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REPORT OF A LEPROSY STUDY TOUR

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INTRODUCTION

As a fellow of the League of Nations I spent a full year, from January, 1933, to January, 1934, on a tour around the world visiting the principal centers of leprosy work. The places visited were the Philippines, Java, Sumatra, Malaya, India, Egypt, Palestine, Norway, South Africa, Brazil, Argentina and the United States, including Hawaii. Since Dr. Etienne Burnet, of the League's Health Organization, has already reported on the laws, facilities and treatment work in those places (1) I shall limit myself in this report to matters other than those dealt with in his, laying particular stress on comparative observations on the scientific aspects of the leprosy problem.

ADMINISTRATIVE PROBLEMS

THE UNTAINTED CHILDREN

That children are very susceptible to infection is fully recognized by the authorities of all countries, and they are doing their best to

practice isolation after birth. At the Culion Leper Colony in the Philippines 70 or more children are born each year to leper parents, and this number tends to increase. Because of the high morbidity and mortality that have followed attempts to remove the infants at birth, they are allowed to remain with their parents for a period of six months, after which they are removed to a nursery in the non-leper part of the colony reservation, and when two years old are sent to the Welfareville Orphanage, at Manila. When I visited this orphanage there were 200 children, boys and girls, among whom were some 10 initial cases of leprosy. A recent report by Rodriguez states that 38 per cent of Culion-born children have developed the disease, but many of those with whom he dealt had been with their parents for years before the inauguration of the present system of removal. In India the hospitals of the Mission to Lepers alone are taking care of 850 untainted children. The age at which they are isolated from their parents varies in different countries. In most of those visited this is done immediately after birth; Brazil, Hawaii and Japan are examples. In South Africa it is done after nine months.

As for the untainted children after they have grown up, they are in most cases turned over to their relatives. In the Philippines the older children in the orphanage are given some vocational education, such as shoe-making for boys and sewing for girls, which is a good practice. When they attain the age of eighteen they are made to work outside the institution. Just outside the grounds of the leprosarium at Purulia, in India, there is a colony of some 200 untainted children and negative patients, engaged in carpentering and farming. When I remarked to the Rev. Mr. Sharp, superintendent of the Purulia asylum, that this must be the only colony of untainted children in the world he pointed out that it is a matter of regret that they are thus segregated. The villagers of Purulia will not mix with them, and their colony is becoming practically an outcast community. Prudence is required for the care of grown-up untainted children, and it would seem better to allow them to mix with ordinary people, as in the Philippines.

The radical solution of this problem lies in the prevention of conception. The best thing would be to prohibit marriage in a leprosarium if that were possible, but that would be unnatural for people with a chronic disease of this kind. If marriage is allowed vasectomy is to be recommended, and this is the more desirable be-

cause of the aggravation of disease commonly seen after parturition in leprosy mothers. This step, if taken, must be from considerations other than those applying to such hereditary diseases as lunacy; the future of the children's social life is the main point in question. In Japan the problem has been fairly well solved by this method.

THE PAROLE PROBLEM

The parole of persons in whom the disease has been arrested has been tried on the largest scale in the Philippines. At the Culion colony alone over 2,000 such persons were released in the ten years between 1922, when the present parole system was adopted, and 1932. Of these some 300 have been readmitted, 195 of them on account of recurrence of the disease. That there have actually been only 10 per cent recurrences is unbelievable; it may be that half of all those paroled have relapsed. Everyone agrees that the proper follow-up of cases is very difficult, and it is not a matter of surprise that this constitutes a problem in the Philippines when it is realized that in the much smaller Hawaiian Islands they have found it very difficult.

Almost all of the patients in Culion are of the cutaneous (nodular) type. In Japan 80 per cent of such cases that have become negative show the symptoms again within six and a half years on the average. I am not in favor of the parole system as practised in the Philippines or elsewhere unless the system includes the strict follow-up of the patients and the readmittance of those who become bacteriologically positive again, but this would be very difficult in practice. The Philippine authorities have been much troubled with this problem, and in a part of Culion Island they are now developing a "negative barrio" or village for "ex-lepers," which is an excellent idea.

