

LEPROSY REVIEW

The Quarterly Publication of
THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION.

VOL. XIX. No. 2.

APRIL, 1948.

Principal Contents:

Rehabilitation in a Leper Colony

The Treatment of Leprosy with
Sulphetrone

Promizole Treatment of Leprosy

Use of Streptomycin in Leprosy

A new Sulphone Drug
"Sulphetrone"

Obituary — Rev. Frank Oldrieve

Reviews

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CONTENTS.

	PAGE
Editorial	43
Rehabilitation—The Industrial and Social Work of a Leper Colony A. B. MACDONALD	45
The Treatment of Leprosy with Sulphetrone T. F. DAVEY	55
Promizole Treatment of Leprosy (Reprint) F. A. JOHANSEN and P. T. ERICKSON	62
Use of Streptomycin in the Treatment of Leprosy (Reprint) G. H. FAGET and P. T. ERICKSON	61
Preliminary Report on a new Sulphone Drug "Sulphetrone" (Reprint) L. H. WHARTON	71
Obituary REV. FRANK OLDRIEVE	75
Reviews	76

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News from Havana

The sulphone of choice in Lepromatous Leprosy

First reports on the value of 'Sulphetrone' in the treatment of lepromatous leprosy, were confirmed at the Fifth International Congress of Leprosy, Havana, when this new product was referred to as the sulphone of choice.

Trials show that the administration of 3 to 6 gm. daily produces a satisfactory clinical response in the majority of lepromatous cases. 'Sulphetrone' is issued as, 'Tabloid' brand compressed products, each containing 0.5 gm., in bottles of 500.

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BURROUGHS WELLCOME & CO., LONDON

(The Wellcome Foundation Ltd.)

EDITORIAL.

The Fifth International Leprosy Congress being held at Havana, Cuba, from April 3rd to 11th, will of necessity have to face many weighty problems. The congress meets at a time of recurrent crises and international tension. They constitute a grim background for a united and global campaign against leprosy.

The congress will be faced with other and more scientific difficulties and it is clear that much of its work and deliberations must be tentative and exploratory. The chemotherapy of leprosy has not yet taken shape and

posed or existing classification would receive general acceptance.

In due course our knowledge of the sulphones and other modern drugs in leprosy will develop from its present adolescence into maturity. In due course also the basic patterns of the disease will emerge and enable us to achieve an accurate and adequate classification. The congress cannot give the final answer to these and many other problems, although it will undoubtedly gather for us a valuable summation of trends.

It would be a disaster, however, if amid the welter of scientific papers the basic ideas and aims of international collaboration in leprosy were to be obscured or forgotten. Leprosy work has in the past suffered from two grave handicaps—lack of standardisation and lack of correlation. These can only be overcome by international effort.

LACK OF STANDARDISATION. It is unfortunately true that a great deal of leprosy work is conducted by methods and standards which would not be accepted in the modern study and treatment of any other disease. A detailed and adequate general examination of each patient is in many places still the exception rather than the rule. Anæmia and ulceration still tend to be considered as integral components of the disease. It is still the exception for a leprosy patient to receive an adequate diet according to modern nutritional standards. The list could be prolonged into a very formidable one indeed. Under these circumstances it is little wonder that the literature of the disease displays considerable inequality in statistical value, in the scientific assessment of experimental results, and even in appreciation of the essential nature of an experiment. Some kind of international standardisation or grading would seem to be a basic need.

LACK OF CORRELATION. An international congress obviously plays its biggest role in the pooling of experience, and it is of course

implemented by the circulation of publications such as the *International Journal of Leprosy*, *Leprosy in India*, the *Revista Brasileira de Leprologia* and the *Leprosy Review*. In spite of this a great deal of leprosy work remains isolated, and many leprosy workers carry on unaware of what has been achieved, or is being done elsewhere. In all branches of medicine there is the danger that the isolated doctor will keep on perpetuating the same mistakes—and leprosy is no exception. Again the call for correlation is a basic one.

Whether in the laboratory, the ward or the clinic work is essentially a specialised adventure in human reclamation. That is what constitutes the real importance of the Fifth International Leprosy Congress.

For many years there has been a growing body of opinion that the word leper, and possibly also the word leprosy, be expunged from medical literature and textbooks. No one with experience will doubt the needless and horrible cruelty caused by the evil stimulus of these two words. There can be few cities in the tropics or sub-tropics where men and women do not go in daily fear that their disease is discovered. The odium and social obloquy which these words arouse are not merely incurred by the victim, but are all too often heaped on his equally innocent relatives and children.

The common belief that the ugly implications of these two words are Biblical in origin appears to be unjustified. There is no evidence that the Biblical Jew suffered from either the stupidity or the cowardice which mark the cruder manifestations of leprophobia. Races which are totally unacquainted with Biblical or Christian tradition, and in whose languages the name of the disease has no resemblance to the word leprosy, shew the same instinctive fear of the disease and attach the same stigma to those who suffer from it. It appears therefore open to question whether a mere change of name will of itself eradicate the stigma. Leprophobia is irrational and is probably connected with a primitive sense of guilt. As such the only real cure for it is the wider spread of knowledge.

It will take a long time for mankind to evolve a sane attitude towards a disease which is both chronic and disfiguring. It may help however if we could eliminate words which have become throughout the centuries encrusted with horror and shame,

REHABILITATION — THE INDUSTRIAL AND SOCIAL WORK OF A LEPER COLONY.

A. B. MACDONALD.

The following is an account of the development, and progress of this side of a leper colony, begun 19 years ago at Itu, Nigeria. As there was nothing of the kind in Africa before, and very little elsewhere there was no one with experience to whom we could look for guidance, and progress was by trial and error. If one system did not work, it was scrapped and something else attempted.

Nigeria has been described as a "land of contrasts." There are some hundreds of highly educated men, who have been able to take degrees with credit in the various faculties at Universities in Britain, and there are millions, largely of the peasant class, who live as their forefathers have always lived before them, cultivating their farms with simple tools or plying their dug-out canoes on the rivers on the way to fishing

everything except the affairs of

between these two classes there are, of course, thousands in various stages of education, elementary or secondary. We work predominantly amongst the primitive people.

The Itu Leper Colony is on the Cross River, which flows into the Bight of Biafra on the Gulf of Guinea. It is about fifty miles from the town of Calabar, which is at the estuary.

Situated in the heart of the tropical forest which giant trees, bush and creepers made impenetrable apart from the roads and paths, a passage had to be cleared by men with cutlasses. Three streams pass through the residential area all the year round. There were oil palms and timber for building purposes, and unlimited firewood. It is about four degrees north of the Equator and on sea level, hot with a moist damp heat.

We obtained a lease of the first area of land to be acquired in 1928. The development is a long story, but to make a long story short, the land now extends to four square miles and we have 3,500 patients in residence. There is a hospital with 80 beds, a hospital annexe with 100 beds, a babies' home, five villages, or "towns" as they are called, a school, church, workshop, roads, a canal, residences for the staff—African and European, a court, a market, farms and farm steadings, and a community where medical, educational, industrial, agricultural, social and religious work are carried on.

The five villages are quite near each other separated only by

distances of 100 to 200 yards. Each is laid out in regular streets, which are named and the houses numbered. A board giving the name and registered number of each patient is on each house. The patient's dwelling is made, native style, of clay plastered into walls of crossed sticks and bamboos while the roof is thatched with leaves from raffia palms sewn into mats, and tied to a framework of crossed bamboos. The houses are semi-detached with a verandah and flower beds in front, and a kitchen in between or behind. Each street has a headman or, in the Women's Town, a headwoman, responsible for the behaviour of the occupants. There are, in all, about 1,000 houses, two to four children or adults in each, and they are inspected once a week to see if they are clean and kept in good order. By the adoption of this simple type of house, there is no "housing problem." We have plenty of land, and all the materials are on the spot.

Sanitary services have been instituted and the streets are swept daily. The latrines are of three kinds. In high ground, which is dry, the bore latrine has been adopted. The boring apparatus, which costs £4 to £5, makes a hole 15 inches in diameter, and 30ft. deep. A square cement slab with a slit in it covers the top. They are the most satisfactory form where water carriage is not available. In the low lying ground, where water is near the surface, the Army system is employed. A trench is made every day, 2½ft. deep, a shovel left beside it, and every morning it is completely filled in, and a new one dug. At the hospital itself, there is a septic tank.

The Colony is well supplied with water. In addition to the Cross River nearby, and the three streams passing through the residential area, there are many more in the agricultural land. A reservoir has been built in the valley near the villages. The water is led into various filtering beds, thence to a collection tank, from which it is pumped by an electric pump to a sunken tank on an eminence, and it falls by gravitation and is laid on to the hospital, public buildings, and the streets in the residential area.

Agriculture and Industries were started for various reasons:—

- (1) First and foremost, to enable the patients to earn sufficient money for food.
- (2) As the most economical way of spending such money as we got as a grant for support. We are a Mission institution, and Government pays about one fifth of the total running expenses.
- (3) As what is called "work therapy"—outdoor and manual labour—giving health to the body, tone to the muscles

and distributing the oil which is injected bi-weekly as a remedial agent.

- (4) To increase self-respect. The patients were, many of them, outcast and despised and considered useless. It is important to foster a spirit of independence, a feeling that they counted and were of value in the community.
- (5) As a contribution, or rather they became a contribution, to the general welfare and improvement of the community at large.

As the present standard treatment by injections of hydno-carpus oil has been described by an authority as being valued at only 15% of the general treatment, it follows that the other 85% is of considerable importance.

