Rhodesia, 1928-51.

1928-30. The average total number of leprosy cases registered in Northern Rhodesia in these years was 5,576. They were enumerated by the District Medical Officers, and in districts without one by the District Officer; this left a very large margin for error, as shown by the data of a later survey given in Table on page 51. No other information is given in the annual reports for these early years.

1931. A number of leprosy patients were given light labour on small wages. They were well received and more amenable to longer treatment. They were presumably fairly early cases.

1932-40. Only figures of the cases treated at hospitals were recorded in these and other years. Between 1931 and 1951 they varied between 60 and 215, with an average of 130.

1942. It is recorded in this year's medical report that since Dr. E. Muir, BELRA Medical Secretary, visited Northern Rhodesia in 1939 considerable progress had been made in the treatment and care of leprosy patients. Three colonies had been established, and three more were being constructed, all under missionary control but subsidised by Government. The services of a BELRA lay worker had also been obtained.

1943-44. Only short war-time reports without any noteworthy information.

1945. New leprosy centres being established, but there is nowhere near enough accommodation for all that seek it.

1946. "There is enormously more leprosy in the country than the hospital figures suggest."

1947. Government grants for building and for staff amounted

to £3,420. The total cases treated at Government and mission settlements and hospitals numbered 1,569. The total estimated cases in the territory was placed at about 8,000. Additional accommodation was provided by Government, but it is still inadequate.

1949. Government leprosaria at Luapula and at Kawambwa raised their number of cases by 51 to reach 270, and the total treated, including 1,289 in mission settlements, reached 1,714 by the end of the year. Government capital and recurrent expenditure reached the sum of £10,990. Sulphetrone was obtained during the year and finance provided for larger supplies in 1950.

1950. The sulphone treatment was started in 1950, but it was too early to assess the results. 'The outlook is more hopeful than ever before, and the elimination of the disease is now well within the bounds of possibility.'

This year is noteworthy for a survey of the incidence of leprosy in Northern Rhodesia in preparation for an active campaign to reduce leprosy. This is dealt with below and illustrated by the data in the Table on page 51. It may be noted here that Ross Innes agreed with the now generally accepted view that "This living with children by leprosy cases is the very root of the reason for the persistence of leprosy amongst African tribes." High atmospheric humidities (due to heavy yearly rainfall combined with high temperatures) were associated with high leprosy incidence, and a graver type of the disease, together with overcrowding in the houses.

1951. Sulphones were increasingly used this year. "A comprehensive policy for tackling the leprosy problem in the Territory is being formulated." Regional leprosaria, Government and mission institutions, under experienced medical staff, will be utilised for this purpose.

**Discussion.** The above notes for 1942 record the first noteworthy advance in Northern Rhodesia following a tour by the BELRA Medical Secretary. Three colonies had been established for leprosy patients, and three more were under construction, all under the control of missions. In 1946 it was recorded that there is enormously more leprosy in this area than the hospital figures suggest. In 1950 sulphone treatment was commenced with good results.

**Survey.** In 1950 Ross Innes carried out a survey and estimated the total number of leprosy cases at 20,000, or 12.6 per mille of population. Infective lepromatous cases constituted 20.4 per cent. of the total cases, or a total of 4,080. Moreover, 60.7 per cent. of the discovered cases were living with 896 healthy children. This close contact he regarded as "the very root of the reason for the persistence of leprosy among African tribes."

The medical report for 1951 records that " A comprehensive policy for tackling the leprosy problem is being formulated " with the supply of regional leprosaria, together with Government and mission institutions under an experienced medical staff.

OMISSION FROM EAST AFRICAN MEDICAL REPORTS OF REFERENCE TO THE ESSENTIAL CONTROL MEASURE OF REPEATED EXAMINATION OF CONTACTS.

The importance of this essential method is indicated in para. 4 of the histological introduction. It is the key to the great reduction of leprosy incidence in Nauru Island and, on a large scale, in South-East Nigeria above recorded, so needs to be emphasised once more in connection with the present efforts to reduce the incidence of leprosy in East Africa on the lines of its successful use in Nigeria.

PROSPECTS OF CONTROLLING AND REDUCING LEPROSY IN BRITISH EAST AFRICA.

It remains to consider the present prospects of anti-leprosy measures in East Africa. Among the advantages are the more effective action of sulphone therapy over hydncarpate injection treatment of the last three decades in producing rapid clinical improvement and reducing the infectivity of advanced lepomatous cases admitted to leprosaria. This advance will facilitate the removal of the great source of infection of children and young people from their houses, for the sake of effective treatment now available at low cost. Moreover, larger funds are available from the Colonial Development and Welfare Fund and from BELRA resources freed from use in Nigeria.