South Africa, and to some extent India, also have their parole systems, but they are of such small proportions that they do not create any problem. In Hawaii, some time ago, about 100 persons were paroled annually, but this number has now been cut to 20 or thereabouts, partly due to experience with the relapse problem.

Another very important question has been raised in the Philippines. During the years 1906 to 1932 there were sent to Culion alone some 21,000 cases—of whom about 13,000 died there—yet the number of lepers in the country has never declined, and I was given to understand that some are now against isolation. However, I should think this not a wise conclusion, for when the disease is virulent the employ-

ment of isolation for only 20 or 30 years may not necessarily show any marked effect. Moreover, it is questionable whether the first census of lepers in the Philippines, 5000, was correct.

In summary it may be said that the parole system unaccompanied by a strict follow-up is dangerous, and that isolation measures must be continued patiently for long years, and their results and merits should not be judged hastily.

VOCATIONAL THERAPY

The basic condition for keeping high the morale of the patients in leprosaria is the work assigned to them. Exercise is very valuable for the sick of this kind. In general, farm work is the best for the purpose, though various other activities may be engaged in. In those institutions where the patients are put to work the atmosphere is surprisingly good, while in many of those where the patients have no work they are depressed, no matter how good the accommodations and equipment. There are marked differences in this respect between hospitals located in the midst of large cities and those in the country, with farming land. The ideal location would be a place some distance from the city but easy of access to visitors.

EPIDEMIOLOGICAL MATTERS

The most essential phase of the epidemiological study of leprosy is survey work. During my tour I had the pleasure of making the acquaintance of three representative survey workers, Drs. Rodriguez of the Philippines, Sitanala of the Netherlands East Indies, and Santra of India. Rodriguez showed me the results of his investigations of Mactan Island, and the distribution of cases in the slums of Cebu Municipality¹, and Sitanala showed me his records. In neither case did I have time to see personally the places studied.

In Bihar and Orissa States, in India, I went with Dr. Santra to a village called Ranikhatanga which he had surveyed. In this village, with a population of 600, the cause of infection of 20 cases was clearly established. It seemed that there was no leprosy there twenty years before; that while there are Mohammedans, Hindus and

¹ Shortly after my visit at Cebu an intensive survey of a municipality on Mactan Island was made as a joint undertaking by Drs. J. A. Doull, working under the auspices of the Leonard Wood Memorial, and Rodriguez, representing the Philippine Bureau of Health. The report of this survey has not yet been published.

Christians in the village the disease is always found among the Christians; and that a considerable number of adults are afflicted. Among other things confirmation was seen that the disease is definitely conveyed by contact, and that the mosquito theory advocated by certain South American workers does not hold good. These matters will be reported on by Santra, whose work I would commend. In India and Africa, which still have vast undeveloped areas, there will be many such unusual places from which much valuable information can be gained.

With regard to the susceptibility of infants, mentioned in discussing the untainted children, a good example was seen in Java. In the Pelantoengan leprosarium there were 167 patients, including 10 full-blooded Europeans and 38 Eurasians. Except for a Russian who was born in Russia and brought to Singapore as a baby, it appeared that all were born in the East Indies. It is said that most cases of leprosy among Europeans are contracted in tropical colonies, and of course one hears of cases of adults contracting it, but the fact that the 48 persons referred to at Pelantoengan were all born in the East is eloquent testimony for the susceptibility of infants.

The sex ratio of lepers is generally 2 or 3 males to 1 female. Deviation from this rule was seen in Bergen, Norway, where the ratio was just the reverse, 10 males to 28 females. More patients are seen among women when the isolation work advances to its last stage, due to relative mildness of the disease in women and the consequent longevity of such patients. Lowe, of Calcutta, is making a thorough study of this subject. With reference to the relation of the blood grouping to the epidemiology of the disease, it can safely be said that it has nothing to do with leprosy.

CLINICAL FEATURES

LEPROTIC ALOPECIA

Foreign physicians visiting Japan seem to think that there is an unusually large amount of leprotic alopecia among our patients. The opportunity was taken to observe whether this is so—whether the condition exists among other peoples and if so to what extent. My observations are summarized in Table 1. From this it will be seen that while the condition exists in certain other countries, in none of them is it as prevalent as in Japan, where in certain leprosaria more than half of the inmates are bald-headed.