Those who are able to work are divided into three categories. Adopting Army symbols, the C1 class is composed of semi-able bodied men and women, who are physically fit for work of any kind on the farms, oil palm plantations, in the workshop, or in any one of the administrative services, such as nursing, police or work in the kitchen, while the children go to school. The C2 class are able to do light work and to go about, but are not, expected to walk long distances. In the C3 category are the debilitated, the old, and the crippled, commonly known as the "sit-down company." We consider it a triumph to get work for these people of any kind, as formerly they did nothing and received food from the kitchen. They do the sorting of the palm kernels, beans, seeds, and sew the mats of raffia leaves for roofing, as they cannot move about. All receive a sum weekly for their services, sufficient to buy food and a little more. More than that we are not able to give. There is a fourth class—those too old or too debilitated or crippled or blind to do any work at all. They are fed at the communal kitchen.

As far as possible, work is on contract, and the remuneration depends on what they do. The introduction of the contract system was of the utmost value, as where there are hundreds of work people working on "time," close supervision is essential. On contract, it is reduced to a minimum. The people work in companies of 16 or so in number with a headman or headwoman in charge, and each company maintains its own discipline and sees that each member does a fair share of work. They do not work long. On two half-days they are "off" for treatment, and of course Saturday afternoons and Sundays. No trade union would quarrel with our working week, which is about 34 hours. In the African way of life, they are not accustomed to working day after

day for twelve months on end, and it is advisable to give them occasionally a week off for rest.

In agriculture cassava roots, yams, and rice, are the staple crops. Cassava is easily grown, and by a simple process the juice which is slightly poisonous is extracted, and the grated root is cooked to form a coarse meal called gharri. From cassava comes the home product known as tapioca.

The yam is a tuber like the potato but more fibrous in texture, and grows to an enormous size, anything up to 15 lbs. or more. To grow it, a small piece of yam with a sprout or eye is planted on the top of a mound of earth. Later it puts out a long vine, which has to be trained to a stick, or tree, 10 feet high. Yams demand a good deal of attention. They have to be weeded, their vines re-tied after a tornado, and when harvested they are tied up separately to walls of crossed sticks open to the sky to prevent rot.

About 120 acres of rice are under cultivation. The seeds are planted in a nursery, and the seedlings, when ready are taken out by the women and planted one by one by hand in the prepared soil. The area is then flooded, by the turning of streams into the fields, and left flooded until about a month before it is ready for harvesting, when the water is drained off. Rice cultivation is a job pre-eminently for women, who do it very well. Recently, through the generosity of B.E.L.R.A., a tractor has been acquired which will do a great deal of the heavy work. When harvested, the seed or "paddy" is beaten off the stocks, hulled, and winnowed in the workshop on special machines.

Other products are groundnuts, Indian corn, cocoa-yams, pumpkins, leaves and small nuts for flavouring soup, sugar cane, bananas and plantains, soya beans, and the various citrus fruits.

Owing to the absence of fertilisers, ground used in one or two successive years cannot be planted again for two or three years, when the bush is burnt and the ash dug in, restoring the salts to the soil. It follows that large areas of farm land are required.

As well as arable farming, there is a stock farm with over 200 sheep, goats, pigs and cows, not to mention donkeys and rabbits. The herd of goats was started several years ago, and two goats from home were imported to improve the local strain. For many years now the milk has been in regular use for feeding the uninfected babies of leper mothers, and the hospital patients. Within more recent years, cow's milk has also been obtained.

In felling large tracts of forest, a proportion of trees is always of use as timber. About 50 sawyers—pit sawyers—have been employed continually cutting up trees for use in the carpenter's shop, for building purposes and also for sale to outside concerns.

As well as the communal farms, many acres are set aside every year for private farms, each man and woman fit to look after it is given a plot and the produce is their own. This is extremely popular and few fail to claim them. Apart from them the teachers, the clerks and nurses would have no regular manual work in the open air.

The land in the Colony is a tumble of small hills, valleys and swamps and was originally covered with forest giants and dense undergrowth interspersed with oil palms. Palm oil is practically the only source of fat, and as such is very valuable. These palm trees were left when the forest was cut. The fruit grows at the top of the tree, and a man might have to climb 70 feet in order to obtain it. The supply of oil obtained was small and the method of extraction somewhat primitive. The fruit was placed in a large container, possibly an old canoe, or a hole in the ground lined with stones. It was pounded with sticks until the pericarp or outer covering of the nut was a slimy mess. Hot water was then poured on and the oil released by the pounding floated to the top.

In Nigeria the rain is devastating and care must be taken when cutting down the forest lest the soil be washed off the hills into the valleys. Bush-felling must be followed by planting. It was decided for this reason that the planting of young palms, quite apart from the monetary return, should be begun. So gradually the hillsides became dotted with serried rows of dark green palms, first a few inches, and then a few feet in height. As these grew up and bore fruit, the old ones were cut down. The young palms were planted at 30 feet intervals and, having plenty light and air, did not grow so high, and the fruit, instead of being cut 70 feet high was now obtained by the collector standing on the ground. The output grew so large that primitive methods were found to be inadequate, and something had to be done about it. To purchase and transport a steam mill from home would have cost two to three thousand pounds, and that was not possible. Fortunately at this time, information came about a derelict palm-oil plant at a village 10 miles down the river from Itu. It had been years before and abandoned by a trading company. True it was half buried in the bush, but ultimately it was purchased for £25, and the herculean task accomplished of dismantling it and transporting it in a lighter to the Colony beach. Then, by pulling, shoving and easing it along the path, it was brought to the Colony workshop. After certain new brass fittings were purchased, and a boiler weighing several tons obtained, it was complete. It worked and has been going for nine years now.

The palm-oil industry provides work for the largest number

of men chosen from amongst the strongest and healthiest. Forty are employed in the mill alone, preparing the fruit and feeding it into the mill. Others are engaged in transporting and in weeding and re-planting as required. After the oil has been extracted, the nuts are separated, dried on a floor above and descend by two chutes into the cracking machine. The kernels are separated from the shells and the weaker patients do the grading. The shells, with firewood, form the fuel for the furnace. A community of 3,500 requires an enormous amount of palm-oil for food. Soap in large quantities is made from it. It is of great value in providing work and wages and the largest single item which makes it possible for us to house, maintain and treat patients for a fee of 15/- a year.

The workshop buildings are sheds roofed with iron supported on cement pillars, and they are about one acre in extent. They house the mill driven by steam. To the driving shaft are attached by belts the machines for rice processing, the circular saw, planing and ton, electric light for all the public buildings, the houses of the staff and power for the water-pump.

The carpenters make all the doors and windows and prepare the building materials, and, with the bricklayers, erect permanent buildings. They also make quite creditable furniture. Owing to a shortage of galvanised iron, six of the permanent buildings, the babies' home, the library, the central kitchen and staff dwellings have been roofed with wooden shingles cut by the circular saw.

From clam oyster shells placed in a kiln and burned with firewood, whitewash is obtained which is a great boon to us and many outsiders.

Around the town and between the palm trees in the near areas, lemon grass is grown. This is cut periodically by the weaker people, and carried to the workshop, where it is steamed and oil of lemon grass is obtained.

In another part of the Colony, are two large sheds, where there are several minor industries. One of great importance is tailoring. A tailor is the name given to anyone who owns a sewing-machine. A great variety of garments for men, women and children are made. They are independent, but the Colony employs them for making the large quantities of hospital linen required, the uniforms for the nurses, for the Police, the Scouts, Guides, Cubs and Brownies, and clothes for children and destitute adults unable to work.

Then there are blacksmiths, who keep the farm instruments in good order, make nails and repair pots and pans and all domestic utensils.

An important subsidiary trade is the making of raffia sacks for holding the palm kernels, the rice and the gharri, as for many years hessian bags were unobtainable. In the same shed are carpet makers, who weave carpets from bamboo and raffia. There you can also have your umbrella re-covered and your shoes repaired.

As a result of all these activities, the spirit of the people is good. There is nothing worse for morale, than to have hundreds of people going about with nothing to do — “ roving idle, unemployed.” They are cheerful and not just sick people to be pitied but a people well able to look after themselves and even give a lead to their countrymen when they go home.

The work is arranged in such a way that it does not clash with treatment. On Monday and Thursday the men receive treatment in the forenoons, while the women come on the same afternoons. The children are brought up after a bathing parade supervised by the teachers, following the forenoon school on Tuesdays and Fridays. Temperatures are taken morning and evening by a staff of 98 so called “ temperature clerks,” mostly senior children from the school, who have been taught how to take them and they are paid for their work.

There are eight miles of roads on which a good deal of labour is spent, especially during the wet season. About three years ago a canal was cut from the workshop to the farthest boundary of the farm area. It was a romantic achievement. On the average it is 12 feet wide and 3 feet deep, and covers a distance of about 3 miles. Every day there operates on it a fleet of about thirty canoes. The canoes are made in the Colony, and their production is an interesting and skilled occupation. The tree is felled and is cut to the length required and the canoe axe does most of the work and the adze and plane the finishing touches. By the ingenious use of levers and wedges and what amounts to a steaming process, the canoes are made much wider than the trees from which they were obtained. The canal was not made easily. The surveying for it had to be carried out in dense tropical forest, and at times meant wading waist deep through liquid mud. To extract the roots of the trees felled in the path meant a good deal of trouble, and often necessitated the men working with their spades and axes below water. Where sections traverse deep swamp, and where the ground was high, it had to be cut to a depth of 10 feet. Four different streams were led into it. There were no bull-dozers. The men worked with spade, axe and often with bare hands. Forty or fifty men were employed six hours a day for nearly a year—the cost was about £300, but it was well worth while. Transport by canoe is much cheaper than by road and especially so in these

days when lorries are difficult to obtain and keep in order. Some of the canoes are long and spacious, and can carry a load equal to that of a 3-ton lorry. At intervals along the canal there are beaches, where the produce is collected and loaded into the canoes. The canal serves to transport palm fruit, the rice, the roofing material, the fire-wood for the mill, the yams and gharri, and the great baulks of timber. It enables the weaker patients to get to the farms, fresh and able for work, and is invaluable in saving the patients from carrying many heavy loads in the tropical heat and rain.

