

# LEPROSY REVIEW.

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

## Contents.

	PAGE
Editorial .. .. .	100
The National Leprosarium of the United States .. O. E. DENNEY	102
Leprosy Work in the Madras Presidency .. .. J. JOSIAH JOSEPH	108
A Comparative Study of the Relative Efficacy of Ethyl Hydnocarpate and Ethyl Morrhuate in Leprosy .. .. G. R. RAO	120
Leprosy in the Leeward and Windward Islands .. R. G. COCHRANE	125
Efficiency of Institutional Treatment for Leprosy .. E. B. CHRISTIAN	130
The Epidemiology and Prevention of Leprosy .. R. G. COCHRANE	134
Curability of Leprosy .. .. . J. RODRIGUEZ	143
Reviews .. .. .	146
Erratum .. .. .	148
Correspondence .. .. .	148

The Association does not accept responsibility for views expressed by the writers. Communications may be sent to the Editor, at 131 Baker Street, London, W.1.

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## Editorial.

OUR readers will welcome the article on the National Leprosarium of the United States, by Dr. Denney. This gives a very good account of the important work which is being done at Carville. It is no exaggeration to say that this institution is one of the most up-to-date, and is the best equipped institution in the world. No worker who is studying leprosy seriously can afford to miss the opportunity of visiting this excellent leprosarium.

The people of the Presidency of Madras pride themselves on the fact that they are in advance of the rest of India. Certainly the account of leprosy work in this Presidency by Dr. Joseph indicates that the authorities are wholly alive to the problem. We commend the article to the careful attention of our readers, and we would like to mention particularly here the excellent work that Mrs. Todd has accomplished in the Salem district. Articles have appeared in *Leprosy in India* concerning her work, and we would refer our readers to this publication. The example of Madras could well be followed by others, for there is a big scope not only in India but in Africa for the right type of propaganda amongst the indigenous populations, so that their leaders may gradually acquire a better knowledge concerning leprosy, and thus use their influence in segregating the more infectious type of case. The prevalence of leprosy is so great that methods are difficult to devise which would envisage every part of the problem, and therefore unless some agreed practical method is evolved which will deal with that aspect dangerous to the public health, the day when the disease is brought under control will be indefinitely postponed.

Dr. Rao, in his article on "A Comparative Study of the Relative Efficacy of Ethyl Hydnocarpate and Ethyl Morrhuate in Leprosy," once more brings to our attention the fact that there is some special action in the hydnocarpus preparations, and that the result of the intradermal treatment cannot be explained by the fact of counter irritation alone. We would, however, stress that while we do not doubt the efficacy of the hydnocarpus preparations, the main line of attack in leprosy is the raising of the individual's resistance on the one hand and the bettering of economic conditions on the other.

The account of Leprosy in the West Indies is continued in this number, and the Leeward and Windward Islands are dealt with. Emphasis is placed on the fact

that it is among those people where the economic condition is poor that leprosy is most prevalent.

In this connection Dr. Christian's article on "Efficacy of Institutional Treatment for Leprosy" is apposite, for that article emphasises the need for institutional treatment. We are convinced that the biggest factor in the acquirement of leprosy is the environmental one, and therefore consider that most stress must be laid on efficient institutional treatment. This means that institutions should, as far as possible, select those cases which are amenable to treatment. The old arrested case, if destitute and uncared for, cannot be left unrelieved and this applies also to the highly infective nodular case, but because accommodation in institutions is usually limited both these categories, where feasible, should be segregated and cared for in the village along the lines of the Indian plan. In islands such as Ceylon, where the problem is easier of control, enforced segregation of infectious cases is more practicable.

Dr. Rodriguez' comments on Dr. Rose's article are so important that we have given his letter a main title. It has been stated that it is an unusual procedure to ask leprologists working under totally different conditions in far away countries to comment on Dr. Rose's paper. The reason for this criticism we cannot understand, for surely unless the views of experts in various countries are obtained we cannot get a true appreciation of the results of treatment. There are so many factors which have to be considered with regard to the interpretation of the results, that it is essential, if a worker wishes his results to be completely accepted, that they should be brought to the notice of other workers and commented on. As has been stated previously here, there must be an explanation of the varying results reported from time to time. It is impossible to concede that a drug is a specific in one country and not in another. Therefore unless we seek the opinions of a large number of workers working under different conditions we cannot get a right appreciation of the results of treatment. We claim that we are as aware as anyone else of the fact that conditions under which leprosy is treated vary enormously. Not only that, but the disease varies and conclusions come to in one country are not necessarily applicable to another. Nevertheless, it is in our opinion essential to review the results of treatment on a broad basis, because while the hydnocarpus preparations have not been bettered to our knowledge, they have not been proved to be definitely a specific for the disease.

# The National Leprosarium of the United States

O. E. DENNEY.

(Published with the permission of the Surgeon-General, United States Public Health Service, Washington, D.C.)

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**T**HE Congress, in 1916, having considered testimony of expert witnesses and upon the recommendations of the various State Health Officers and various national medical societies, determined upon the Federal care of lepers found within the United States, and enacted a Bill to provide a home for the care and treatment of persons afflicted with leprosy and to prevent the spread of the disease in the United States, said home to be administered by the United States Public Health Service and, for the purpose of carrying out the provisions of this Act, appropriated the sum of 250,000 dollars.

Considerable difficulty was encountered by a committee designated to select a suitable site for the proposed institution because of the evident impracticability of finding in combination, the desirable prerequisites of relative isolation from cities or towns; convenience of transportation; physical suitability of site and local public goodwill. The World War interrupted somewhat the surveys of the committee and it was not until January 3rd, 1921, that the final recommendations of the committee were crystallised in the purchase of the Louisiana Leper Home at Carville, by the Federal Government.

The unexpended portion of the appropriation after purchase of the site, was immediately used for the construction of additional dormitories for the housing of new patients and medical personnel. Necessarily tentative estimates concerning the number of lepers residing within the United States determined a plan of procedure whereby the institution, rather than be completed as a unit, should be enlarged by progressive stages until sufficient to accommodate all known cases. Appropriations have been made and expended subsequently, until the institution at the moment provides hospitalisation facilities for approximately 500 patients, together with adequate living quarters for permanent employees. A total expenditure of 1,143,082 dollars has been made to date for construction purposes. Additionally, a chapel for the use of Protestant patients and one for those of the Roman Catholic faith, have been built from non-Government funds and presented to the Government.

### CENTRAL POWER HOUSE.

By virtue of relative isolation it has been necessary to provide facilities so that the institution is almost entirely self-contained and, from an administrative standpoint, may be considered as having been constructed around the central power plant as a nucleus. This structure contains equipment and machinery for the sedimentation, filtration and chlorination of the water supply ; for the circularisation of hot and cold water and steam heat ; and to generate electricity for illumination and refrigeration to the buildings, approximately one hundred in number. The same building houses an ice plant manufacturing approximately ten tons of ice a day and circulating refrigerated brine to various storehouses. Fire-fighting equipment is centralised and a stationary fire engine controls the water pressure at fire hydrants appropriately spaced throughout and among the buildings.

Sewage disposal by means of underground septic tanks and chlorinated effluent constitutes a unit of the plant, as does a garbage and refuse incinerator.

Fuel used in the central power plant and the kitchens is crude oil purchased in barge lots arriving by way of the Mississippi River, the oil being stored immediately adjoining the power plant in tanks which hold approximately a three months' supply.

### PATIENTS' QUARTERS.

Radiating from the central power plant are the quarters for the patients, consisting of 35 cottages arranged around the four sides of a rectangular space, which space serves for recreational purposes. Each cottage is joined to its neighbour by a raised, covered screen walk. A typical dormitory consists of 12 private bedrooms with conveniently located bath and toilet facilities, recreation room and sleeping porch. Most of the cottages have radios.

### PSYCHOPATHIC WARD.

At the north-west end of the rectangle is a psychopathic unit with facilities for the isolation and special care of 12 mentally deficient patients and those requiring special segregation for disciplinary purposes.

### RECREATION BUILDING.

At the opposite end of the rectangle there exists a 'T' shaped building, one wing of which is used as a moving-picture theatre ; "talkies" are exhibited three times weekly. The short wing of the letter 'T' houses the canteen,

which is operated by the patients for the sale of commodities not furnished by the Government, namely, cosmetics, soft drinks, tobacco, candy, etc.

#### INFIRMARY.

On the south side of the main rectangle there has been erected an infirmary building for the hospitalisation of those patients who may be suffering from the acute manifestations of leprosy or from intercurrent conditions and therefore are too ill or too disabled to care for themselves in their regular quarters in the cottages. This infirmary has 65 bedrooms with, additionally, four large verandas convertible into bed space should emergency arise. The infirmary also contains the various facilities so necessary in the general care of leprosy patients; outstanding among these are dressing clinics for the daily care of patients suffering from ulcerating lesions; eye, ear, nose and throat department for prophylactic and treatment purposes; electrotherapy section for the experimental and routine administration of infra-red, ultra-violet, diathermy and the like; hydrotherapy department for the furnishing of contrast baths and massage, found by experience to be useful in leprosy neuritis; and hydrotherapy by modified Turkish bath system. The Medical Officer of the day has a suite of rooms in the infirmary for the treatment of minor symptoms not of sufficient importance to require hospitalisation.

The surgical site consists of an operating room with appropriate preparation and sterilising rooms; immediately adjoining which is the X-ray department, chiefly used for diagnostic purposes. A dental suite with one dental officer on full time duty cares for the many disabilities of the mouth.

The attending specialists have consultation and treatment rooms, adjoining which are the record rooms in which are contained the individual progress notes of all patients in the institution. The building likewise contains a pharmacy for the compounding of the many prescriptions as well as for the preparation of the various special anti-leprosy medicaments. Diet kitchens and small dining rooms are located on each floor for the service of the bedfast or ambulatory infirmary patients. The laboratory is located in the infirmary building and occupies one entire wing on the second floor; the suite consists of a department devoted to blood chemistry, one to clinical photography and photomicrography; a museum for the preservation of interesting surgical or post-mortem material; a general



laboratory for routine examinations and a research laboratory devoted to pathology and bacteriology.

Each of the 65 bedrooms is steam heated, electrically lighted and cooled and contains a lavatory with hot and cold water ; an electric call system as well as bedside radio serves the patients. Portable air-conditioning machines are available for the comfort of those seriously ill.

The building, a two-storey structure, has a flat roof upon which has been constructed a pergola for the use of convalescents in clement weather. This roof garden is accessible both by stairway and elevator.

#### MORTUARY.

The hospital morgue is located at the extreme east end of the main quadrangle and contains an electrically refrigerated mortuary cabinet with storage facilities for four bodies. The building includes the post-mortem room and facilities for the preparation and temporary storage of autopsy specimens as well as a small room in which funeral services may be held should it be undesirable, for some special reason, to take the remains of a patient to either the Protestant or Roman Catholic chapel for services.

#### HOSPITAL CEMETERY.

At some distance from the north end of the quadrangle is located the hospital cemetery in which there are interred, at Government expense, the remains of patients dying in the hospital whose relatives have preferred not to claim the bodies.

#### KITCHEN AND MESS HALL.

Inside the main rectangle and adjacent to the infirmary is located the kitchen mess hall, a structure with sufficient facilities and space for the preparation and service of food to 500 patients. The kitchen proper contains the usual facilities including refrigerating space sufficient to care for a 48-hour supply of foodstuffs. The food service in the mess hall is by cafeteria system and the patients, after obtaining their selections, are seated in cubicles in the main dining room in groups of their own selection, by race, sex or other preference. The dishes, trays and table ware are washed by means of dish-washing machine, which uses pressure sprays of superheated soapsuds and boiling water for rinsing. For those patients who, due to special incapacities, prefer not to come to the cafeteria, food is served by means of food trucks of the thermos type at their respective quarters.

### SCHOOL AND LIBRARY.

The main quadrangle has a small building set aside for school purposes in which the small number of children, illiterates or foreigners, may receive rudimentary instruction. In a separate building there are library facilities with current magazines, newspapers, books of fiction, travel, education, etc., available.

### STOREHOUSES.

A large refrigerated storehouse, subdivided into appropriately sized rooms, conserves commissary supplies, including beef and pork raised and slaughtered on the station. The same building contains the bakeshop which furnishes bread and pastries for the institution. Three large warehouses are necessary for the storage of general supplies, including reserve stocks of clothing for general distribution, medicine and the like.

### UTILITY BUILDINGS.

The size of the institution makes it necessary to employ carpenters, painters, plumbers, electricians, garage mechanics, etc., and small buildings have been erected for the use of these various journeymen who are permanent employees and devote full time to the care and maintenance of the various buildings.

### FARM.

A very considerable portion of the 360 acres comprising the reservation is devoted to the raising of vegetables and forage. The hospital has a modern dairy barn with facilities for the care of the milk herd of 100 carefully bred cows and has modern facilities for the pasteurisation of the daily milk output, averaging 150 gallons. A piggery is maintained as well as a herd of cattle for beef purposes.