I am inclined to think that climate has something to do with this condition. In the Philippines close observation failed to reveal any case. This is similar to the situation in Formosa, where the climate is much like that of the Philippines and where it is said there are very few cases of alopecia. It is very hot in Java all the year round, but in the Pelantoengan leprosarium, situated some 4,000

TABLE 1.—*The frequency of leprotic alopecia in the countries visited.*

Country	Leprosarium	Number of patients	Cases of alopecia
Philippines	Culion, Manila, Cebu	a	0
Java	Pelantoengan		
	Chinese and Malayan	119	5
	European and Euroasian	48	5
	Soerabaya	154	1 Native
Sumatra	Hoeta Salem	500	1
	Laoe Si Momo	400	1
	Belawan Deli		
	Chinese	207	3
	Javanese	213	1
Malaya	Sungai Buloh		
	Chinese	900	1
	Others	300	0
Egypt		—	0
Palestine	Jerusalem	25	1
Norway	Bergen	38	0
South Africa	Pretoria		
	Native	739	5
	"Cape colored"	120	1
Argentina	Muniz Hospital	182	3
United States	Carville	350	5 { 2 Whites 3 Mixed
Hawaii	Kalaupapa	450	1 Japanese

^a Several thousands of patients seen.

feet above sea-level, several cases were seen. In Sumatra things are different. At the Hoeta Salem and Laoe Si Momo leprosaria, which are situated on a cool highland about 1,000 meters above sea-level, and in which the inmates are natives of the Batak highlands, there is little of this condition, while at Belawan Deli, at sultry sea-level, there are many. This is rather puzzling, but it may be that the Bataks are generally put into the leprosaria at a relatively early

stage of the disease, while the people at Belawan, chiefly Chinese, are taken in after they are seriously ill. At Pretoria, South Africa, I saw typical cases of alopecia among Bantu natives.

By way of control inquiry was made regarding this matter in wintry Norway, but no case was seen at Bergen. In view of the fact that alopecia is always peculiar to nodular leprosy it is quite natural that it is not seen in this old institution, where the inmates are mostly of the neural type. It may be mentioned, too, there were only 10 men among the 38 lepers seen. In Japan there are fewer cases among the female patients than among the men. Another control to be considered was the group of Japanese at Kalaupapa, Molokai, where warm weather prevails in all seasons. Of 450 lepers there 50 were Japanese, and of these only one showed alopecia. It is said that in China, too, this condition is common, but at Sungai Buloh, Malaya, only one case was seen among some 900 Chinese lepers; the case seems to be different under the conditions existing in their home land. It would appear that a cold climate plays an important role in causing baldness, but further studies must be made before a definite conclusion can be reached.

BLINDNESS

Not much difference is seen in the nature of the eye affections due to leprosy in different countries, the only difference being the number of patients affected. The occurrence of blindness was inquired into especially, and the data collected are given in Table 2.

In Sao Paulo, Brazil, the leprosarium at St. Angelo admits only patients in advanced stages of the disease, and 7.5 per cent were blind. That at Capouva admits mostly mild cases, and there was not a single blind person among 200 inmates. At Pirapitinguy, where cases of medium severity are admitted, several blind were seen among the 937 patients there. At Carville, and at Kalaupapa, Molokai, few cases had been newly admitted, most of the inmates having been there for long periods. With regard to Japan, at the Zensei Hospital there are about 200 blind people out of 1,100 inmates, the proportion approaching 20 per cent. It is true that there are reasons why that hospital should attract blind people, but the other leprosaria in Japan also have proportions of blind inmates as high as 10 per cent. This bears no comparison with the condition at Culion, where the proportion is 1 per cent. This seems to bear testimony of the seriousness of leprosy in Japan.

The fact that most of the cases at Culion were of relatively mild nature led to speculation as to the cause of the difference from conditions in my own country, but this is a difficult question. One should, first, learn whether or not in the Philippines the number of severe cases were so few in the past. According to Sister Calixte, the oldest resident at Culion, 800 lepers from Cebu were admitted when the colony was opened in 1906. Deformities seen among them were of extreme degree, but none of them was blind or baldheaded.

