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Treatment of Leprosy.

THE
JOURNAL
OF THE
THAILAND RESEARCH SOCIETY
(Formerly The Siam Society)
Natural History Supplement.

Vol. XII, No. 2

BANGKOK

1940.

MILESTONES IN LEPROSY.*

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Perhaps no single word in the English language carries with it so much dread and horror as the word leprosy. To picture to ourselves the treatment of the leper in times past, is to picture a living death. In the middle ages, when leprosy swept over Europe, lepers received little short of actual execution, while even today in some parts of Africa lepers are killed on sight.

Let us imagine for a moment that we are living in those dark ages of the twelfth century, in England. As the bell in the churchyard of a small village strikes midnight, a doorway opens, and a small band of hooded monks slips out into the fog and inky blackness. The leader carries a cross on high, and the rest of the band are chanting a hymn, as if to keep up their courage. Down across the marsh and into the narrow refuse strewn streets they march, proceeding slowly because of the rough uneven walking. When they reach the house, which is their goal, they halt for a moment, make the sign of the cross, and then, as their courage revives, knock on the door of the hut.

LEPERS OF THE MIDDLE AGES.

At the sound of the knocking the inmates shrink back in terror. For a moment no one moves, then slowly the bar of the door is drawn, and the monks enter. This midnight visitation had been ex-

* Lecture delivered January 16th before the The Natural History Section.

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pected. Some days before some one had noticed a discolored spot on the body of the man of this home, and had reported it to the church. An immediate prolonged investigation followed which included a close scrutiny of the entire body. Now several days later the church had reached a verdict and had sent their representatives to declare him a leper and to summon him to his own funeral.

The poor unfortunate is commanded to follow, and as they pass out again into the night, doors of other houses silently open and the villagers, as commanded, join the procession. Back across the marsh to the church we follow this sad procession, to the very altar, the neighbors following the crowd into the church, hugging the walls, keeping as far as possible from the leper.

There kneeling he hears himself declared a leper, his wife declared a widow, his children fatherless. His property is immediately inherited by the next of kin, and the burial service is read—the service that none other ever hears, except he be a leper. The priest tries to add a few words of comfort, how God in his mercy has brought this terrible affliction for some reason known only to Himself. The members of the wrecked home are admonished to accept the situation as best they may, trusting in God.

Again the procession moves out into the night, this time to the very graveyard, where they halt by a newly dug yawning grave. Again the leper is commanded to kneel. A list of prohibitions is read to him. He may not bathe at any public stream, nor draw water from the village well. He must wear the garment distinctive of the leper on all occasions, carry a rattle, and cry out "unclean" whenever he is approached by any other except a fellow leper. He must wear gloves and receive what food he can beg in a basket fastened to a long pole.

THE LIVING DECLARED DEAD.

Again he is declared dead, beside that open grave—a symbol of what he may expect if he ever fails in the least of the restrictions imposed on him. Then with another hymn the procession hurries off, leaving the still living but better dead leper in the cold chill of the midnight fog. Henceforth his only companions will be others just as miserable as himself. Bereft of human comfort or companionship, left

to wander in the byways and lonely wastes, until, forsaken and alone, death will claim his body by the side of some distant road.

That happened in England only a few hundreds of years ago. We read that there were at one time twenty thousand places of asylum for lepers in Europe. Slowly the dread disease died out of this part of the world, for the most part, but it has continued to exist elsewhere, mounting to the staggering total of five millions which are now found in various parts of the world. In some places it is apparently rapidly increasing.

MODERN METHODS OF TREATMENT.

Fortunately with the dawn of modern medicine, the treatment of lepers has become less barbarous. But the care of such sick patients in hospitals or sanatoria is accomplished in only a very few places in the world, and to do so all over would be a terrific task, quite beyond the bounds of possibility for many countries, Thailand included. When a method is found that will make possible the immunization of all those who come into intimate contact with lepers, such as the children of leper parents, or others living in the same household, then we may expect a rapid diminution in the disease.

Unfortunately there is no accepted method for attaining this goal, at present. Nor is there any method of active treatment that is effective for the majority of patients. At the recent Congress of leprologists from all over the world, meeting at Cairo in 1938, no new methods of treatment were received or advanced.⁽¹⁾

CHAULMOOGRA OIL TREATMENT.