### QUARTERS FOR NON-LEPROUS PERSONNEL.

Living quarters are provided for employees and their families ; more than 100 non-leprous persons reside within the reservation.

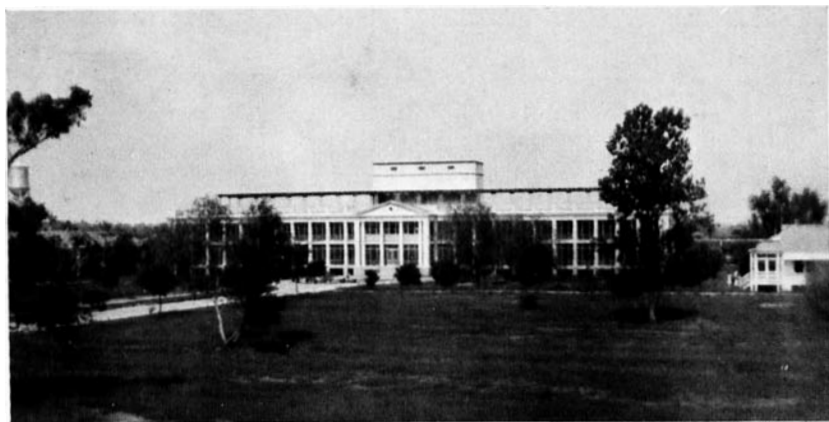
### ADMINISTRATION BUILDING.

The Administration Building is an antebellum plantation home. The lower floor is used for general administrative offices, and contains a large kitchen, for preparation of food for non-leprous personnel, and several dining rooms.

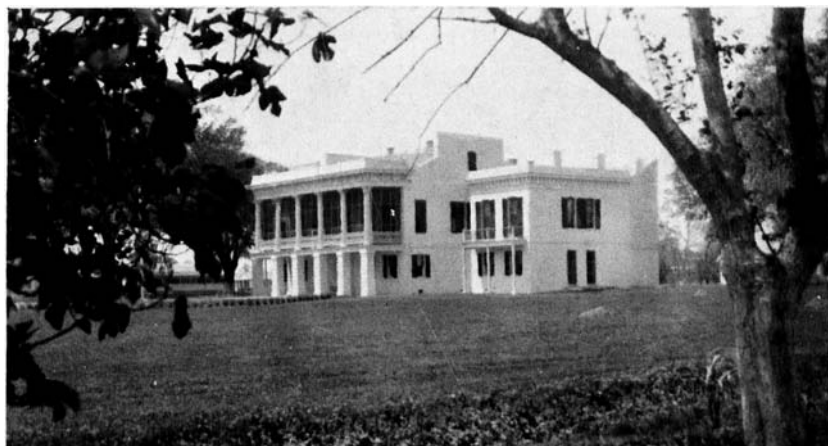
NATIONAL LEPROSARIUM, CARVILLE.



DAIRY BARN. MILK PASTEURISING HOUSE AT LEFT.

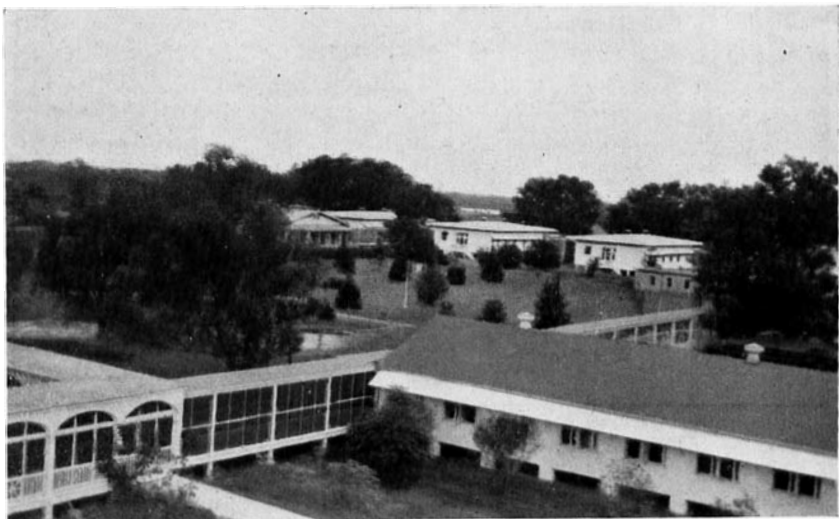


THE NEW INFIRMARY.

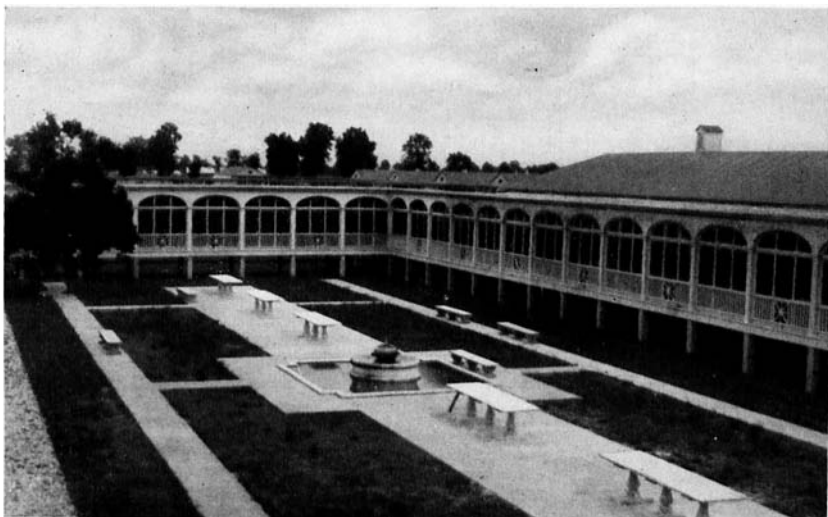


ADMINISTRATION BUILDING.

NATIONAL LEPROSARIUM, CARVILLE.



PATIENTS' COTTAGES.



TEA GARDEN.

The upper floor is devoted entirely to dormitories, recreation rooms, sleeping porches, etc., for use of the nursing staff.

#### ADMINISTRATION.

The medical care of the patients, consisting at this time of 350, is under the supervision of four resident medical officers, one dentist and four consultants in the specialties.

The nursing care is provided by orderlies who are themselves patients, supervised by 17 especially trained nurses, members of the order of St. Vincent de Paul.

The material section is responsible for the physical maintenance and upkeep of the entire reservation and there are 138 employees in this section.

The clerical section cares for the miscellaneous clerical work attached to the operation of the hospital, including typing and compilation of patients' records.

#### SOCIAL WELFARE.

In order to minimise group and individual discontent so frequently manifested in an institution for the treatment of chronic and relatively incurable diseases, considerable effort has been expended toward recreational and occupational facilities. Both outdoor and indoor exercises and recreation are stimulated by golf, baseball, basketball, tennis and the like, supplemented by moving pictures shown at regular intervals, by semi-professional and home talent theatricals and encouragement to participate in appropriate activities. To provide additional physical activity for patients, a major portion of the work necessary within the patients' portion of the reservation is performed by the patients themselves, who receive payment therefor, dependent upon the nature of the work accomplished. Nearly a third of the patients are so occupied.

The leprosarium operates as a unit of the Marine Hospital Division of the United States Public Health Service and received its funds for maintenance by allotment from annual Congressional appropriations. The present per diem cost for complete care of an individual is 2.39 dollars, which sum includes 33 cents expended daily for the ration of each patient.

The leprosarium, since its organisation as a Federal institution, has received patients from nearly every country of the world as well as native born, and at the present time cares for patients from 24 foreign countries who, at the time of admission to the leprosarium, had established residence for more than five years within the United States.

In the fourteen years of Federal administration, 801 patients have been hospitalised. Of this number 179 have been released as leprosy, arrested, and the individual no longer a menace to public health. Since the formal release of this group 14 have suffered relapse and have been readmitted for further treatment.

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## Leprosy Work in the Madras Presidency.

J. JOSIAH JOSEPH.

**T**HE seriousness and importance of the leprosy problem in the Madras Presidency were not realised till 1929, when Dr. Santra and his survey party demonstrated the high prevalence of the disease in certain areas. At the end of that year the Madras Government appointed Dr. J. Josiah Joseph to carry on the work Dr. Santra had initiated, chiefly in the direction of opening Leprosy Clinics and training Medical Officers. In 1930 he worked in East Godavari, Madura and South Kanara districts, trained Medical Officers and Health Officers, opened 15 clinics and inaugurated through the Public Health Department a rough survey of the Presidency which revealed about 56,000 cases. Realising the necessity for a generalised campaign throughout the Presidency the Government sanctioned the Group Leprosy Scheme. Six Group Leprosy Officers, Dr. Joseph being a Group Officer as well as the Chief Officer, were directed to organise the work throughout the Province within two years, the province being divided into six groups of districts. The Group Scheme having been found to be successful was extended in 1933 for another two years and again in 1935 for another two years. The Group Officers have so far trained about 500 Medical Officers in the up-to-date methods of classification, diagnosis and treatment, did propaganda work in villages, examined students for leprosy and have brought about 400 clinics into existence.

The following is a brief account of the activities connected with the campaign :—

1. *Medical.*—There are 12 leprosy asylums accommodating about 2,100 inmates, which is one hundredth of the total number of cases in the province and one twenty-fifth of the total number of cases treated in leprosy clinics in a year. The largest and most popular one is the Lady Willingdon Leprosy Settlement at Chingleput, which accommodates about 750 patients. The total cost of annually

maintaining these institutions, partly with contributions from the Government and partly with contributions from other sources, is a little over three lakhs. The following is an abstract statement showing the work done in these institutions during 1933 and 1934.

TOTAL TREATED DURING THE YEAR.					TOTAL DISCHARGED.					
Hindus	Christians	Mo-hamm-edans	Others	Total	Symp-tom free	Dis-ease arres-ted	Much im-proved	Other-wise	Died	Total
1933.	1031	202	349	3335	144	172	157	993	118	1584
1934.	833	186	334	3142	90	163	188	645	110	1196

There are 408 out-patient clinics which are financed as follows :—

Government ... ..	135	} Four of these have been closed for want of drugs.
Local Fund Board ... ..	199	
Subsidised ... ..	40	
Mission ... ..	23	
Private aid ... ..	8	
Whole-time (Board)	3	

It cannot be stated that all these clinics are working efficiently. The bi-weekly attendance at the various clinics is as follows :—

1— 5 cases	...	...	...	...	74 clinics
6— 10 "	...	...	...	...	73 "
11— 25 "	...	...	...	...	117 "
26— 50 "	...	...	...	...	92 "
51— 75 "	...	...	...	...	24 "
76—100 "	...	...	...	...	12 "
101—150 "	...	...	...	...	8 "
151—200 "	...	...	...	...	4 "

The total attendance at all these clinics for 1934 was 903,090, compared with 695,295 for 1933, and 380,050 in 1932.

From the available returns for 1934 the following results have been evaluated for 107 leprosy clinics :—

Total cases treated more than three months				Results of cases treated more than three months							Total treated less than 3 months	Total cases treated
3-6 Months	6-12 Months	12-24 Months	Total	Symptom Free	Much Improved	Slightly Improved	Stationary	Worse	Died	Total		
2712	2663	1626	7001	352	2348	2839	1349	78	35	7001	7305	14306

There are three whole-time leprosy clinics—one Government and two District Boards. The Government whole-time daily clinic is attached to the Government Royapuram Hospital where Medical Students and Medical Officers are trained, and where the Chief Leprosy Officer is conducting experiments with drugs tried by other leprosy workers.

The leprosy drugs used for injection are the creosoted hydnocarpus oil and the creosoted esters which are manufactured locally and supplied at 8 annas (7d.) and 1 rupee 4 annas (1s. 2d.) a lb. respectively, and which are generally mixed in equal parts to reduce the viscosity of the one and the irritability of the other.

All the Medical Officers in charge of leprosy clinics carry on this work in addition to their dispensary or hospital duties and are not remunerated for this work as it forms one of their routine duties. But the medical practitioners in charge of the subsidised rural dispensaries are, in the case of Salem and South Arcot districts, given a remuneration on a sliding scale in the former district and a fixed quarterly honorarium in the latter district, as the pay they receive for their general dispensary work is small. In a few instances, this work is done by honorary doctors. It can be said with due deference to the medical officers already engaged in this campaign that encouragement by way of appreciation and remuneration will be a great incentive to them to take more interest in the campaign and to work whole-heartedly.

2. *District Leprosy Councils.*—The Leprosy conferences held in Calcutta at the beginning of 1933 and in Madras six months later, decided to have District Leprosy organisations to direct and co-ordinate the work in the districts, and a Central Provincial Leprosy Council for the Presidency. Accordingly, as many as 16 district Leprosy Councils have been formed and a Presidency Council will be formed very soon. Some of these Councils are devising ways and means to conduct the campaign along the most efficient lines and to raise money to meet the expenditure to be incurred thereby. In this connection mention must be made of the Salem District Council which is doing extremely good work, Mrs. A. H. A. Todd being solely responsible for this. It was she who organised the Council and has put it in a strong financial position by holding a very successful Leper Day, when 33,000 rupees was realised on that day alone. It was her sincerity and determination to rouse the civic conscience of the people of her district that made the appeal a great success. The District Boards have been



requested to hand over their contributions for leprosy work to the District Councils, who have established the Leprosy Fund which is reinforced by subscriptions, donations, Leper Day collections, proceeds from benefit performances, etc.