TABLE 2.—*The occurrence of blindness in the leprosaria visited (approximate figures).*

Country	Leprosarium	Number of patients	Cases of blindness	Percent blind
Philippines	Culion	6,500	67	1.0
Malaya	Sungai Buloh	1,200	12	1.0
India	Purulia	700	20	2.9
	Chandkuri	700	15	2.1 *
Ceylon	Hendela	600	10	1.7
South Africa	Pretoria	960	20	2.0
Brazil	St. Isabel	830	4	0.5
	St. Angelo	940	70	7.5
United States	Carville	350	30	8.6
Hawaii	Kalaupapa	470	30	6.4
Japan	Zensei	1,100	200	18.2

* One-half of these cases were due to trachoma, syphilis or smallpox.

The seriousness of the disease in Japan may be due in part to the fact that the inmates of Japanese leprosaria live unusually long. In recent years, it is said, the duration of life from the beginning of the disease to death is 17 years, on the average. In other countries, I understand, it is from 8 to 10 years, and 15 years at the most. The figure of course depends much on the accuracy of determining the beginning of disease. Another cause for the severity of the disease in Japan may be the intense cold which prevails there in the winter. The patients' condition gets worse in winter and improves in summer. Winter is so dreaded by them that by the end of the winter season a kind of depression prevails in all the leprosaria. The same reason is responsible for the existence in Japan of so many patients with laryngeal leprosy, many of whom have been tracheotomized.

NEURAL SYMPTOMS

In all of the countries visited the motor neural symptoms are generally mild. This is the case, for example, with facial paralysis, a condition which in Japan is usually marked and often affects both sides. Many of the patients there have abducted lip, which is rarely seen elsewhere. When the neural affection advances, accessorius paralysis will appear. I have seen many of such paralyses in Japan but during my tour, though I made it a rule when I saw a patient with neural symptoms to make him hold out his hands, I failed to find any so affected. Neural symptoms, too, are aggravated by coldness.

MACULA TUBERCULOID

In the initial stage of leprosy, macula tuberculoid are sometimes seen as a special variety of macules. Two variants are seen, one (A type) with only the edge raised and erythematous, the other (B type) with the whole surface in this condition, as has been described by Wade. Histologically the tuberculoid macule consists largely of lymphocytes and epithelioid cells; giant cells are often seen; bacilli are negligible in numbers, as is the case in the ordinary macule.

At Culion this type of macule was not seen; this is because only patients who are found positive for the leprosy bacillus are admitted there. On the other hand at Cebu, where I examined 700 inpatients with the disease in mild degree and 50 outpatients in initial stages, I saw among them 15 cases with macula tuberculoid. Most of them had typical A type lesions, but a few had the B type, as is often seen in India and South Africa. In the former country I saw many of them; about one-half of the leprosy outpatients at the School of Tropical Medicine in Calcutta are of this type, though of course there are also some of the A type. In South Africa also I saw many of the B type. At the Inspectoria of Rio de Janeiro, Brazil, there were many of the A type, and at Rosario, Argentina, many B type cases. Both types are seen in Japan, but I think they are not so numerous as in India. The intense heat of India in the summer may have something to do with this, though I was told that the numbers of such cases among the outpatients at the School of Tropical Medicine is practically uniform, irrespective of the season.

The A type can easily be told from an ordinary nodular leproma, but the B type with its whole surface elevated is easily mistaken for a nodular lesion as the two are often of similar appearance. It is

especially difficult to differentiate them in India and Africa, where the people are dark. This subject will be touched on again.

COMPLICATIONS AND CAUSES OF DEATH

The complication of leprosy which most attracted my attention was syphilis in India. In one leprosarium there were many cases of snub-nose caused conjointly by syphilis and leprosy. The bone was affected by the former and the cartilage by the latter, so that there was double depression of the nose. Some of the patients had leprosy infiltration of the palate and perforated syphilitic ulcers of the hard palate. These were seen mostly in the central parts of India.

It is the practice of Muir and his school to give salvarsan treatment before administering chaulmoogra oil to all patients who give positive reactions with the Wassermann or Kahn test. Formerly I entertained misgivings about this procedure in view of the occurrence of non-specific positive reactions in the nodular type of the disease. However, having seen so many syphilitic complications in the Central Provinces I now know that Muir was quite right.