The generally accepted treatment is the use of injections of chaulmoogra oil, its derivatives, or closely allied oils. The success of such treatment has varied in different countries and with different races, the cause of which variation is not fully understood. In our own asylum in Chiangmai for the past ten years we have had a turn over of about a hundred patients a year. Of these perhaps twenty died, seventy-five left the asylum of their own choice, though not certified as symptom free, and five only being arrested cases which we could certify as symptom free. Since the average length of treatment in our asylum is four years, it is easily seen that the results are very

meager indeed as judged by the length of active treatment and the percentage of those who are freed of their active symptoms.

FOOD HOUSING, SURROUNDINGS.

In general leprologists consider proper housing, good food, pleasant surroundings and adequate medical attention and treatment for concomitant diseases or physical ailments such as malaria, intestinal parasites, tuberculosis, etc., as more important than injections of chaulmoogra oil. In the Chiengmai Leper Asylum these factors have been admirably worked out by Dr. J. W. McKean, founder of the colony, and by the present superintendent, Mr. J. H. McKean. The Chiengmai Leper Asylum is in reality a small village of nearly two hundred houses. Plate I. In general two patients are assigned to each two room cottage. The village is laid out in proper order with well kept streets, a market place, a fine church, a recreation center, a hospital and injection clinic, workshops, gardens, etc. If proper surroundings will cure leprosy, then the patients in Chiengmai surely have every chance. Yet only one per cent. of our patients per year reach the stage where we feel justified in releasing them as symptom free. We know that some of those will return later with a recurrence of their disease.

Some four years ago a young German scientist, M. J. Oberdoerffer, M. D., went to Africa under the British Empire Leprosy Relief Association. Starting with an open mind, he began by making extensive surveys of the disease, its incidence among the population in different districts and the types and course of the disease in different locations. In three different areas he personally examined some 50,000 persons. Dr. Oberdoerffer, who addressed the Thailand Research Society some seven months ago,⁽²⁾ has published his findings in a paper given before the Far Eastern Society of Tropical Medicine at Hanoi in 1938.⁽³⁾ Without going into the details of his findings, I will simply say that the results of his work in Africa indicated that the eating of the tuber colocasia, known in Thailand as Puak, predisposed individuals to leprosy.

TOXIC EFFECTS OF COLOCASIA.

A careful survey of the history of leprosy in Egypt and the introduction of colocasia shows that leprosy did not spread till after



Village street in Chiangmai Leper Asylum.

