

# LEPROSY REVIEW

The Quarterly Publication of  
THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION.

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VOL. IX. No. 4.

OCTOBER, 1938.

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The International Congress of  
Leprosy.

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Malamulo Mission Leper  
Colony.

Reviews.

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# LEPROSY REVIEW.

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EDITOR

E. MUIR, M.D.

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The Association does not accept responsibility for views expressed by the writers. Communications may be sent to the Editor, at 115 Baker Street, London, W.1.

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## NOTES ON CONTRIBUTORS.

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BERNARD MOISER, M.D. (LOND.), M.R.C.S., .C.P., D.P.H., is the Leprosy Specialist for S. Rhodesia, and is in charge of the Leprosy Hospital at Ngomahuru.

## Editorial

We draw the attention of our readers to the change of address indicated on the cover. During recent years the British Empire Leprosy Relief Association has expanded considerably in its scope and in the staff necessary to deal with its many activities. Larger quarters were therefore necessary, and suitable rooms have been found almost next door to our old office, at 115 Baker Street.

The Medical Secretary of the Association has, during the last few months, been making an extensive tour of various countries, especially those of British East Africa. He visited Malta, Egypt, the Anglo-Egyptian Sudan, Belgian Congo, Uganda, Kenya, Tanganyika, Zanzibar, Aden, Somaliland and Palestine. In each of these countries he had an opportunity of studying the leprosy problem in consultation with the medical authorities. The next issue of the *Leprosy Review* will be a special East African number, in which will be embodied the reports prepared during this tour.

In our last issue we gave a short report of the International Congress of Leprosy held in Cairo last March. We now publish the reports of the four subcommittees, which deal with the aspects of leprosy at present regarded as the most urgently requiring clarification and agreement. Classification is a most difficult subject in a disease like leprosy, with its protean forms and manifestations. During the last seven years a tremendous amount of work has been done on this subject; and whether we consider the new classification entirely satisfactory or not, it must be acknowledged that a distinct advance has been made. We have now an authoritative classification which can be used throughout the world, and which should at least diminish the confusion that has often surrounded otherwise valuable literature. The most important changes are the adoption of the word "lepromatous" in place of cutaneous, and the definite placing of leprides and other lesions of the so-called tuberculoid type. The classification has been made, as far as possible, practicable for all kinds of leprosy workers. The basic classification is as simple as it can be. Some of the subclassifications are more complicated, but these are intended more for the use of experts who are in a position to make more detailed study of the disease.



We publish in this number the second half of an article on *Domesticating Anti-leptic Species in Brasil*. The fact that chaulmoogra oil still holds first place in the treatment of leprosy in spite of the almost daily "cures" that are lauded in the public press, is a matter of significance. The value of chaulmoogra has increased in proportion as a pure non-irritating oil has become available; and this article is a valuable contribution towards the methods necessary for obtaining such oil.

## Obituary.

PROFESSOR V. I. KEDROWSKY.

Professor V. I. Kedrowsky, Head of the Leprosy Section of the All-Union Tropical Institute, Moscow, died on December 4th, 1937, at the age of 72. His name is one of the most famous among leprologists, especially for his culture of an acid-fast mycobacterium which he and many others held to be the *M. leprae*. He held the posts of Director of the Gabrichievsky Bacteriological Institute, Moscow, and was Professor of Pathological Anatomy at the Moscow University from 1915 to 1937. Professor Kedrowsky had planned to attend the International Leprosy Congress in Cairo last March, and it was with great sorrow that the members of the Congress heard of his death.

DR. EARL BALDWIN MCKINLEY.

The news of the death of Dr. Earl Baldwin McKinley, under tragic circumstances, came as a great shock to his large circle of friends. He was travelling as a passenger on the missing American clipper on which he and his fellow passenger, Mr. Fred Meier, of the Department of Agriculture, were engaged on a scientific campaign recently inaugurated by the National Research Council's committee on aero-biology. This is directed towards tracking the passage of microbes through the air. Dr. McKinley's chief contribution to the campaign against leprosy was the cultivation of the bacillus of leprosy outside the human body. Aged 44, his first big post was as Administrator of the School of Tropical Medicine at Puerto Rico. During the war he interrupted his medical work to become an intelligence officer in the U.S. Army. Since 1931 he has been Dean of George Washington University Medical School in Washington.

# International Congress of Leprosy

## REPORTS OF THE SUBCOMMITTEES

An international Congress of leprosy was held in Cairo from March 21st-27th, 1938. The Scientific Committee of this congress appointed four committees to report respectively on Classification, Treatment, Epidemiology and Control, and the Cultivation of the Leprosy Bacillus. The reports of these committees, which are given below, were unanimously adopted.

### THE CLASSIFICATION OF LEPROSY

#### *Report of the Subcommittee on Classification\**

The problems of classification of cases of leprosy should be viewed broadly, bearing in mind both (a) the requirements and circumstances of work of the practical field worker to whom classification is necessary for purposes of prognosis, treatment

time-consuming methods of differentiating types of the disease, and (b) the refinements of such differentiation that are possible to the specialist who employs special methods of investigation. The great majority of persons who deal with leprosy, work under circumstances that require that the basic or primary classification be as simple as possible.

Progress in knowledge of the forms of leprosy and of the nature of the leprous processes has been made since the classification that is now most generally used was adopted by the Leonard Wood Memorial Conference on Leprosy in 1931, and it is now possible to modify some of the terms of that classification to eliminate certain causes of misunderstanding. However, our knowledge of the matter has not yet progressed to a point where it is possible to attain unanimity of opinion on certain essential features.

It is recommended that for the present the basic division of leprosy into two types, along the lines laid down in the Memorial Conference classification, be continued until such time as further study of the matter permits attainment of unanimity. It is further recommended that future research be in the direction indicated by the questions raised by the minority of this committee, the main question being whether

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(\*) This committee consisted of Dr. H. W. Wade (*Chairman*), Dr. R. C. Germond (*Secretary*), and Drs. P. L. Balina, A. Dubois, J. M. M. Fernandez, V. Klingmüller, J. Lowe and Rabello, Jr.

or not the neural type of the Memorial Conference classification should be divided into two distinct main types, "simple neural" and "tuberculoid." For the present it is the predominant opinion that such divisions should be considered as subtypes or varieties.

Objections have repeatedly been raised to both of the current names of the two types (*i.e.*, "neural" and "cutaneous") because of confusion arising from the special sense in which they are employed in leprosy classification, because of difficulties of translating them into other languages, and for other reasons. However, no other words have been proposed which are free from similar objections. It is the opinion of the committee: (*a*) That for the time being, at least, the type to which it is now applied. (*b*) That because "cutaneous" has proved particularly confusing its use should be discontinued, and replaced by the term "lepromatous,"

It is proposed that the definition of the two types of the Memorial Conference classification be amended as follows :

#### PRIMARY CLASSIFICATION

*Neural (N) type.* — All cases of the "benign" form of leprosy, with disturbances of polyneuritic nature (*i.e.*, alteration of peripheral sensation, atrophies and paralyses, and their sequelae), nonlepromatous nature (*i.e.*, leprides, usually with localized sensory disturbances), relative resistance to the infection, prognosis as regards life although mutilation may take place, and usually react positively to leprolin. Bacteriologically the skin lesions are typically but not invariably found negative by standard methods of examination, though the nasal mucosa may be found positive. Many of these lesions are histologically of tuberculoid nature.

*Lepromatous (L) type.* — All cases of the "malignant" form of leprosy, prognosis, usually negative to leprolin, matous lesions of the skin and other organs, especially the nerve trunks. Bacteriological examination usually reveals abundant bacilli. Disturbances of polyneuritic nature may or may not be present; they are usually absent in the earlier stages and present in the later stages of primarily lepromatous cases, from the neural form.

## SUBCLASSIFICATION

## Subdivi

two points of view: (*a*) with respect to the degrees of advancement of the disease, and (*b*) with respect to the forms or varieties of cases within a type (*i.e.*, subtypes), based on the nature of the lesions. The former method of subdivision is that of the Memorial Conference classification and it has proved useful in the hands of many workers, especially in dealing broadly with large numbers of cases. The latter method of subdivision is generally employed in dealing more precisely with individual cases. Both methods have their uses and should be understood, but a generally applicable, practical formula for combining the two has not been arrived at. The two methods are dealt with independently.

*1 — General Subclassification*

(By degrees of advancement)

The following specifications are unavoidably somewhat crude but they indicate in a general way the basis of the division into three degrees of advancement of each type.

*Neural 1 (N1).* — Slight neural: (*a*) Cases with from one to several small macules, or a proportionally smaller number of large macules, whether flat or elevated, without indications of polyneuritic changes; or (*b*) cases presenting only polyneuritic changes of slight degree: disturbances, of peripheral sensation affecting one or two extremities, not of marked extent, with only minor trophic disturbances, muscular atrophy or paresis, if any; or (*c*) cases showing combinations of macular and polyneuritic manifestations in equivalent degree of total affection.

*Neural 2 (N2).* — Moderately advanced neural: (*a*) Cases with fairly numerous or large macules, or wide distribution, without evidence of polyneuritic changes, or with such manifestations of fairly slight degree; or (*b*) cases presenting only polyneuritic changes of moderate degree: peripheral one extremity, of less extent if affecting more than one; and moderate trophic changes, atrophy and paralyses, including beginning contractures if of limited extent; or (*c*) cases showing combinations of equivalent total degree.

*Neural 3 (N3).* — Advanced neural: (*a*) Cases with very numerous or very extensive macular lesions of the more marked kinds, with polyneuritic changes; or (*b*) cases

presenting only advanced polyneuritic changes: extensive peripheral anesthesia and more or less marked motor and trophic disturbances: paralyses, atrophies, contractures, trophic ulcers and mutilations; or (*c*) cases showing combinations of equivalent total degree.

*Lepromatous 1 (L1).* — Slight lepromatous: Cases with lepromatous skin lesions consisting of one or a few macular areas, or a few small infiltrated patches or small nodules, or diffuse lepromatous changes of slight degree; lesions of the nasal mucous membrane are usually absent.

*Lepromatous 2 (L2).* — Moderately advanced lepromatous: Cases with numerous macular areas or fairly numerous small or fewer large infiltrations or nodules, or diffuse lepromatous changes of moderate degree; lesions of the nasal mucous membrane are frequently present.

*Lepromatous 3 (L3).* — Advanced lepromatous: Cases with numerous and extensive or very marked lepromatous lesions which may vary in their stage of development or retrogression; lesions of the nasal mucous membrane are almost always present.