Mention may also be made of the Saidapet Leprosy Association under the able leadership of Mrs. H. C. Buck. At the beginning of this year the Saidapet Leprosy Week was arranged, when lectures and exhibitions were given and competitions and sports were conducted, and on the Leper Day 700 rupees was collected. The members of this Association have completed the survey of the town, have examined all the dhobies, and licenced the healthy, have finished medical inspection of all the schools and are popularising the local leprosy clinic, which is in charge of their honorary medical officer. In the house to house survey conducted by men and lady social workers, 456 cases were detected in a population of 33,037. The association now aims at following up the detected cases, observation of all the children and bettering the hygienic conditions which are now favouring the spread of the disease.

3. *Clinic Committees.*—In many treatment centres there are social committees to see to the needs of the clinic, to help the Medical Officer and to persuade and encourage patients to take regular treatment. The majority of these committees are able to attend to the needs of the clinic only, such as construction of leprosy sheds. In some places, individuals have constructed permanent clinic buildings, in some places the committees have raised subscriptions and have constructed pucca sheds, while some committees which could raise only small sums have constructed temporary sheds. Another activity in which some committees are interested is the feeding of indigent lepers and those who come from distant villages on the treatment days, with a view to attracting more patients to the clinics. Opinions differ in this matter, as the question is whether the patients should be attracted to the clinics by giving food or whether the patient should realise the necessity for and the efficacy of treatment. However, this activity has popularised many a clinic. One should remember that almost all the patients are daily labourers, and have to forego their wages on the days they attend the clinic, and that some of them have to walk a number of miles to and fro for the sake of treatment. If this activity could be carried on without interruption and if the social workers will give the necessary assistance, undoubtedly it will serve a very useful

purpose. This depends greatly upon the interest and enthusiasm of the Medical Officer. In some places feeding is done by a number of charitable persons who take it by turns ; in some places provisions are collected from the public and are cooked and supplied to patients ; while in other places money is raised by subscriptions and benefit performances, and the provisions are bought, cooked and supplied. I may mention that owing to the enthusiasm of the Medical Officer and staff of the Local Fund Dispensary, Madurantakam, where about 200 cases are treated on each clinic day, more than half that number are fed on that day. The cost of feeding comes to 500 rupees per annum. This activity has been going on for more than a year and money was never found wanting.

4. *Propaganda*.—The Public Health Staff could not be depended upon for this work as they are fully engaged in other duties as vaccination, epidemics, etc., and the area of work allotted for each of them is very vast. Most of the propaganda work is done by the Group Leprosy Officers who are often directed by me to visit such of those clinics that are declining in popularity, and to do propaganda work in and around those centres to persuade patients to resort to treatment. Magic lantern lectures, distribution of leaflets and personal talks are the chief methods employed to do this work. Those infectious cases who should be isolated are advised either to go to the Leprosy Asylum or to isolate themselves in their own homes if facilities exist. Propaganda regarding the hygienic aspect of this work is not lost sight of, the people being told how a sanitary and hygienic mode of living can ward off leprosy.

The B.E.L.R.A. Leprosy Film was often shown in a few districts and was greatly appreciated by the people, who used to come in large numbers to see it. The Madras Public Health Department has also produced a leprosy film with a romantic plot wherein a young girl who had leprosy was treated by a doctor who finally married her. I have also revised the lantern slides to be more educative and fewer in number (30). The leaflets and posters have also been revised by me to be more appealing to the public.

5. *School Medical Inspection*.—The School Medical Inspection by special medical officers has been stopped owing to financial stringency, and the Government did well to put an end to that system of inspection as it was purely superficial. A new scheme should evolve whereby the students' health will be properly attended to and the special

cases periodically examined. The Director of Public Instruction has permitted the Group Leprosy Officers to examine students in educational institutions for signs of leprosy and to give the necessary advice to the affected individuals. The following are the results of this inspection :—

	1931	1932	1933	1934	Total
Number of Schools examined ...	3	24	103	179	309
Number of Students examined ...	600	3582	17276	23497	44955
Number of Positive Cases ...	1	20	191	271	483
Number of Suspicious Cases ...	—	—	—	20	20

These students are advised to take treatment or to be under observation by the medical officer in charge of the nearest leprosy clinic, but most of them never cared to take their advice. It seems to me that it is very necessary that the school authorities should insist that the active cases are treated regularly and the others are sent periodically for observation by a trained doctor if they are to continue their studies, for one cannot say when a case in the quiescent phase will be stimulated into activity and become infectious. All leprosy experts agree that the disease in children up to a certain age must be attended to, and that if it does not develop beyond a certain age the chances of its working havoc in later years are very remote. This being so, it is very essential that students having the disease should be kept under careful treatment or observation.

6. *Survey*.—The Presidency was surveyed by the Public Health Department, in 1930, with a view to locating treatment centres, and about 56,000 cases were registered. As we expected that leprosy clinics would attract many early cases undetected by the Public Health staff, Medical Officers were directed to register all cases in detail that come to their notice. As the result of this about 120,000 cases have been registered. Many are the instances where the number of cases attending the clinic from a town or village was about five times the number of cases detected by the Health Staff in the same place. It is regrettable to state that some medical officers have omitted to give detailed addresses of cases residing in towns, which omission would cause great difficulty in tracing them. Survey work and registration are also being done by the Group Leprosy Officers during their propaganda work.

It has often been suggested that the survey of a district

will reveal the incidence in that area and give us an idea as to the places where the campaign should be centralised. No doubt, we may get a more definite idea of the incidence in that area, but I doubt whether it will serve a more useful purpose than the figures we have obtained and are obtaining, if they are well utilised, apart from making some deductions for purposes of epidemiology. One has also to consider the time, energy and money required for such a survey. Take for example the district of South Arcot with a population of about  $2\frac{1}{2}$  millions (2,500,000). Working on the experience of Dr. Santra, Propaganda Officer for the B.E.L.R.A., with four sets of survey workers working in different directions, a rough survey of a number of villages having a population of 198,000 was completed in two months, which works out at 25,000 per month, or 1,250 a day (with 20 days to the month) for each set of workers. Having been one of the survey workers then, I can testify to the fact that this was not a house-to-house survey and that several adults were absent on account of their daily pursuits. Taking another instance, a complete house-to-house survey of Saidapet, with a population of 33,000, was completed by one set of social and medical workers in about four and a half months, which works out at 7,000 a month. Hence a complete survey of South Arcot district, with a population of 2,500,000, can be done by four sets of workers as Dr. Santra's survey party did it, in 25 months, and as the Saidapet Leprosy Relief Association did it, in about 80 months. If a survey is done at all, it must be done thoroughly, in order to study the epidemiology and the exact incidence for comparison in future years.

After careful consideration of this subject of survey and the facilities and staff under me, I have decided to carry out centralised surveys, that is, surveys of areas around some specially selected clinics within a radius of five miles, which will include about 35 villages with a total population of about 35,000. The scheme will be :—

1. A few special treatment centres located in highly endemic areas, which are popular and where the registration work has been properly done, will be selected and worked out by each leprosy officer.

2. The cases registered at the special clinics and those detected by the leprosy officers and the Public Health staff are entered in village forms and a tabular statement showing the cases in each village belonging to the specified area drawn up as follows :—

	Stations within five miles from Clinic	Distance from Clinic	Population	Regd. up to end of 1933	Registrations in 1934					Total Regd. up to end of 1934
					1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	T'tl	
1	Madurantakam (H.) Kadaperi ..	Clinic 1 mile	7592	78	26	14	7	4	51	129
	(H.) Moseri ..			1	1	2	—	—	3	4
2	.. .. .	1 ..	—	7	6	1	2	1	10	17
3	Mambakkom ..	2 ..	697	21	3	3	4	—	10	31
4	.. .. .	—	—	—	—	—	—	—	—	—
5	Karunguzhi ..	2 ..	5400	40	11	3	5	8	27	67
	(Ham.) Malapayan			2 ..	5	1	1	1	1	4
6	.. .. .	—	—	—	—	—	—	—	—	—
7	Arangunam ..	3 ..	1285	26	3	2	2	2	9	35
8	Gerdracheri ..	3 ..	791	22	—	3	—	—	3	28
9	Pakkam ..	4 ..	1672	13	13	8	2	—	23	36
10	Unnamalai ..	5 ..	800	16	2	1	1	—	4	20
11	Pidan ..	5 ..	1628	35	4	3	—	4	11	46
12	Polambakkham ..	5 ..	1280	35	9	3	7	—	19	54
13	Etc., etc. ..	—	—	—	—	—	—	—	—	—
14	Etc., etc. ..	—	—	—	—	—	—	—	—	—
Total within specified area ..			40806	473	91	82	60	54	287	760
Total beyond specified area ..			—	235	90	56	46	46	238	473
Total Registered in Clinic				708	181	138	106	100	525	1233

3. The villages in the specified area will be visited to verify the cases, detect new cases, examine contacts, especially children, trace source of infection, do propaganda work, carry on school inspections, and study economic, social, hygienic and other conditions in the village.

4. The names are then entered in permanent registers which will be used by social and medical workers for purposes of propaganda, etc.

This intensive survey-cum-propaganda work around each clinic will be of great value in the following ways: (a) incidence in the specified area can be approximately estimated; (b) clinics will become more efficient; (c) a leprosy or public health conscience will be cultivated in the minds of the villagers; (d) incidence in one village can be compared with others in respect of age, sex, type, etc., and the epidemiology studied; (e) periodical surveys will show increase or decrease and the effects of the campaign and the reasons for them.

There is a great tendency nowadays towards concentrating on the medical aspect of the leprosy problem. Undoubtedly, many patients have been benefited by treatment—the disease being arrested in several persons—and consequently, if greater facilities are afforded for treatment, the results will be better. In the Madras Presidency there are 400 clinics and many more could be opened

if finances permit. Now that the public are realising the efficacy of treatment, work should be directed towards making the existing clinics efficient, towards gauging the incidence of leprosy in highly endemic areas where treatment and propaganda can go hand in hand and towards prevention.

It cannot be denied that the three most important ways of eradicating leprosy are by (1) ridding the patient of his disease or arresting its activity and virulence ; (2) increasing his natural defensive powers of resistance by improved diets and, (3) amelioration of his hygienic and personal conditions of living, which afford a favourable soil for the spread of leprosy. The first method depends upon the treatment and the regularity of the patient. The great disadvantage of the present-day method of treatment is the pain and the prolonged treatment, the effects of the treatment being manifested after a long time. There is also the scarcity of interested medical workers who could feel with the patients and encourage them to persevere in the treatment. On the other hand, the patients, like the rest of mankind, often expect a speedy cure or an early change in their lesions. Moreover, most of the patients are daily wage-earners, sometimes the only family bread earners, and a day's attendance at the clinic would mean deprivation of their income for the day. It is also to be noted that as the early stages of the disease do not cause any inconvenience or any disfigurement, the patients are indifferent to treatment.

The second method is almost impracticable under the present-day conditions of financial depression. In many villages the inhabitants are living a hand-to-mouth existence, with the result that any scourge of epidemics takes a heavy toll of lives. Many of the patients that attend the clinic show signs of inanition, and the fact that in clinics where feeding is done and more than 50 per cent. of the patients are fed, proves this. The economic aspect of this question cannot be touched upon at present except in the direction of advising the patients to use the available nutritious articles of diet in a better way.

The third method I still consider as the most important aspect upon which the success of the campaign will depend. It can be rightly stated that the improved conditions of living, the improved diet and a public health conscience, contributed far more towards the decline of leprosy in England than the stringent legislature and the compulsory segregation in leprosaria where it is very likely that most of the inmates would have been of the advanced

non-infectious type. Hence, however small our efforts may be, and however few the facilities, the public health aspect of the leprosy problem must now be attended to. I do not advocate the idea of forming separate committees for leprosy, for tuberculosis, for rural reconstruction and so on, where the public health activity is so very similar. A health unit may be opened in an area with an efficient clinic as the nucleus of the leprosy campaign which is to be conducted on an extensive scale. To begin with, the area may be three miles in radius (about 28 square miles, enclosing about 20 villages) which may be extended in course of time. The villagers should realise that a general problem is being tackled in the interest and welfare of every individual in the village and their co-operation should be enlisted in the direction where their disabilities and wants lie. Their interest to stamp out leprosy should then be aroused. They will be given the names of all the affected individuals whom they ought to persuade to undergo out-patient or in-patient treatment, according to the needs of the case, and even arrange for isolation. Four or five such health units in the Presidency can be taken up and the activities compared and modified according to the results obtained and difficulties encountered. An intensive public health work in four or five places and centralised surveys in about 20 areas will be a very useful work to start with. At the same time there should be a proper supervision of all the clinics with a view to maintain their efficiency.