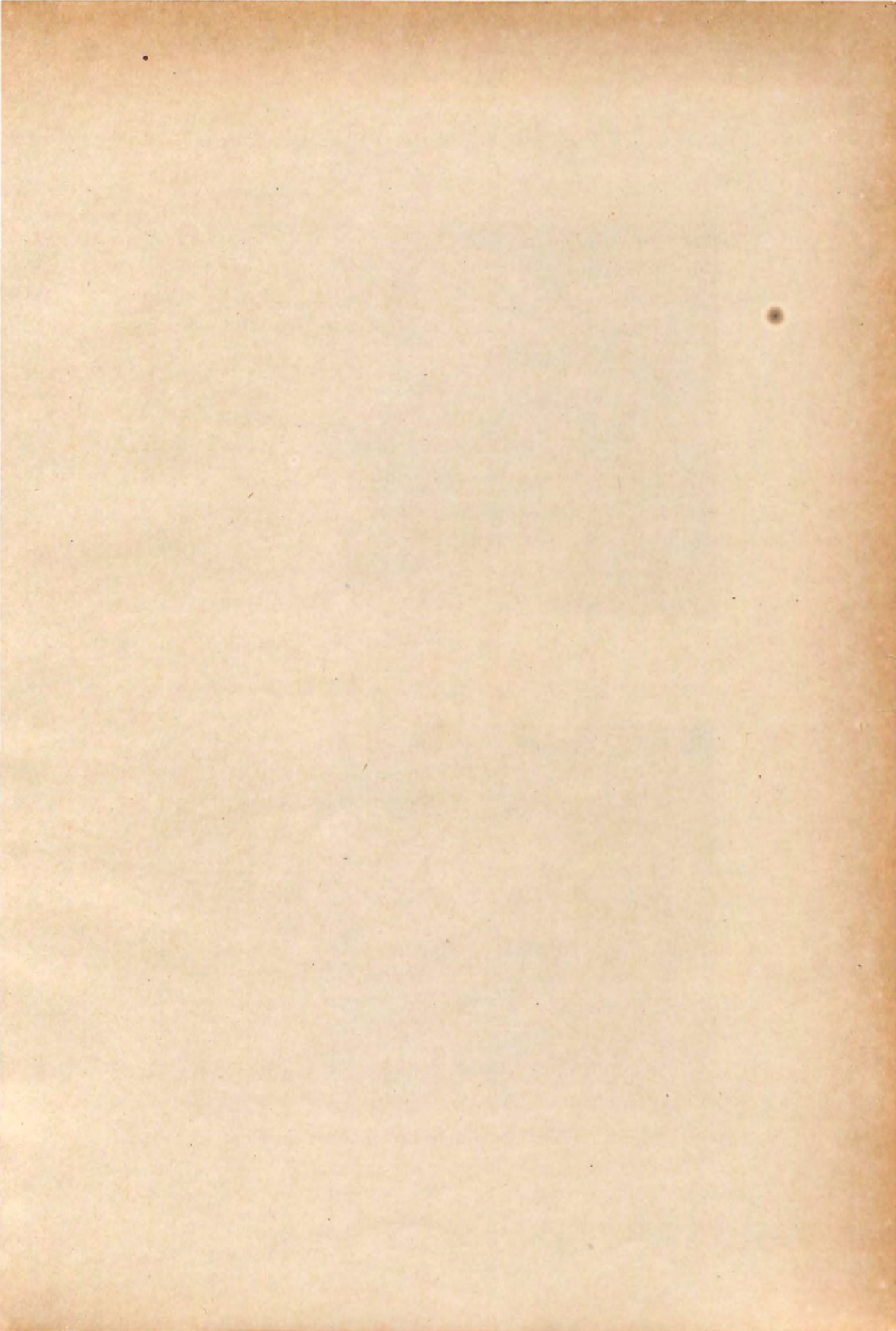




Fig. 1. Deep ulcer of foot in a leper.



Fig. 2. Ulcer completely healed after six months.



colocasia was being eaten in that country. The toxic ingredient in colocasia is found in other plants as well, notably the corn cockle, a weed, at one time very prevalent in the grain fields of central and eastern Europe. It is further one of the substances found in partly decomposed fish. This thought revives an old theory advanced by Hutchinson to the effect that the eating of fish by certain peoples seemed to affect the incidence of leprosy. Dr. Oberdoerffer has found that colocasia or some similar substance containing sapotoxin is found in every region where leprosy is wide spread, including certain regions in Europe and the United States.

A Dr. Clark in Africa several years ago carefully worked out the toxicology of *Xanthosoma*, botanically related to colocasia, and found that it caused a marked degeneration of the adrenals.⁽⁴⁾ The extreme toxicity of the substance is readily seen when one realizes that .1 mg. of the purified sapotoxin will kill a rat instantaneously. The recognition of colocasia as an important predisposing factor in leprosy is the first of the milestones of which I wish to speak.

At this point Dr. Oberdoerffer left Africa and came East. After visiting some of the leper asylum in India Burma, and Malaya he came to Thailand where he took up his studies in the Chiangmai Leper Asylum. This association was mutually helpful and I wish to express my gratitude to Dr. Oberdoerffer for the experimental work he started in Chiangmai, and the assistance he gave to our asylum while he was with us.

The first problem studied was the cause of bone absorption and deformity in leprosy. A careful radiological study of this condition was made, and a new conception of the cause and treatment obtained.⁽⁵⁾ The results of this work have been quite satisfactory and have been observed for 18 months. We feel that the methods employed are entirely practical and quite within the reach of any leper asylum or leper group.⁽⁶⁾ Plate II.

ANIMAL INOCULATION WITH LEPROSY.

Although many attempts by many workers have been made in an effort to infect an experimental animal with leprosy, in a manner which would produce the clinical symptoms of the disease, it had never been accomplished. In India Dr. Cochrane has removed the

spleens from monkeys and then implanted leprous tissue within the abdomen.⁽⁷⁾ While a multiplication of bacilli were found to follow this treatment, it was not accepted as clinical leprosy.

Working on the assumption that eating of colocasia predisposed individuals to leprosy, Oberdoerffer began a series of experiments with monkeys, feeding them on a diet of colocasia, and then inoculating the animals with leprous material. The first animals to be so treated were two Rhesus monkeys secured Sept. 1st, 1938. Two months later a small nodule of leprous material was inserted under the skin of the back and the wound closed with a metal suture. The exact details of the experiment are published in the Thai Science Bulletin.⁽⁸⁾

Since that time other monkeys have been added, so that we now have some thirty animals under observation, as well as three pigs. The results have been definite and positive. We have been able to produce all the major symptoms found in early cases of human leprosy in these animals. Bacilli having all the morphological characteristics of the organism which causes leprosy have been recovered from the skin, the ears and the nasal secretions of various test animals. There have been marked changes in pigmentation of the skin, thickening of areas of the face and other parts of the body, and nerve changes.

