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EDITOR E. MUIR, M.D.

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NOTES ON CONTRIBUTORS.

DR. M. OBERDOERFFER, is engaged in leprosy work under the British Empire Leprosy Relief Association at the Oji River Leper Settlement, Onitsha Province, S. Nigeria.

J. A. K. BROWN, M.B., M.R.C.S., was the founder of the Leprosy Colony at Uzuakoli, S. Nigeria.

JOHN LOWE, M.D. is the Director of the Leprosy Research Department at the School of Tropical Medicine, Calcutta.

T. F. DAVEY, M.SC., M.B.,CH.B., is the Medical Superintendent of the Leprosy Colony at Uzuakoli, S. Nigeria.

MRS. L. M. RUSSELL is an honorary worker at the Uzuakoli Leprosy Colony. For many years she worked with Dr. Schweitzer, assisting him with his work at Lambarene, French West Africa.

Editorial

We publish an account of the Uzuakoli Leper Settlement which should be read with care by all who are interested in the control of leprosy and especially by those in charge of leper settlements We have visited many such institutions, some larger and many smaller, but in none have we met with greater efficiency or a better understanding between patients and staff. In the October 1936 number of the *Review* we mentioned that the annual expense of this settlement including the staff as it was then was about £2,600. This was on a basis of 850 patients. The number has now increased to 1,000, but we understand that grants have not increased in proportion. An honorary worker is at present in charge of the uninfected children and attends to other nursing appointments and a Toc H worker looks after the industrial and agricultural side of the work. One may ask how it is possible to manage so efficiently so large an institution with so small a staff and expenditure and even to launch out into new activities such as are mentioned under *future policy*. The main answer lies in the genius of the man and his wife who planned and founded the colony. They worked on the voluntary principle, they understood the African—his strong and weak points—and how to get him to co-operate. Without willing co-operation neither treatment nor control of leprosy are possible. By way of contrast readers should compare *Beautiful Isle of Lost Hope* (page 191) where compulsary segregation holds sway.

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The article on *Leprosy Folk-lore in South Nigeria* by the founder of Uzuakoli Leper Settlement is of interest and distinct value. If co-operation is to be enlisted it must be by mixing with the people, knowing their language, winning their confidence, understanding their point of view, and then while correcting errors making use of what is valuable in native folk-lore. Many of our readers are in touch with primitive life in other countries and we shall welcome contributions towards the general knowledge of leprosy folk-lore.

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Probably the most difficult problem to solve in connection

with leprosy is that of child infection. Practice with regard to allowing marriage and disposing of children born of leper parents varies in different countries. In India, where the majority of leprosy institutions belong to, or are subsidised by the Mission to Lepers, the sexes are segregated from each other, and with one exception married quarters are not allowed. Children who accompany parents on admission, or are born in the institutions, are placed in special homes where they are brought up until able to earn their own livelihood. In the recently formed leper settlements in Nigeria a different plan has been followed. The dividing of family life has not been found practicable among these primitive people. But the problem arises as to what to do with the children born to leprous parents. The obvious method is to segregrate children at birth and bring them up by hand. This has been done successfully under excellent European supervision and training. Any objection first shown by the parents to parting with their offspring soon disappeared when the children were found to flourish. An account of the methods used is given by Mrs. Russell on page 184.

But the bringing up of children in this way is costly, and the expenditure is altogether out of proportion to its final results. For the children have to be sent back to their parents' healthy relations as they grow up, and this is often followed by tragic results as is shown by the letter from Dr. Davey appearing in our *correspondence* pages. The arguments in this letter are thoroughly logical. The most effective means of controlling leprosy is to prevent children coming in contact with infection. But in the villages outside the settlement the number of highly infectious cases is still very large, and in these same villages there are innumerable young children in close contact with these infectious cases. With limited financial resources how can the children best be saved? Obviously by admitting as many as possible of the highly infectious cases to the settlement.

On page 188 the system employed in the Bunyonyi Leper Island is described in detail, and on page 191 the method used at Garkida in N. Nigeria.

We will welcome further correspondence on this subject which is a very difficult and complex one. The best methods must necessarily vary in different countries, and by pooling varied experiences our readers may help each other.

Study of Nose Leprosy

M. J. OBERDOERFFER.

It is a well known fact that nose lesions frequently occur in leprosy. It is uncommon in pure maculo-anaesthetic cases, but most of the cutaneous cases show nodules, ulcers, and even a deeply destructive process in the nasal septum and the lower turbinate bones. It has been stated that these lesions most frequently occur in the anterior part of the septum, a matter of special interest in what I shall describe in this paper.