Among the 3,500 patients are 650 children, 350 being Adoptees under the BELRA Child Adoption Scheme. These, if at all able, go to school. There is a large well-built school of 12 classrooms, an assembly hall and rooms for teachers and a store. Most of the children who come, have never been at school before, and thus the classes for beginners are by far the largest. Others are for infants and Standards 1 to 6. Up to Standard 1 teaching is in the vernacular, thereafter in English. Handicrafts occupy an important place and the children also do gardening. The boys do soft wood carving, basket and brush making, and can make quite a presentable arm-chair, while the girls are taught spinning and weaving, sewing, embroidery and knitting. The hours are 8 till 11.30 a.m., which would be most popular with children at home. Then they proceed to the kitchen where they get a cooked meal. In the afternoons they assemble for light work. They divide up into companies and are allocated to jobs according to their age and strength.

Education is compulsory, too, for adults, who are unable to read. Evening schools are held two nights a week for each section, to which all must come, unless they are too old or too weak to make the effort. When they are able to make words out of letters, they are presented with a Bible. Many hundreds have been taught to read in this way and we know of villages where the only woman who can read is one discharged and returned from the Colony. The teachers are all patients and are 28 in number.

Recreation is important in any community and especially so in one like this and it takes various forms. Football is played by the schoolboys and young men who have been at school. Surprisingly, youths without education had little use for the game, considering it a waste of time. Teachers and clerks play a rather gentle game of tennis. There are draughts and many native games of a similar kind. On different evenings the Brownies and the Cubs, the Guides and the Scouts, hold their meetings, work for their tests, and engage in various games, outdoor and indoor,

singing and dancing. Some are members of the choir and the brass-band, and many young anglers are to be found along the canal bank or the Cross River where there are plenty of fish.

The centre of social life, however, is the market, the scene of petty-trading, for which all seem to have a natural affinity. It is held at 5 o'clock every evening and there are to be found for sale foodstuffs from the farms, cloths, beads, household utensils, stationery, and even cosmetics. It serves as the principle means of communication and passing the gossip of the day. Then there is the Colony shop, where the food from the communal farms, the palm-oil, the rice, the gharri, etc., is sold at a cheap price.

Next to the market is the library, where books, magazines and papers of various kinds are there for those who can read English.

Then there is the brass band of eighteen players, who have been taught to read staff music and play the hymns at church service, and entertain us on Friday nights and on other occasions. Every opportunity is taken to make the Colony as attractive as possible. The main avenues are lined with flower beds, and patients are encouraged to grow flowers in front of their houses.

A patient with a distinct genius was discovered, and under the guidance of Doctor's wife, made some very creditable statues of cement, which add much to the adornment of the place.

A cinema show is given periodically at an outdoor stadium. There the band plays popular songs and the children sing.

A communal kitchen, staffed by eighteen cooks, supplies food to those who are "on chop." Twice a day the bugles sound, and the children make their way hurriedly to join the queue. Over 600 meals twice a day are served—these are mostly for children and adults who are unable to work. The meals for the hospital and annexe are taken by the women to the wards on trays. The food is rice, yams, gharri and fruits in season. They also receive soup made of meat, fish, palm-oil, soya beans and other vegetables and the inevitable hot pepper, so palatable to the Nigerians, although it would remove the mucuous membrane from the mouth of the European. Each patient also receives a weekly supply of soap. Those on the kitchen food list, too—the children and those unable to work—receive clothing, mostly made by the Colony tailors supplemented by boxes of gifts from home.

THE ADMINISTRATION.

The staff is composed of the medical superintendent and his wife, who is a trained nurse, and four BELRA assistants. One is the accountant and the work of the office in a Colony of this size is enormous. Patients' particulars have to be filed, accounts kept

and money received and paid out, and a vast number of letters received and answered. All postal transactions for patients pass through the office as, of course, they are not allowed out to the public Post Office. The office is indeed the control room of the whole machine. One European is an electrical engineer, gifted in dealing with anything mechanical, and he it was who dismantled and re-assembled the derelict palm-oil mill. Another is the builder and supervises the carpenters and bricklayers during the erection of buildings, while a fourth relieves during furlough, and carries out the work of any of these departments, including the agricultural side. We receive also valuable help from the wives of BELRA assistants, one of whom has had secretarial training and does duty in the office and school, while another is a trained nurse working in the Colony hospital.

Like all other African communities, this has its own Chief. He is an important man, something like the sergeant-major in his position. On him depends much of the life and character of the Colony. There is a court house and the chief presides, assisted by three sub-chiefs and the headwoman of the Women's Village. The court meets twice weekly—at night. If it met in the day, there would be some difficulty in getting the ordinary work done. Considering that fifty different tribes are represented, there is really very little trouble. Minor offences do occur, for which a court is necessary, petty thefts, slanders, debts, infringements of Colony rules and occasional cases of immorality. The court does its best to settle disputes. If the accused is not satisfied, he can appeal to the Superintendent, who constitutes the Appeal Court. For that, however, he must put down sixpence and if he wins his appeal he gets the sixpence refunded.

A uniformed police force of men, and women for the Women's Town, maintain order and act as watchmen, particularly night-watchmen. They are indispensable, as much valuable property has to be guarded. They are also time-keepers and ring the hours and the half-hours day and night. Once a week they parade and they are given some elementary drill.

The predominant type of leprosy at Itu Leper Colony is neural, amounting to 73.25 per cent., N1 and N2. Of those considered N3, there are 30 only. Those showing diffuse depigmentation outnumber those with definite discrete macules. The tuberculoid cases, major and minor, form 8.5 per cent. of the total.

It has been noted that a tuberculoid case can become lepromatous but such an occurrence is infrequent. Nor has 'self-healing' leprosy been evident except on rare occasions.

Lepromatous cases amount to 18.25 per cent., and are kept in a special village or section by themselves. When they become bacteriologically negative, and 20 to 25 per cent. of these do under 'standard' treatment, they are transferred to the villages reserved for purely neural cases.

A beginning has been made with treatment by diasone—the number being limited by the resources of the Colony.

Such is the community of Itu Leper Colony. No attempt is made to make a European village but, retaining all that is good, to make a model African colony. The medical work does not come under review in this article but, of course, all expect to be "cured" or, if not "cured," relieved. No doubt patients are amenable, and discipline is maintained because of that hope, and they do appreciate

Neither is direct missionary work included, but this account would not be complete were it not made clear that the church is at the heart of the colony, and its influence, which cannot be described on paper, is real and deep. Relations between members of the comm

harmonious, and Government officials are often surprised that there are not numerous fights and quarrels amongst people drawn from so many tribes differing in customs and habits, and speaking several different languages.

The harmony and spirit of service, and cheerful acceptance of duties, rules and regulations, alien to their upbringing, is very considerably due to the Christian atmosphere which prevails.

THE TREATMENT OF LEPROSY WITH SULPHETRONE.

T. F. DAVEY.

Sulphetrone, (tetrasodiumphenylpropylamino-diphenyl sulphone tetrasulphonate), a new sulphone drug, has been used experimentally in the treatment of leprosy at Uzuakoli Settlement for 10 months, and although 37 patients are now undergoing therapy with it, this report is confined to the 17 cases who have received the drug for more than 5 months.

When the clinical trial of sulphetrone was contemplated, trials with diasone had already been in progress for 12 months, and in view of the progress of patients receiving diasone, it was felt desirable to provide rigorous conditions for testing the new drug by selecting the most unpromising cases that were available. The 17 cases concerned were all lepromatous patients of varying degrees of severity, some of them extremely heavily infected. They were classified as follows

Advanced nodular or diffuse leproma	...	...	4
(Cases 4, 5, 7, 15)			
Moderately advanced ditto	...	...	7
(Cases 1, 8, 10, 11, 12, 16, 17)			
Early or mild ditto	...	...	4
(some also exhibiting macules)			
(Cases 2, 6, 13, 14)			
Macular lepromatous cases	...	...	2
(without nodules or obvious diffuse infiltration)			
(Cases 3, 9)			

All these patients had received treatment with hydnocarpus oil in adequate dosage for varying periods, three of them for more than 10 years. In 7 cases the disease was advancing rapidly, with a very bad prognosis. In the remainder the infection had clinically been more or less stationary for some time. These circumstances provide the only form of control possible in a trial of this nature. The two macular cases were included for the sake of interest. All cases were adults, but after experience with the drug the experiment has recently been enlarged by the addition of 20 children to the series of patients.

DOSAGE.

The drug is supplied in tablets of 0.5 gm, and therapy commenced with one tablet each week according to tolerance, up to a daily dose of 3 gms, given on six days of the week. When this standard daily dose was reached, without toxic signs, the drug was given in courses of six weeks at this dosage, followed by two weeks rest. Although there was some individual variation, this dosage proved suitable and has been maintained. During the rest periods and during parts of the course, patients also received ferrous sulphate, gr. 3 b.d.

TOXIC SIGNS.

Observations were made at suitable intervals throughout the course of treatment of patients' weight, daily temperature range, urine, hæmoglobin, E.S.R., and red and white blood cell counts. A hypochromic anæmia developed in 15 out of the 17 cases, the

decline in red cell count varying between 100,000 and 800,000, with an average fall of 450,000. The lowest figures in individual patients were reached between the second and the sixth month of therapy, after which the count tended to rise again, and in 9 cases it is now higher than at the start of the experiment. In all patients hæmoglobin percentage has remained in the neighbourhood of 60%. The white cell count has shown no significant variation. There has been no evidence whatever of kidney damage. Patients have not complained of nausea, vomiting or disturbances of vision. Headache has been experienced by three patients, but in only one of these could the sulphetrone possibly be implicated. Symptoms of lepra reaction have appeared in three patients, in all cases mild, and further reference will be made to these. The drug has proved to be relatively atoxic in the dosage employed. Blood concentration

CLINICAL PROGRESS.