The female monkeys seem to be more susceptible, but the males have been infected as well. The incubation period in human leprosy is unknown, various figures being quoted. The longest time suggested is twenty years, and the shortest two years. In the case of our monkeys the incubation period seems to be two months or more. A relatively long period of incubation in monkeys is in keeping with what we would expect from our study of human leprosy. In an effort to speed up this period of incubation we are now injecting animals with sapotoxin obtained from colocasia, and have found that the progress of the disease has been distinctly more rapid than with the monkeys who received only colocasia by mouth. Another animal has been inoculated with material from a positive leprous monkey, and in this case the speed of progress seems to be accelerated. We hope to increase the virulence of the disease for monkeys in this way, which would simplify problems of research. Plate III.

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Fig. 1. Monkey one year after inoculation with leprosy
(note the swelling around the eyes and nose).

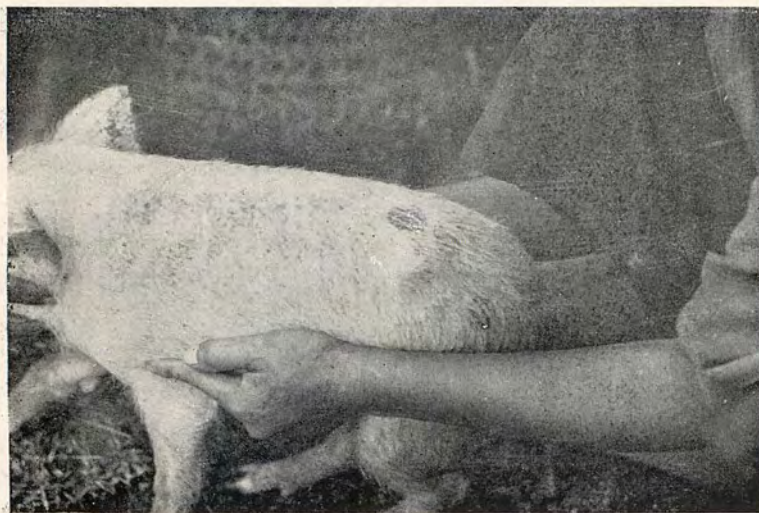


Fig. 2. Pig four months after inoculation with leprosy
(note lump on the left rump).

Numerous control animals have been observed. In the case of monkeys inoculated with leprous material, but not fed on colocasia, there have been no signs of leprosy. In the monkeys who have been fed on colocasia, or injected with sapotoxin but not inoculated with leprosy there have been no changes. In every instance where we have inoculated an animal with leprous material and fed him on colocasia we have found some symptoms of the disease.

In spite of the fact that leprosy is one of the oldest diseases known to men, and the fact that many skilled scientists have spent their lives working on the subject, a great many of the factors of the disease are yet unknown. We do not know the method of infection, the point of entry into the human body, the exact incubation time, the factors which allow some few individuals to become infected with leprosy, while the mass of the population seems to be immune. We hope that with this new approach to the subject—the experimental infection of animals—many of these questions can be settled. An experimental animal also makes possible the investigation of various methods of treatment, new drugs and procedures. A problem at which we are now at work is the question whether or not, with a new treatment developed in Chiangmai, we will be able to immunize animals against infection of leprosy. If so, then we will apply the same method to humans hoping to reach this goal which will in time eliminate leprosy from the face of the earth.

The result of the animal experiments then have added very considerable weight to Dr. Oberdoerffer's theory of adreno-cortical insufficiency as a predisposing factor in human leprosy, through the action of colocasia in diet. Further in the development of a laboratory method of study of leprosy in test animals, a new approach has been made which is already adding to our knowledge of the subject. We expect to begin experiments with anti-leprosy measures shortly.

Another line of attack on the problem of leprosy suggested by Dr. Oberdoerffer was the effort to stimulate the adrenal glands in patients infected with leprosy. A new adrenal preparation Hiron was given to several patients, but without apparent result. Arrangements were made with the local meat market to supply whole fresh adrenal glands from pigs and cows. Several patients were required

to eat the raw glands daily. While the patients showed some improvement, it was not sufficiently marked to carry on beyond a few weeks.

SHORT WAVE RADIATIONS.