I would finally add a part of the report on Leprosy adopted by the Eleventh Meeting of the Research Workers' Conference of the Indian Research Fund Association, held in 1933 :—

“ We consider that the time is now ripe for the Provincial Governments which have not already done so, to adopt a definite policy of leprosy work.

For the more efficient working of the anti-leprosy measures a Provincial Leprosy Board should be formed in each Province where leprosy is endemic. The Board should be chosen from representatives of the Medical and Health Departments, Mission to Lepers, British Empire Leprosy Relief Association, and any other agency interested or engaged in leprosy work.

The Board will not as a rule be an executive body but principally advisory and initiatory. Its functions may include the following :—

(a) Formulating a policy for the development of leprosy work in the Province.

## Leprosy Work done in the Madras

	Districts	1931 Census	Health Depart- ment Survey	TOTAL NEW CASES		
				1931	1932	1933
1	Gaujam ... ..	3337	5098	151	186	1100
2	Vizagapatam ... ..	3347	4468	339	1906	1425
3	East Godaveri ... ..	1459	3330	4021	2352	1937
4	West Godaveri ... ..	2278	2468	375	562	2149
5	Kestna ... ..	316	841	61	363	364
6	Gunhir ... ..	799	3233	178	264	728
7	Kurnool ... ..	267	384	—	99	171
8	Ananteipur ... ..	232	129	—	8	166
9	Bellary ... ..	276	481	27	27	82
10	Cuddapah ... ..	269	232	78	425	191
11	Clultoor ... ..	1144	1216	1768	1227	819
12	Wellore ... ..	414	1317	—	198	922
13	Madras ... ..	126	—	542	1120	2774
14	Chengleput ... ..	1799	2816	373	2340	2884
15	North Arcot ... ..	2776	5965	290	568	2467
16	South Arcot ... ..	4129	9050	2313	2297	9069
17	Salem ... ..	1064	3665	1139	5977	7789
18	Trichinopoly ... ..	1240	2076	84	103	2090
19	Tanjore ... ..	1939	2700	59	1534	1485
20	Madura ... ..	1624	2597	2283	2116	2046
21	Ramuad ... ..	852	969	69	297	760
22	Tinnevelly ... ..	856	750	115	696	600
23	Coinbatore ... ..	291	207	24	255	294
24	Malabar ... ..	1672	813	773	1095	1169
25	South Kanara ... ..	710	666	268	284	722
26	Nilgiris ... ..	11	10	—	—	—
	Total ... ..	32127	55481	15206	26963	44628



## Presidency from 1931 to 1935

Treated	Total	Total Attendance at the Clinics				No. of Existing Clinics
		1931	1932	1933	1934	
1422	3559	3999	14074	29771	32599	20
2049	5719	3358	26308	27118	36929	21
1707	10017	39780	30696	29739	29402	22
2103	5189	4377	16013	35313	44590	13
518	1306	—	6404	7474	11982	12
907	2077	523	2718	7689	10296	15
287	557	—	1033	2384	2544	10
113	287	—	113	2768	2276	6
68	204	—	140	2600	1704	3
206	900	404	5223	2842	2600	7
1651	5465	14269	13313	10612	17899	13
853	1973	—	1937	17039	16159	9
3834	8270	7513	18404	38496	55194	9
3971	9568	11963	43938	64180	101353	22
4213	7538	3389	4099	30604	65364	26
10192	23871	13420	18843	70973	157485	35
4181	19086	23486	84829	167567	134511	40
2878	5155	413	674	31442	45124	20
1597	4675	2386	20365	30406	35412	11
2564	9009	23939	32789	29955	41056	21
348	1474	1190	2912	12503	13334	16
709	2120	506	7866	10824	11047	12
609	1182	466	3629	4368	9785	15
2542	5579	11529	19796	24536	32580	16
437	1711	2256	3932	4592	7240	9
5	5	—	—	—	15	1
<b>49350</b>	<b>136147</b>	<b>169166</b>	<b>380050</b>	<b>695295</b>	<b>903050</b>	<b>404</b>

(b) Advising regarding future development of leprosy work planned by the local bodies in the Province.

(c) Co-ordinating leprosy work in the Province.

(d) By suitable propaganda through all available agencies, trying to create a background of public opinion without which anti-leprosy campaign cannot succeed.

(e) Raising funds for anti-leprosy campaign in the Province."

(*Vide B.E.L.R.A. Annual Report for the year 1933.*)

I am of opinion that the leprosy work in Madras Presidency progressed rapidly because of the close co-operation of the Government, the Local Boards and the public, as well as the willingness on the part of the medical officers to carry on this work as a part of their ordinary duties. The Government, ably assisted by the Provincial Leprosy Relief Committee constituted by them, strongly supported the leprosy campaign and continued its support even in the days of financial crisis. Success is ensured wherever governments take the leading parts in the campaign.

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## A Comparative Study of the Relative Efficacy of Ethyl Hydnocarpate and Ethyl Morrhuate in Leprosy.

G. R. RAO.

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### INTRODUCTION.

**I**N the Croonian lectures on "Researches on Leprosy and their Bearing on the Treatment of Tuberculosis," delivered before the Royal College of Physicians of London, on the 26th June, 1924, Sir Leonard Rogers (1924) (1) mentioned that sodium morrhuate was found to be effective in leprosy; and the same author states elsewhere Rogers (1928) (2) that "Good results could also be obtained by injections of sodium morrhuate, etc.," and illustrates this by the results of his own observations published in his 1921 paper, quoting from which he states that out of 51 cases treated for three months and upwards, 41 per cent. were completely cured, 39 per cent. greatly improved, 18 per cent. improved, and 2 per cent. stationary. As this latter paper could not be consulted in the original, it is difficult to find out what types of cases were mainly benefited and what types did not respond to morrhuates.

Muir et al (1924) (3) as a result of their collective studies on the therapeutic value of hydnocarpus, cod liver, linseed, olive, and cocoanut, ethyl esters, concluded that "both the closed carbon ring and the amount of unsaturated fatty acids appear to be factors of value." Apart from other papers by workers in different parts of the world, dealing with attempts at evaluation of the "in vitro" bactericidal activity of the morrhuates along with other ethyl esters and sodium salts of unsaturated and saturated oils, a perusal of the available literature shows a paucity of papers dealing with comparative experimental studies carried out with a view accurately to assess the relative efficacy of the ethyl esters of cod liver *vis-a-vis* the ethyl esters of hydnocarpus wightiana.

In view of the favourable opinions expressed by Sir Leonard Rogers, and because, next to linseed oil, cod liver oil has the highest "iodine value" (which indicates the degree of unsaturation of the fatty acids); and further, no records of comparative studies from the therapeutic standpoint were available in the literature up to the end of 1931, Dr. E. Muir of the Calcutta School of Tropical Medicine suggested to the writer that he should carry out the experiment on which this article is based. Dr. Muir kindly supplied large quantities of ethyl morrhuate.

#### MATERIAL FOR STUDY.

Five C3 cases of leprosy and one N2 case with very marked symmetrical lesions (four out-patients attending the clinic and two in-patients of the Purulia Leper Colony) were chosen and examined thoroughly for the existence of other concomitant diseases that might vitiate this experiment. After dealing with the predisposing factors by appropriate treatment, they were subjected to this study. Half per cent. iodised ethyl hydnocarpate was injected intradermally into the lesions on the right side of the body, while diluted ethyl morrhuate (ethyl morrhuate one part and ethyl oleate two parts) was injected intradermally into the lesions on the left side, once a week, keeping the doses of both the preparations the same, *viz.*,  $\frac{1}{2}$  ccm. to 6 ccm. At each weekly injection, the respective doses of the preparations injected, were, as far as possible, kept the same. Pure ethyl morrhuate was found to be too irritant and therefore had to be diluted with ethyl oleate to permit of its continuous use. Even after dilution, it was found to be comparatively more irritant than the iodised ethyl hydnocarpate.

Of the six cases taken for this study, one C3 case (inmate) suddenly absconded and another C3 case (out-patient) was found to be too irregular in attendance and was therefore excluded from this experiment. The rest, three C3 cases (two out-patients and one inmate) and one N2 case, took the treatment regularly for a period of from one year and eight months to two years and four months; and the observations recorded here are based chiefly on the results of treatment in these four cases who, evidently, have had adequate and prolonged treatment. One N2 case was purposely included in this study as he had well-marked symmetrical macules (hypopigmented patches) some of them with slight anæsthesia, and it was considered desirable to study the influence of the drugs injected intradermally, on the pigment of the skin as well as on the sensory disturbances noticed.

Ser. No.	Name and Sex Inmate or out-patient	Type on admission	Dosage range in CCM.	Total No. of Injections	Total period of Treatment	Final results (Clinical)	Final Bacteriological results	Remarks
1	Shanta, F., O.P. Elderly woman nearing 40 years of age	B <sub>3</sub> (C <sub>3</sub> )	½ to 3	49	yrs. mts. 1 8	(N <sub>2</sub> ) much improved	RTBS <sub>2</sub> & LTBS <sub>2</sub> —neg., RHC & LHC—neg	Had to int rupt 7 mont treatment domestic reasons
2	Soi Rajwar, F., O.P. Adolescent	B <sub>3</sub> (C <sub>3</sub> )	½ to 3½	51	1 8	(C <sub>2</sub> -N <sub>2</sub> ) im- proved	LHC.20/50,RHC- Very few coc- coids, LHE- 16/20, RHE- few small groups of coccoids, nose -M/1 ++	Had to int rupt 7 mont treatment domestic reasons
3	Moti Rajwar, M., O.P. below 16 years of age	(A <sub>1</sub> ) N <sub>2</sub>	½ to 2½	52	1 10	(N <sub>2</sub> ) much improved	nil	ni
4	Sraban Majhi, M., House, No. 5, adult	(B <sub>3</sub> ) C <sub>3</sub> -N <sub>2</sub>	½ to 2½	86	2 4	C <sub>2</sub> -N <sub>2</sub> improved	RHE-M/1, LHE- M/1 + RHF- 5/10, LHF-9/10, nose-M/1 +++	nil

O.P.—Out-Patient. M—Male. F—Female.  
Mts.—Months. The numerator indicates the  
number of bacilli found, and the denominator  
the number of fields examined. M/1—Many  
bacilli per field, the plus indicates more.

R.T.B.S.—Right lateral half of the back  
trunk, second region from above; similarly  
refers to the left. R and LHC—Right and l  
cheek. R and LHE—Right and left ears. R  
LHF—Right and left halves of the forehead.

## RESULTS.

In judging the results of a comparative study of this nature, one has carefully to bear in mind the probable systemic effects exercised by prolonged treatment with a tonic preparation like the morrhuate. Making due allowance for this factor, the influence of morrhuate *vis-a-vis* that of the hydnocarpate on (i) the various clinical signs of the disease ; (ii) the causative organisms, *viz.*, *M. leprae* ; and (iii) the total results obtained from this experimental treatment have been assessed as follows :—

(a) *On hypopigmented areas* : Undoubtedly, ethyl hydnocarpate had a much better effect on the pigment of the skin than ethyl morrhuate (in spite of the latter being more irritant) even after leaving a broad margin for the temporary but marked cosmetic effect exercised on such lesions by the iodine contained in the iodised ethyl hydnocarpate. (b) *On anaesthetic areas* : While the improvement in anaesthesia on the side treated with hydnocarpus esters was lasting, that on the other side treated with cod liver esters was transient ; and in some cases no effect on anaesthesia was noticed. (c) *On leprotic infiltrated patches and nodules* : On these also, the effect of hydnocarpus esters was more noteworthy than that of the cod liver esters, resolution being more rapid on the right side than on the left. (d) *Effect on M. leprae* : There is an appreciable difference in the bacterial contents of the lesions on both sides, as will be evident from a glance through column No. 8 in the table appended at the end of this paper. Right side lesions show comparatively fewer bacilli, the technique of taking clips, and staining the smears being the same, and the method of counting the bacilli also being the same, all done by the same observer. (e) *Total results obtained* : Of the four cases, two are considered to have "much improved," one C3 case, Shanta (*vide* photos) becoming N2, and the other N2 case, Moti Rajwar, becoming N1 with marked clinical improvement in his lesions, the improvement being more marked on the right than the left side. Two other cases, Soi Rajwar (C3) and Sraban Majhi (C3-N1) are considered to have only "improved," both of them becoming C2-N2 cases. The slowness of improvement shown by the former may be explained on the ground of her age, *viz.*, adolescence, which makes an increased demand on the human economy ; and in the latter case, the presence of extensive and severe seborrhoeic dermatitis on the face and to a lesser extent all over the trunk, interfering with the intradermal method of treatment and also with the absorp-

tion of the injected drug, may have minimised the benefits of treatment.