*‘Mixed’ cases.*—Recognition should not be given to “mixed leprosy” as a type. However, cases of the lepromatous type usually exhibit, sooner or later, varying degrees of polyneuritic involvement, and for precision such “mixed” or “complete” cases may be designated LN. The symbol L should be given precedence, regardless of the original nature of the case or the relative severity of the two elements, because of the predominant importance of the lepromatous element. In grading the degree of advancement of these cases the appropriate figure is placed after each symbol; *e.g.*, L2-N1, or L1-N3.

*Secondary neural cases.* — Cases that have previously been of the lepromatous type with polyneuritic features (mixed cases), but in which the lepromatous lesions have resolved leaving only the polyneuritic manifestations, are called “secondary neural.”

## 2 — *Special Subclassification*

(According to the nature of the lesions presented.)

1. *Lepromatous type.* — No varieties of the lepromatous type of leprosy have been established that are sufficiently distinct, frequent and general in occurrence to require recognition in formal classification. In some places (*e.g.*,

India) where many cases show, at least for a time, "diffuse" involvement of the skin, not localized in macules or infiltrations, there might be an advantage in distinguishing such cases (which might be indicated by the symbol Ld), but it is not certain that this division would be generally useful.

2. *Neural type*. — The neural type of leprosy may be divided into two main subtypes, namely, "macular." For some purposes such subclassification may be sufficient. However, variety should be divided into "simple" and "tuberculoid," and the latter may be further divided into "minor" and "major" forms. For such work, therefore, is proposed :

Neural (type)

Anesthetic (nonmacular, polyneuritic) (Na)

Simple macular (with flat macules) (Ns)

Tuberculoid macular (minor and major) (Nt)

*Anesthetic*. — This variety of neural leprosy presents evidence of involvement of nerve trunks only (polyneuritic changes and sequelae) without macular skin lesions.

*Simple macular*. — The simple macular cases, which comprise a considerable proportion of those encountered, present skin lesions (leprides) that have no or only very slight elevation or palpable infiltration. When elevation is present, it is often difficult to detect it in diffuse light, and the surface is smooth, elevation is usually limited to a narrow marginal zone. "Residual" lesions, fore are "simple" under this definition (though they may be affected by scarring) should not be considered as a separate variety.

*Tuberculoid macular*. — This subtype, as stated, may be divided into two groups,

(a) *Minor tuberculoid*: The lesions so designated are the less marked ones of the kind that has become generally recognised to be histologically tuberculoid and that is clinically recognisable as such with certainty. These lesions show definite elevation of characteristic appearance, there are considerable variations. They are usually marked by irregularity of the surface, due to the essentially marked nature and superficial location of the tuberculoid process. That condition may produce elevated bands or areas which

may be continuous or discontinuous even to the point of producing isolated papulations. Occasionally the process is relatively deep in the dermis, in which case the surface may be relatively smooth, and the appearance may therefore approach that of some of the major tuberculoid lesions, but the degree of the condition is less than in that form.

(b) Major tuberculoid: The lesions so designated are the more striking, grossly elevated ones to which recognition as tuberculoid has been largely confined in the past. They are "major" both in degree and nature of the pathological process. Typically the process invades the deeper layers of the skin to a marked degree, and also the subcutaneous tissue, and, by further extension in the cutaneous nerves related to the macules, it may produce gross involvement of them. Macules of this variety are those most liable to be mistaken for lepromata, especially when they are (a) small but thick, morphologically nodular, (b) in a "reaction" condition, reddish, turgid and smooth, or (c) bacteriologically positive. One feature that helps to differentiate them is their typically sharp demarkation and frequently asymmetrical distribution. Another occasional feature is the tendency to the development of marked enlargement of the local cutaneous nerves, which condition sometimes extends to the main trunks of an affected extremity, thus introducing a secondary polyneuritic element. A point of importance is the frequency with which these lesions start abruptly, as a "reaction" condition, and the relative rapidity—and, sometimes, the completeness—with which they may subside.

#### DEFINITIONS

For the purpose of amplifying certain features of these proposals, and of facilitating the attainment of uniformity in applying them, the following definitions are adopted.

*Leproma*. — The lepromatous condition, which is the distinguishing feature of the type of leprosy so named, is a granulomatous one in which the invaded tissues show maximal tolerance of the bacilli. The essential histological feature is an accumulation of "lepra cells," which may show little differentiation from their original form (the macrophage), or may contain globi, or may undergo multiple vacuolation to produce the so-called Virchow cells, which are often multinucleate. The lepra cells contain bacilli in considerable and often great numbers, though bacilli may also occur in cells of other types. Lepromatous lesions in the skin may

be so slight as to be imperceptible, ranging up to marked, extensive infiltrations or conspicuous nodular masses. As a rule they are more ill-defined and diffusely outlined than the leprides, and they do not exhibit the same tendency to radial extension or the same changes of color or sensation.

*Lepride.* — This term is applied to the discrete macular lesions that are characteristic of neural leprosy when the skin is involved. The leprides vary greatly in appearance, size and as regards elevation; they may be flat or markedly thickened; they may be smooth-surfaced or very irregular ("granular," "pebbled," or micropapulate); they tend to enlarge radially and to merge with adjacent ones, and to undergo central resolution. Disturbance of sensory perception, slight or marked, is a typical feature though its development may be delayed. The definitely elevated leprides, at least, are granulomatous, the essential feature being the nonspecific "tuberculoid" change, together with which there usually is banal chronic inflammatory infiltration of variable degree. Associated cutaneous nerves may be similarly affected and may undergo necrosis or even cold-abscess formation. Though these lesions result from the reaction of the tissue to the presence of the leprosy bacillus, ordinarily bacilli are not found in smears and only in very small numbers in sections. In occasional cases, however, especially during or after a reaction condition, bacilli can be found in smears and they may be numerous.

*Leprotic and leprous.* — These terms should be used only in their general sense, signifying pertaining to or affected with leprosy.

*Lepromatous.* — This term signifies of the nature or possessing the qualities of the leproma. In classification, as here proposed, it applies to cases with this form of lesion.

*Macule.* — This term is specifically applied to the leprides (neural type leprosy) but is sometimes used to designate lepromatous patches. It signifies a circumscribed area of skin of abnormal colour—varying widely in this character in different races but usually hypopigmented, occasionally hyperpigmented, and often erythematous—and commonly with other surface abnormalities, such changes being evident in the whole or only in parts of the area. In the terminology of leprosy it is used without regard to the presence or absence of infiltration or elevation.

*Infiltration.* — This name is often applied clinically in



a special sense to a diffuse thickening of lepromatous nature.

*Plaque.* — Ordinarily this term is applied only to large leprides in which central resolution is delayed or absent, and not to areas of diffuse infiltration.

*Papule* (\*)—A papule is a very small, more or less solid circumscribed, superficial elevation of the skin, usually but not necessarily circular, conventionally described as varying in size from that of a pinhead or less to five millimeters in diameter (splitpea size). Papules occur in both forms of leprosy and differ correspondingly in structure and often in appearance.

*Nodule.* (\*) — A nodule (synonymous with but preferable to “tubercle”) is a solid elevation of the skin, often similar to a papule except that it is larger; in practice the application of this term is not limited as regards maximum size. Ordinarily it is applied only to lepromata. Nodules are usually more deep-seated than papules, and often arise from localized subcutaneous masses.

*Polyneuritis.* — This term has been employed to designate involvement of the peripheral nerve trunks which results in sensory changes of the extremities that tend to spread centripetally (“acroteric” anesthesia), and in trophic changes of various kinds, and paralyzes and atrophies which may also involve the face. Polyneuritic manifestations do not include the sensory changes in the leprides, or lesions of superficial cutaneous nerves that develop by extension from leprides.

*Trophic changes.* — Under this head are included those changes that are ordinarily ascribed to disturbances of the vasomotor system and of nutrition: anidrosis, glossy skin, ichthyosis, pigmentary changes, loss of hair, perforating ulcers, atrophy and necrosis of bones with consequent mutila-

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(\*) The definitions of papules and nodules here given are those generally accepted by British and American dermatologists. It is to be recognized that these terms are employed in different senses in other countries. The members of the committee from South America submitted the following comment:

“Quelques auteurs, parmi lesquels se rangent les léprologues de l'Amérique du Sud n'admettent pas le terme “papule” dans la lèpre, parce que en dermatologie la papule est une efflorescence spontanément résolutive, et que dans la lèpre les lésions cutanées auxquelles les auteurs anglais et américains appliquent le nom de papule, ne s'effacent qu'en laissant après elles une lésion cicatricielle, au moins histologiquement. A la rigueur on pourrait employer pour les désigner le terme “papuloïde”. Quand à ce qu'est à propos des lésions granulaires de la lèpre tuberculoïde, pour les mêmes raisons les dermatologistes de l'Amérique du Sud préfèrent adopter la désignation de lésions “micropapuloïdes.”

tions and neuropathic joint lesions. Strictly speaking atrophy and paralysis of muscles, and contractures consequent on such changes, are not included, but in practice the distinction is often not made.

### SPECIAL SYMBOLS

*Indication of the original phase of the disease.* — If it is desired to indicate symbolically in a mixed case the form that occurred first, this can be done readily by placing the prime accent mark ('=primary) after the appropriate letter, as C'N or CN'. This would not interfere with the use of the customary figures to indicate the degree of advancement.

*Indication of secondary neural cases.* — If it should be desired to indicate a secondary neural case, that can be done as N''(''=secondary.)

*Indication of bacteriological status.* -- If for epidemiological or other considerations it is desired to indicate in a case symbol the bacteriological status of the case, that can be done by adding + or - (or, as suggested by Lie, B+, or B-) to the case symbol.

Professor Balina and Dr. Rabello, Jr., who took part in the deliberations on the subject of the classification of the clinical forms of leprosy, wish to point out that they have already published their personal views on this matter, either during or before the Congress. The definitions and descriptions here adopted are based on those articles by H. W. Wade in *Internat. Jour. Lep.* 4 (1936) 409—430 and *American Jour. Trop. Med.* 17 (1937) 773—801.

## THE TREATMENT OF LEPROSY

### *Report of the Subcommittee on Treatment\**

Hydnocarpus oil and its esters intramuscularly, subcutaneously, and intradermally remain, so far as our present knowledge goes, the most efficacious drugs for the special treatment of leprosy. Oils from *Hydnocarpus wightiana* and *H. anthelmintica* are most widely used.