In the absence of a satisfactory chemical agent for the stimulation of the adrenals we decided to try to increase the active blood flow in that organ. Such increase—active hyperaemia—can in other organs be produced by the action of ultraviolet rays, or short wave radiation. We therefore procured a short wave diathermy and chose a group of thirty-five patients for treatment. Careful examinations were made at the beginning, after six weeks, three months, and six months, and the results compared with a similar group under general treatment, and with the history charts of previous treatment and medication. Here again the results were conclusive.⁽⁹⁾ The use of diathermy on this group of patients was definitely beneficial. There was a marked reduction in the presence of lepra bacilli in the nasal secretions of the patients. The number of leper reactions, a distinctly deliterious stage in the course of the disease which will be explained later, was markedly reduced, both in the severity in all of the cases, and the complete absence in by far the majority of cases. Out of twenty-one patients who had been having repeated reactions in the six months preceding the experiment, only one case had more than a single reaction during the latter four and a half months. The general condition of the patients improved. There was a gain in weight and an increase in blood pressure. There was some improvement in the skin lesions and in nerve function. We feel that the diathermy treatment is a distinct improvement in methods of treatment, and one which offers assistance to such leper asylums as can afford a rather expensive installation. It further adds weight to the theory of adreno-cortical insufficiency in leprosy. In Chiangmai we have obtained a second machine in order to make the use of diathermy available to a larger number of patients.

DIPHTHERIA ANTITOXIN & TOXOID.

The most startling of all our experimental work is, however, neither of the ones outlined above, but rather the use of diphtheria

antitoxin and toxoid.⁽¹⁰⁾ We know that in diphtheria, a toxin is liberated which damages the adrenal glands. In this disease the body normally forms antibodies which, if the disease is not too virulent, or too rapidly fatal, will neutralize these toxins and restore the patient to health. However in leprosy that defence mechanism seems to be absent, or at the most very weak and ineffectual. Dr. Oberdoerffer and I wondered if there might be something more than an analogy between this well proven attempt of the body to form antibodies against diphtheria toxin and the lack of such in leprosy. We did not expect that diphtheria antitoxin would cure leprosy, but it might be that antitoxin would neutralize leprosy toxin in that toxemic syndrome in leprosy, namely leprous reaction. So far as we have been able to find there is only one reference to the use of antitoxin in leprosy. Babes treated two cases, noted initial flattening of nodules, but he never wrote on the subject again.

On Dec. 6th 1938 we chose a number of patients who had been having severe leper reactions, hoping that in this way we could prevent or minimize the number of reactions. I might add that in a reaction the leper patient is often covered with red raised nodules somewhat like "hives." There is a slight fever with general body discomfort, aching of the joints, and symptoms similar to those experienced with a bad cold. Reactions may last a day or two, or in severe cases for many months. It is during these attacks that the patient is often seriously weakened, and may be much worse generally afterwards.

As a control a number of similar cases were treated with tetanus antitoxin, antivenum, and a few with 30% glucose solution. The results of these control substances were entirely negative, no changes being demonstrable. The first results of the injections of antitoxin were not outstanding, and interest in this experiment lagged. However after Dr. Oberdoerffer had been obliged to return to Germany on account of poor health, the records of the institution were examined and it was apparent that more benefit had been obtained than we had thought. We soon got down to work in earnest, studying the effects of diphtheria antitoxin in leprosy. We know that in the case of diphtheria, antitoxin produces a temporary immunity. The effect

is immediate, but it is soon lost. With toxoid, on the other hand, the results are slow coming, but the protection obtained is thought to be lifelong. In the hope that we could get more lasting effects from toxoid, a quantity was ordered from America.

STARTLING RESULTS.

The results of the use of toxoid have been startling, almost dramatic. In general both antitoxin and toxoid have similar effects, though there are some differences, and the toxoid seems to be the more effective, and more permanent of the two. Fundamentally the benefit seems to be in the wholesale destruction of the bacilli, the causative factor in leprosy. In many cases of the disease bacilli are found in tremendous numbers in the skin, lobes of the ears, nasal secretions, as well as in the internal organs. Without exception in more than fifty cases examined the bacilli wherever found have shown similar changes. At first the bacilli seem to thicken at the ends, as though containing polar bodies. Later examinations show the bacilli broken up, liberating masses of acid fast granules, with often almost a complete absence of the normal bacilli. The microscopic slide occasionally looks as if it had been powdered with red pepper. In some cases this fragmentation is so acute that abscesses form under the skin, which on examination show only masses of granules and cell debris. While this fragmentation of bacilli is not unknown in leprosy it is generally believed to occur only in those cases where the disease has passed its peak, and the patient is on the road to recovery. Such a case is often spoken of as being "burned out."