To illustrate the marked difference in the appearance of the lesions treated by the two different esters, two photos of Shanta, one taken in January, 1932, just before commencing the experimental treatment, and the other, taken in January, 1935 (*i.e.*, three years after the experiment was started, or in other words, at the close of the experiment) are included in this paper. In the interests of space, the photos of other cases are not given. From these two photos it can be seen that the left side lesions are still clearly visible in their entire outline, whereas the right side lesions have almost completely resolved. Keloids produced by irritation due to intradermal injections, are more extensive on the left side than on the right. This shows that cod liver esters are more irritating than hydnocarpus esters. While the lesions on both sides have become bacteriologically negative, the left side lesions have not completely resolved and are still visible clearly.

#### SUMMARY AND CONCLUSIONS.

(1) The relative efficacy of  $\frac{1}{2}$  % iodised pure hydnocarpus wightiana (ethyl esters) and cod liver (ethyl esters) diluted to one in three with olive (ethyl) esters, was studied in four cases of leprosy (three C3 cases and one N2 case) with well marked symmetrical lesions, injecting the ethyl hydnocarpate intradermally into the right side lesions and the ethyl morrhuate similarly into the left side lesions, once a week, for a period of from 1 year and 8 months, to 2 years and 4 months.

(2) On the hypopigmented, anæsthetic and leprotic infiltrated areas as well as nodules, the clinical effect was much more marked on the side treated with the hydnocarpus (ethyl) esters, than on the other side treated with ethyl esters of cod liver, even after making due allowance for the temporary cosmetic effects exercised by the iodine contained in the iodised ethyl hydnocarpate, on the hypopigmented and/or erythematous lesions.

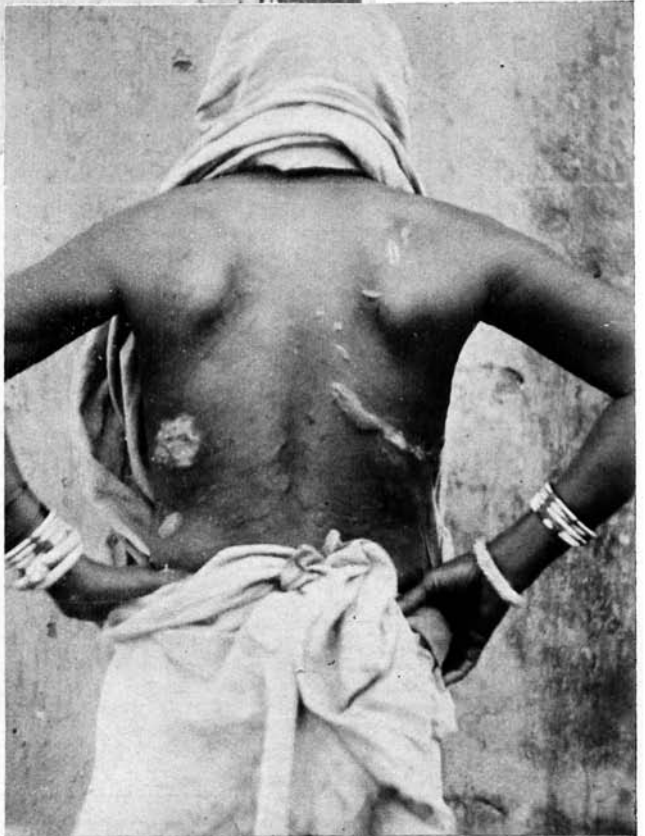
(3) While some diminution of the number of bacilli in the treated lesions as compared with the bacterial content of the untreated lesions, as for example, the nose, was obtained with the ethyl morrhuate, the effect was distinctly more pronounced in the lesions treated with ethyl hydnocarpate. And this improvement in the bacterial content of the lesions does not appear to have been in any way influenced by the irritating quality of the drug injected.

(4) In spite of its more marked irritating effect on the

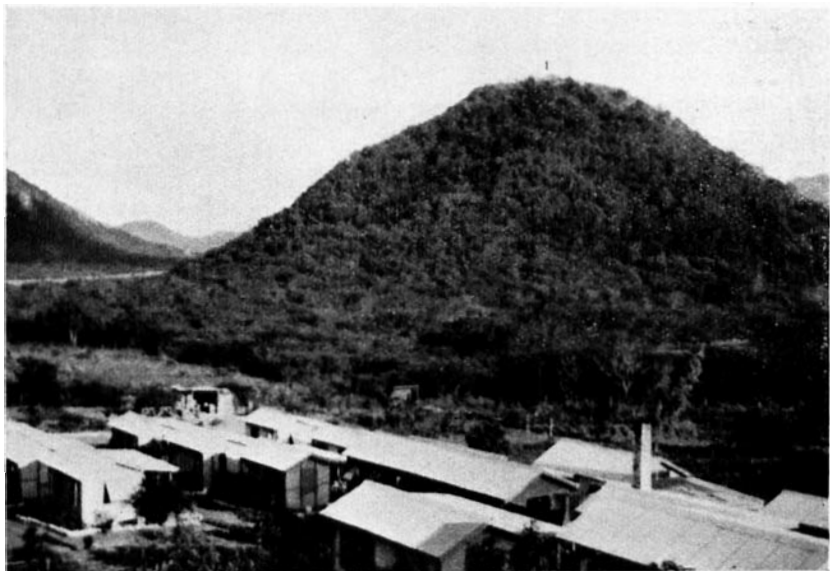


Case showing lesions on both sides of body before commencing treatment.

After 3 years' treatment. Note disappearance of lesions on right side, while those on left side are clearly visible in their entire outline. Keloids produced by irritation are more extensive on left side than on right.



(Photos by Mr. A. Donald Miller)



GENERAL VIEW OF LEPROSY SETTLEMENT, ANTIGUA.



FAMILY INFECTED WITH LEPROSY.  
NOTE SEVERITY OF INFECTION IN CHILD.



skin, ethyl morrhuate seems to be comparatively less efficacious than ethyl hydnocarpate, in leprosy. The latter seems to have some special effect on the active leprosy lesions whether of the neural type or of the cutaneous type. This special effect does not appear to be caused by the irritation produced by injecting the drug intradermally, as the more irritating ethyl morrhuate has produced a lesser degree of clinical improvement in the lesions treated with it.

#### ACKNOWLEDGMENTS.

The writer's grateful thanks are due to (i) Dr. E. Muir, of the Leprosy Research Department of the Calcutta School of Tropical Medicine, for suggesting this experiment and for the supply of the required quantity of ethyl morrhuate ; and (ii) Mr. A. Donald Miller, Secretary for India of the Mission to Lepers, for the two photos included in this paper.

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## Leprosy in the Leeward and Windward Islands.

R. G. COCHRANE

**T**HE Leeward Islands consist of Dominica, Antigua, Montserrat, St. Kitts and Nevis. The seat of government is at Antigua and each island is administered by an Administrator. It is interesting to note that in those islands where the economic conditions are fairly satisfactory, there appears to be little leprosy of endemic importance.

#### DOMINICA

This island is 29 miles long and 16 miles broad, and has a population of 44,000. Dominica is the most mountainous island of the group, the interior of which is almost inaccessible by ordinary means. The chief towns are along the coast, and the easiest approach to these is by means of motor launch. Of the islands of this group Dominica and St. Kitts have the highest incidence of leprosy. The disease occurs in two chief centres, one around Roseau and the other in the southernmost town of Souffriere. There has been considerable concern regarding the spread of

leprosy within recent years, and there is justification for such anxiety. In the first place there is no segregation of the open case, and there is evidence that children are being infected ; this is especially so in the Souffriere area. The total number of cases reported in the island is some 37, but no detailed survey or examination of contacts has been made, and therefore the number may be considerably higher. It is evident, however, that leprosy is an important endemic disease, and more active measures should be taken for its control. These might include :—

- (1) Establishment of a settlement for the open case.
- (2) Examination and follow up of contacts and school children in areas where the disease is known to be prevalent.
- (3) Observation and/or treatment of early non-infective cases.
- (4) Propaganda in schools and education of responsible authorities in the prophylaxis and control of leprosy.

Dominica presents a unique opportunity for starting from zero and demonstrating the possibility that leprosy is a disease possible of control. It is hoped that an anti-leprosy scheme will be organised which will deal with leprosy as a public health problem, and not be an attempt only to segregate and treat all known cases of the disease in the island without relation to the type of the disease or to areas and spread in the country. Special emphasis should be laid on the incidence among children and the preventing of children and adolescents from coming into contact with open cases.

#### ANTIGUA

Antigua, the seat of the government of the Leeward Islands, has an area of 108 square miles, and a population of approximately 52,000 (1932). The incidence of leprosy as judged by the number of inmates in the Home, does not appear high. This is certainly the case if the position is compared with that of St. Kitts, with approximately half the population and the number of known cases between 60 and 70. There are 18 cases isolated in the Home, four of whom come from other islands. Cases seem to be sent in from all the parishes of the island, but as is to be expected, the greater number come from the more populated parishes of St. John's and St. George's, in which the two chief towns are situated. The low incidence of leprosy in the island is probably due to the better economic condition. Although leprosy does not appear to be prevalent in the island it has

been suggested that further enquiries might be instituted, in order to ascertain whether there are definite foci from which they are arising, *e.g.*, it might be profitable to examine school children and contacts of existing cases. It is interesting to note that the great majority of cases in the institution are of an extremely severe kind, suggesting that even though the disease may be tending to diminish, it does not necessarily mean that the type of case is less severe.

All the inmates are African in origin, and it appears that the racial factor may not be unimportant in determining the type of disease.

#### MONSERRAT AND NEVIS

It is unnecessary to dwell on the position in these islands as the sporadic cases which arise are transferred to a settlement on one of the other islands.

#### ST. KITTS

St. Kitts is one of the smaller islands of the Leeward group. It has a population of 18,000 (1932), and is 28 miles long and 5 miles broad. Economically the inhabitants appear to live on a very low level. The staple product is sugar, and the soil seems to be of such a poor nature that very little else will grow. This means that if the sugar market is depressed the island suffers economically. The straightened economic condition of the island strikes a visitor forcibly, especially if he should be coming from islands such as Grenada and Antigua. Owing to these facts it is not surprising to find that the incidence of leprosy appears to be fairly high. There is an institution in St. Kitts about 6 miles out of the capital town of Basseterre, in which there were isolated at the time of my visit, 53 cases. In addition to those isolated in the leprosy hospital there were some 27 known cases in the island who were also cared for by the doctor in charge of the Home, who visits them periodically, giving them treatment. These cases came chiefly from Basseterre, but others were scattered over the island. Of the 53 cases in the institution, 3 were 20 years and under, and there were 35 males and 18 females. The majority of the cases were of the very advanced cutaneous type.

The total number of known cases in the island therefore at the time of my visit was 70. Ten of the cases in the Home came from one or other of the smaller islands. The Home is well organised and recreational facilities are provided for the inmates. The seriousness of the situation so far as leprosy is concerned is revealed on closer examination. Although one was only able to examine in a very cursory

manner the contacts in the capital town of Basseterre, it was somewhat of a surprise to find that in every case of nodular leprosy whose contacts were examined, one to three children had become infected. This means therefore, that to obtain a probable estimate of the number of cases in the island, it would be legitimate to double the figure of known cases. This would give an incidence of 140 out of a population of 18,000, or 0.8 per cent. In view of the fact that the number of children infected seems to be fairly high, it is legitimate to conclude that leprosy is probably spreading in St. Kitts. The houses in which the disease occurs in Basseterre are of a very poor type. They are crowded together cheek by jowl with innumerable children in and around the vicinity. Such are the conditions that all the elements required for the spread of the disease are present, and the fact that open cases in the advanced cutaneous stage are at large in an area where children are under grave risk of infection, and where the economic conditions are very poor, makes the probability almost a certainty that the disease will spread further. The authorities are alive to the position in St. Kitts, and measures have been suggested for the control of the disease. The following points have been emphasised:—(1) Examination of all school children in the island; (2) Isolation of all open cases in the settlement; (3) Observation of all contacts of cases discovered; (4) Treatment and/or observation of early neural cases discovered, especially among children; (5) Propaganda among the public and medical profession concerning treatment, the mode of spread of the disease and methods of control. Leprosy should not be impossible of control in a small island such as this, and it will be interesting to watch the situation develop, for valuable lessons could be learned from a concerted attempt to control the disease in the island.

## WINDWARD ISLANDS

The Windward Islands consist of St. Vincent, St. Lucia and Grenada, and the seat of the Government is at Grenada.

### ST. VINCENT

St. Vincent is 11 miles in length and 12 miles in breadth and has a population of 47,961 (1932).

The total number of cases segregated in the island is 17, all of whom are adults. Accurate information as to the foci of the disease is not available, and therefore, it would be difficult to say whether there is any evidence that the disease is of any real endemic importance. Conditions

under which sufferers are segregated are not altogether satisfactory, and suggestions have been made concerning this. As far as present evidence goes there does not seem to be any real need for further active steps to be taken, as there seems little indication that leprosy is an important public health problem.