The following gives in tabular form the results of the nose examinations of 160 lepers at Itu, South Nigeria.

Simple ulceration of sept. ant. ...	30	18.8%
Plaques or nodules of sept. ant.	23	14.4%
Ulcer of sept. post.	3	1.9%
Ulcer of turb. bone only ...	5	3.1%
Generalised process	38	23.7%
No pathological picture ...	61	38.1%

The cases were unselected and of all clinical forms and stages. The predominance of the localisation in the anterior septum is evident. The early plaques and nodules of this localisation can be described as follows:—Thickened, livid-looking, non-inflammatory, submucous nodules, the mucous membrane over which showed no lesion at all. In 5 cases the granuloma formed the centre of 2 to 3 ectatic vessels. The plaques were dry, slightly elevated and livid, surrounded by healthy pink mucosa.

Theories on nose leprosy.

The frequency of nasal lesions, their common localisation at a very exposed spot, and the tender quality of the nasal mucosa, have given rise to the following theories, each of them doubtless being of some value, whereas none of them can claim to explain all cases of nose leprosy. To mention them and to add a new one with the same limitation, is the task of this paper.

1. The nose lesion as a primary lesion (Sticker). Bacilli enter the mucous membrane through minute erosions and then form granules and ulcers. The modus of infection, comprising the cases, in which leprous material is brought from other leprous lesions of the body, may be:—scratching of the nose (Muir); chronic catarrh, to which in this country the dry harmattan wind might contribute in some cases.

2. The leprotic process, the result of generalisation in the lymph spaces of the mucous membranes, with consequent localised ulcers (Deycke). It is supposed that infiltration of the lymph spaces with granulomatous tissue manifests itself in a rhinitis sicca (Bluck, Gerber, Sticker, Bengengruen). The last of these supposes that the lymphatic infiltration compresses the minute vessels of the mucous membrane, thus creating ulcers from lack of sufficient blood supply in the periphery. He even thinks of trophoneurotic genesis from the higher sympathetic neuron. That seems improbable, considering the small number of nose lesions
form of leprosy.

Deycke is not inclined to accept the primary lesion at all. He thinks the diffuse lymphatic infiltration corresponds with the general onset in the body, succeeded by secondary lesions in the walls of the vessels. The early nose lesions in my material were so circumscribed and abruptly limited by healthy looking mucosa, that I doubt whether this explanation is applicable to all cases.

Sokolowski states very definitely the predominance of the anterior septum as the location of early nose lesions.

Before I dicuss my findings, I want to give some anatomical data of the anterior part of the septum nasi.

The anterior nasal septum has been found to be the most frequent position of nose leprosy. The anterior nasal septum is also the spot in which epistaxis is most common, due to the tender and exposed mucous membrane in this part. Epistaxis is due neither to capillary nor to arterial bleeding. It seems to be a profuse bleeding from temporarily permeable large veins. This theory finds an anatomical basis in the findings of Donogany. The phinologists call this spot of habitual nose bleeding the " Locus Kiesselbachii ". Its histological construction is the following:—The whole septum nasi anterior region is rich in arterial and venous capillaries, which lie in a specific accumulation of glandular tissue
these minute vessels have a marked tendency to become ectatic; especially the deeper vessels in the perichondral tissue and in the medium glandular parts show great variation in lumen, and have a remarkably thin wall. The subepithelial vessels are not so liable to ectasis and show more normal conditions, though in old cases of habitual nose bleeding, and, as I have said above, in some of my cases too, the greater subepithlial vessels show ectatic changes, similar to the well known ectasis in the skin vessels of old people.

Donogany supposes that the whole region of the locus Kiesselbachii might be considered as a rudimentary rest of

the organ of Jacobson, which is still found in earlier forms of vertebrates as a *corpus cavernosum*-like body.

When we consider the distribution of leprous localisations on the body, we find that the most frequent early lesions occur in parts of the body which show a tendency to blood vessel ectasis, either on the basis of frequent injuries by solar rays or mechanical injuries, or on the basis of the original ectatic structure of the minute vessels. These parts are the ear lobes, the pink cheek, the forearms, etc. (Lewis). The analogy of the distribution of pellagrous lesions has led to theories about a common causative agent in pellagra and leprosy.