In general condition every patient has improved. The weight has increased in 6, decreased in 7.

Individual notes on the 17 patients are appended.

COMMENTS.

Of the 17 cases reported on, 13 have received sulphetrone for 10 months, 1 for 9 months, 2 for 6 months, and one for 5½ months. They have received no other anti-leprosy treatment during this time. No patient has become worse. In two there is little change, but all the rest showed real and notable improvement, in 7 cases the improvement being very marked indeed, nodules becoming absorbed and infiltration diminishing. The improvement was particularly striking in the advanced and degenerating cases, in all of whom the outlook of the case has been entirely transformed. In most cases improvement was apparent within three months of the first dose. The progress of the series is summarised as follows.

Great improvement	...	...	...	7 cases
	(Nos. 4, 5, 7, 13, 15, 16, 17)			
Moderate improvement	...	...	...	8 cases
	(Nos. 1, 2, 6, 8, 9, 11, 12, 14)			
Slight improvement	...	...	...	2 cases
	(Nos. 3, 10)			
Stationary	...	...	...	Nil
Worse	...	...	...	Nil

The bacteriological findings have not followed the clinical improvement. This is not surprising, and has been discussed by Muir in relation to diasone therapy (1). Nevertheless, two cases

have become bacteriologically negative, and in 9 others, bacilli, formerly exceedingly numerous, have diminished in recent tests, promising findings in view of the relatively short period of trial, and the type of case concerned. In this respect sulphetrone compares favourably with diasone.

Although most cases have improved steadily without interruption and without evidence of lepra reaction, a few showed heightened sensitivity to the drug and care with dosage was necessary. Case No. 1 is of particular interest. Here a lepromatous condition of many years duration, already extensive and degenerating, began to improve steadily during sulphetrone therapy, until without warning and without constitutional symptoms, five months after the first dose, a papular exanthem appeared, the lesions of which proved on biopsy to be atypically tuberculoid in nature, while the lepromin reaction changed from negative to strongly positive. These lesions have tended slowly to subside and, although bacilli remain numerous in them, degenerating forms are frequent. The change from the lepromatous to the tuberculoid phase is an extremely rare phenomenon, and was probably influenced by the sulphetrone in this case. After some weeks rest sulphetrone was resumed in this case on a standard dose of 2 gm daily. The further progress of this remarkable case will be of interest.

Another case calling for comment is case No. 6. After four months therapy this patient began to exhibit a succession of vesiculo-pustular lesions on the face, which discharged a bead of pus containing large numbers of degenerating bacilli. The patient at this time began to be very sensitive to sulphetrone, doses in excess of 1 gm stimulating more of these lesions. An increase above this dose in the month of October resulted in an acute reaction, with œdema of the face and a large number of large pustular lesions. On the neck, limbs and trunk, wheals and flat pink macular areas appeared. The drug was discontinued and these rapidly disappeared, and three weeks later the patient was very fit. There has been marked clinical improvement in this patient, but close medical supervision is necessary. It is of interest to note that a precisely similar condition has arisen in a child who recently commenced sulphetrone therapy, numerous vesicular lesions appearing within one month of starting the drug.

In case No. 10 also, a macular eruption has appeared, faint and poorly defined, becoming marked after 7 months of sulphetrone therapy. There were no constitutional symptoms, but the macules have persisted and the bacteriological test has become negative. There appears to be a tendency for the drug to stimulate a mild

lepra reaction with the appearance of macules. A similar tendency has been noted with diasone. It is of interest that in 11 of the 17 cases, the lepromin test has changed from negative to positive. This allergising effect in some individuals calls for careful supervision of the drug.

Case 1. Ref. No. 565. Male. Age 35. Moderately advanced lepromatous case, diffuse thickening plus nodulation. Rapidly degenerating. Has had hydnocarpus oil treatment for ten years. Commenced sulphetrone treatment 20/1/47.

Report. (26/5/47). Dramatic improvement. Lepromatous ulcers on legs have healed, nodules are becoming absorbed, and infiltration of face is noticeably less. Bacteriological findings show little change as yet. Drug has produced no toxic signs. Red cell count has actually improved.

Report. (9/7/47). The patient has suddenly produced an extensive eruption of papules which have united in some areas to form macules indistinguishable from tuberculoid lesions in appearance. Bacteriologically strongly positive with globi, but lepromin formerly negative is now 3 plus.

Report. (14/11/47). Lepromin continues +ve. The eruption mentioned in previous report is still present and the patient continues in a borderline state between leproma and tuberculoid. Biopsy shows a heavy infiltration of epithelioid cells in what is otherwise a lepromatous section, with a tendency to giant cell formation. The eruption has tended to flatten. It is still bacteriologically +ve. The lepromatous infiltration of face and ears is rapidly resolving with diminution of bacilli and the general condition of this remarkable case is good.

Case 2. Ref. No. 4939. Male. Age 35. Early nodular lepromatous cases with macules and nodulation of ears. Has had hydnocarpus oil treatment for 1½ years with only slight improvement. Commenced sulphetrone treatment 20/1/47.

Report. (26/5/47). Improved. Macules have faded, nodulation persists. Bacteriological findings still 4 plus. Patient feels very fit. No toxic manifestations.

Report. (14/11/47). Continued improvement. Patient is very fit. Skin is still strongly +ve.

Case 3. Ref. No. 4921. Male, Age 40. Borderline tuberculoid case, exhibiting innumerable macules, bacteriologically positive, little unaffected skin remaining. Disease stationary. 8 months treatment hydnocarpus oil. Commenced sulphetrone treatment on 20/1/47.

Report. (15/5/47). Much improved. Now bacteriologically negative. No toxic manifestations.

Report. (14/11/47). Patient is very fit but no change from last report.

Case 4. Ref. No. 3024. Female, Age 19. Advanced nodular leprosy with sunk nose and florid nodulation of face and ears, small nodules on all parts of the body. Has had hydnocarpus oil treatment for 13 years. Commenced sulphetrone treatment on 20/1/47.

Report. (15/5/47). Stationary, but patient feels fit and prefers sulphetrone to hydnocarpus oil. R.B.C's have fallen by 200,000.

Report. (14/11/47). Since May this patient has shown dramatic improvement as is brought out by photographs. Bacilli are becoming less in numbers in most recent tests.

Case 5. Ref. No. 2011. Female. Aged 40. Moderately advanced nodular leprosy degenerating. Has had hydnocarpus oil treatment for 14 years. Commenced sulphetrone 20/1/47.

Report. (15/5/47). Dramatic improvement. Nodules resolving. Patient formerly a misery to herself and other people is now happy. R.B.C's have fallen by 400,000. Bacteriological findings still 4 plus.

Report. (14/11/47). Improvement is maintained and bacilli are becoming fewer in smears from the skin.

- Case 6. Ref No. 721. Male. Age 30. Extensive though early lepromatous infection with nodulation. 1 year's treatment with hydnocarpus oil, and showing improvement. Commenced sulphetrone on 20/1/47.

Report. (15/5/47). Dramatic improvement. Nodules resolving very rapidly. Bacteriological findings still 4 plus. R.B.C's have fallen by 800,000. *June 1947.* This patient for the last three weeks has been in a state of mild lepra reaction, with a succession of small pustules appearing on the face, discharging a bead of pus containing many lepra bacilli, and healing almost without scars. Dosage of sulphetrone has been cut out for a week, then resumed, then cut out for a week. Improvement is most marked.

Report. (14/11/47). The mild leproma reaction reported in June settled down leaving the patient considerably improved, but only sensitive to sulphetrone small doses (1 gm.) leading to recrudescence of pustulation on the face. He has continued intermittently on this dose and, when increased in October, another reaction occurred more marked than in June but having the same characteristics. This has now settled down. Bacteriological test remains strongly +ve in skin but bacilli are not so numerous in the ear.

- Case 7. Ref. No. 819. Male. Age 35. Extremely virulent lepromatous infection, with advanced nodulation and infiltration and rapid degeneration. Commenced sulphetrone on 20/1/47 after only two months treatment of hynocarpus oil.

Report. (15/5/47). Dramatic improvement. Erythema much less, and widespread absorption of nodules and infiltration. Bacteriology still 4 plus. R.B.C's have fallen by 200,000.

Report. (14/11/47). The dramatic improvement reported in May still continues and a hopeless case is completely transformed with widespread absorption of leproma. Marked diminution of bacilli in ears.

- Case 8. Ref No. 489. Male. Age 30. Longstanding moderately advanced diffuse lepromatous case. *Hydnocarpus* oil treatment for 4 years with conditions stationary. Soluthiazole course Oct./46—Jan./47 without visible effect. Commenced sulphetrone 3/2/47.

Report. (15/5/47). Clinically little change. Bacteriological test shows diminution of bacilli from 1 plus to plus scanty. R.B.C's have fallen by 400,000

Report. (14/11/47). The patient is very fit and in recent tests bacilli are found to be fewer than formerly.

- Case 9. Ref. No. 701. Male. Age 40. Lepromatous macular case with innumerable lepromatous macules, improving after 6 years' treatment with hydnocarpus oil. Soluthiazole course Oct./46—Jan./47. Commenced sulphetrone 3/2/47.

Report. (15/5/47). Improved, macules fading and have become bacteriologically negative. No toxic symptoms.

Report. (14/11/47). The patient is very fit and in recent tests bacilli are found to be fewer than formerly.

- Case 10. Ref. No. 4604. Male. Age 33. Moderately advanced lepromatous case with erythematous lepromatous macules and diffuse infiltration of the face. 4 years' treatment with hydnocarpus oil with some improvement. Commenced sulphetrone 3/2/47.

Report. (15/5/47). Marked improvement. Bacteriologically negative. No toxic effects.