#### ST. LUCIA

This island is 27 miles in length with a breadth of 14 miles, the population being 59,676 (1932). There is a settlement for those suffering from leprosy at Rat Island, which is an island off the coast some 60 miles from the capital town. I was unfortunately too short a time on shore to enable me to visit this settlement. There seems to be some indication that there is a small focus of leprosy some 9 miles from Port Castries. This is a fishing village where from time to time cases have arisen. A superficial and hasty examination of one of the schools was made, and 200 scholars were examined, no cases being discovered. There seems, however, to be some justification for a complete examination of all school children in the village. It appears that there may be a problem needing attention, but until further data are amassed it is impossible to say whether leprosy is an important disease or not. Recommendations have been made regarding lines along which enquiries might be made.

#### GRENADA

The area of Grenada is 21 miles in length and 12 miles in breadth, and the population is 66,302 (1932). Of all the islands in the group this appears to be economically in the most satisfactory condition, and it is interesting to note that leprosy does not appear to be a problem of any magnitude. The Home, some 7 miles from the capital, St. George's, is adequate for the purpose, and is neat, tidy and well cared for. The number in the Home is 13, and the last case reported some 18 months ago was an expatriated case from Trinidad. The last indigenous case was discovered some 3 years ago, and there has been no instance of childhood infection for many years.

The general situation indicates that apparently conditions in the island are such that the disease tends not to spread, and there is no evidence that further steps need to be taken with regard to the control of the disease.

It is suggested by some authorities that there should be a central home for the smaller islands of the Leeward and Windward group. It is admittedly expensive to organise a leprosy settlement only for a few cases, such as

exist in Grenada, St. Vincent and Antigua, but on the other hand the islands are so far separated that there would be considerable objection to transporting lepers a distance from their homes. If this were done it would be very difficult for the authorities to discover cases, because it would cause individuals to hide themselves. From many points of view one central settlement has attractions, but the problem of transportation, and of the undesirability of taking individuals far away from their homes, give rise to difficulties which would be hard to overcome.

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## Efficiency of Institutional Treatment for Leprosy.

E. B. CHRISTIAN.

(*Reprinted from "Leprosy in India," Vol. VI., No. 4, October, 1934.*)

**T**HE treatment of leprosy is very prolonged and sometimes discouraging both for the patient and the doctor. One cannot come to rapid conclusions regarding the results of treatment from the rate of discharges, but by seeing the effects of treatment in the discharged patients. Apart from the special and general leprosy treatment the doctor ought to see that the patient takes sufficient exercise, and keeps himself clean; and he should cheer up the patient if depressed, as is very often the case. Mental depression in leper patients is very common and has very bad effects on the general health of the patient, and consequently on recovery.

### OUR ROUTINE TREATMENT.

*Drugs.*—Intramuscular, subcutaneous, and intradermal injections of 4% creosoted hydnocarpus oil or its esters twice a week with maximum dosage of 6 c.c. Treatment of intercurrent diseases, if present.

*Exercise.*—Regular daily three hours' work for all the patients who are not ill—especially gardening and field work.

*Diet.*—Average Indian village diet.

*Personal Hygiene.*—We see that all the patients keep themselves clean in body and clothes.

*Entertainments.*—Games, cinema, occasionally dramas acted by the patients themselves, and gramophone music.

### DISCHARGES.

From the beginning of 1929 to the end of 1933, 621 patients were discharged on 6 months' parole either as

disease-arrested or symptom-free. The period of treatment ranged from 6 months to 10 years, the early neural cases—especially the adults—being discharged sooner. The average length of treatment in each case is about 26 months.

*Our Standard of Discharge.—*

1. Bacteriologically negative, or showing only a few short forms of acid-fast bacilli in the skin, about 1 or 2 in four or five fields of the microscope. (Method: scraping of the nasal mucosa and skin clip.)

2. No nerve or skin reactions for a period of 6 months.

3. Sedimentation Index between 10 and 20.

4. Good general health of the patient.

Out of the 621 patients who were discharged, 223 patients came back for re-examination. The major portion of them came with an idea that they had a relapse due either to some trophic ulcers or cracks in the feet, and for other skin diseases, mostly scabies. The rest came to see their old friends and to get examined to be sure that they were keeping well. What happened in the case of the other 395 patients is not known to us. A few of the educated patients write to us sometimes regarding their health saying that they are well, and about two dozen of them are working in town as mechanics, peons, and menial railway servants. Presumably these people are well and do not wish others to know that they had once been patients in a leprosy hospital! Probably the others who did not come for the re-examination are quite well, at any rate without active signs; otherwise, knowing that a discharged case, if relapsed, will always be re-admitted or advised, they would have been sure to come back for re-examination if they had had any signs of recurrence of disease.

Out of 621 patients discharged, 397 were discharged without bacilli and 222 with a few bacilli. Out of 223 patients re-examined, 111 were from those who were discharged without bacilli, 112 from those discharged with a few bacilli. Out of these 223 patients, there were 30 cases of relapse consisting of 7 children (under 14 years of age), 3 women, and 20 men.

Out of 112 who were discharged with a few bacilli, we found no bacilli on re-examination in 15, and an increase of bacilli, both in nasal and skin smears, in 5. The rest, though showing a few bacilli, were the same or better than when discharged.

Out of 111 patients who were discharged as bacteriologically negative, bacilli were found in 17, and in two of

these 17 bacilli were found in nasal and skin smears. Eight of them, though negative, still had increased anæsthesia or fresh patches, and the rest were the same or better than they were when discharged. All those that had trophic ulcers were temporarily admitted and treated surgically, if necessary.

	<i>Re-examined patients.</i>	<i>Patients relapsed.</i>
Children under 14 years of age	33	7
Women ... ..	26	3
Men ... ..	164	20
	<hr style="width: 10%; margin: 0 auto;"/> 223	<hr style="width: 10%; margin: 0 auto;"/> 30

The relapse rate is 13.4%, being high in children. The 7 children who relapsed had had, on an average, treatment for 22 months, and along with the routine treatment they had had 60—120 grains of potassium iodide bi-weekly for a period of 6 months. All these 7 cases were negative when discharged. In two of these bacilli were found both in nasal and skin smears, in one a few bacilli were found in a skin smear, and the rest had fresh patches on re-examination. So far not a single case of relapse has been recorded in children who had been discharged after reaching the age between 16 and 20. In children leprosy treatment does not give so quick results as in adults, but when they reach adult age they improve and clear up rapidly under treatment.

As far as our out-patient clinics are concerned we encounter a great many difficulties and our results in them are not half as good as in our institution. The chief difficulties are :—

1. Irregularity in attendance ; the treatment being a prolonged one the patients get discouraged in a few months and, the progress being slow, discontinue treatment and resort to "magic fortnight cure" treatments advertised in the papers.

2. An out-patient generally thinks that anti-leprotic treatment alone will save him from the disease, and neglects diet, exercise, and personal hygiene. When advised about exercise, many patients state that they get plenty of exercise in the course of discharging their daily work in their respective employments.

3. Mental Depression.—Especially in out-patient clinics where the majority are early cases, the very fact that it is leprosy they are suffering from worries them continuously, added to which are the worries of work, etc., which affect their general health and consequently their recovery.



4. Intercurrent Diseases.—A doctor in charge of our out-patient clinic sees the patients twice a week and the other days he is not in contact with them. In the meantime, if the patient gets an attack of dysentery or malaria, the doctor may not know anything about it at all till the patient reappears again at the clinic after an absence of a fortnight or a month. For instance, after an anti-leprotic injection the patient may have an attack of malaria, and after the malaria subsides he may have fresh patches or a lepra reaction. The patient blames the treatment and discontinues attendance.

5. Superstition and Social Stigma.—Very often this is the main reason for the patients in the out-patient clinic not attending regularly for treatment. This latter is very often the case among educated patients.

On the other hand a patient who has once been in a leprosy hospital, after voluntary or official discharge, and attends an out-patient clinic, is very regular in attendance and improves under treatment. This is because he lives up to the standard of institutional life. He knows a good deal about the disease, has seen many patients getting better steadily, though slowly; and so he has hope, faith, and a happy frame of mind.

#### CONCLUSIONS.

1. Patients having a few bacilli, one or two in four or five fields of the microscope after a prolonged period of anti-leprotic treatment, can quite safely be discharged as disease-arrested. The danger of these patients infecting others is very remote. Eventually, even without treatment, these bacilli may disappear if the patient keeps up his general health.

2. Children ought not to be discharged until they reach an age between 14 and 16, as before that age they are more liable to relapse.

3. Apart from the special and general anti-leprotic treatment, exercise, diet, personal hygiene, and the mental condition of the patient should be particularly looked into.

4. Leprosy treatment may be adequately tackled in an institution.

#### ACKNOWLEDGMENT.

My thanks are due to my chief, Dr. Donald P. Dow, for valuable suggestions and allowing me to publish this article.

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# The Epidemiology and Prevention of Leprosy.

R. G. COCHRANE.

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## INTRODUCTION.

**T**HERE are still many aspects of leprosy which have yet to be elucidated, but we can to-day take a bird's-eye view of the problem in a way which was impossible ten or fifteen years ago. There has evolved a new outlook, the chief result of which is the increasing number of cases with early or slight lesions which are being seen. This has complicated the clinical picture, and as will be shown has a most important bearing on its public health aspects. In this connection I propose to put forward a hypothesis which has arisen as a result of experience gained in studying the disease in many countries and under many varying conditions, and which may help to simplify the problem of controlling and ultimately eliminating it.

A basic consideration is that while leprosy is doubtless mildly contagious it seems to be no more than just pathogenic to man; that in order for it to gain a sufficient footing in the body to cause damage a considerable disturbance of normal resistance is necessary. The disease is closely analogous to tuberculosis in many respects; but the causative organism is peculiar in that, though it is a parasite, it seems in many instances to establish an almost perfect commensalism with the tissues. This is illustrated by the type of case, not infrequently seen, in which there is little clinical evidence of the infection, but on examination innumerable bacilli are found wherever a scraping is taken; a balance seems to have been reached between the body and the bacillus whereby the latter lives and multiplies but causes little or no damage to the host. There seems to be little evidence of the production of toxins, and the reaction to the organisms by the body seems to be a reaction to a foreign body rather than to a toxin-producing organism.

## AGE AT INFECTION.

The hypothesis that leprosy is usually acquired in childhood or early adolescence is being more and more generally accepted. Lampe (1, 2) states that he is firmly of that belief, and holds that active measures should be concentrated chiefly on the children. It is also believed by many that this period is one in which, if the infection is

implanted, it is most liable to spread and set up active disease. It seems entirely probable that a large proportion of cases do become infected during these periods, and that once adult life is reached the chances of acquiring the disease are greatly diminished. However, there is reason to believe that there are many cases in which infection is actually established but does not go on to the active disease. If a patient has had only slight evidence of a leprotic infection in childhood, and if this has remained inactive during the stress and strain of adolescence, the chances of it becoming active are slight. There is, of course, the possibility that latent foci may light up even under the most unexpected conditions, but preventive measures on a large scale cannot be formulated upon the exceptions to what may be found to be a general rule.

On the basis of the foregoing, one of four things may happen if a child acquires leprosy:—

(1) The disease may advance into the more active stages and the individual become progressively worse.

(2) There may be a stationary or latent period and then, owing to lowered resistance, the disease may light up many years later.

(3) The infection may remain stationary and the lesion become naturally arrested, though remaining evident.

(4) The lesion may disappear entirely.

#### THE ABORTIVE CASE.

As a result of the increased interest shown in leprosy, and of the emphasis on surveys, cases of categories (3) and (4)—the abortive cases—are coming to light in both children and adults, whereas previously little or nothing was known about them. That such cases occur need not occasion surprise. One of the special features of leprosy is its self-healing nature. Therefore, it seems quite as reasonable that leprosy should be naturally arrested in an early stage as that this may happen in late ones, as unquestionably is quite frequently the case. As a matter of fact there is every reason to believe that in many individuals who are in good health, and whose resistance is relatively high—though not quite high enough to prevent infection entirely—the disease does become arrested in the early stages.

There is an important parallel in tuberculosis, where many individuals have foci of the infection but show no clinical symptoms and do not pass into the more advanced stages—these, too, are “abortive cases.” The chief difference between such cases in tuberculosis and leprosy is that in the former there is no means apart from a suspicious

X-ray photograph whereby a patient with a slight early, latent or abortive lesion can be detected, whereas in leprosy a clinical diagnosis of a suspicious skin patch can often be made when there is no evidence of general activity of the disease, and such lesions can easily be observed for years.

I am aware that many believe that there is another class of abortive case in endemic areas, namely, persons who harbour the leprosy bacilli in deep foci and never show any external lesion. Such cases, if they exist, are more closely analogous to the undetected tuberculosis infections, but they do not come into the present discussion because they are never recognised.