In some of the leprosaria in India I saw a number of cases with complicating trachoma. In Japan, some time ago, great importance was attached to the fact that trachoma was infrequent among lepers, but this is quite without significance.

Generally speaking, tuberculosis is the most important and frequent complication of leprosy. Of the 3,153 deaths in Culion for the years 1924 to 1932, 48.6 per cent were due to tuberculosis, followed by 13 per cent due to nephritis. In the Pulau Jerejak Island leprosarium at Penang there were 85 deaths in 1932, of which 27 were due to septicemia and 17 to pulmonary tuberculosis. In Japan the proportions are roughly 40 per cent for tuberculosis, 20 per cent for nephritis and 10 per cent for septicemia. Preponderance of tuberculosis is a condition common to leprosaria throughout the world.

A point that attracted notice during my tour is the fact that the mortality rate among lepers is declining year by year. Data from Pulau Jerejak and Culion for four different years are given in Table 3. These show that the rates are fast declining, and this is also the case in Japan. This testifies to the fact that more patients are now put in leprosaria in the earlier stages of the disease and, above all, that the methods of treatment have advanced remarkably—a condition that is happily favorable for the cause of antileprosy work.

PATHOLOGY AND SEROLOGY

The autopsy of a leper is one of the most interesting to be seen. The distribution of lepromata in the various organs, and the systematic differences that are found in the different types of leprosy, make every autopsy a matter of deep interest. An autopsy done only to establish the cause of death is an insult to the leprosy cadaver.

Autopsy work is being carried on at Culion and at the Muñiz Hospital in Argentina. In many other places visited autopsies were being made in cases in which the cause of death was not clear. At

TABLE 3.—*Death rates at Pulau Jerejak and Culion.*

Pulau Jerejak ^a				Culion ^b			
Year	Inmates	Deaths	Per cent	Year	Inmates	Deaths	Per cent
1922	699	186	26.6	1908	2,402	1,221	50.8 ^c
1923	688	140	20.3	1915	4,260	530	12.4
1927	871	122	14.0	1923	6,039	543	9.0
1931	1,040	88	8.5	1932	6,750	366	5.4

^a The death rates for Pulau Jerejak are based on the figures shown in these columns, that for inmates being the number remaining at the end of the year.

^b The death rates for Culion are based on the number of inmates at the first of the year, plus new admissions and births during the year.

^c This extremely high figure is due largely to a very severe outbreak of beriberi in the first few years of the colony, resulting from the use of polished rice.

Culion it is impossible to examine all bodies, for though the number of deaths there has declined in recent years it was still 366 for the single year of 1932; and in consequence autopsies are only done on selected cases. This was the only place where I was able to see such examinations, and during my stay there I saw more than ten of them and made tissue specimens myself. Nothing seen was different from what I have observed in Japan.

With its large inmate population and numerous deaths, Culion constitutes a field for the study of leprosy, clinically and seropathologically, unsurpassed by any place in the world. The only difficulty that I noticed is the absence of cases of the neuro-macular type. Since only bacteriologically positive cases are admitted there Culion is practically without patients with the primary neural type. A study cannot be complete, from either the clinical or pathological viewpoint, without a comparative study of the neural and nodular

types. I should think that such a comparative study should be made by the workers at Culion acting in concert with those of some leprosarium where there are many neural cases.

In Brazil the facilities for antileprosy work are being improved strikingly and there is no doubt that similar progress will follow in the field of research. It was noted there that the patients are divided into the three categories of mild, intermediate and severe, different hospitals being used for each category. Therefore, a suggestion similar to that made for the Philippines with regard to the study of the disease would also apply there.

It may perhaps be common to all diseases, but in the study of leprosy the clinical, pathological and serological aspects are very closely related to each other. As I have mentioned in a previous article ⁽²⁾ the different types of leprosy are distinctly differentiated from all three viewpoints. It is therefore necessary for the clinicians to know the pathology of the disease, and for the pathologists to be acquainted with its clinical aspects. At Culion measures are taken for the maintenance of this accord.