At the same time the skin lesions flatten out, change color, and gradually disappear. There is a general thinning of the skin in those cases where there have been thickened areas, and in marked cases the badly stretched skin does not regain its elasticity, but remains wrinkled resembling "crepe paper." This condition is also seen in burned out cases. Plate IV.

EFFECT ON THE NERVES.

Another striking effect of the treatment is on the nerves. When the first patient told me that he could now feel in an area previously without sensation, I smiled and remarked to Mr. McKean, "an



Fig. 1. Nodular leprosy eruption of face.



Fig. 2. After three months of treatment.

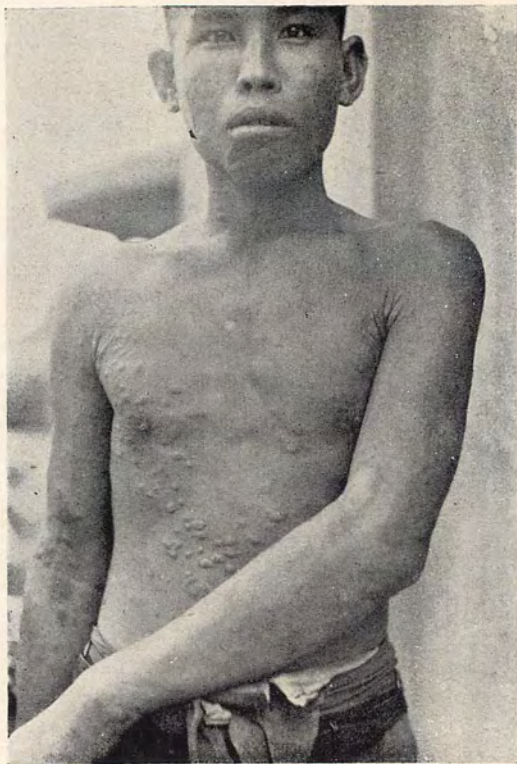


Fig. 1. Leper before treatment.

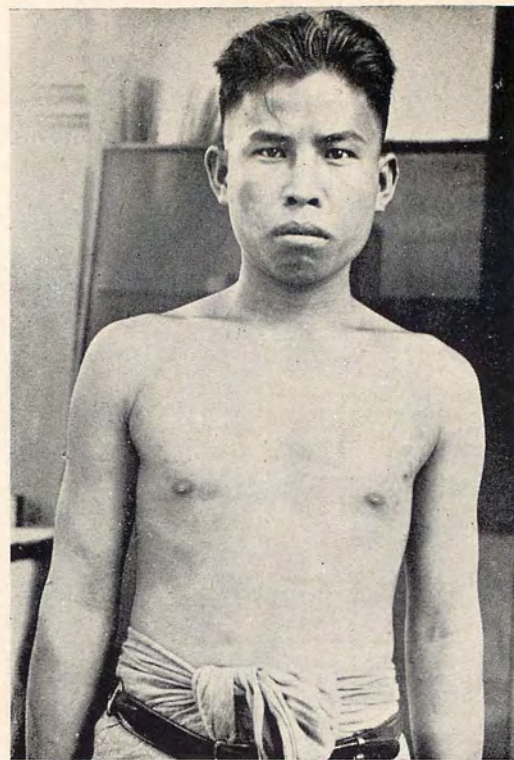


Fig. 2. After six months of treatment with diphtheria antitoxin.

evidence of wishful thinking." However after several patients had made such a statement we got busy, blind-folded the patients and tested them out, using previously made charts for comparison. It was true. There was a return of sensation in many areas, together with return of muscular activity in some cases of partial paralysis. When tried out on enlarged painful nerves, so common in leprosy, we could hardly believe our eyes. Heretofore the only hope of relieving such nerves lay in open operation during which the nerve was exposed and multiple incisions made into it. Now we find that one injection of toxoid gives lasting relief within forty-eight hours. The nerves not only regain proper function and sensation, but reduce rapidly in size, in many cases becoming normal in a short time.

We have at the present time approximately 150 patients under treatment with toxoid or antitoxin. The results have been beneficial in practically every case. Some of the cases have become symptom free in a short time, so that it would be impossible at the present time to make a diagnosis of leprosy. Just what the final results will be I can't say. In a disease such as leprosy where there is such a prolonged incubation period, and where there are normally long periods of exacerbation and remission, a considerable time must elapse before the results can be judged with certainty.