- Report.* (14/11/47). In August an eruption of faint papulate macules appeared most marked on the buttocks and poorly defined. Bacteriological test is now negative.
- Case 11. Ref. No. 4710. Male. Age 30. Moderately advanced lepromatous case with infiltration and highly erythematous macules. 3 years' hydnocarpus oil treatment without effect. Soluthiazole course 3/2/47.
- Report.* (15/5/47). Marked improvement. Erythema disappeared and no toxic signs.
- Report.* (14/11/47). Improvement maintained. Macules invisible. No change in bacteriology.
- Case 12. Ref. No. 4667. Male. Age 30. Moderately advanced nodular leproma. No improvement after 4 years' treatment with hydnocarpus oil. Sulphetrone started 3/2/47.
- Report.* (15/5/47). A crop of macules of lepromatous infiltration has diminished. No change in bacteriology. No toxic signs.
- Report.* (14/11/47). The macules mentioned in the first report are gradually becoming more pronounced, and bacilli are not as numerous in skin smears.
- Case 13. No. 4914. Male. Aged 25. Early lepromatous case with nodular ears and numerous erythematous macules. Commenced sulphetrone therapy 10/2/47.
- Report.* (15/5/47). Improved. Macules are flattening and muscular power in hands improved. No change in bacteriology. No toxic signs.
- Report.* (14/11/47). Remarkable improvement occurred in this case. Nodules of ears have disappeared and general condition is excellent. There is diminution in numbers of bacilli in smears.
- Case 14. Ref. No. 236. Male. Age 45. A mild lepromatous case who has remained stationary for a long time. Commenced sulphetrone therapy 3/3/47.
- Report.* (14/11/47). Patient is very fit. Erythema has disappeared from lesions. Bacteriology remains mildly +ve.
- Case 15. Ref. No. 4943. Male. Age 32. A rapid degenerating florid nodular case becoming advanced and with hopeless prognosis. Commenced sulphetrone therapy 26/5/47.
- Report.* (14/11/47). Remarkable improvement. Nodulation everywhere diminishing. Improvement marked in eyes.
- Case 16. Ref. No. 805. Male. Age 30. A widespread nodular case of two years' history. Ex-serviceman. Sulphetrone therapy commenced 26/5/47.
- Report.* (14/11/47). Very great improvement with widespread diminution of nodulation. Lepromin has become positive.
- Case 17. Ref. No. 493. Male. Age 29. Degenerating nodular case. A nurse. Commenced sulphetrone therapy 3/7/47.
- Report.* (14/11/47). Much improved. Nodulation disappearing rapidly. Bacilli declining in numbers in skin smears.

Acknowledgment is hereby made to the Director of Medical Services, Nigeria for permission to publish this article.

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PROMIZOLE TREATMENT OF LEPROSY.

F. A. JOHANSEN and P. T. ERICKSON.

(Reprinted from *International Journal of Leprosy*, Vol. 15, No. 4.)

There is reprinted in this issue of the *Journal* a preliminary report on promizole treatment of leprosy at the National Leprosarium which appeared in the Public Health Reports, June 28, 1946, (1).

Promizole has been used in the treatment of lepromatous leprosy as a clinical trial over a period of two and one-half years. In evaluating its efficacy it is considered that it exhibits a therapeutic action comparable to those of promin and diasone. Although slightly less toxic than these sulfones, it does not seem to present any definite advantages in the routine treatment of leprosy other than the quality of being well tolerated orally, a quality which it shares with diasone.

Early in the clinical evaluation of promizole (1) it was thought that improvement in some patients occurred more rapidly with its use than with that of other sulfones. Subsequent experiences with promin and diasone have shown equally as rapid clinical improvement as that reported from promizole.

It would appear then that the only advantage of promizole over other sulfones lies in its reported lower toxicity. This possible advantage, however, is more apparent than real, for the daily requirement of promizole for therapeutic effects is at least six to eight times that of other sulfones administered orally. A steady diet of from 12 to 18 tablets per day over an extended period of time, as is necessary in promizole therapy, leads to unpalatability and distastefulness. The patient sometimes fails to make himself take the adequate doses of the drug necessary for beneficial effects. In addition, promizole in some instances causes a cherry red dye to be excreted in the urine. This causes concern even if the patient is forewarned that there is no associated danger. It is also difficult to understand and sometimes embarrassing to the patient. Anemia, allergic dermatitis, and gastric intolerance have not been found sufficiently less in evidence to give promizole any particular advantage over other sulfones. Finally, the manufacturer's report (2) that promizole is synthesized with much difficulty and expense must be regarded as a definite disadvantage in so far as making promizole a practical treatment for leprosy.

In view of the above mentioned difficulties and the fact that

promizole does not appear to present any special advantages over other sulfones in the treatment of leprosy, our present inclination is not to extend use of this drug beyond the consumption of the present supply of the drug.

As far as statistics are concerned a total of 25 patients have been initiated on promizole treatment. As these patients were started on treatment at three different intervals, for the purpose of discussion they may be divided into 3 groups based on the length of treatment. At present only 15 of these 25 patients are under treatment with promizole.

The first or the original group begun on promizole treatment constituted the main subject matter of the preliminary report. At the time of that report 7 of this original group of 11 patients had been under treatment for one year. Now (November 1, 1947) these 7 patients have been under treatment for two and one-half years. Recently, 2 of these 7 have discontinued promizole and are receiving other sulfones. It was necessary to resort to other sulfones for these patients because of the development of a marked aversion for promizole. Clinical improvement has continued in all these patients, except the two transferred to other sulfones. Since the first report (1) 2 patients have developed and are now showing negative bacterioscopy.

The second group begun on promizole included 8 patients. This group was also mentioned in the preliminary report as showing some clinical improvement. At present 5 of this group of 8 patients have been under treatment for one and one-half years and have shown progressive clinical improvement. One patient is showing negative bacterioscopy. Discontinuance of medication in 3 patients was not incidental to the drug; 1 absconded from the institution after having shown marked clinical improvement, and the other 2 died of chronic nephritis being beyond medical aid when the drug was commenced.

The third group included 6 patients. At present 5 of these have been under treatment for slightly over one year. All are still positive bacterioscopically. The sixth patient of this series died of cirrhosis of the liver.

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USE OF STREPTOMYCIN IN THE TREATMENT OF LEPROSY.

A PRELIMINARY REPORT.

G. H. FAGET and P. T. ERICKSON.

(Reprinted from *International Journal of Leprosy*, Vol. 15, No. 2.)

Streptomycin was first isolated in 1944 by Selman A. Waksman and his co-workers at the New Jersey Agricultural Experimental Station, Rutgers University, from cultures of certain strains of the actinomycete, the *Streptomyces griseus*. From the original and subsequent reports (1, 2) of this group of investigators it appeared likely that streptomycin exerted antibacterial activity against a variety of gram-negative and some gram-positive pathogens including *Mycobacterium tuberculosis*. When the studies of Feldman and Hinshaw (3) demonstrated that streptomycin exerted suppressive effect on experimental tuberculosis in the guinea pig, the senior author became definitely interested in its possible therapeutic value in clinical leprosy. Through correspondence with Selman A. Waksman and through the courtesy of Dr. J. M. Carlisle of Merck & Company, Incorporated, he received 50 million units of streptomycin in the summer of 1945 for experimental purposes in leprosy. This was sufficient for the treatment of only one patient. Treatment was started on this patient on July 28 and ended on September 17, 1945. After an observation of several months following treatment it was felt that the results, although not definite, were encouraging. This case greatly stimulated interest in further streptomycin therapy of leprosy and it was determined that it should be tried on a more extensive scale as soon as an adequate supply became available for this purpose.

The later report of Hinshaw and Feldman (4) that streptomycin might prove useful in some type of clinical tuberculosis increased the importance of its further assay in leprosy. The report of the remarkable healing of laryngeal tuberculosis in a case treated with streptomycin (5) reported by the above authors was another feature of the drug which particularly appealed to the medical staff of the National Leprosarium.

It was not until June 1946 that an adequate amount of streptomycin was made available as part of the supply allotted to the U. S. Public Health Service. It was decided to place 10 selected leprosy patients on a four months' course of intensive treatment with streptomycin. At the end of that period since the results were not conclusive it was decided to prolong the treatment with reduced

dosage for another four months which brings the experimental study to the present date.

TECHNIC OF ADMINISTRATION

The streptomycin used in this study was obtained from three different pharmaceutical firms. It was administered in 10 selected cases of lepromatous leprosy intramuscularly in doses of $\frac{1}{4}$ gram (250,000 "s" units) every three hours for a total of 2 grams (2,000,000 "s" units) in twenty-four hours. Each gram lot was dissolved in 6 cubic centimeters of physiologic saline solution, making the volume of each injection 1.5 cubic centimeters. This treatment was continued without interruption, except in 2 cases, for a period of four months. Thereafter the dosage was diminished to $\frac{1}{2}$ gram every twelve hours or a total of 1 gram (1,000,000 "s" units or micrograms) in twenty-four hours. The latter dose is still being administered at present and will be continued for a few more weeks.

TOXIC MANIFESTATIONS

Early reports on streptomycin even when the less pure preparations were being utilized describes it as a drug of low toxicity. It appears from our experience, however, that this is true only when comparatively small doses are given over short periods of time. With higher dosage and more prolonged treatment the incidence of toxic reactions increases considerably. When high dosages are given over a period of months, serious toxic effects are apt to occur and the less serious and more common ones may become exceedingly unpleasant to the patient (see Table I).