A suggestion that I wish to make on the technical side of the pathological work is that they whose practice is to make only smear preparations should go a step further and extend that study by means of tissue specimens, otherwise the essentials of the problem may not be grasped. Another suggestion is in connection with the staining of leprotic lipid. That this substance has an important bearing on the type of leprosy, and that it constitutes the basis of the positive Wassermann test in this disease Mitsuda has held for twenty years.

With regard to the serological work, no great differences were seen in the various countries visited. The determination of velocity of red-cell sedimentation is well conducted in India for the regulation of the amount of drug to be injected. In other countries it is not employed so much.

THE MITSUDA REACTION

I was interested to see that the intracutaneous test was being tried extensively in many countries. In the Philippines Chiyuto demonstrated with it the susceptibility of infants to the disease; the reaction is noticeably weaker in young children than in older ones and in adults. This needs further study, of course, but it is never-

theless of much interest. Muir is much interested in this problem and is experimenting at the Tropical School and the Gobra leprosarium in Calcutta, and with the untainted children at Purulia. Similar work had also been started at the Santa Isabel colony in Brazil.

The most important feature of the Mitsuda reaction is its peculiar relation to the type of the disease. It is positive in most cases of the maculo-neural type, and negative in the nodular type. This characteristic of the reaction can be used to advantage for the classification of leprosy types and also for the differentiation of tuberculoid macules from the infiltrations that appear in the early stages of the nodular type. This is particularly useful in the case of people with dark skins, as those dealt with in India and South Africa. In addition, it serves in connection with prognosis, and also for a control in connection with the cultivation of the leprosy bacillus.

THE TYPES OF LEPROSY

Formerly the cases of leprosy were divided into three types, macular, neural and nodular. Subsequently, with the development of antileprosy work in India and in the Philippines, different classifications began to be adopted. In 1931 an attempt at their unification was made by the leprosy conference held in Manila, and a clinical classification was adopted ⁽³⁾ that divided cases into two main groups, namely, neural (N) and cutaneous (C).² This clinical classification seems to have been widely accepted, but it is merely given in summary and practice is still very divergent.

We have not been in favor of this classification for the reason that it has been our understanding that it would place cases of macula tuberculoid in the cutaneous type, together with those formerly called nodular. It is our opinion that such cases should be put in the neural category for the reason that the lesions are macular rather than nodular, whether from the standpoint of pathology, or serology, or of the skin reaction. That the Mitsuda reaction gives evidence in this connection has been mentioned.

In the Philippines, until recently, few primary cases of this type were recognized and the question of their classification had not

²In the Philippines leprosy cases are dealt with, as regards isolation, according to whether they are found bacteriologically positive or negative. This division is the "administrative classification" of the Manila Conference.

been raised. I was informed by Wade that in his own experience this problem was not met until he visited Japan and South Africa after the Manila Conference, when he saw many cases of this variety. As yet most of the leprosy workers in the Philippines are inclined to put these cases in the cutaneous type because of the rashes appearing on the skin. In Java Sitanala, contrary to many others there, assigns it to the neural type because the characters of the lesions are similar to those of the ordinary macules.

Muir and the men of his school classify the macula tuberculoid as neural with accuracy. Many cases of this variety and of erythema occur in India as the initial stage of the nodular type. In that country, where the skin of the people is rich in pigment, it is very difficult to distinguish the different types by the color of the rashes.

Classification is not merely a question of words. It matters little whether the types are called neural and cutaneous or A and B; the question is how the distinction is made. We would support any accepted classification readily if only the tuberculoid cases were not classed with the nodular, but were put with the neural. Some workers are of the opinion that the macula tuberculoid were better classified separately. In Japan for many years three types were recognized, neural, nodular and macular, the last naturally comprising the tuberculoid cases. If the neural-cutaneous classification is to be continued the tuberculoid cases should be placed in the former category.