The irritant properties of these drugs have been shown

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(\*) This committee consisted of Dr. G. A. Ryrie (*Chairman*), Dr. F. G. Rose (*Secretary*) and Drs. C. J. Austin, H. I. Cole, H. H. Gass, H. E. Hasseltine, B. Moiser, H. de Moura-Costa, E. Muir, L. de Souza-Lima and M. Vegas.

to be due to the decomposition products of their therapeutic constituents, *i.e.*, chaulmoogric, hydnocarpic, and gorlic acids. This decomposition takes place rapidly in the seeds and hence it is necessary to use only oils pressed from fresh seeds. The oil itself is quite stable and keeps fairly well under proper conditions of storage. The ethyl esters are much less stable than the oil, and should be prepared and sealed hermetically against air as quickly as possible. Distillation of the esters and elimination of the free fatty acids is of less importance in the reduction of irritation than the use of an oil prepared from fresh seeds. The use of ampoules, where possible, is recommended; when bottles are used they should be of such size that the entire contents may be used on the day that they are opened. Any remaining drug should be used for local applications. Reheating of esters should be avoided.

Many workers have recently used larger doses, up to 30 cc. or more, of esters or oil per week. If the drugs are made and handled as mentioned above, they are well tolerated, and the results are correspondingly satisfactory.

With regard to the subsidence of lesions in leprosy, the subcommittee is of the opinion that this may be due to one of two causes: (*a*) lowered resistance of the patient resulting from intercurrent diseases, metabolic disturbances, etc., which cause loss of reactive power, or (*b*) control of the infection as a response to treatment. In the latter case, the process differs essentially from that in the former case, and is to be regarded as wholly beneficial.

For the improvement and maintenance of the general health of the patient: (*a*) it is of very real importance that the diet should be liberal, well-balanced, and rich in vitamins; (*b*) healthy, moderate exercise in the form of occupational therapy and outdoor exercise important to eliminate intercurrent diseases.

The treatment of tuberculoid leprosy is more effective than that of lepromatous leprosy, and the beneficial results in the former are in direct proportion to the intensity of treatment. This opinion is unanimous. Doses up to 1 cc. per 10lb. of body weight, or even more, twice weekly, administered subcutaneously or intramuscularly, have been used and recommended. Here again the purity of the drug is of the first importance. Except in acute phases, intradermal infiltration is a desirable method of treating tuberculoid leprosy.

The same general line of treatment should be recommended for the leprosy. Treatment with hydnocarpus oil and esters gives

beneficial results, though it is not generally as effective as in tuberculoid cases. Intradermal infiltration is of special value. The maximum dose possible should be given, having strict regard to the necessity of avoiding lepra fever.

Because of the danger of relapse, a prolonged period of after-treatment is advisable, particularly in cases of lepromatous leprosy.

During the last five years considerable attention has been directed to the employment of aniline dyes in the treatment of leprosy. The selective affinity of such dyes for leprotic lesions, combined, in many cases, with powerful bactericidal activity *in vitro*, raised considerable hopes for this form of treatment. These hopes have not, up to the present, been fulfilled, and dye treatment in leprosy cannot be considered to have reached a stage where recommendations regarding such treatment can be made. Further experimentation is very desirable, especially with fluorescin.

With regard to acute tuberculoid leprosy, it has been suggested that the best treatment of an acute reaction is to double or treble the original dose of hydnocarpus oil.

Treatment by hydnocarpus oil or esters should be discontinued at the onset and during the course of lepra reaction (lepra fever). The course of lepra reaction is so variable that it is difficult to assess the value of any drug in its treatment. The following drugs are suggested as having proved in different centres to be of value in selected cases: (a) fluorescin, freshly prepared, given intravenously; (b) mercurochrome, freshly prepared 1% solution intravenously (not more than 10 cc.); (c) potassium antimony tartrate intravenously. As regards general treatment of the condition an initial saline purge and light diet are recommended and alkalinisation may be of value. Great stress should be laid on the importance of rest and careful nursing.

With regard to acute neuritis in leprosy, general treatment, counter-irritation, local injections, the local application of heat, and diathermy are at present the only resources except operation which must not be too long delayed.

Lesions of the eye and nose occur with great frequency in leprosy. Pyorrhoea is also a common condition which it is of primary importance to eliminate. The services of an ophthalmologist, a nose and throat specialist, and a dentist should, therefore, be made available in all leprosarria. Routine examination of the eyes should be made with a view to early treatment where necessary, particularly in countries where the incidence of eye lesions is high. Similarly, routine examination of the nose should be made in all cases.

The treatment of leprotic ulcers, in the present state of our knowledge, is unsatisfactory, and further investigation in hospitals and other institutions is recommended.

With regard to perforating ulcer, it is recommended that necrotic bone, where present, should be removed. Rest of the affected limb is a valuable feature of treatment of the condition.

No proprietary preparation of hydnocarpus oil or esters, or any other proprietary preparation at present on the market, is more effective than the pure oil and esters prepared in institutions. For this reason, and because of their greater cost, the preferential use of such preparations is not recommended.

With regard to treatment with potassium iodide, the use of this drug is frequently followed by disastrous results. It is therefore to be discouraged for the purposes of diagnosis, treatment, or as a test of recovery unless in very skilled and experienced hands.

In conclusion, the committee, realising that as yet no form of treatment can be regarded as wholly satisfactory, desires to stress the importance of therapeutic research, and would urge that interested bodies devote further funds to this purpose.

## THE EPIDEMIOLOGY AND CONTROL OF LEPROSY

### *Report of the Subcommittee on Epidemiology and Control\**

#### 1. RECOMMENDATIONS FOR EPIDEMIOLOGICAL INVESTIGATIONS

##### INTRODUCTION

*Incidence.*—The incidence of leprosy should be taken as the number of cases per thousand of the total population. It must be specified upon what information the incidence is based. (a) This must include the total number of persons residing in the area under consideration. (b) The total number of persons examined must be stated: any discrepancy between the total population and the number examined should be explained. (c) Cases in isolation should be assigned to the area in which they were living at the time they were isolated. (d) All cases of leprosy diagnosed as such by the examiner, including quiescent and arrested cases, should be recorded.

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(\*) This committee consisted of: Dr. Briercliffe (*Chairman*), Dr. R. Cochrane (*Secretary*), Drs. E. Agricola, A. V. Bernard, Mr. P. Burgess, Drs. Et. Burnet, M. Dalgamouni, F. Davey, J. A. Doull, G. Gushue-Taylor, P. H. J. Lampe, Prof. E. Marchoux, Mr. A. D. Miller, Dr. J. N. Rodriguez, Col. A. J. H. Russell, Drs. I. Santra, G. M. Saunders, S. de Simon and J. B. Sitanala.

*Age groups.* — The following age grouping should be used: 0—4, 5—9, 10—14, 15—19, 20—29, 30—39, 40—49, 50—59, and 60 or more years. A “child” is to be taken to mean any person falling within the first three age groups.

*Sex incidence:*—By the sex incidence of leprosy is meant the number of male cases per thousand and the number of female cases per thousand of the population examined.

*Types of survey:*—It is recognised that there are two main types of survey: (a) extensive or general, and (b) intensive or particular. (a) Extensive or general surveys: Such surveys may be based upon the incidental examination of known cases of leprosy by officials and others, or upon the examination of certain groups, as for example school children, prisoners, contacts of known cases. (b) Intensive or particular surveys: An intensive survey depends upon the complete examination of the entire population by trained personnel. In such a survey it should be stated whether the examinations were conducted in the clinic or in the persons' own homes.

#### MINIMAL EPIDEMIOLOGICAL DATA

The committee recommends that the information for standard epidemiological studies be recorded in two main groups: (1) general; and (2) individual. The latter concerns both (a) all of the individuals in the area surveyed, and (b) the lepers and leper suspects.

#### *General Information.*

The following general information regarding the region and the people required: (a) Climate, meteorology and soils. (b) Geography and topography. (c) Racial groupings. (d) General social and economic conditions. (e) Diet. (f) Housing and sanitation. (g) Hygiene-habits of the community. (h) Clothing. (i) Prevalent occupation (agriculture, fishing etc.) (j) Prevalent diseases (epidemic or otherwise). (k) Birth rate, death rate, and infant mortality rate when available. (l) Density of population. (m) History of leprosy in the community. (n) Native folk-lore, traditions, customs, and superstitions regarding the disease.

#### *Information concerning Individuals.*

*Information regarding all individuals examined.*—The following information is required for every individual in the area surveyed: (a) Serial number of individual. (b) House number. (c) Name. (d) Age. (e) Sex. (f) Race, caste, religion. (g) Relationship to head of family. (h) Physical

examination: malnutrition, skin diseases, other diseases including leprosy, definite or suspect (for lepers and suspected lepers see below). (i) History of contact with lepers as indicated below.

*Information regarding lepers and suspects.*—The following information is required concerning lepers and suspected lepers: (a) Previous illnesses. (b) Leprosy contact history: (1) intra-familial and/or household contact, (bed contact, room contact, house contact including joint-family system), stating family relationship; (2) extrafamilial (intimate or casual); (3) contact not known. (c) Contact period: (1) time since first known contact; (2) time since last known contact; (3) duration of contact; (4) contact continuous or intermittent. (d) Particulars about presumed source of infection. (e) Age at onset of first manifestation of leprosy. (f) Course of disease. (g) Present status, description and type of disease including site of initial lesion. (h) Laboratory findings, examination of smears and if possible of sections, and serological tests. (i) Conclusion: (1) leprosy, definite; (2) leprosy, suspected.

#### METHOD OF CONDUCTING AN INTENSIVE SURVEY

It is essential that the area chosen for a survey be sharply delimited, and if possible it should coincide with an administrative area. In brief, there may be said to be two steps in an intensive survey. First, there must be a complete enumeration or census of the chosen area by a sanitary inspector or assistant, preferably someone with sufficient preliminary training in leprosy work to enable him to recognise obvious lesions of the disease. The second step is the careful examination of every individual in the area by a leprologist, and the recording of data on appropriate forms.

*Preliminary Examination or Survey.*—The enumerator should conduct a house-to-house census of the area, recording his findings in some type of census book or on a family card. The houses are to be given numbers and a map of the area should be drawn, roughly to scale, indicating streets, lanes, houses (with numbers), streams, public latrines, etc. It should be made the practice that the inspector see every individual, and that he do not record data on hearsay evidence.