TABLE I. *Summary of toxic effects encountered*

Toxic effect	No. of Patients
Vertigo	10
Eosinophilia (with leucocytosis)	10
Soreness of site of injection	10
Decrease in erythrocytes (500,000) and hemoglobin (10%)	9
Loss of weight	9
Fall in blood pressure	9
Fever and malaise (with arthralgia—3)	8
Headache	7
Casts and red blood cells in urine (renal impairment—1)	7
Flushing of skin	5
Anorexia, severe	4
Nausea and vomiting	4
Skin eruptions	4
Pruritis without eruption	3
Diarrhea and abdominal cramps	2
Tinnitus and impaired hearing	1

The most serious complications encountered were tinnitus and impaired hearing, and an exfoliative dermatitis. The more common and rather severe toxic manifestations were vertigo, fever, and skin

eruptions. Less serious conditions were eosinophilia in all cases, fall in blood pressure in 9 cases, headache in 7 cases, malaise in 8 cases, flushing skin in 5 cases, nausea and vomiting in 4 cases, transient diplopia in 1 case, diarrhea in 2 cases, and appearance of albumin and casts in urine in 7 cases. All of these latter mentioned effects have been attributed to impurities contained in earlier preparations of streptomycin but were here encountered with supposedly highly refined products.

Vertigo occurring in all of the patients treated began during the first week in 3 patients, the second week in 2, the third week in 3, and during the fourth and fifth weeks in the remaining two patients. Vertigo was classified as severe in 4, moderate in 3, and mild in 3. Severe cases were those in which the patient was so dizzy when up that he preferred to stay in bed. Nausea and vomiting were frequent in such cases. Moderate cases were those where patients were so wobbly on their feet that they generally walked close to the walls for support and spent most of their time sitting in their rooms or on the porch of the hospital. Mild cases were usually ambulatory but could not walk a straight line and swayed considerably in the Rhomberg test. Vertigo was still present in all patients but mild in character at the end of eight months' treatment.

Eosinophilia occurring in all of the patients treated started within the first two weeks of treatment and progressively increased to a peak in the twelfth week to 3400 cells per cu. ml. of blood. Slowly declining during the next four weeks to 1200 cells, it became stationary until two weeks after reducing dose by one-half; then it declined again. Eosinophilia was still present in all patients at the end of the above mentioned treatment period. Usually 10 to 20 per cent was the differential eosinophile count. It varied from a low of 4 to 5 per cent to individual heights of 42, 43, 47, 54, and 65 per cent.

Low grade progressive anemia developed in 9 patients in the early weeks of treatment but responded well to administration of iron and liver extract. The loss of erythrocytes amounted to from 500,000 to 1,000,000 per cu. ml. in 7 patients, and from 1,000,000 to 2,000,000 in 2 patients.

Loss of weight averaging 9 lbs. due to anorexia, malaise, nausea and vomiting, and loss of sleep occurred in 9 patients. After diminishing the dosage, 5 patients regained weight and showed an average increase of 6 pounds over their initial weights. Four are still underweight by an average of 7 pounds.

There was a fall in blood pressure of from 10 to 40 mm. of mercury in both diastolic and systolic phases in 9 patients. This

hypotension seemed to vary directly with the severity of the vertigo in most cases.

Fever and malaise were present in 8 patients. Onset was on the first to the eighth day of therapy in most cases and the duration a week to a month or longer. Low grade fevers of 37.4° to 38°C . was the usual occurrence, but occasionally it rose to 39°C . or slightly higher. Fever accompanied all cases of skin eruption and arthralgias. In 5 patients it was associated with erythema nodosum, neuritis, or lymphadenopathy; but in 3 patients there was nothing to account for the fever except streptomycin.

Headache occurred in 7 patients. In 3 it was transient but in 4 it seemed to be a part of a histamine-like reaction, occurring with flushing of the skin, fall in blood pressure, and nausea and vomiting.

Renal irritation occurred in 7 patients who showed the appearance of red blood cells and casts in the urine during the early weeks of treatment. In one patient there also developed albuminuria and impaired renal function with increase of the N. P. N. from 28 to 53 mg. per cent. During the last few weeks urinalyses have shown negative findings in this patient.

Skin eruptions occurred in 4 patients and pruritis without skin eruptions in 3 others. The skin eruptions developed on the seventh and eighth days in 3 patients. In the other, a white male aged 58, it first appeared on the second day followed by a recurrence on the thirty-ninth day. This second attack developed into a severe generalized exfoliative dermatitis with an eosinophile count of 65 per cent and a leucocytosis. This dermatitis subsided in a week after the discontinuance of streptomycin. Small gradually increasing doses were then prescribed in order to desensitize him. Unfortunately through error a larger dose than intended was injected and the dermatitis promptly recurred. It abated again upon discontinuing streptomycin and the patient became desensitized by starting with a $1/10$ gram dose which was gradually increased. At present he is on full ($\frac{1}{2}$ gram) doses twice daily like the other patients.

Diarrhea and abdominal cramps occurred in 2 patients. In one the symptoms were mild and subsided spontaneously. In the other they were more severe but relieved on decreasing the dose of streptomycin. They promptly recurred when dosage was again increased. Smaller dosages permanently relieved the condition.

Tinnitus and impaired hearing occurred in one patient. This patient, a white female, aged 31 years, was known to have had impaired renal function prior to treatment and was under careful observation. At the end of the first week of therapy this patient

developed flushing of the face and a generalized maculo-papular skin eruption. Streptomycin was promptly discontinued. After symptoms subsided treatment was resumed with one-fourth of the previous dose. Subsequently, upon gradually increasing the dosage, a severe vertigo occurred during the third week. Tinnitus and impaired hearing then occurred when the streptomycin blood level was found to be 41 "s" units per cc. of blood. The dosage was again reduced to one-fourth and tinnitus subsided but impaired hearing persisted. An audiometer reading taken in the fifth month of treatment showed loss of useful hearing in the left ear and reduction of hearing to 50 per cent in the right ear. Streptomycin therapy was permanently discontinued and five weeks later a repeat of the audiogram showed only slight improvement of auditory function. Since then hearing appears to be returning gradually and it is hoped that impairment of hearing will not be permanent.

Soreness and inflammation at the site of injection was a minor reaction. However, with one preparation all patients complained bitterly of pain following injection of the drug and subsequently developed inflammatory masses at the site of injection which were exceedingly painful to palpation.

EFFECTS ON LEPROSY

The therapeutic effects of streptomycin in leprosy are not as yet conclusively demonstrated but encouraging changes seem to have occurred in some cases. Nasal obstruction and epistaxis have been checked in a few cases. Healing of a leprosy ulcer of the soft palate occurred rather rapidly in one patient. Bacteriologically there have not been any reversals so far from positive to negative skin or nasal smears. The reports of the monthly bacteriologic skin and nasal smears seem to indicate however a decrease in the numbers of acid-fast organisms in 8 cases. There has been an improvement in the sedimentation rate of 3 patients. In the blood serology 7 of the 9 patients with presumably false positive or doubtful serologic tests for syphilis showed improvement in a lessened degree of positivity or a change from doubtful to negative.

There appear to be some photographic changes on the improvement side in some of the nodular and macular lesions of the patients under treatment.

Among the 10 patients treated there were 7 men and 3 women; 9 were white and 1 colored. They were all lepromatous cases of moderate to far advanced stages. Five patients were treated with streptomycin alone; of this number 4 had had no previous treatment, while one had had a previous course of streptomycin.

Four patients were treated with streptomycin and promin.

They had all been on promin for several months to two and one-half years prior to starting streptomycin and each had shown slight improvement although new nodules had developed in one of them. Since the improvement did not seem to be as rapid or as extensive in them as is usually the case with promin therapy, streptomycin was added in the expectation that it would hasten the improvement.

One patient who had had no previous treatment was started on diasone in addition to streptomycin to note if the progress of her improvement would not be more rapid than that of those on streptomycin alone. She did make good improvement, but it is difficult to say that this improvement was more rapid than that noted in the others.

RESPONSE TO STREPTOMYCIN AND STREPTOMYCIN-SULFONE THERAPY

Degree of response	Streptomycin		Streptomycin-sulfone		Total	
	No.	Per cent	No.	Per cent	No.	Per cent
Definitely improved	1	20.0	1	20.0	2	20.0
Slightly improved	2	40.0	3	50.0	5	50.0
Stationary	1	20.0	1	20.0	2	20.0
Slightly worse	1	20.0	0	10.0	1	10.0
Total	5	100.0	5	100.0	10	100.0

The above table sets forth the degree of response to treatment experienced to date in the streptomycin and streptomycin-sulfone groups of patients. By clinical, laboratory, and photographic study, 20 per cent registered definite improvement, and 50 per cent showed slight improvement. Two, or 20 per cent, remained stationary and one, or 10 per cent, became slightly worse. The degree of response to treatment seemed slightly better with streptomycin-sulfones than with streptomycin alone but the numbers treated are too small to give statistical evidence of this.

LOCAL APPLICATION OF STREPTOMYCIN

Streptomycin has also been used locally in the treatment of leprous ulceration with good results (6). This streptomycin was prepared locally from filtrates of cultures of *Streptomyces griseus* grown in the station laboratory. This filtrate at first was used as wet dressings. In a few instances there occurred a local irritation of the surrounding skin. In such instances the filtrate was diluted with boric acid solution. This resulted in subsidence of the local toxic reaction.

More recently the streptomycin filtrate has been incorporated

into an ointment base. This is a more soothing application and seems to produce more rapid disinfection and healing of ulcers.

Some very stubborn ulcers, which had previously resisted other types of treatments, such as the sulfa drugs, penicillin, and tyrothricin, seemed to respond slowly but surely to the streptomycin applications.

Although the results in ulcer healing are encouraging, it must be stated that the production of streptomycin in the local laboratory is a too laborious and time-consuming procedure for general adoption. For this reason it is felt that it would be more economical as well as more efficient to use the purified streptomycin powder of pharmaceutical firms in the preparation of an ointment for local application to ulcers.

DISCUSSION

Streptomycin produces encouraging results in the treatment of leprosy.