It would appear, however, at the present time, that in the use of toxoid and antitoxin we have a treatment which far exceeds any method yet known. Results are obtained in a few weeks, which formerly were seen only after months or years of treatment. While the early cases are less spectacular in response, all types seem to be benefited. This leads us to the feeling that the results in many of the cases will be permanent. Plate V.

IMMUNITY AGAINST LEPROSY.

Looking forward into the future, we cannot escape the thought that in this method we have a possible means of protection of the intimate associates of lepers, and the general population. We know that in diphtheria toxoid protects for life. If such is the case in leprosy, then it is conceivable that the terrible scourge will eventually be eradicated from the face of the earth. Such a method of protection is no more difficult than vaccination against typhoid, and

probably more lasting in its effect. We are now trying to immunize monkeys in this way, and will shortly attempt to infect them with leprous material. It will take several months or possibly a year to form any conclusions along this line. We have also begun the immunization of a group of children of leper parents, hoping in this way to protect them against the disease. Possibly a year from now we shall have definite evidence one way or the other.

COOPERATION.

Thus far our experimental work has been carried on in a small scale and with limited funds. However the special appropriation received from the American Mission to Lepers has been exhausted, and we will need additional funds in order to carry on this work and to expand it as we feel it should be done.

With so much of the world at war Thailand has before it the unique opportunity of being the leader in this great cause—of being the country and nation to be the first in pioneering in these new conceptions and revolutionary treatments of leprosy. I hope to see the Thailand government carry on with the work thus started, using the tools now at hand in an attempt to rid this country and the world of terrible scourge of leprosy. The Chiangmai Leper Asylum, the Presbyterian Church through its Thailand Mission stand ready to co-operate with the Thailand government in further work for lepers.

We believe this to be the opportune time for the establishment of public health units for training in the recognition of the disease and for the treatment along these advanced lines.

In conclusion I should like to express the gratitude of the Chiangmai Leper Asylum to the Thailand Government who have so graciously supported the work of the Asylum, and to our friends in America and the American Mission to Lepers who have made our efforts in Thailand possible. We would also express our thanks to Dr. M. J. Oberdoerffer, who started the experimental work in Chiangmai, but was obliged to return to Europe because of ill health.

OUTLOOK.

We know that the road of the leper has been ages long, and every foot of the way has been trod in anguish and misery. Although

the path has been less arduous and less cruel in recent years, it has been dark with very few rays of hope. To-day we bring new conceptions, new milestones of progress.

1) We have a new conception of the cause of deformities, and new methods of treatment.

2) We have a new conception of the factors which influence the infectivity of the disease.

3) In the successful inoculation of monkeys with leprosy we have a new tool with which to push our investigations.

4) In the use of Diphtheria toxoid and antitoxin we have a method of treatment far exceeding any method yet found, and which offers hope of improvement and in some cases a cure to a greatly increased number of patients.

5) We have the hope, yet to be worked out fully, of immunizing children and contacts of lepers, which, if further substantiated, brings to us for the first time in the history of the world the possibility of the eradication of leprosy.

At last there are rays of hope shining down that dark and lonely road of the miserable forlorn creature—the leper—relief is in sight.

Discussion.

Dr. Viehoveer invited questions, and Dr. T. C. Oakley said that there were two points on which he desired further information. There was this business of eating *taro*. It seemed to him that, if *taro* was a cause of leprosy, why did they get leprosy in children who apparently did not eat it as much as the adults?

LEPROSY AND TUBERCULOSIS.

The other point was the similarity between leprosy and tuberculosis. He thought the similarity was very very close. The bacilli looked very much alike and therefore it seemed to him that if a cure for tuberculosis was found, then they would be very near finding a cure for leprosy.

Dr. Collier replied that the giant cell found in tuberculoid leprosy was similar to the giant cell found in tuberculosis. They knew that they were very much alike. There was the similarity that Dr. Oakley suggested.

INCIDENCE OF INFECTION.

As regards children they knew that the incidence of infection in children was alike in both sexes, while the incidence of infection in adults was very much heavier in men, being three to one woman.

It was quite probable that the menstrual cycle in women, with its monthly stimulation of the glands, brought an added protection which was not found in man. In support of that idea was the fact that among the average population in the north of Thailand the age at which women begin to menstruate was after the fourteenth year while among leper women it was after the sixteenth year. They had reason to believe there was decreased glandular activity among leper women.

THE FINANCIAL POSITION.

Dr. Viehoever wished to know what was the financial position in relation to the experiments.