On the other hand, the enormous extent of leprosy infected areas in East Africa, together with varying incidence of the disease, will increase the administrative and financial difficulties of what amounts to a modern crusade against the crippling and deforming disease of leprosy. Moreover, the density of the population of East Africa varies from 5.5 per square mile in Northern Rhodesia to 55.5 in Nyasaland. Ross Innes has also repeatedly stressed the greater incidence of the disease in low lying, humid, rather than in more elevated dry areas. This is in accordance with the world-wide high leprosy incidence in hot and heavy rainfall areas pointed out by the writer in 1923.

These disadvantages may necessitate the essential yearly surveys of the population, from amongst whom infective cases have been isolated in leprosaria, or in leprosy villages used for this purpose in Nigeria, being restricted in areas of low incidence to the examination of the occupants of houses known to have harboured leprosy patients and their relations and other close contacts. The earlier cases can be treated in special dispensaries, as in Nigeria, or on

a particular day each week at district hospitals and dispensaries, at a low cost. During the last few years East African annual medical reports record that many leprosy patients are now clamouring for such treatment, and will travel miles to obtain it. These are all matters to be decided by the leprosy specialists who have recently been appointed to East African territories.

#### FURTHER RESEARCH WORK TO IMPROVE THE TREATMENT OF LEPROSY.

The recent great advances in the treatment of leprosy must not be allowed to blind us to the fact that we still lack the ideal drug, or combination of drugs, as now used in the treatment of tuberculosis due to acid-fast bacillus closely allied to that of leprosy. Several promising anti-leprotic drugs are now being tested and more are likely to crop up.

The suggestion of the writer in 1948 for the use of a combination of hydnicarpate injections—for some thirty years the most effective treatment of early cases of leprosy—with sulphones on account of the greater bacteriocidal action of hydnicarpates over sulphones, has now been confirmed by the following investigators:

E. Muir (1950) tried the combination of remedies, at the writer's suggestion, at the large Indian leprosarium at Purulia. He gave sulphetrone orally, and at the same time injected hydnicarpus oil intradermally under the leprotic lesions on one side of the body only, and found the injections speeded up the local diminution of lepra bacilli on the injected side.

Tolentino (1950) also tested this combination of drugs, and he came to the conclusion "that sulphone drugs gave the best results in resolving leprosy lesions, and that the chaulmoogra-sulphone combination produces the greatest bacteriological improvement."

R. Cochrane (1948) reported that in two years trial of sulphones in early lepromatous cases none had become bacteriologically negative. Yet 50 per cent. of 165 such cases became negative under adequate doses of hydnicarpus oil.

P. Laviron and L. Lauret (1950) also endorsed the suggestion of Rogers that a combination of sulphones and hydnicarpus oil should be used in the treatment of leprosy.

American leprologists have had the longest experience of sulphones in leprosy at the National Leprosarium in the U.S.A. It is therefore important to note that F. A. Johansen and P. T. Erickson (1950) records relapses after sulphone treatment had been discontinued, and they advised continued small doses after apparent recovery.

Moreover, F. A. Johansen and P. T. Erickson also recorded that "the relapse rate among the patients for whom the sulphone therapy was discontinued was 45 per cent."

Further researches on sulphones and other new drugs, as well as in the bacteriocidal effect of combinations of drugs is therefore indicated. The new leprosaria now being organised in East Africa, one of which already has 2,500 patients, many of them early ones, can afford facilities for such researches on an adequate scale.

### SUMMARY

1. The writer's method in 1925 of controlling and materially reducing the incidence of leprosy in any country is once more outlined.

2. These measures are dependent on the establishment in 1917 of an effective treatment of the early stages of leprosy by the injection of hynocarpates and other such suitable preparations. Its successful use in Nauru Island in 1927-34 has now been confirmed on a large scale in Nigeria.

3. Small-scale trials of modern anti-leprosy measures during the last three decades in British administered East African territories, and in the Rhodesia group, are summarised in view of the present large scale measures now being organised in this vast area.

4. The importance of sulphone treatment in advanced infective lepromatous cases during the last decade is emphasised, and its value in obtaining their voluntary isolation is pointed out.

5. The necessity for further research to obtain a reduction in their toxicity, and to enhance the bacteriological action of sulphones and for careful trials of other promising drugs and combination of drugs is indicated. Recent work on the greater bacteriocidal action of hydnocarpates, and their combined use with the sulphones, is summarised and further trials of that and other combinations of remedies indicated.

6. New large-scale leprosaria in East Africa are now available for such researches, any success in which hasten the time required to reduce greatly the incidence of leprosy in any country by methods now available. Great Britain is responsible for the largest number of leprosy patients of any country, only one-tenth of whom are as yet receiving the benefits of established treatment.

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