Because of the existence of abortive cases, and of the numerous cases with extremely early or slight lesions that are being found in many places as a result of modern activities, entirely wrong conclusions are liable to be drawn from ordinary data on the incidence of the disease. If, for instance, a survey of an area has revealed a high incidence of leprosy it is only natural to assume that it is on the increase, and that all the cases which have been discovered need provision for active treatment. However, increasing knowledge of the early and especially the abortive cases indicates that our attitude may need modifying.

#### THE ABORTIVE CASE AND TREATMENT.

It seems very likely that indiscriminate treatment of every person found to have signs of leprotic infection may eventually bring modern treatment into disrepute. In treating all and sundry, especially in out-patient centres, one is treating among the adults those on the one hand who have abortive infections, and on the other hand those whose bodies are so invaded by the organism that there is little if any hope of bringing them to a stage of non-infectivity. Because of the lack of selection of cases in many out-patient centres favourable results are difficult to obtain within any reasonable period, and the whole work is adversely criticised.

With special reference to the children with inactive, very early or abortive lesions, one cannot agree with the view that it is wrong not to treat all cases regardless of type and activity of the lesion. We have no evidence that the present anti-leprosy drugs can prevent the development of further lesions in such cases. A recent article indicates that "drug treatment does not prevent these early developments of leprosy in young children," and that after the earliest lesions have appeared specific remedies do not prevent the development of more active forms of the disease (3). From this it would seem that proper living

conditions constitute our main defence in such cases. Care of this nature probably gives the child an 80 per cent. chance of not developing further lesions ; in many instances the suspected area will return to normal in a few years.

#### THE ABORTIVE CASE IN PRACTICE.

It is most important to consider these things when a diagnosis of leprosy is made. The physician must ever remember the social factor, that a definite diagnosis often blasts the patient's life for ever. If the patient be a girl it may completely ruin her chances of marriage. It is also to be realised that it is probably as useless to give special remedies to the abortive cases as to the advanced secondary cases. In consideration of these facts, and of the existence of abortive cases among those found with very early or slight lesions, I believe that the general statement may be made that when such evidence of a leprotic infection is found it does not necessarily follow that either treatment or isolation should be instituted. It seems legitimate to conclude that, apart from examining such cases every six months, no further action need be taken unless and until there is evidence of activity of the disease.

#### DESCRIPTION OF ABORTIVE LESIONS.

For these reasons, and others to be discussed, it is important that all leprosy workers should recognise the existence of the abortive type of case, and that the clinicians should be able to recognise it. Therefore it may be well at this point to endeavour to set down as carefully as possible the guiding points for the recognition of these lesions as seen in both adults and children. It may be said here that Mitsuda's test may be found of value in helping to decide whether a case is an abortive one or not, at least in adults.

*Lesions in Adults.*—In an adult it is a fairly simple matter to be reasonably sure when such lesions exist.

(1) A single skin lesion which has no sign of activity whatever, and has been in existence for some length of time—a year or more. If the history shows that the patch has been noticed only recently (within six months) it would be wise to keep the person under observation. If this cannot be done it may be necessary to treat the patient in order to insure his attendance for observation ; an exception might be in the case of a healthy adult over 30 years of age, in which case isolated inactive patches of a suspicious nature may be left alone. It should be remembered that a supposedly early patch may be changed to scar tissue by intradermal injections, but in doing this it cannot legitimately

be concluded that one is producing any effect on a leprotic infection unless some previous evidence of activity has been demonstrated.

(2) Multiple hypopigmented patches which have been in existence for a considerable time, with no other clinical sign such as anesthesia, enlarged nerves, etc. Such cases, while not coming under the heading of abortive cases, probably represent naturally arrested cases. The loss of pigment may be permanent and it may be a waste of time to endeavour to restore pigment to the affected areas.

(3) Neural lesions where one main nerve is thickened without tenderness, with no other clinical manifestation of the disease.

*Lesions in Children.*—Recognition of the abortive lesion in children is more difficult, but the following points may prove helpful :—

(1) Unless they are absolutely typical, suspicious patches on the face may be disregarded except when accompanied by signs elsewhere. Hypopigmentation on the face is closely simulated by the results of septic infections, *e.g.*, impetigo.

(2) If a child has only a single patch which does not show signs of activity, it is better to see that the child is placed under healthy surroundings than to treat it.

I wish to emphasise by repetition that with children diagnosis is more difficult than with adults, and that the responsibility of the physician is greater. I hold that whatever may be our views concerning the absolute efficacy of present treatment—a subject to be touched on again—we have no right to withhold the special remedies from any active case. On the other hand, as has been said, in treating as a leper a child who has a suspicious patch one is not certain of doing it any good with respect to the infection, and one is certain to do it harm socially. Therefore, unless there is definite evidence of activity of the disease in such cases there should be great hesitancy about applying the special remedies. In the event of a child being found to be an active case the situation is, of course, very different ; he should be put under active treatment. If the case proves to be an “ open ” infectious one he should, for the sake of other children if not for his own, be withdrawn from school and isolated.

#### THE PUBLIC HEALTH ASPECT.

The position of the abortive case in general anti-leprosy measures is a matter of the greatest importance, one that should be given most careful consideration. As has been pointed out, this element may entirely vitiate conclusions

drawn from mere numbers of persons found by survey to show evidence of leprotic infection. I was first impressed by this aspect of epidemiology during a tour in Africa a few years ago, when I was struck by the differences in the types of the disease seen in different places. In the Bahr-el-Ghazal Province of the Sudan especially I noted a large number of adults who had comparatively mild forms of the disease. This aspect of leprosy I have emphasised in a report to the Government of Ceylon on an investigation recently made there :—

“ If this type is comparatively common, then it means that measures for prevention taken on information concerning the number of sufferers may be laying emphasis on entirely the wrong areas.”

The question of what measures should be taken has not yet been satisfactorily settled. During the past few years schemes for the control of leprosy have emphasised chiefly the establishment of treatment centres and the treating of every case presented. However, a compilation made by the Mission to Lepers covering the past six years shows that in India the number of cases that are healed averages 9 per cent. of those treated. Some institutions have published figures as high as 17 per cent., but even in that case it means that a very large percentage do not become completely clear of the disease.

While I believe that we have made a great advance in treatment during the past ten years, it is nevertheless to be stressed that the present treatment methods do not necessarily benefit every type of case. Those which benefit most are those active cases in which the bacillus has not completely invaded the body ; if statistics were confined to such cases the percentages of recoveries would be considerably higher than those indicated above. However, the facts as they exist strongly indicate that the stress which has been placed on out-patient treatment in a leprosy control campaign may need modifying. It may be noted that at the All-India Conference, held in Calcutta in March, 1933, the emphasis tended to swing from treatment to prevention (4).

#### A MODIFIED PUBLIC HEALTH PLAN.

There are still other factors that bear on the public health aspect of the problem. Leprosy is far more prevalent in some endemic centres than hitherto imagined, and in places the incidence that has been revealed by the work of the past ten years is such that unless the figures are interpreted properly they may be very discouraging. Leprosy, after all, is only one of the many endemic diseases in any

country and the treating of even every early case would involve an expenditure of money and absorption of time out of all proportion to its importance. The problem which this disease presents is, as a whole, so difficult that it is humanly impossible to cope with it completely, from all aspects, in any country where the disease is very prevalent. A system adequate to that would engulf the medical resources of any budget. However, one may suggest that to attempt such a colossal task is perhaps unnecessary, but that a fresh viewpoint and a modified plan of campaign are called for.

In view of the foregoing, certain principles should be laid down in order that time may not be wasted, and that the disease may be brought under control in a given area in the shortest possible time. The following are the main points :

(1) A complete survey of the leprosy infected area is required. The data should include the ages of the patients and the types of cases.

(2) Open cases should be isolated. This should be either in an institution—self-supporting—or in special huts in the patients' own villages, a measure that the villagers should be encouraged to carry out.

(3) Active cases should be treated. Particular attention in this respect should be paid to children who present signs of activity.

(4) Contacts and non-active cases should be followed up and observed periodically.

(5) Propaganda should be carried on, emphasising :  
 (a) That leprosy is an ordinary disease communicated by close contact, and neither venereal nor a curse of God ;  
 (b) that only certain stages are infective ; (c) that not every case needs treatment, there being forms which only need periodical watching ; (d) that of the cases that need treatment those which have it early have the best chances of recovery ; (e) that only those cases which are dangerous to the public, need be segregated ; others can be treated as out-patients at special clinics or ordinary hospitals ; (f) that in early and non-infective stages children need not leave their schools or workers give up their employment, though they should be examined periodically ; (g) that all who have come into close contact with a patient should have periodic examinations ; (h) that a healthy body is the best defence for the individual, and the development of a public health sense is one of the greatest factors against the spread of the disease.

In interpreting survey data it is to be realised that a



high gross incidence is not necessarily an indication of the activity of the disease or of the difficulty of controlling it. Besides the total figures there is needed information as to the proportion of the revealed cases which pass on to the more active stages, and what proportion are of the abortive types. If the cases in a given region are chiefly neural and children do not seem to be infected, then it seems legitimate to conclude that the disease is not on the increase in that area, and that it may be expected to tend gradually to die out without any special measures being taken. If, on the other hand, infective cases are common and the incidence among children high, active measures should be taken to prevent further spread.

I venture to suggest that much of our propaganda is on a wrong basis. We often survey an area with a fanfare of trumpets that arouses interest in the matter, establish out-patient centres without due regard to the conditions that exist, cause the local institutions to be besieged with cases to overflowing, and then rest content that we are dealing with the leprosy problem. The fact often is, I feel certain, that out-patient clinics become silted up with cases which are unsuitable for treatment. These fall into four categories: (1) early abortive cases which need no treatment; (2) arrested cases without deformity but with permanent areas of hypopigmentation; (3) deformed arrested ("burnt-out") cases; (4) advanced skin cases which are dangerous to the community and cannot hope to be rendered non-infective within a reasonable time.

One of the reasons why it is impossible to generalise with regard to leprosy prevention is that its prevalence not only varies greatly in different countries, but different districts in the same country show enormous variations. Leprosy seems always to exist in foci, but the factors that cause these foci are imperfectly understood. The main factors that affect the spread of the disease in a given area are: (1) introduction of an infective case into a village previously healthy; (2) famine or disease lowering the resistance in a village already mildly affected, thus aggravating the actual cases and facilitating further spread; (3) unfavourable climatic and dietetic factors; (4) overcrowding and unhygienic surroundings; (5) industrialisation. However, this is by no means the whole story, and it is just here that patient field work should be repaid. If every detail such as the climate, history, habits, disease, housing, etc., were studied in contrasting districts, both where leprosy is prevalent and where it is not common, certain common

factors might be elicited and further epidemiological facts ascertained.

The view point with regard to epidemiology and prevention here presented, one submits, simplifies the whole problem. The apparently gigantic task that the health authorities face where there is a great deal of leprosy would be much lessened if it were realised (a) that certain areas might not need special measures for leprosy control, and (b) that if the cases revealed by a survey were properly analysed only a certain proportion of them would need to be treated. With respect to the second point, it has been said that there is in it a fundamental fallacy, namely, that it is impossible in any disease to say whether or not a given case will prove to be abortive without treatment, and as an example in support of this contention tuberculosis has been cited. However, the circumstances in the two diseases are so different that this is not valid. The earliest or slightest lesions in tuberculosis cannot be detected positively and watched. The evidences which many people infected with leprosy exhibit are so early or slight and so inactive, that they are fairly comparable as regards stage with the undetectable focus of tuberculosis in, say, a single bronchial lymph node, but they are detectable and can be watched. And I maintain that, as many people with such tuberculous foci never develop clinical tuberculosis, so many with analogous foci of leprotic infection do not develop active leprosy. To make due allowance for such cases where they occur in appreciable numbers will lighten in a corresponding degree the task of leprosy control.

It is regretted that the nature of my work has made it impossible to investigate in detail this most interesting aspect of the leprosy problem, and will not permit pursuing it further. It is hoped that those better situated to do so will investigate the matter in a way not yet done. However, one is confident that an evaluation of the abortive case will lead to more accurate epidemiological knowledge and to a revision of general policies of control and prevention of the disease.

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- (3) Chiyuto, S.—“Early Leprotic Changes in Children and their Bearing on the Transmission and Evolution of the Disease.” *Abst. in: Trop. Dis. Bull.* 31 (1934) 5.
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## Curability of Leprosy.

(Comment on Dr. Rose's Article published in 'Leprosy Review,' Vol. V. No. 4.)

J. RODRIGUEZ.

THE Editor of LEPROSY REVIEW has asked me to comment on a paper with the above title which appeared in LEPROSY REVIEW recently.

Dr. Rose is certainly to be congratulated on the fair and moderate way in which he has discussed his data. He seems to have taken full advantage of the unusual opportunities found in British Guiana to do what many other workers would like to see done more generally, that is, a really adequate follow-up of paroled or discharged quiescent and arrested cases. We are finding out that in leprosy, as in other chronic infectious diseases, our criteria as to the cure should not be based solely on the condition of the patient at the time of discharge from the hospital, but that the subsequent history should also be taken into consideration as well.