In large and continuous dosage its toxic manifestations seem to be too severe in comparison with results obtained.

Deafness in one patient which has improved only slightly to date may be too dear a price to pay for the benefits obtained.

It is the impression of the writers that unless streptomycin can be further purified to render it less toxic or the effective therapeutic dose can be reduced, or a different method of administration developed, such as streptomycin suspension in oil and wax, streptomycin will probably not become the treatment of choice for leprosy.

For comparable results the sulfones have thus far been found to be less toxic and therefore more feasible in the treatment of leprosy.

The improvement observed is not appreciably more rapid than that obtainable with the sulfones. Whether this improvement will be progressive with continued treatment, as is the case with the sulfones, is problematic.

Perhaps smaller doses of streptomycin will be found to enhance the therapeutic action of the sulfones and such a combination will prove to be the best future treatment of leprosy.

At the recommended dosage of 2 grams daily (2,000,000 "s" units) given for prolonged periods, streptomycin seems too toxic and its mode of administration too disturbing to the patient to be of practical value.

It is the writers' opinion that further investigation of streptomycin therapy in leprosy must continue before conclusive evidence of its clinical effect can be determined.

Streptomycin seems to be an effective agent in the local treatment of chronic leprous ulcerations. Its study in this field should be continued by using it as wet dressings and in ointment bases to observe the best method of topical application as well as the optical concentration for curative effect.

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PRELIMINARY REPORT ON A NEW SULPHONE DRUG "SULPHETRONE."

L. H. WHARTON.

(Reprinted from *International Journal of Leprosy*, Vol. 15, No. 3.)

Sulphetrone is tetrasodiumphenylpropylamino — diphenyl sulphone tetrasulphonate. The use of three "sulphone" compounds has already been reported in the literature in leprosy therapy. These sulphones are all derivatives of diaminodiphenylsulphone, the parent compound.

DIAMINODIPHENYLSULPHONE

PROMIN DIASONE PROMIZOLE SULPHETRONE

The use of sulphetrone in the treatment of tuberculosis is based on its anti-tuberculous activity in the guinea pig. It inhibits the development of experimental tuberculosis in this animal and prolongs the life of infected animals as compared with controls.

So promising have been the results in human tuberculosis with experiments by Anderson at Glasgow, that it was decided that

clinical trials in leprosy should be made. Through the courtesy of Dr. Ernest Muir, C.I.E. Medical Secretary of the British Empire Leprosy Relief Association, a sample of the drug was sent to this leprosarium, and we were asked to work out a suitable dosage, and to report on its clinical effect.

The present report gives the preliminary results of a therapeutic trial with sulphetrone in six cases of leprosy for a period of six months.

Six young adults were selected varying in age from 16 to 35 years, five males and one female, all suffering from lepromatous leprosy (type L1) and all lepromin-negative. These patients had all received prolonged treatment with chaulmoogra oil, and had not benefited. Treatment consisted of sulphetrone tablets 0.5 Gm. for fifteen weeks continuously with four weeks rest at the end of each course of treatment. As sulphetrone produces hypochromic anemia we gave each patient one month's treatment with ferrous sulphate, 3 grs. three times a day, and yeast, prior to the administration of sulphetrone.

Starting with a dose of 0.5 Gm. daily we gradually increased the dose until we reached the maximum which could be tolerated by the patients. This was 3.0 Gm. daily. Estimations of concentration of the drug in body fluids were done weekly for the first four weeks and fortnightly thereafter; these included blood counts, hemoglobin estimation, and urinalysis. Throughout the course of treatment no abnormalities were noted by urinalysis. The drug was well tolerated and we have been greatly impressed by its action.

The following tables give details of our findings:

Average daily dose of drug 3.0 grams.

Table 1. Concentration of drug in blood in mg. %

Case		Average	%
1	7 to 12		9
2	6 to 12	"	10
3	7 to 12	"	9
4	6 to 12	"	9
5	6 to 10	"	8
6	6 to 12	"	9

Concentration of drug in cerebrospinal fluid in mg. %. All cases 2 mg. %.

Table 2. Concentration of drug in urine in mg. %

Case		Average	%
1	4 to 12		6
2	6 to 12	"	8
3	6 to 12	"	9
4	6 to 12	"	9
5	6 to 12	"	10
6	6 to 12	"	8

Table 3. Hemoglobin % (Haldane))

At commencement		After 6 months
Case 1	70	90
„ 2	60	78
„ 3	80	80
„ 4	80	85
„ 5	60	65
„ 6	75	78

Table 4. Red cell count (Erythrocytes)

At commencement		After 6 months
Case 1	5,410,000	4,600,000
„ 2	4,100,000	3,140,000
„ 3	5,200,000	3,920,000
„ 4	4,260,000	4,300,000
„ 5	4,330,000	3,000,000
„ 6	4,260,000	3,300,000

This shows mild anemia in all cases except Number 4. Every case showing a red cell count below $3\frac{1}{2}$ million was given ferrous sulphate orally 5 grains 3 times a day.

Table 5. White blood cell count

At commencement		After 6 months
Case 1	10,900	8,800
„ 2	6,900	6,300
„ 3	4,700	5,400
„ 4	5,400	5,300
„ 5	4,500	4,700
„ 6	8,000	5,200

There was no marked leukopenia. The differential white count showed very slight variation in the percentage counts of polymorphonuclears, leukocytes, and eosinophiles.

Table 6. Sedimentation rate (mm/hr.)

At commencement		After 6 months
Case 1	4.5	9.0
„ 2	49.2	30.0
„ 3	10.0	9.0
„ 4	10.0	16.0
„ 5	12.5	6.0
„ 6	15.5	19.0

Table 7. Increase of weight in almost all cases

At commencement		After 6 months
Case 1	140 lbs.	162 lbs.
„ 2	118 „	123 „
„ 3	186 „	190 „
„ 4	147 „	144 „
„ 5	109 „	109 „
„ 6	131 „	109 „

Table 8. Mild toxic effects

Case	Nausea		Cyanosis		Disturbance of vision	
	Present	1st week	Nil	Nil	Nil	Nil
1						
2		Nil	Nil	Nil	Nil	Nil
3		Nil	Nil	Nil	Nil	Nil
4		Nil	Nil	Nil	Nil	Nil
5	Present	2 weeks	Nil	Nil	Nil	Nil
6		Nil	Nil	Nil	Nil	Nil

Table 9. Monthly nasal and skin bacilli counts*

Cases	Months											
	1st		2nd		3rd		4th		5th		6th	
	N.	S.	N.	S.	N.	S.	N.	S.	N.	S.	N.	S.
1	9	12	3	5	Neg.	5	Neg.	3	Neg.	Neg.	Neg.	Neg.
	10	10	10	10		10		10				
2	22	30	18	22	Not exam.		13	20	10	16	8	13
	10	10	10	10			10	10	10	10	10	10
3	38	§§	30	37	20	25	15	22	9	18	5	13
	10		10	10	10	10	10	10	10	10	10	10
4	20	32	16	22	10	18	8	16	6	13	4	9
	10	10	10	10	10	10	10	10	10	10	10	10
5	18	20	15	22	9	15	6	12	4	9	Neg.	6
	10	10	10	10	10	10	10	10	10	10		10
6	Neg.	15	Neg.	10	Not exam.		Neg.	6	Neg.	4	Neg.	6
		10		10				10		10		10

* The numerator denotes the number of bacilli and the denominator the number of fields examined.

Neg.:—Negative; §§:—More than 10 in each field; Not exam.:—Not examined.

In all cases a marked reduction in bacilli is seen.

SUMMARY

Sulphetrone in 3.0 Gm. daily dose, giving 1 tablet (0.5 Gm.) every four hours, has proved to be safe. We have seen only very mild toxic effects from the drug, nausea, which was quickly relieved by administering sodium bicarbonate, 30 gr. three times a day orally. There has been marked improvement in clinical symptoms, with flattening out of nodules. Bacteriological smears from nose and skin have shown marked improvement from month to month and one patient with positive nose and skin smears became bacteriologically negative in the fifth month.

It should be noted that this trial was made on early L_1 cases that were free from any complications of the disease. Clinical

trials continue and will be extended to include patients with more advanced lesions, and with complications.

CONCLUSIONS

We consider the results obtained by the use of sulphetrone after six months clinical trial sufficiently promising to warrant further investigation. We have found the drug less toxic than other sulphones we have used.

We look forward to literature from other workers on this new sulphone.

(We wish to express thanks to Dr. Ernest Muir, and Dr. F. Prescott of the Wellcome Research Institute, London, for supplying us this drug gratis. This drug is still in the experimental stage.)

OBITUARY.

THE REV. FRANK OLDRIEVE.

Frank Oldrieve, who died recently in Swaziland, was one of the pioneers of work among lepers, whose name will be remembered for many years. Born in 1880, he went first to the Belgian Congo as a Baptist missionary, but left Africa in 1909 for Northern India where he took charge of a station under the Mission to Lepers. Close contact with the disease for 10 or 12 years roused in him the urge to establish more active and constructive measures than then obtained in India, and in 1923, on his return to England, he joined with Sir Leonard Rogers and Sir Frank Carter in raising interest widely in the problem of controlling it, and in founding the British Empire Leprosy Relief Association, of which he became the first General Secretary. For four or five years he travelled widely in the interests of the Association, but failing health and a realisation of the need of specialised medical knowledge in the Secretaryship, induced him to relinquish the post in favour of Dr. R. G. Cochrane.

After several years' church work in southern Africa, his interest in leprosy prevailed and after a spell as superintendent of the Ngomahuru settlement in Southern Rhodesia he undertook the position of secretary to the South African Auxiliary of the Mission to Lepers. It was while engaged on this work that he died on 21st March, 1948 at Mbabane settlement. Widely known and esteemed, he set an example of devoted work in the cause of leprosy which will be an inspiration to others.