Dr. Collier said the American Mission to lepers had very kindly given a grant of one thousand American dollars for that research work. That was now all gone. "Our monkey food in this monkey business (laughter) cost us pretty nearly that one thousand dollars last year." They had been also experimenting with pigs and hoped to do so with horses and cows. There was a great deal of experimental work to be done and funds were needed.

At a time when Europe and many nations were at war, it seemed to him that a unique opportunity offered itself for the Thai Government to lead the way in leprosy research. The work done in Thailand and the technical papers connected therewith were being published in the Thai Science Bulletin. He understood that the Government was very much interested in the subject and proposed to establish eight new asylums for the care of lepers.

He was hoping that some method of co-operation would be established between the Government and the other organizations engaged in this work. They were all willing to co-operate with the Thai Government in doing something unique and wonderful in the cause of leprosy, now possible through further research.

THE EATING OF "PUAK."

The Rev. A. Bassett said he understood Dr. Collier to say that it was not possible to infect the monkeys until they were fed with puak. Was that correct?

Dr. Collier replied that it was correct. Monkeys who did not eat puak did not seem to be infected with leprosy. The same fact was true of pigs which strengthened Dr. Oberdoerffer's contention that puak was a very strong factor. Puak was found in many parts of the world. The sapotoxin was also found in decomposed fish which produced the old theory that the eating of fish also induced leprosy. The point was that if a person ate a lot of puak and was exposed to leprosy then he would get infected by it.

THE INFECTED MONKEYS.

In reply to another question, Dr. Collier said they had infected Rhesus monkeys and a baboon face monkey. They were hoping to get some gibbons also for experimental purposes. Thirty monkeys had been infected and fifteen were showing positive results. He intended carrying out more experiments among pigs, but he did not think that the response would be the same as in the case of monkeys.

Professor J. E. Davies said he understood the lecturer to say that lepers who were badly mutilated were less dangerous from the point of view of infection; secondly, he was told that lepers who died did not do so from that disease but from other causes as a result of leprosy weakening their powers of resistance. Was that so?

Dr. Collier said that his answer to the second questions was "yes." As to the degree of infection it was difficult to say. He hoped that the monkey experiments would provide valuable data on the subject.

Dr. Viehoever mentioned that the Department of Science was devoting its attention to the question of puak, and then called upon H. H. Prince Varnvaidyakara Voravarn to propose a vote of thanks.

THE SOCIAL PROBLEM.

Prince Varnvaidyakara said: For once I did not expect to be called upon to thank the speaker because I am a mere layman, and really the duty should have fallen on a medical man. But, as Dr. Viehoever has said, I attended the lecture which was given by Dr. Oberdoerffer and if I ventured to put a question or two, it was on the social side, because he did not give us at that time much hope of finding a practical cure or remedy, but suggested that one solution of the problem of the leper scourge was that of colonisation.

From the social and financial point that solution was not very encouraging to me. It is quite true, as the speaker has told us, that the Thai people are tolerant towards leprosy, at any rate more so than in Europe. Nevertheless leprosy is considered here as a scourge, and it is the policy of the Government to try and do what it can to eradicate this scourge, if possible.

And that is why I was particularly glad to listen to Dr. Collier to-night because he has given me, at any rate, some hope of more useful work. He mentioned that the Government already proposes to extend the leper asylums, and I understand that some Budget appropriations have already been granted for that purpose (applause).

I think the details of the research work, which we have heard to-night, have given us the hope of finding some practicable solution, and it is

most encouraging indeed. I should like to assure you that I am personally very interested in what Dr. Collier has said, and I should like to hear more about his work, and if I can be of any use in getting Government people interested, I shall be only too willing to do so.

In any case I assure you that the Government is interested not only in the general problem of leprosy but it is also aware that the puak is very dangerous from this point of view, and when the kitchen garden law and regulations were being drafted the question was discussed whether this puak, which Dr. Collier said was being brought to market in boat-loads, should be included as a vegetable to be recommended for kitchen gardens; and it was turned down on account of its danger from the point of view of leprosy.

I think that people are learning more and more about the danger of eating this puak and perhaps, in a short time, Dr. Collier will not see boat loads of puak coming to the markets in Bangkok. I am personally interested in this work of eradicating leprosy and I do say that Dr. Collier has given me much more hope than has Dr. Oberdoerffer, and that is why, in the name of the Society, I wish to propose a most hearty vote of thanks to our speaker to-night.

The vote was carried with acclamation. Those present then spent some time in inspecting the photo "gallery" of patients, and the various textiles and other articles, produced by the lepers.

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