*Clinical Examinations.*—After the preliminary survey has been completed the leprologist proceeds to examine all persons in the area. It is probably best to have some build-

ing near the centre of the area set aside for use as a clinic, where as many as possible of the population should be examined. In the examination the whole body should be inspected, the clothing having been removed, and when that is not done record should be made of that fact. The examiner's findings in each case are to be recorded in the survey book, and in addition, when leprosy is present or suspected, a separate examination form should be filled in. The preliminary data recorded by the inspector should be checked, and more detailed information obtained. With nonlepers, as well as with those suffering from the disease, an effort should be made to determine whether or not there has been any previous contact with lepers. When there has been such contact its time and duration, as well as its nature should be ascertained. Such information is to be obtained by questioning and from the records after the completion of the survey. Its collection may present considerable difficulty.

#### DEVIATION OF RATES

Certain leprosy indices which may be valuable can be derived from the survey data. These are :

(1) The case-type rate which is the number of open cases per 100 cases of leprosy.

(2) The sex rate which is the number of male lepers per 100 cases of leprosy.

(3) The childhood rate which is the number of child lepers per 100 cases of leprosy.

(4) The contact rates which are: (a) the number of lepers with familial (household) contact per 100 cases of leprosy; (b) the number of lepers with extrafamilial contact per 100 cases of leprosy (c) the number of lepers with contact unknown per 100 cases of leprosy.

Further correlation, such as the ratio between case types and sex, etc., may be derived from these data at the discretion of the investigator.

#### GENERAL PRINCIPLES OF LEPROSY CONTROL\*

So long as the mode of transmission of leprosy is not known with absolute certainty, any method of prophylaxis

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(\*) The subcommittee received a proposal that it should "formulate a general scheme of leprosy control which may be modified according to the local conditions in regard to segregation in different countries." After careful consideration it was decided that it is preferable to set forth what are believed to be the more important principles governing the control of leprosy, rather than to formulate a general scheme.



is to some extent empirical. The present conception is that leprosy is an infectious disease spread principally by direct contact, and possibly by indirect contact, *e.g.*, the wearing of infected clothes. As with other infectious diseases, the aim is to discover cases as soon as possible in order to control the spread of infection in the community; and in order to give the patient the benefit of treatment.

#### METHODS OF DISCOVERING CASES

(1) *Examination and continued observation of regular contacts.*

(2) *Periodic examination of children of school age.*—Where this is done as a part of a school medical service, the staff should have adequate training in the diagnosis of early leprosy.

(3) *Dispensary diagnosis.*—In many tropical countries where leprosy is prevalent there is an extensive general dispensary system. The dispensary staff, whether fully qualified or not, if trained in the diagnosis of early leprosy, should be able to discover early cases of the disease.

(4) *Notification of cases* by medical men and also by responsible members of the public: for example, practitioners of indigenous medicine, school teachers, headmen. Such notification will be more effective if the general public has been instructed in the early signs of the disease.

#### PREVENTION OF SPREAD

(1) *Isolation of open cases.*—The present view is that the open case constitutes the greatest danger to the public health, and therefore such cases should be prevented from contact with healthy persons, especially children. This has been attempted in the following ways: (a) isolation in institutions; (b) isolation in the patients' own homes; (c) isolation in villages.

(a) *Isolation in institutions:* In a few countries compulsory isolation is being slowly replaced by voluntary isolation. This change is largely due to the fact that the conditions of isolation are now considerably more attractive and encouraging to the patient. In other countries with large leprosy populations compulsory isolation is out of the question because the expense would be out of all proportion to the financial resources. It is recognised, however, that in certain countries compulsory isolation is still practicable and advisable. Where this is the case the general conditions of the patient's life should approximate as nearly as possible

those of voluntary isolation, and reasonable periods of leave should be granted. Visitors to settlements should be discouraged from staying with patients, and rest houses away from the patients' quarters might be provided. In any country where segregation in institutions is compulsory, the establishment of multiple regional leprosaria instead of a single central institution is advisable in order that the patients may be as near as possible to their own homes. The establishment of agricultural colonies is also recommended. Whatever the type of institution, every effort should be made to make it, at least in part, self-supporting. In connection with the establishment of such regional leprosaria and agricultural colonies, there need not be any danger to the health of the surrounding population if proper precautions are taken. In countries where there is a system of voluntary isolation, it is recommended that the health authorities be empowered to compel the isolation of any case of leprosy which is considered of special menace to the public health.

(b) Isolation in the patients' homes: Isolation of a person with leprosy on his own premises may be designed to separate him from the public and from members of his own household, or from the public only. In neither case do we consider home isolation to be a generally effective method. This applies especially to isolation from the patient's own family. Exceptionally, or under favourable circumstances (for example, in the case of a wealthy patient), home isolation may be possible. Home isolation is not recommended as an alternative to institutional isolation.

(c) Village Isolation. Village isolation is designed to effect partial isolation of lepers in community units. This method would be applicable only in countries where sufficient funds are not available for a complete system of isolation in settlements. Complete isolation is the most effective method of control, and village isolation should not replace it except where the former system is impossible.

(2) *Nonisolated cases*.—All leprosy patients who are not isolated should be kept under regular, periodic surveillance by the health authorities. The method of carrying this out will vary in different countries. Usually the clinic will be the centre for the control of such cases. Therefore the cases registered at the clinic will fall into two categories: (a) those under surveillance and treatment, and (b) those under surveillance only.

(a) Cases under surveillance and treatment.—It is assumed that all patients with active lesions will be placed under treatment and so will be seen frequently by a responsible officer.

(b) Cases under surveillance only.—Patients who do not require treatment should be examined at regular intervals. The interval will depend on the nature of the case, but the patient should be examined at least every six months, or more often if required. Bacteriological examinations should be made each time the patient is seen. In this connection it is to be understood that every case released from isolation will be placed under surveillance. Surveillance should include regular visits to the patient's house in order that advice regarding sanitation and hygiene can be given, and in order that the home conditions may be known to the authorities.

### LEPROSY IN CHILDREN

The importance of leprosy in children cannot be too strongly stressed; therefore every effort should be made to discover early lesions of leprosy in children. To this end every child, in areas where leprosy is endemic, should be examined on admission to school, and should be re-examined every year during school life. In many instances the early lesions in children are of such a nature that the child should be permitted to continue his school studies provided he is kept under surveillance, but it is recognised that, in certain countries, the feeling of the public may compel the authorities to exclude such cases from school. Children who are open cases should be isolated. Children with progressive lesions should, where possible, be sent to an institution which has special facilities for treatment of leprosy in children.

### CONTACTS

Close contacts of every case of leprosy should be examined, and contacts who are children should be re-examined regularly.

The history of leprosy shows that persons working with the disease rarely contract it provided they observe reasonable precautions against infection.

### PROTECTION OF HEALTHY CHILDREN

Healthy children of leprous parents should be removed

from their parents, when the latter are considered a potential source of infection. Children born of leprous parents who are open cases should be removed immediately after birth and brought up under healthy conditions.

### EDUCATION AND PROPAGANDA

In order that leprosy may be dealt with successfully on a comprehensive scale, and before any large proportion of early cases will come voluntarily for examination, there must be a change in the attitude of the public towards the disease. Greater achievements have been possible as a result of increased interest in the patient's welfare under conditions of isolation; further, the increasing number of discharges has contributed towards this end. There remains, however, a vast field for health education. Any scheme for the control of leprosy will depend for its success on an educated public opinion.

No standard type of procedure to this end can be laid down for universal application, and local customs and conditions must always be taken into consideration. There are, however, certain general principles which may be formulated. These are as follows :

(1) Any propaganda must be in accord with the best informed scientific opinion.

(2) Propaganda should have as its objective: (a) Dispelling unreasonable fear of leprosy and thus teaching a right perspective regarding it. (b) Emphasising the necessity of early diagnosis, so that if a case is not considered serious anxiety may be allayed, while if treatment is needed it may be commenced at the earliest possible moment.. (c) in this connection adequate training should be made available for medical students and post graduates, such instruction preferably being given by a leprologist. (d) Courses in the diagnosis of early leprosy should be given to nurses, health visitors and sanitary inspectors. (e) Elementary instruction about leprosy should form a part of the teaching in hygiene given in teachers' training colleges. (f) Special attention should be given to the instruction of households in which there are known cases of leprosy, in methods of personal and general prophylaxis, and particularly regarding the keeping of children from contact with the infected member of the household.

## VOLUNTARY ORGANISATIONS

Voluntary organisations have in the past, and can in the future, aid greatly in antileprosy work. It should be emphasised, however, that the control of leprosy is the inescapable responsibility of the governments concerned. The primary function of the voluntary agencies should be to co-operate with governments in demonstrating the value both of approved and of newer methods of prophylaxis, education and therapy. With this principle in mind, but with recognition of the fact that in many countries financial support by government is still far from adequate, the following suggestions are made with regard to activities of voluntary organisations.

(1) *Educational activities.*—At present assistance is needed to provide opportunity for medical, nursing and technical personnel to broaden their knowledge. Much may be accomplished by organisation of short courses for intensive instruction. Regional conferences are also helpful to this end. There is a serious lack of educational material, scientifically correct and suitable for the public, such as bulletins, moving picture films, lantern slides and charts.

(2) *Welfare and Therapeutics.*—The maintenance of leprosaria should not be continued indefinitely by voluntary agencies, but should increasingly become an obligation of governments, and in new projects governments should themselves undertake financial responsibility, though their management can often best be undertaken by voluntary organisations. There is also considerable scope for such organisation to work out the most suitable type of institutions for the particular country, and the best methods of their administration. The development of preventoria for children of leprous parents who are open cases may be mentioned in this connection; these should also be generously supported by the government. There will probably always be a need for social work among patients, both in and out of institutions, for which government will have difficulty in making provision.

(3) *Research.*—Research work in leprosy should be promoted in the laboratory and the field, both by governments and voluntary organisations.

(4) *Rehabilitation.* — Rehabilitation of discharged patients is a sphere in which voluntary organisations can render valuable help with government assistance by providing suitable work for them and by helping to reabsorb them into the community.

## CULTIVATION OF THE LEPROSY BACILLUS

*Report of the SubCommittee on in Vitro. Cultivation of M. Leprae*

## MAJORITY REPORT

The majority of the subcommittee appreciate that much work has been done on the artificial cultivation of Hansen's bacillus. The fact that results reported by various individual or groups of workers have not, in the majority of instances, been duplicated by others, although many attempts have been made with this end in view, leads to the opinion that the problems of the *in vitro* growth of the causative agent of leprosy have not yet been solved satisfactorily. The committee highly commends the work of all who have laboured in this field and heartily recommends that research along this line be continued.