REVIEWS.

International Journal of Leprosy. Vol. 15, No. 2. Apr.-June, 1947.

Therapeutic Value of Chaulmoogra in the Treatment of Leprosy, by Salomon Schujman. This article is a valuable and timely one coming, as it does, when sulphone treatment is tending to overshadow the benefits that can be obtained with adequate dosages of hydnocarpus oil. The author summarises as follows:—

“The disagreement of many authors regarding the therapeutic value of chaulmoogra oil is due essentially to the lack of uniformity in the selection of the cases to be treated. The therapeutical value of chaulmoogra should be appraised only by the results obtained in lepromatous cases. With the derivatives of chaulmoogra it is possible to achieve persistent clinical and bacteriological negativation of lepromatous cases; the treatment, however, must be administered early; it must be sufficient, and must be continued after the negative result has been achieved.

“In more than 80 per cent of cases the failures of chaulmoogra are due to irregular and insufficient treatment. Notwithstanding, there is a small percentage of patients which do not react favourably to customary doses of chaulmoogra oil.

“In obtaining favourable results in lepromatous cases, the author attributes great importance to the intradermic administration of chaulmoogra oil. New drugs should be experimented with, but we must not think of abandoning chaulmoogra oil.”

Local Treatment of Leprous Ulcers with Crude Preparations of Streptomycin, by G. L. Fite, P. T. Erickson, F. Gemar, and F. A. Johansen. This is an extremely well-illustrated article on the effect of the local application of crude streptomycin broth to chronic, trophic, mixed and lepromatous ulcers. The results obtained seem to be specially significant in mixed and lepromatous ulceration.

Contribution to the Study of Classification of Leprosy: Aspect of Lesions, Antigenic Response and Presence of Micro-organism in Histologic Structure, by H. Portugal. The substance of this article is really condensed into its somewhat ponderous title. In the study of the S. American Classification, the author covers a wide field, and his discussion of uncharacteristic types is of real interest.

Pathogenic Bases of the South American Classification of Leprosy, by M. de Souza Lima, J. B. Rubio, Lauro de Souza-Lima and P. Rath de Souza. This is an interesting and stimulating discussion of the pathogenic bases of leprosy variation in terms of degrees of phagocytosis. It is neat and intellectually attractive. But the reader must judge for himself whether it corresponds to the facts.

Early and Late Reactions to Lepromin in Contacts, by Noberto Olmos-Castle and Pascual B. Arcuri. A short study shewing that

the early and late reactions in the crude Mitsuda test are of the same value.

Leprosy in Spain, by Felix Contreras Duenas. The author estimates that there are at least four thousand lepers in Spain and draws attention to the increase in the disease due to the Civil War. (It would be of immense value and interest if parallel estimates of leprosy in war-torn territories such as Italy and Greece could also be made.—Ed.)

On the Epidemiology of Leprosy in French Guiana, by H. Floch. A study of the history of the disease in French Guiana, with particular interest in the lepromin test in children.

Public Health Management of Leprosy in the United States, by G. McCoy. This is a short but most interesting and important article on leprosy administration. It should be read by everybody interested in the public health control of leprosy.

Summary of the Work of the Brazilian Federation of Societies for Assistance to Lepers, by Mrs. Eunice Weaver. A study in "Welfare" on which subject the author is a recognised authority.

This issue of the Journal also reprints an article by V. Pardo-Castello and Francisco R. Tiant entitled *Leprosy: The Correlation of its Clinical, Pathologic, Immunologic and Bacteriologic Aspects*. This is a compact general study and is interestingly written. There are one or two errors. For instance, the statement is made that tuberculoid reaction never lasts less than three months. In describing the lepromin test, only the out-dated Mitsuda reaction is mentioned, instead of the modern refined lepromin of Dharmendra.

International Journal of Leprosy, Vol. 15, No. 3. July-Sept. 1948.

Blood and Urine Concentration of Promin, Diasone and Promizole in the Treatment of Leprosy, by Sister Hilary Ross. This article contains a number of interesting and useful observations, including the point that there is no correlation between blood promin levels and the clinical progress of the patient. The article, which cannot be summarised, should be read by all interested in the laboratory control of sulphone.

Frequency of the Clinical Types of Leprosy according to the Natural Regions of Brazil, by Joao Batisti Risi. This article was reprinted in the January number of the *Leprosy Review*.

Leprosy in the State of Rio Grande do Sul, by P. Mendes and

G. Mangeon. The authors give an account of the history of leprosy in Rio Grande do Sul and of the work of the State in its measures to combat the disease.

The Mitsuda Test in Non-Leprous Persons in a Non-Endemic Country, by Ruben D. Azulay and Jacinto Convit. The authors find that 74 per cent of 73 non-leprous patients gave a positive Mitsuda reaction.

Private Co-operation in the Campaign against Leprosy in Brazil, by Eunice Weaver. This is an interesting general account of the magnificent welfare work for patients and their children in Brazil.

Observation on the Classification of Leprosy, by J. N. Rodriguez. This is a lengthy and important article in which the author suggests a modification of the South American classification. He divides leprosy into four stages, interstitial (maculo anaesthetic): perivascular round cell (uncharacteristic): tuberculoid and lepromatous. This article is worthy of most careful study. (It would be of great benefit if Dr. Rodriguez would give us a further paper, with photographs and clinical descriptions of his suggested classification. —Ed.).

A Propos de la Nouvelle Classification Pan Americaine de la Lepre, by R. Chaussinand. This paper is a criticism (in French) of the South American Classification, in which the author makes a plea for simplicity and the avoidance of confusion by repeated changes in terminology. He advocates the retention of the Cairo classification, adding secondary symbols C (cutaneous) and P (polyneuritic), and also a macular Nt 1 symbol for intermediate types.

This number of the Journal reprints an article on "*The Sulphone Treatment of Leprosy*," by E. Muir. This is a general survey of sulphone therapy and constitutes a useful and lucid summary of our knowledge up to date.

Reprinted also in this issue is *Leprosy of the Eye and its Appendages*, by S. N. Chatterji—a useful and practical account of symptomatology and treatment.

International Journal of Leprosy, Vol. 15, No. 4..Oct.-Dec. 1947.

Historical Inquiry as a Method of Estimating the Trend of Leprosy, by Jas. A. Doull, Ricardo S. Guinto, Huldah Bancroft and Jose N. Rodriguez. This is a careful and scientific study of incidence trends in leprosy in the Philippines. This article, which is difficult to summarise, deserves the serious attention of everyone interested in the long term tendencies of the disease in an endemic country.

Erythema Nodosum in Leprosy, by R. R. Wolcott. The author claims that there is a sharp distinction between lepra reaction and the recurring acute phases of leprosy which are seen during sulphone treatment, and which he terms erythema nodosum. Many leprologists, however, would not agree with the clinical distinctions made by the author, particularly the statement that lepra reaction lesions are not painful on pressure. No reference is made to the fact that exaggerated reflexes and plantar hyperalgesia may be found in both conditions. (The case for erythema nodosum as a separate syndrome in leprosy would require further proof before it receives general acceptance.—Ed.).

Immunology of Leprosy, by J. M. M. Fernandez and Rodolfo Mercau. The authors study the effects of *M. leprae* suspended in different oils. They conclude that the antigenic properties of *M. leprae* are increased in an oily medium.

Epidemic Foci of Leprosy in the State of Texas, by F. A. Johansen. An account of the incidence of leprosy in Texas, with some general observations on the problem.

Leprosy in Ancient Indian Medicine, by Dharmendra. A scholarly account of the subject, shewing that the disease was probably well known and well described in India 2,500 years ago.

The Editorial of this issue contains a valuable review of scientific papers published in the Journal for 1942-1947.

Leprosy in India, Vol. XIX, No. 2. April, 1947.

The Treatment of Leprosy with Hydnocarpus Remedies, by Dharmendra and N. Mukerjee. This article deals with the routine treatment of leprosy for those with limited experience of the disease. It is clearly written and well illustrated.

Lagophthalmos in Leprosy, by S. N. Chatterjee and Dharmendra. The authors deal with the general considerations underlying the problem of leprotic lagophthalmos: anatomical and physiological aspects; mechanism, associated changes and treatment. There is a wise advocacy of prophylactic and medical therapy. The illustrations are excellent.

Dr. Muir's article on *Diasone in the Treatment of Leprosy*, originally published in this Review in October, 1946 is reprinted in this issue.

Leprosy in India, Vol. XIX, No. 3. July, 1947.

Iodised Hydnocarpus Oil in the Treatment of Leprosy, by P. J. Chandy. This is a short account of forty-four cases treated with a specially iodised Hydnocarpus oil. After two years treatment twenty-nine of these forty-four cases had become bacteriologically negative. As the Editor points out in a footnote, these were originally lepromatous cases of a favourable type. (Tolerance to a special preparation of Hydnocarpus oil can hardly be judged without controls, and cannot be estimated by small dosages of 1-8 cc. a week.—Ed.).

The Use of Massage in Leprosy, by H. H. Gass. A short article advocating the more general use of massage, particularly in neural cases.

Leprosy and anti-leprosy work in Almora, by M. Masih. This is an account of anti-leprosy work in the Almora district of the United Provinces. The population is 60,000 and there are estimated to be about 2,000 cases of leprosy. The work of the various missions clinics, surveys, etc. is described.

When the Song Began (Carey Press, 88 pp., 2/6d.) is an account by George Hicks of his work with the Baptist Missionary Society, including the Superintendence of a Leprosy Asylum at Gaya in Bihar and Orissa. Mr. Hick's story goes back a good many years, and it is not surprising to find that he met the usual difficulties—fear of contact, lack of specific cure, complication of clean wives and children, etc. Nor is it surprising to find that, by his devoted and patient work, the asylum had, when he left it, developed into an attractive, well built institution, where 250 patients were under treatment.



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