LEPRA REACTION

The problem of lepra reaction was also discussed by the Manila Conference. From its report it appears that two reactions are made into one. One of the two reactions is the so-called "erythema nodosum leprosum," which is seen at the stage when the infiltration is absorbed during the treatment of a nodular case. This was seen at leprosarria in all countries visited. The other reaction is what is termed the acute exacerbation rash—*acuter schub*—which appears in the maculo-neural type and is less frequent than the former. It is an acute inflammation which usually begins with an extensive flesh-pink infiltration. It is especially common in women after child-birth. Histologically it is of the same kind as the macula tuberculoid. A few cases were seen at the San Lazaro Hospital in Manila and some other places in the Philippines. These are also being called "reactions." This term is liable to be confused with other reactions, such as those

of sera, etc. If it has to be used it should be used distinctively, as "the reaction of neuro-macular type" or as "the reaction of nodular type." In Japan distinction is made between the two, the former being called a rash, and the latter erythema nodosum leprosum.

THERAPEUTIC MATTERS

The preparation of the iodized ethyl esters of *Hydnocarpus wightiana* oil (W.E.I.) is carried on at Culion on a large scale, the output averaging more than 1,500 liters per annum. Valuable studies with regard to the manufacture of this product have been made there continuously during the last ten years and more. It is to be said, however, that there are certain shortcomings in connection with its intradermal injection as practised in the Philippines:

(1) Pigmentation due to the iodine remains at the point of injection, and on this account the paroled patients attract the attention of passers-by on the streets, which must be disagreeable to those patients. An effort is now being made to replace the iodine with some other, non-pigmenting, substance.

(2) The intradermal injection—the "plancha" method as they call it in the Philippines²—deprives the affected skin of its natural tone of color, so that in a person who has had a series of injections the type of the disease becomes indiscernible. Nor can there be seen in the skin of such a person the delicate changes in color tone that gradually take place with the progress of treatment.

(3) An impression was gained at the Culion laboratory that the skin lesion that has been injected no longer serves for the study of the pathology of leprosy. The injected ethyl esters and leprotic lipoid become mixed, so that it is difficult to distinguish them by staining.

Notwithstanding these shortcomings of the method one can but admire the efforts that have been made by the Culion authorities to contribute to the therapy of leprosy. As to the merits of the method, not much difference was seen from the results obtained by the hypodermic injection of chaulmoogra oil as practised in Japan, which would appear to be rather prompt in bringing about results. But we must take into consideration the fact that, while in most countries injections of the chaulmoogra derivatives are usually given once a week, in Japan the oil is injected every day or every other day. It may be mentioned, however, that the large numbers of cases of erythema nodosum leprosum and the reactions seen in nodular cases in the Japanese leprosaria may be due to this frequency of in-

² [Plancha is a Spanish term signifying to iron (clothing), hence to smooth, make flat, and so applied to various flat objects, as *plancha de hierro*, iron plate.—Editor.]

jection. Cases of erythema nodosum leprosum were very few in Hawaii, where the injection of chaulmoogra oil and its derivatives had been given up.

The efficacy of chaulmoogra oil is an obvious fact, though there are some who doubt its value. It is true that in some cases absorption of infiltrations and nodules occurs spontaneously, without any injection, but the fact remains that chaulmoogra oil helps remarkably to cure the disease. The best example of this that I have seen was in an African leprosarium where some patients rejected the treatment while the rest submitted themselves faithfully to it. Looking at those who were not treated it was obvious that their condition was extremely bad, though the symptoms manifested were quite new. These patients were so much worse than the others that I could readily single out those that were not receiving the injections.

It is noteworthy that in India the whole, purified chaulmoogra oil is replacing the ethyl esters for intradermal injection. This is because of economical advantages and lack of difference in the remedial effect. I also saw the injection of dyes (such as fluorescein and methylene blue) practised in Malaya and some other places, but this is still in the experimental stage.

In concluding this report I wish to tender my thanks to the League of Nations, which provided for a twelve-month study tour on a rather extensive schedule, notwithstanding the financial difficulties it was confronting at the time. Thanks are also due to Dr. Etienne Burnet and other members of the League secretariat, and to the authorities in the many countries that I visited. Especially was I impressed by the kindness of the medical and religious men directly connected with antileprosy work, whose genuine love beyond nationalities made them accept warmly this humble traveller as one of their brothers everywhere he went. I am deeply thankful for the hospitality shown by them, and much inspired by it. Because of the shortness of my sojourn in different places visited I fear that there may be errors in my statements. If there are any I would bespeak tolerance from my readers, and correction of my mistakes.

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