(Signed) H. E. Hasseltine (*Chairman.*)  
Malcolm H. Soule  
K. E. Birkhaug

## MINORITY REPORT

It is the opinion of the undersigned that the causative organism of leprosy has been cultivated by Prof. W. Kedrowsky and a few other research workers. It is urged that investigators in this field be encouraged to continue in the furrow already ploughed, and on the other hand, to seek for new ways, but always to carry on without preconceived ideas about the strict acid-fastness of the different bacterial forms occurring in leprosy material which are, in my opinion, only broken down stages of one and the same lower fungus.

(Signed) John Reenstierna.

## Domesticating Anti-Lepric Species in Brasil

P. H. ROLFS AND C. ROLFS.

## PART II.

*The Monoclinous* flowers (see Fig. 6) are inconspicuous but more lasting than the staminate ones; remaining fully opened for three or four days before casting their floral envelope or falling off. They are somewhat difficult to detect.

Repeatedly trees have been inspected and given a non-flowering check, but later were found to be bearing fruit.

Our Centennial Tree is monoclinal; the first year it bloomed, 1929, a generous lot of flowers were produced but no fruit set. Although the main orchard producing staminate flowers in abundance is less than 300 meters away. The second year of blooming we hung in it small staminate branches, placed in vials with water. Result was a generous setting of fruit in that quarter of the tree. Every morning

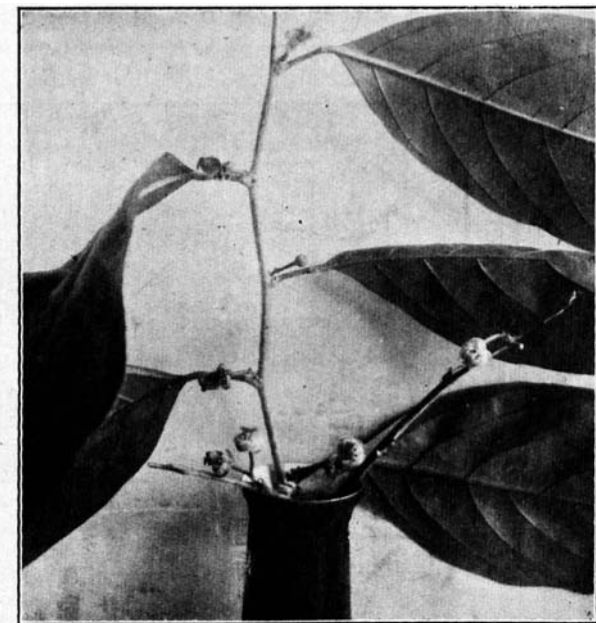


FIG. 6. Monoclinal Flowers. Occur singly, on new shoots and terminal branchlets. The four flowers nearest vase fully opened, showing pistils, stamens, petals and sepals.

new staminate flowers opened. These attracted smaller insects, which later visited the monoclinal flowers. A check on the insect behaviour showed nine out of thirteen visited the staminate flowers first. Small hymenoptera, including the honey bees and large ants, were the most frequent visitors. The behaviour of the ants was interesting; if they ran up a branch, other than the one to which the staminate blooms were attached, they back-tracked and tried again. Later they would search out the sprigs bearing the monoclinal flowers. In 1937 this tree set one fruit without artificial aid. (Dec. 5, 1937, while working on this article a humming bird visited the "bouquet" of monoclinal flowers in an open window only two meters away.)

On Tree V:5 it took from 19 to 21 months from the opening of the flower until the dropping of the fruit. During which time the second crop of 57 new fruits had set.

#### THE NURSERY.

Fruit dropping occurs in winter (June, July, and August). The seed need to be carefully conserved; neither too dry nor too wet. (See Seedbed under Sapucainha in Part I. Also Araujo, Luiz Carvalho.)

Sow seed in spring, allowing 20 cms. each way between seed; when well conserved they have a high percentage of germination. Provide complete shade, removing gradually



FIG. 7. The Chaulmoogra Seedbed is a joy to the nurserymen; Aug., 1937, about six months sown, more than two thousand in the College seedbeds; 10 x 10 cms., 90% germination; 80% sufficiently acclimated to justify planting to the nursery.

until the seedlings are 40 to 50 cms. high. At germination the seedlings are sensitive to direct sunlight. A Chaulmoogra seedbed is a joy (see Fig. 7) to the nurserymen while the seedbed of Sapucainha is his despair.

*Nursery Row.* When the seedlings have attained a height of 40 cms. and are well "hardened off," they transplant to the nursery as easily as do citrus seedlings. The College has a thousand or more trees in the nursery and some hundreds of seedlings planted to an orchard.

#### BUDDING.

The experiments show that the "T"-bud method is successful and makes a robust tree. (See Fig. 8). The location on the stock and choice of buds follows closely that discussed under Sapucainha. Our stock was limited to the staminate trees that had bloomed. The monoclinal trees and the "unknowns" were regarded as too valuable to be



used for budding or grafting experiments. Tree V:5, carrying a crop of fruit, was our only source of budwood.

#### PRODUCTIVENESS.

Tree V:5 ripened the first crop of four fruits in 1931, five years after planting, and has been a constant but variable cropper. In 1932, the second crop consisted of 57 fruits. The seed were sent to Dr. G. S. Jamieson for chemical analyses. He informed us that the per cent. of oil was the



FIG. 8. Budded Chaulmoogra. Tree IV: 5. Budded Sept. 13, 1930, on S.P.I. No. 56,633 stock Bud from Tree V:5, of the same importation. Four meters tall and five spread. Doubtless the oldest and largest budded Chaulmoogra in the Americas. (Junior author at left). Photo. Dec., 1936.

same as that in the seed from Burma and that the quality of the oil was equal to the best.

Likewise the daughter bud IV:5 (see Fig. 8) has been a regular but moderate cropper. Tree A:1 in 1937 set such a heavy crop that its top broke out in September when the fruits were less than half grown, losing over a hundred fruits. During the same month the top broke out of tree A:14 and one of the larger limbs split from the weight of fruit. The majority of the trees have so far been light to "shy" bearers. However, our orchard is very young; only eleven years old; precocity and productivity may not be linked qualities. The relatively small number of monoclinal trees does not justify making quantitative generalizations.

The discovery that the Chaulmoogra is productive with us without artificial pollenization is important.

## RESUME.

1. The climate in the highlands of Minas Geraes is such that these afford a suitable habitat for the Chaulmoogra. (Our orchard passed a temperature of minus four-tenths of a degree Centigrade without showing injury.)

2. Our seeds produce a quality and quantity (per cent.) of oil equal to that of the seed grown in Burma.

3. Asexual propagation (3) is easier than in the case of the avocado and produces a vigorous tree. (See Fig. 8.)

4. The monoclinous flowers, while doubtless self sterile, are abundantly productive in the presence of staminate trees (even over-productive as in the cases of Trees A :1 and A :14 in 1937).



FIG. 9. Interior Fruiting Branchlet. Nov., 1937. Fruit, diameter 8 cms.; a year old; still 6 mos. to ripening, from Tree A :12, one of the best croppers. In Sept., 1937, the top broke out and a larger limb split from weight of fruit. Most of the crop is borne on interior branchlets.

## THE GORLI BUSH

(ONCOBA ECHINATA, OLV.)

At the same time that Dr. K. A. Ryerson presented the "Escola" with the Chaulmoogra seedlings, he gave us 40 seedlings of the Gorli Bush, S.P.I. No. 55,465. These averaged about 25 cms. high and were planted in a nursery to

attain size and robustness suitable for setting out to an orchard. During May, 1926, some 20 or 25 were judged to be in condition to justify planting out; of these 19 were living in December, 1937. The other 21 died out, one after another, without being visibly affected by insect or diseases. The nineteen living ones ranged in height from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  meters and of varying diameters (3).



FIG. 10. Crown Shoot of Gorli Bush. O:14 is the heaviest fruiter; this shoot, one of twenty, carried 83 fruits, Dec. 3 1937.

In October, 1929, the first flowers were recorded; none of which set fruit. In August, 1930, fifteen bushes bloomed; nine set fruit.—Four years from planting.

*Productiveness.* In production they vary greatly; some being quite unfruitful; a majority bearing a small crop. Only one, O:14 being a heavy producer. It was one of the first nine to come into bearing and has always borne the heaviest

crop. In 1937 it ripened as much or more than the other 18 combined; as it had done in some previous years. This year (1937), it ripened a thousand six hundred fruits. An average sized one weighing 170 gms. (see Fig 1) and yielded 141 seeds weighing ten and one-tenth gms. About a kilo six hundred gms. for the bush. (See Figs. 1 and 2.) One of the largest fruits yielded 15 gms. of air dried seed. It takes from six to nine months from the time of blooming to ripening, when the fruits turn a golden yellow. They remain on the bush for some weeks, splitting open and dropping the seed; often the fruits turn brown and the seeds become quite air dry.

*Propagation.* Our Chief Chemist, Dr. Guilherme Emmerich, who had an abundance of fruit from our anti-leptic orchards, informed us that the Gorli was less desirable than the other two, so our interests in propagation were centered on those two species.

The late Dr. Areene Puttemans rooted cuttings, showing that this method of asexual reproduction may be employed. The rooting of ripened shoots would appear to be a very promising method for reproducing these plants.

The seeds germinate readily, which suggests that propagating from the best bushes for a number of generations would be practically certain to lead to the development of a productive strain. Requiring, however, much time and patience.

The growth of the Gorli Bush is mainly from vigorous sprouts arising at the crown. This rather invalidates budding; since it would require a great deal of expert labour to prune out the sprouts arising from below the bud. Root grafting might be the solution.

Unless new conditions arise, our time and energy might be expended to greater advantage on some other species.

#### CONCLUSIONS.

1. Domestication is imperative to secure uniform crops of high quality.
2. An orchard of seedling trees is productive but lacks uniformity and productiveness.
3. Our investigations have demonstrated that budding of the Sapucainha and Chaulmoogra is feasible.
4. The Sapucainha is the more precocious and productive.

#### ADDENDA.

Dr. J. B. Griffing, wishing to be of as great service as possible to those engaged in this meritorious work, has kindly permitted us to make the following announcement:—

That the "Escola Superior de Agricultura" will attempt to supply a half kilo of seed (500), gratis; from trees budded to variety E.S.A.V. No. 1; to such

institutions as wish to propagate the Sapucainha. Those institutions that can maintain an orchard of fifty to an hundred Sapucainha trees will find this amiable gesture very helpful.

Requests for seed should be made to Dr. J. B. Griffing, Director, E.S.A.V., Viçosa, (State of) Minas Geraes, Brasil.