As I have not been able to follow-up our cases after parole as thoroughly as Dr. Rose did, I am not in a position at the present time to either confirm or refute his basic findings. Wherever there have been a considerable number of paroled patients, great difficulty has been found in following up cases. In the province of Cebu, Philippine Islands, there have been paroled from Culion and from the local Treatment Station, during the period from 1923—1934, 1,050 cases among a population estimated to be slightly over 1,000,000. A number of them are living in distant islands and in inaccessible mountainous regions. We have been trying to keep track of as many of them as possible and we expect to be able to present data on them somewhat along the lines of Dr. Rose's work in the near future. Up to the present, we already have on our records 21 cases which have relapsed after being quiescent and arrested for from 6 to 10½ years. Also, in Cebu we have had the opportunity of observing five paroled cases who have lived under almost ideal conditions as regards hygiene, food and treatment after discharge from the station. Unfortunately, four of them relapsed after varying periods ranging from four months to three years.

Coming now to a couple of details regarding the article of Dr. Rose, quite a few workers would probably object to the use of the word "recovered" in the manner suggested

by him. The four cases mentioned above were absolutely free from the slightest mark or blemish at the time of parole and should perhaps be classified as "quiescent and recovered" in accordance with Dr. Rose's classification, but as we now know, they had not quite recovered because definite cutaneous lesions developed on them subsequently. It is desirable perhaps to select another word to indicate the feature that Dr. Rose wants to emphasise.

Dr. Rose's statement that "cases treated in early childhood, moreover, yield more readily to treatment than the adult" (last sentence, page 155), seems to be directly contradictory to the opinion of D. E. B. Christian, who says in his last article (*Leprosy in India*, October, 1934, last sentence, page 195), "In children leprosy treatment does not give such quick results as in adults, but when they reach adult age they improve and clear up rapidly under treatment." It is striking that two good leprologists, using apparently the same method of treatment and the same criteria for testing the effects of a cure (frequently of relapses), should arrive at diametrically opposite conclusions in the effect of the treatment in the same class of patients (children). As has been stated in one of our last articles, such results are baffling and confusing to the other workers.

It may be possible for many to offer criticisms regarding some details in Dr. Rose's article, but very few workers are in a position to make fundamental criticisms, because there are so few, if any, who have been able to do what he has accomplished. Perhaps his best critic will be the ultimate results of his own work. He concludes his paper thus :

"When this (children's home) has been completed, we shall have as effective a protection from leprosy as exists in any country in which leprosy is indigenous." We should be able to see in the next two or three decades whether the protection has been really adequate or not.

I should like to take this opportunity to clarify my position with regard to the general outlook for the early macular (?) cases. I have been much distressed lest due to lack of clarity in my last two articles appearing in the REVIEW, I have given the impression that the outlook for such cases is particularly gloomy. This seems to be hinted in the following statement appearing in the editorial in the October, 1934, issue of the REVIEW :

"The majority of Dr. Rose's cases appear to be those in which the bacilli on the recognised acid-fast forms could be detected, and it is just there that Dr. Rodriguez appeared to hold out the most hope."

While this is certainly correct, it must be emphasised that it is true only in so far as the chaulmoogra treatment is concerned. The title of my article referred to was "Results of the *Chaulmoogra Treatment* in Very Early Cases of Leprosy." I must hasten to add that from a general view point, however, my experience has been that as a whole, the outlook for the average early macular leprosy is certainly much brighter than that of the average early cutaneous case. To begin with, he stands a good chance of becoming arrested without the years of painful injections. We hope to be able to present figures shortly which tend to prove that at least among the children of lepers, the incidence becoming positive, *i.e.*, progressing to the cutaneous stage, was much reduced after they had been placed in hygienic surroundings and given adequate diet and care, irrespective of whether chaulmoogra treatment was given or not. In other words, we are fully in accord with Cochrane when he says: (*International Journal of Leprosy*, October—December, 1934, page 388):

"We have no evidence that the present antileprosy drugs can prevent the development of further lesions in such cases (children with inactive, very early or abortive lesions) . . . From this, it would seem that proper living conditions constitute our main defence in such cases."

The point we have tried to emphasise in our article was that in precisely those cases referred to by Cochrane, the chaulmoogra derivatives appear to be of questionable value and may even prove harmful, since it has been shown by Read in his work on dogs, that the kidneys may be damaged by too large doses or too prolonged injections.

Manifestly, it is unfair to bring such cases to a home, give them good food, adequate care, administer to them chaulmoogra injections, and then give all the credit to the injections. We believe that if we wish really to evaluate the effects of the chaulmoogra treatment in such cases, we should have controls consisting of children given exactly the same care as the others, but receiving either no injections at all or only a trivial number of them.

Furthermore, the criteria to be used in judging the effect of the treatment should not be based merely on the changes in the appearance or nature of the macular lesions, but principally on whether the development of bacteriologically positive cutaneous lesions has been prevented or not.

While the publication of unreasonable and unduly pessimistic reports regarding the effects of the chaulmoogra treatment certainly to be deplored on account of its

unfavourable effects on prophylactic measures against the disease, it is believed that far greater harm will be done to the cause if leprosy workers do not adopt a more critical and rigid attitude towards their results. As it is, a great deal of harm already has been done to the chaulmoogra treatment by well-intentioned but over-enthusiastic and probably not over-critical workers, who would have us all agree that chaulmoogra oil has been proven definitely to be a specific in leprosy. Not a few even seem to believe that leprosy can be eradicated by indiscriminate injection of "all and sundry, especially in out-patient centres." Perhaps it were better if we admit that although this drug is certainly useful in the treatment of leprosy, "there is still much room for improvement with regard to our knowledge as to its proper indications, limitations and action in the human body," and that therefore it is not yet safe to give undue weight to the value of this particular treatment in schemes to control the disease.

Finally, I would like to state that the above opinions are entirely personal and should not be considered as reflecting in any way the opinions of co-workers in the Philippines.

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## Reviews

INTERNATIONAL JOURNAL OF LEPROSY, Vol. II, No. 2 (April-July, 1934).

Dr. G. W. Peschkowsky writes on "Increase in the Phagocytic Activity of Polymorphonuclear Leucocytes as the Result of Inflammatory Reaction in Leprosy." We reproduce the summary, which is as follows:—

The blood picture appears to be an expression of the type of inflammatory reaction of the organism—of the reticulo-endothelial system of the organism—to the introduced leprosy infection.

(1) Monocytosis seems to be unfavourable from the viewpoint of prognosis, since in the majority of the cases it marks the dissemination of the process, the formation of fresh granulomata and increase of the old ones. From the pathologic-anatomical viewpoint it corresponds to the proliferative chronic inflammations.

(2) Lymphocytosis appears to be a favourable symptom from the prognostic viewpoint in the majority of cases, since it coincides with the period of convalescence in the course of the disease, and from the pathologic-anatomical viewpoint it is manifested by decrease or checking of the inflammatory process.

(3) Polymorphonuclear leucocytosis runs parallel with an intense exacerbation of the process in the lepromata, manifested by suppurative inflammation with subsequent destruction of the bacilli in the polynuclear leucocytes.

(4) A mixed white-cell picture corresponds to the clinical course and to the pathologic-anatomical substrate.

Dr. Gordon A. Ryrie contributes a further article on "The Use of Fluorescein and Phthallic Acid in Leprosy." Fluorescein injected as described in the article, he states, appears to be worthy of a trial as a six weeks' course of treat-

ment between the chaulmoogra preparations. Dr. Ryrie states that it has been found that in a number of cases the hydnocarpus esters are better tolerated after such a course, and has gained the impression that improvement due to fluorescein sometimes continues some time after the drug has stopped. He concludes that there appears to be little evidence of beneficial effect of fluorescein in advanced cases.

The article on "The Irritant Constituent of Anti-Leprotic Oils," by Drs. Paget, Trevan and Attwood, was abstracted by the authors and appeared in a previous number of LEPROSY REVIEW (Vol. VI, No. 2, April, 1935).

Dr. J. O. Nolasco writes on "Histologic Studies of the Plancha or Infiltration Method of Leprosy Treatment." His conclusions are as follows:—

(1) In monkeys given intradermal and subcutaneous injections of hydnocarpus oil and its iodised ethylesters, the injected oily drugs are absorbed by way of the lymphatics.

(2) With subcutaneous administration comparatively little of the drug infiltrates the corium. The intradermal method is therefore superior since the bulk of leprotic skin lesions are in the corium.

(3) Nerve trunks (ulnar and median) were found to be unaffected by injections in the forearm in this experiment.

(4) Cellular reaction in the tissues injected with oil is not a prominent feature, in contrast with that caused by the iodised ethyl esters. From this it is inferred that the latter is probably the more effective drug in the local treatment of leprosy.

(5) The macrophage is mobilised locally at the site of the injection, along the lymphatic vessels, and in the regional lymphatic nodes, this being an increased local defence reaction against the injected oil and, incidentally, against *Mycobacterium leprae*.

(6) The local injections of the lesions in lepers and the consequent absorption of the injected drug into the lymphatics and the regional lymphatic nodes, is believed to be effective in bringing the drugs in concentrated form into direct contact with the bacilli in the lymphatic system.

Drs. Ota and Sato contribute an article on the "Cultivation of Leprosy Bacilli" and conclude with:—

(1) An acid-fast bacillus cultivated from leprosy materials is not necessarily the leprosy bacillus. We have obtained cultures of the human tubercle bacillus from a clinically typical leprosy nodule and a typical leprotic lymphoma.

(2) It is very difficult to obtain the tubercle bacillus from the blood by Lowenstein's method, even with lepers having complicating tuberculosis. We used this method in 83 cases of advanced nodular leprosy, one half with pulmonary tuberculosis, and obtained no culture of the tubercle bacillus. On the other hand we cultivated twelve strains of acid-fast bacilli which were not tubercle bacilli.

(3) In one instance, four months after an acid-fast bacillus was obtained from a leper by the blood culture method, the same organism was also recovered from a nodule removed from the same patient, demonstrating that the cultures were not contaminations from outside, but that the patient had a general infection with this organism. This is important evidence that the organism is the leprosy bacillus.

(4) Two other strains of the acid-fast bacillus were cultivated from nodules from two patients. It is more difficult to obtain these organisms from the nodule than from the blood, though we believe that more positive results may be obtained by improving the technic.

(5) From the results of animal inoculations and complement-fixation and skin reactions not described in this paper, it seems highly possible that the strains obtained by us are *Mycobacterium leprae*.

(6) These strains may be divided into two types according to the colour of the cultures, one being whitish, the other ochre or orange coloured, though these characteristics are not always constant, and in some cases whitish strains change to ochre colour during sub-cultivation. These types we call *Mycobacterium leprae* var. *album*, and *Mycobacterium leprae* var. *aurantiacum* respectively.

The article on "The Distribution of Leprosy in the Sudan," by Dr. O. F. H. Atkey, was reprinted in LEPROSY REVIEW, Vol. VI, No. 1 (Jan., 1935).

It is becoming increasingly difficult to give readers an adequate idea of the valuable material which is being published in the *International Journal of Leprosy*, and therefore we would urge those who are in touch with leprosy work to join the International Leprosy Association, and so be able to read these excellent articles in the Journal.

## Erratum.

Our attention has been drawn to an error in the setting out of Dr. Mitsuda's article on "The Curability of Leprosy," published in Vol. VI, No. 1, page 18, line 9. This should read: "He died in 1931. This is the general course of cutaneous cases (in 70% to 80%.)"

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## Correspondence

MEDICAL SUPERINTENDENT'S OFFICE,  
SUNGEI BULOH SETTLEMENTS,  
SUNGEI BULOH, F.M.S.  
9th February, 1935.

*To The Editor, "Leprosy Review," London.*

DEAR Dr. COCHRANE,

I find from a large number of both private and public communications that my article "A Preliminary Report on the Action of Certain Dyes in Leprosy," has given rise to considerable misconceptions. This article does not describe a cure for leprosy; it does not suggest a treatment for leprosy. It does not claim that Trypan Blue "dissolves the fatty envelope of the bacillus"; it does not claim that any of these dyes are bacteriocidal *in vivo*. It gives no grounds for suggesting that "results were due to pyrogenic action of the injections." It expressly points out that lepra reaction was excluded.

I have had a number of letters from different institutions asking me for "details of the New Treatment." I am afraid I have to some extent similarly misled a contributor in your last issue—Dr. Rao, who writes a very careful and interesting article on the therapeutic efficacy of certain dyes in leprosy.

To prevent further false hopes I must point out that the article in question is a study of the effects of rapid and formidable reticulo-endothelial blockage by a large number of different dyes. It forms part of a series of consequent studies on chemo-therapy which are still in progress. It should not be taken as justification for a hope that six fairly advanced cases would improve on small doses of Trypan Blue.

I don't want Dr. Rao to think I am being derogatory about his very useful article. From my own experience I think that it is necessary to reiterate that these dyes are not therapeutic and that at present their interest is scientific only.

I am, yours sincerely,

GORDON A. RYRIE.