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## British Empire Leprosarium.

B. MOISER.

The report in the "Leprosy Review," Vol. IX No. 1 January 1938, of the Malcolm Morris Memorial Lecture, delivered by Dr. J. M. H. Macleod, prompts me to set on paper a plan which has long been in mind, namely to establish a British Empire Leprosarium at Ngomhuru, Southern Rhodesia.

I wish to say at once that this plan is in no way set up in opposition to the Home of St. Giles in England, for not every patient would wish to come here, nor would every case be suitable. It applies chiefly to officers who have contracted the disease in the Colonies, more especially in Africa.

After 20 years in the West African Medical Service, in Nigeria, the completely negative results of my treatment of lepers in that country at least served to stimulate interest in the leprosy problem, about the most difficult problem to which man ever set his hand.

In 1929 I gladly accepted the post of Medical Superintendent of Ngomahuru Leprosy Hospital, and during the last 9

years, my outlook on the problem has completely changed from despair to ever increasing hope. Two facts are very apparent. (i). Results here are vastly different to my former experience. (ii). The disease in Southern Rhodesia is of a much milder type. These facts call for explanation. The explanation probably lies in the sum total of conditions here, climatic and economic.

Ngomahuru is situated approx., in Lat. 21 S., Long. 31 E., at a height above sea level of about 3000 feet, only a few miles from the Great Zimbabwe Ruins. The average rainfall is about 22 inches occurring from October to March, with January as the wettest month, but light rains fall almost every month. The maximum temperature has never reached 100° F., in my verandah, and the thermometer does not fall lower than about 50°, but light frosts occur in the low lying parts during June, July and August. The months of March and October, are the hottest but seldom oppressive. There is always a breeze from S. E. In short it is a healthy climate.

The important factor in the economic conditions of the natives is that they do not live in large towns, but are scattered about in small "kraals" all over the Native Reserves. It is from the Native Reserves that the lepers come. It is not from the large communities that occur in such places as Mining camps, Locations, Railways, etc., as might be expected. Moreover, in such communities the natives are medically attended, and the disease would be discovered if it occurred.

Beer drinks are a national institution in the country. They occur frequently and lepers are invited, and are treated in no way differently from other guests. I have come to the conclusion that these beer drinks are the main cause of dissemination of the disease, and have suggested that lepers should be rigidly excluded, and given their beer in other places, by themselves.

It is not proposed that a vast sum of money be spent at once in building houses, a large treatment centre etc., but that a beginning be made in a small way, and extended if successful.

Ngomahuru is a large fenced estate of 8,400 acres, comprising undulating lands, and rock tree-covered hills rising 600—700 feet above the general level. It is situated in beautiful surroundings. Numerous excellent sites on high ground exist for the erection of detached houses. Anything in the nature of a large central hospital with wards is anathema, for I can never forget the squabbles that occurred in the old days when two men had to share a house. There

is very little malaria. An excellent water supply already exists.

European patients would attend a small central treatment station, fitted with a laboratory for examination of specimens, and be attended by suitable native patients, as is at present in vogue here. They would have the services of a qualified nurse, as well as of a full-time Leprologist. A central recreation room is desirable, and a reading room, and possibly a billiard room.

There would be no lack of exercise and occupation, which are as important as medical treatment. A golf course already exists, tennis, shooting, fishing and riding, are available, and other forms of sport and recreation could easily be added. The main point is that we have a large area of ground to be made use of.

The flower gardens have already earned the reputation of being the "Show Place of Rhodesia," and give pleasure to many visitors. The rose bushes alone number one thousand. The creation of these gardens has been the preliminary to the publication of the whole scheme. Patients will not come to a desolate bush station, they will find beautifully planned flower gardens, productive vegetable gardens, and fruit orchards already in existence, and will have every opportunity to surround their own cottages similarly.

Wireless keeps them in touch with the world. Clergy visit the hospital and hold services. Ngomahuru is regarded as a curative institution, and it is difficult to imagine a more suitable spot, where patients will be able to receive all forms of treatment, and lead happy, unrestricted lives, with a good hope of return to their homes.

It will be asked at once, who is to pay for all this? It has been stated before, the plan is essentially tentative and should begin by the Government of Southern Rhodesia erecting 2 or 3 cottages and leasing them at a small rent to the individuals, or to the Governments concerned in the case of Civil Servants, in which class the majority of patients would be. Patients would pay a small sum to Government, for medical care and treatment, and would feed themselves.

No doubt too, charity would come to the aid of patients. Toc H is a live wire in Southern Rhodesia, as elsewhere, and members have offered to come out and give concerts. B.E.L.R.A. and Toc H have already sent here at their own expense a lay worker to give assistance, an act which is tremendously appreciated, as help was badly needed.

It is hoped that this preliminary outline will induce the Government of Southern Rhodesia, British Empire Leprosy

Relief Association, and Toc H to take a further interest, and give support to a scheme for keeping patients out of England where they make little or no progress towards recovery, and give them what appears to be a good chance of becoming non-infectious, and even cured.

As soon as possible after the diagnosis has been made, the patient should be sent here by air, to avoid the restrictions of travel by land and sea. Wives should accompany their husbands, if they so desire, but children would not be permitted. Patients should not be sent to England, where the climatic conditions are so much against them. If there is difficulty in chartering a plane, then the hospital should keep its own plane.

I am indebted to the Medical Director of Southern Rhodesia, Dr. A. P. Martin, for permission to send this article for publication in "Leprosy Review."

## **Malamulo Mission Leper Colony, Nyasaland**

### **REPORT FOR 1937.**

In making our report for the year 1937, we are happy to be able to give evidence of progress and improvement as we compare the present record with that of the previous year.

The demand for more room in the colony has made necessary the erection of 25 more huts. These are of mud-and-pole construction, arranged in straight lines parallel with the other huts. Inasmuch as we have no funds available for the building of huts, these were constructed by the patients themselves, who were only too glad to build them for the privilege of being admitted. Our huts now total 185.

At the close of the year our 185 huts were taxed to their capacity by 249 inpatients and several others were waiting to be admitted. Many of the waiting ones had to be sent back to their villages. Although several inpatients were ready for discharge early in January 1938, yet the vacancies thus made would not provide for all those who were waiting. We were compelled to send about 10 back to their villages without attention. It is a very painful task to send them away,



for they cannot understand the reason. They beg and plead to be allowed to remain.

The selection of those who are to be admitted is guided for the most part by three factors :

- First : The type of leprosy and how much the patient will be benefitted. Cases in which prognosis is good now, but if left would develop into advanced cases requiring years of treatment, are admitted.
- Second : How infectious the case is to the community. All cases with highly positive nasal and skin smears, such as nodular cases, are admitted.
- Third : Badly crippled N3 cases, many of whom travel long distances and are unable to return. (Some of these poor patients are so debilitated by their long trip that they succumb a few days or weeks later from sheer exhaustion of their bodily powers).

Since the report of 1936, much has been done to reduce the number of non-lepers living in the colony. There are now five non-leper wives and several small children living in the colony. Since the privilege of being admitted to the colony is so much appreciated, the rule concerning non-leper wives and relatives is much easier to enforce. Patients are allowed periodic visits from close non-leper relatives, which though not altogether desirable from the standpoint of exposure of non-lepers, does help to keep the patients contented, while at the same time avoiding constant contact with them.

Our community gardens are doing well. We need much more room but the plan itself seems sound under the test of two years of experimenting. The inmates are very cooperative and we find that they benefit both physically and mentally from the work. As a result of this the supply of greens has been greatly increased, thus resulting in better nutrition for the patients. There is yet much to be done along this line for we firmly believe that this angle of colony life is essential to the better physical and mental welfare of the patients. It is interesting to note that though greens have always been available, large numbers of the men in the colony who did not have their wives, ate only maize and beans. After investigating the reason for this apparent laziness, we found that "gathering 'ndiwo' and preparing it was woman's work." Now the women of the colony gather and prepare the vegetables after which they are apportioned out to the men, thus making certain that they receive in their diet the proper amount of greens.

Lepers in the colony at the time of this report, (December) are from the following districts :

Cholo	53	Tanganyika	1	Fort Johnson	2
Mlanje	54	Blantyre	9	Mombera	9
Chikwawa	14	Zomba	12	Karonga	2
Lower Shire	11	Ncheu	13	Kotakota	7
Chifadzulo	9	Dedza	31	Dowa	9
		P. E. Africa	11		

The staff has remained about the same, including both European and native. As the year closed, Dr. J. P. Chapin was the physician in charge. Miss Gladys Piatt, who has been the sister in charge, is to be married soon and Miss Margaret Johnson, a graduate nurse from California, U.S.A., will take over her duties. The school, which includes work through class IV, continues as usual. Because of the meningitis epidemic the school was unable to open until December 1937, but we were very fortunate in having no cases in the colony.

More microscopic work has been done and routine stool and urine specimens, as well as nasal smear and ear clip are being required for all newly admitted patients. As the need seems to indicate, there is periodical checking on the patient. No lepers who were suffering from leprosy only were admitted during 1937. All had one or more of the helminthic diseases in addition to occasional obvious cases of syphilis, tuberculosis, yaws and pellagra. Nearly half of those admitted were infected with bilharzia.

During 1937 seventeen patients were discharged as either symptom free or no longer infectious and needing treatment.

The following are some of the cases treated during the past year:

Eneret, from Dedza; and Million, from Chikwawa were both  $N_1C_3$  cases and further weakened by anklystome and ascaris. The man, Million was badly undernourished and showed symptoms of pellagra. Both of these cases had ulcers upon admittance and these became worse with many new ones developing. Both patients gave a history of luetic infection. In spite of treatment they became very toxic and exhausted and died a few weeks after admittance. Prognosis was, of course, hopeless when first admitted.

Goliat, from Mlanje, was admitted in 1928, with  $N_1C_2$  leprosy which he indicated, began in 1913. Now, December, 1937, his fingers and toes are hopelessly deformed and he has some motor paralysis in the leg. But, all anesthesia has disappeared and all his skin is normal in appearance except for one large area on the side of his abdomen, which is pale and flat. He has had negative smears three times, even

following full doses of pot. iodid., and gives every sign of being entirely cured. He has had no new symptoms of the disease for the past two years. He is only waiting until others have been checked over to be discharged and will receive his discharge paper then.

Dail, from Mlanje, was admitted in 1926, the first patient to enter the colony at its beginning. He was a young man then and already hopelessly afflicted with nerve leprosy. He remained for four years and was discharged in 1930 as incurable and noninfectious. This year he was readmitted in October with such a deep ulcer that the bones of the left heel were exposed. All the phalanges and metatarsals had sloughed off. This unpleasant ulcer was cleaned up and in November the leg was amputated just below the knee. The stump has healed perfectly. Now the patient has a bright smile, although he was extremely depressed over his misfortune at first. Efforts were put forth to help him become interested in something apart from himself. These efforts were successful and now he has learned to get around well on crutches (home-made ones of bamboo), makes mats, baskets, brooms and native combs. He attends church, sings well and has made the most of his circumstances.

Kwaleya, and her husband Dinek, were inpatients, but both had improved so much after years of treatment that their discharge did not seem far off. Since their home was not far away, they were permitted to be out-patients. In December, 1937, Kwaleya came for her quarterly examination and she had numerous new raised hypopigmented areas all over her face, back and chest. There seems to be no other cause for such a startling relapse than some bad teeth and pyorrhoea that she refuses to have treated. She may have become infested with worms, but was negative when allowed to leave the colony.

After observing the work at the colony for a long period of time one is convinced that there are still many many lepers outside the colony. The stream of lepers presenting themselves for admission seems never ending. Yet, almost every leper has left behind a friend or relative in his village. When asked why those left in the villages do not come they give the following reasons: too old or sick to make the trip, trying their native medicines; indifference.

Even though there might be room for all, forced segregation would be impracticable with these people who could

easily hide their disease in the villages and never be detected by Europeans. They have no idea of the way it is spread and so give Europeans no cooperation. Since the segregation of all lepers is impossible, and since many lepers will never be reached and treated under present methods, it would seem that treatment in the colonies is not the sole answer to the problem. It is our hope that in the coming year more may be done in instructing and teaching. Considerable attention has been given to the inspection of latrines, huts, drinking water, etc., and we have tried to show them the reason for such action. Some nursing instruction was also given to the orderlies. If the lepers who come could be made to feel that it is a privilege to be admitted, they would be more susceptible to the teaching and thus take back with them a better knowledge of the proper way to live when they are discharged. In this way the colony would serve a double purpose—that of healing and teaching. We expect to accomplish more along this line.

In considering this endemic leprosy problem and a way to meet it, we were impressed by comments in the "Leprosy Review" on the strategic position of teachers. It would seem that village teachers here could be taught the prophylaxis, etc., of leprosy, and in turn teach their pupils and the parents in their districts; just as tuberculosis campaigns are organized in other parts of the world. It is quite impossible for a few Europeans ever to cope with the problem personally; though much could, no doubt, be done through native dispensers. At any rate, last year the English III class were given lessons on leprosy in their Hygiene class, and also clinical instruction at the leper colony. They were very much interested and found many of their incorrect ideas about the disease revised. I consider that such a training most important to the natives, and they are very eager for the instruction.

Since these classes were held, the little booklet entitled, "Leprosy Control, A manual for Teachers, Children and Parents," by Dr. E. Muir, has come to our attention, and we have obtained a few copies. We are eager to have more of these booklets for our graduates this year. The booklet, properly taught with demonstration of cases at the colony would prepare teachers to carry on prophylactic teaching in the villages which seems to be the greatest means of reaching the greatest number of people.

We, at Malamulo, are deeply interested in this leper problem and are ready to cooperate in any way possible to help eradicate this plague.

## NOTICE.

**Prizes for Original Research in Leprosy.**

Dr. H. C. de Souza-Araujo has created in the National Academy of Medicine, of Rio de Janeiro, two prizes of \$1,000 (one conto de reis, or about 2,000 French francs each), to be granted June 30th, 1940, by the above Academy, to the authors of the best original and unedited works presented to the same before April 30th, 1940, on

“ Bacteriology of Leprosy ” and on

“ Immunology of Leprosy.”

The papers can be written in Portuguese, Spanish, French or English.

The first prize is called “ Premio Kedrowsky,” in homage to the memory of Professor W. Kedrowsky, who died last December in Moscow, and the second is called “ Premio Lleras Acosta,” in homage to the memory of Professor Federico Lleras Acosta, of Colombia, who died in Marseilles last March, on his way to Cairo to attend the International Congress of Leprosy.

Address : Secretary, Academia Nacional de Medicina, Syllogêo Brasileiro, Rio de Janeiro, Brazil.

**REVIEWS.**

**“ Leprosy, Diagnosis, Treatment and Prevention,”** (6th Edition) by Ernest Muir, C.I.E., M.D., F.R.C.S. Edin., Medical Secretary of the British Empire Leprosy Relief Association, London.

Since the publication of the last edition (5th) of this book, which had been largely based on Dr. Muir's Indian experience of leprosy, the author has made extensive tours of other leper countries, including West Africa, Nigeria, Sierra Leone, the Gold Coast etc. in 1935, and has been able to give detailed reports of progress made. The result is that all the latest information on the subject, supplemented and confirmed by Dr. Muir's observations and investigations, will be found incorporated in this new edition of his book.

The work is divided into three parts.

*Part 1* deals with the *History, Endemiology, Bacteriology, Clinical* and histological features and *Diagnosis* of the disease.

Under bacteriology due consideration is given to, and sympathy expressed with the investigators, who are working at the artificial cultivation of the bacillus. The methods of making and examining bacteriological specimens, taking skin and nasal mucosa smears, staining slides etc. are so clearly explained that they can all be learned and carried out by the trained natives. Insistence is made on the necessity of determining and registering the resistance to leprosy in different cases for the purposes of treatment and of prognosis. In this connection the Leprolin Test is described in an appendix, and its value assessed as an aid in measuring the special resistance of the patient to leprous infection.

*Part 2* deals with *Treatment*, and the chief emphasis is laid on the necessity for such effective general treatment as will raise the resistance of the patient, this, indeed, being considered the first essential for successful results for any special medicinal treatment. While the author gives consideration to the use of various remedies still in the experimental stage, he does not recommend any such. Of the fact that chaulmoogra oil and its derivatives continue to be the most efficacious drug for the special treatment of leprosy, Dr. Muir gives very convincing confirmation. The methods of application of the remedy are described in detail, as is also (in an appendix) the method of preparation of the esters. Excellent appendices also describe the Sedimentation Test and the Iodide Test.

*Part 3* deals with *Prevention*. Prophylactic and Public Health measures are described. Many different systems or methods of isolation have been examined and are described. The necessity is urged of accuracy of diagnosis of infective cases that require isolation, as distinguished from the far more numerous non-infective cases that do not require isolation. The necessity is urged of making more intense propaganda of leprosy information among the native peoples. Very thorough specialist training of doctors, nurses, medical assistants and social workers is a *sine qua non* of efficient work in the anti-leprosy campaign, and for the better equipment of such for their task, this book will be found to be the most readable, most reliable and most complete text book yet published.

Because of the reliability of Dr. Muir's work, as a world-famed leprologist, there is sure to be a great demand for the book from all leper lands, and requests for permission to translate it into other languages.

The author had had as his object the production of a book that will be of practical use, especially for doctors and anti-leprosy workers, and all padding and anything else which is not of strictly practical importance has been left out, so as to make the book as small as possible, and as cheap as possible. It is sold at the exceedingly cheap price of four shillings.

J. W. LINDSAY.

**International Journal of Leprosy**, Vol. VI, No. 2. April-June, 1938.

*Acute Ulcerative or Sloughing Tuberculoid Leprosy*, by G. A. Ryrie. This article describes a form of leprosy with which few leprologists are familiar.

"It appears to be most common in Malaya and is there found only among the Chinese lepers. Acute ulcerative tuberculoid leprosy is of special interest for two reasons. One is that it appears to shed additional clinical light on the tuberculoid process of the disease. The other is its remarkable response to hydnocarpus treatment, which has what appears to be a truly specific effect upon it. The process begins with the usual flare up or 'reaction' of acute tuberculoid leprosy, the lesions being multiple and consisting of raised inflamed plaques, and marginal zones around central areas of partially anaesthetic skin. As in ordinary acute tuberculoid leprosy, the lesions often appear on the sites of old and apparently inactive simple leprides. The onset, though not as rapid as that of lepra fever ('lepra reaction' of cutaneous leprosy), may be and often is by no means slow, and multiple angry-looking lesions may appear where no special activity was observed forty-eight hours before. The lesions have a definite tendency to spread into the relatively immune areas of the body, which are normally free from cutaneous involvement. There may be low fever and malaise, and unless suitable measures are taken there may be considerable mental depression.

"The frank sloughing stage which is the subject of this note may develop in any of three ways: (a) After about a week a fine exfoliation is seen on the surfaces of the lesions; the appearance is as if cigarette ash had been dusted finely over them. It should be noted that the process may stop at this scaly stage or at any further point short of complete sloughing. In progressive cases the exfoliation gradually becomes more gross until large tatters of dead epithelium hang from the lesion areas, and under them can be seen the raw surfaces of the acute tuberculoid areas. Shallow ulcerations appear here and there, beginning usually at pressure points, and they gradually deepen and spread. (b) There may be little or no exfoliation. The lesions in these cases become more and more inflamed, tense and shiny, until the thinned-out epithelium gives way and ulceration proceeds.

(c) The ulcerative stage may be preceded by the appearance of tiny engorged venules on the lesion surfaces. In two cases I have noted punctate hemorrhages, and in one case larger ones, as in scurvy; it may be added that the condition is unaffected by vitamin C. In one case I have seen autogenous, nonpurulent blisters.

"The patient loses weight rapidly and looks—and is—extremely ill. The task of dressing considerable areas over the arms, legs, face and trunk is a very awkward one, and the patient experiences difficulty in finding a posture of any comfort. Small children suffering from this condition tend to cry continuously, and even in adults the sight of the large ulcerated areas causes a good deal of mental distress. In the earlier cases that were under my treatment the dressings had to be renewed day after day for months on end, with little sign of recovery and with increasing cachexia and hopelessness on the part of the patient. Recovery without the treatment to be described is extremely slow. The stage of ulceration may persist from three to seven months, to be followed by a protracted convalescence. Considerable distortion of the face may result, and perforation and erosion of the ears, the appearance being like of severe scarring from burns. On the trunk can be seen broad circular bands of scar tissue surrounding the central anesthetic areas. I have not seen a fatal case, but I have little doubt that secondary sepsis would occur if extreme care were not taken, because the raw ulcerating areas may be very large indeed. A point of considerable interest is that even at the worst stages the erythrocyte sedimentation rate is unexpectedly low.

"The ultimate prognosis is bad. Most of the cases that I have seen degenerate in a year or two to the cutaneous stage, with rapidly spreading lesions. One case under observation just now, however, after undergoing three years ago the worst attack of acute ulceration tuberculoid I have ever seen, has now developed fresh acute tuberculoid lesions. Some cases, however, apparently remain static, showing only the residual scarring without undergoing cutaneous or other change.

"No one observing the clinical progress of the condition would speak of this phase of tuberculoid leprosy as representing general bodily resistance to the disease. In its whole course and ultimate prognosis the word 'resistance' seems out of place. If, however, we consider the tuberculoid process as essentially a phase of tissue-resentment, a reaction to the presence of the infecting organism that is lacking in the cutaneous type of the disease, then we can picture a condition or sequence of conditions that vary from the relatively meek protest of the lesser forms or degrees of the tuberculoid type of lesion, through the more striking forms sometimes called 'Calcutta leprosy' to the tissue mania, so to speak, of the acute ulcerative condition here described. If the underlying factor of the condition in the last of these stages is to be considered as 'resistance,' it is resistance so violent and overdone that it damages the patient and often prepares the way for the transition to cutaneous leprosy.

"The only effective treatment is hydnocarpus oil, given in large doses inside and out. Give subcutaneously 1 cc. of hydnocarpus oil for every ten pounds of body weight, twice a week, and if necessary increase the dose up to 1 cc. for every five pounds. Along with this apply daily, and lightly massage in, hydnocarpus ointment in liberal quantities over the ulcerated areas. Leave a thick coating of it on



the ulcer bed, and also impregnate the inner dressings with it. The preparation used here is :

Hydnocarpus oil, 3 drachms	...	(10.00 cc.)
Eucalyptus oil, 1 drachm	...	(3.25 cc.)
Zinc oxide, 50 grains	...	(3.33 gm.)
Dettol, pure, $\frac{1}{2}$ drachm	...	(2.00 cc.)
Vaseline, yellow, ad 1 ounce	...	(28.00 gm.)

The response of acute ulcerative tuberculoid leprosy to this treatment is, relatively speaking, dramatic; it is the most convincing demonstration I have seen of the specific efficacy of hydnocarpus oil. The cachexia ceases and the ulcerations heal, sometimes with surprising rapidity."

The article is well-illustrated with plain and coloured photographs.

E. Keil, writing on *Malaria and Leprosy* says that in well-nourished leprosy patients who are treated without delay with atabrin (0.3 gm. daily for 5 days) followed in subtertian cases by plasmoquine (0.01 gm. for 5 days) recover without any noticeable increase in the leprosy condition.

B. Moiser, writing on *Hospitalization in Leprosy*, advocates the treatment of non-infective cases in annexes of general hospitals (in Africa), the special large leprosy hospitals being reserved for infectious cases.

*The Roles of Familial Susceptibility and Contagion in the Epidemiology of Leprosy*, by W. L. Aycock and E. B. McKinley. This interesting article may be summarised by quoting the last paragraph:—

"At present, epidemiologists with the problem of leprosy are emphasizing as most important factors in the transmission of the disease the degree, duration and closeness of contact. The type of contact which young children experience with their elders appears to represent the degree and duration of intimacy which would satisfy this concept; that which occurs between adults is of another character and does not provide the factor of duration. One observes in various parts of the tropics, for example, the mother or father holding the naked child for hours in his or her arms. Many of these children develop their first lesions of leprosy on the buttocks or thighs and it has been suggested that this represents a skin-to-skin contact transmission from the older person to the child as a result of prolonged and repeated opportunity for such transmission. Be that as it may, there must still be many instances of this nature where degree, duration and closeness of contact have existed and no leprosy has resulted. This angle of the problem has received little attention, and might it not be that those children who acquire leprosy in this manner are those who have inherited susceptibility to the disease?"

P. Parmakson writing on *Statistic Report on Leprosy in*

*Estonia*, makes the astonishing statement that leprosy is much more common among females than males. The following table gives the numbers and ratio in various age groups :—

Age Groups	Males		Females		Total		Ratio, males to females	
	No.	%	No.	%	No.	%	Cases of leprosy	General Population
0- 9	—	—	—	—	—	—	—	1 :0.97
10-19	1	1.8	—	—	1	0.6	1 :0.00	1 :0.99
20-29	6	11.1	7	6.7	13	8.2	1 :1.16	1 :0.99
30 39	12	22.2	19	18.3	31	19.6	1 :1.58	1 :1.15
40-49	7	13.0	18	17.3	25	16.0	1 :2.57	1 :1.25
50-59	11	20.4	21	20.2	32	20.2	1 :1.91	1 :1.26
60-69	11	20.4	27	26.0	38	24.0	1 :2.45	1 :1.40
70-79	5	9.3	11	10.6	16	10.1	1 :2.20	1 :1.61
80-89	1	1.8	1	0.9	2	1.3	1 :1.00	1 :1.80
TOTAL	54	100.0	104	100.0	158	100.0	1 :1.92	1 :1.13

In explanation it is mentioned that “ men often work outside their homes in towns and therefore do not frequently meet diseased persons, while the women, living at home and nursing leprous members of family, are more exposed to infection; this causes a predominance of disease in women in that region.” But no really satisfactory explanation of this reversal of the usual ratio is available.

H. W. Wade, D. S. de Simon and A. C. Fernando write on *The Skin Lesions of Neural Leprosy—Observations in Ceylon*. This well-illustrated article should be read in full. It is a valuable further contribution to the literature on the subject.

An article on *The Biochemistry of Leprosy*, by G. G. Villela, gives a full list of 106 references on this subject.

### **Leprosy in India.** Vol. X, No. 1. January 1938.

This number contains an article by J. Lowe on the *Classification of Leprosy*. He raises the following interesting points :—

“ Mitsuda and Ogwa state :

‘ Enlargement of peripheral nerves : In the clinical examination of lepers one can detect enlargement of the median and radial nerves in their upper and lower portions, and of the ulnar in its middle portion, at the elbow. At autopsy we usually examine these nerves and, when there is indication for it, the peroneal and posterior tibial nerves as well.

There are two kinds of nerve enlargement, one characteristic of cutaneous leprosy and the other of neural. In the former type the swollen portions show lepromatous changes histologically and in general contain more bacilli than do the lesions in neural cases. In the latter type tuberculoid changes are often found in the enlarged nerves, sometimes with caseation or calcification. These changes are often associated with tuberculoid macules of the skin. In these nerve lesions bacilli are very scanty, as reported by Chatterji and others. Contrary to the usual rule, smear examination is better than histological search for bacilli in the caseous lesions of the nerve.

As a result of atrophy the affected nerves sometimes become thinner than normal, but in that case their consistence is firmer. Enlargement of nerves was found in all of the neural cases and 88 per cent of the cutaneous ones. In the other cases the nerves were atrophic or of normal size, but in either case bacilli were to be found, together with histological changes characteristic of one or other type of the disease.

Thus it appears that in neural leprosy, whether of the "macular" or of the tropho-anaesthetic types, the lesions, wherever they may occur, in skin, cutaneous nerves, or nerve trunks, commonly show granulomatous change of tuberculoid nature. This finding brings up a very interesting and important point. Is it not at any rate possible that all active 'neural' leprosy is essentially 'tuberculoid' leprosy."

An article on *Extensive Ulceration of the Skin in Leprosy*, by J. Lowe and S. N. Chatterji, has already been reproduced in the July, 1938, number of this journal. Its findings may be compared with the article by G. A. Ryrje, appearing in the "International Journal of Leprosy" and reviewed and abstracted in this issue.

### **Leprosy in India, Vol. X, No. 2. April, 1938.**

H. H. Gass writes on *Cobra Venom in Leprous Neuritis*. The venom was supplied by the Department of Pharmacology of the School where it was standardised in mouse units, one mouse unit being contained in 1 cc. of solution. The recommended dosage was as follows:—1st day .1 cc., 3rd day .2 cc., 5th day .3 cc., increasing in this way until a dose of 1 cc. was reached. In our work this system of dosage was followed in most of the cases, but only up to the .5 cc. dose, for this dose was as a rule sufficient to stop the symptoms. Of the 36 cases treated there was marked improvement as regards pain in 17; considerable improvement in 15, slight improvement in 2, no improvement in 1. In one case, with excruciating pain in both ulnar nerves, there was dramatic

cessation of pain after 0.5 cc. had been reached. An editorial, however, points out that " one or two other workers in India, using similar methods, have so far obtained results much less favourable.

*A Preliminary Report of an Epidemiological Survey of Leprosy in a Typical Rural Area of West Bengal*, by J. Lowe, is summarised as follows :

A preliminary report is given on an epidemiological survey of a rural area with a population of 10,000 living in 42 villages. The methods adopted are briefly described. The gross incidence of leprosy in the area is 4.38%. In addition, there are thirty cases with lesions suggestive but not diagnostic of leprosy. Of 438 cases detected, eighty were cases of cutaneous type (i.e. 18%), the remainder being cases of neural type. These figures are compared with the figures of 50% and 5% reported in other parts of the world, and are regarded as indicating marked regional differences.

The study of the incidence at different age groups showed steadily increasing incidence up to adult life. The study of the age at onset of symptoms indicate that the great majority of the infections have been contracted early in life. The study of the incidence and severity of the disease in males and females indicated that males showed about twice the incidence as females in all age periods, and also that in males the disease tended to be more severe.

The study of the transmission of the disease showed in over 80% of cases that there was a definite history of contact. In most of these cases the history indicated contact with an open case of cutaneous type. In villages or families where open cases existed the disease appears to spread, whereas where only closed neural cases were found the disease does not appear to spread. The study of the source of infection in 438 cases indicated that in one-third infection was from near relatives, in one-third from distant relatives, and in the rest from non-relatives or from unknown sources. The great number of cases attributed to contacts of distant relatives is considered as being caused largely by the joint family system.

The study of the closeness of contact showed a large number of patients who apparently contracted the disease from contacts outside the homeland it is considered that such contacts are dangerous in childhood. The findings suggest that, the disease contracted early in life is more likely to be of severer form than the disease contracted later in life. The findings suggest that the disease contracted from the house-contact is more likely to be of severe type than the disease contracted from outside the house. Several cases in one family are frequently found.

The incidence of leprosy in children is regarded as an important index of the seriousness of leprosy in the Public Health problem. It is considered likely that similar studies in other areas may give somewhat different results, since clinical and epidemiological findings appear to vary considerably in different races and countries.

# LEPROSY REVIEW. VOLUME IX.

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