Leprosy must until now be considered to be a specific septicaemia with a primary focus, probably in the skin. The frequent symmetrical distribution can only be explained by vascular spread. Is it not probable that the ectatic stasis forms a spot of predilection for the onset of secondary lesions? We found that mechanical or solar influence creates such predilectionary spots, or they may be preformed as developmental rests. I cannot discuss here the analogies between leprosy and pellagra, but I believe that there is a common analogy in that two different disease-producing factors manifest themselves on the same soil—the damaged bloodvessel.

I have stated that the early cases of my material show a remarkably limited submucous appearance. I think that in these cases the histological basis gives more probability of secondary metastatic development than of external origin. The ectatic stasis-producing deep vessels of this region form the basis of haemogenous onset.

Summary.

The septum anterior nasi, called *Locus Kiesselbachii,* is doubtless exposed to external lesions, and is thus apt to form a suitable soil for the growth of lepra bacilli, brought to the surface of the mucous membrane in various ways. The histology of this spot gives rise to the opinion that in a certain number of cases the ectatic, abnormal conditions of the deeper vessels form the soil for haemogenous infection.

Acknowledgments.

I wish to thank Dr. Macdonald, Itu, for his kind permission to perform these studies in his leper colony and to publish the results, and Dr. Muehe, University of Hamburg, for his kind collection of literature on this subject.

Leprosy Folk-lore in Southern Nigeria

JAMES A. K. BROWN.

The fear of leprosy is not only general, but also very intense,—so much so that the native name of the disease (Opo) is seldom used, lest its repetition should cause the sickness to come upon the speaker. Descriptive words are preferred, " Oria-Ocha "—white sickness; " Nchiche "—changing of the skin; " Iberiekpe "—the sickness following the inheritor of the property of a man dying of the disease. One has occasionally noticed a reticence, over the use of the English word, by interpreters, " the sickness " being the designation adopted. A teacher told me that once, when teaching hygiene, he showed a picture of a leper, and asked a boy to touch it, but he was too afraid.

The natives ascribe the disease to various causes, some of which apply to other ailments too. They may be grouped under (1) Supernatural Agencies, (2) Heredity, (3) Poisons, although it is quite common to find elements of each in the explanation of how any particular leper became infected.

The following are typical explanations of how leprosy came to certain compounds:—

(a) " A certain thief was very poor, and had neither food to eat nor clothes to wear. One day he went to his friend's house to beg food, and on his way he met a leopard who asked him where he was going. The thief remained silent, so the leopard cursed him. " As I am now spotted, because of my wickedness in eating whatever I find, so also may you be spotted." The thief went on his way, treating the leopard's curse as a joke, and soon met his friend. Whilst in his friend's house, the thief was studying where his friend stored his goods. When night came he hid himself in a corner, awaiting his opportunity. Eventually the friend, unable to find his guest, went out to look for him. The thief then took what he wanted, and ran away. On his way, he had to pass a certain spotted tree, and when he reached this tree the spots from the tree fell on him. In this way the thief became a leper, as a result of the leopard's curse. Thus, when a native doctor tries to cure leprosy, he must bring the bark of that tree, the hair of a leopard, and these, mixed with sand, must be rubbed over the whole body."

(b) " We believe that the leper got his disease by offending Kamanu Eze Elu, the God of Sea and Sky. Others believe that Obiah, the Creator, punished with leprosy any who fished in a river called Miri Obioh. In my town there was a rocky river—now dried up—in which there lived a man-beast. One day a man shot idly into the river and, to his surprise, found he had killed the monster, the son of Kamanu or Utakpo, the ' Judge of the Dead '. When he reached home mourning, he found himself covered with black and white patches, and this was Utakpo's punishment to men. We believe that a day

will come when the sun will rise from the West and all our streams come together into a large fountain. Into this the lepers will drop their sacrifices and be healed immediately."

(c) "Two men had a serious quarrel about a piece of land. Neither would give way and the case was taken to the Court. The man who had won suspected that his opponent would try to do something evil to him, and put watch-men about his yard. One night they saw a tall man, entirely naked, stealing into the yard. They watched him patiently until he had hidden the poison into the roof of their master's house, and then sprang upon him and found he was the eldest son of the man who had been to Court with their master. In the morning the captive was compelled to put the poison in a bucket of water and bathe. A few days later leprosy appeared in his body."

The disease may be a punishment for some offence against the gods. It may have been deliberate sacrilege, or neglect to perform some religious rite. Idle thoughts and words about the local deities, or assisting a leper whose disease is a punishment, are sufficient to bring down the wrath from above. In this type of case the disease passes to the next generation, until all offspring of the offender are wiped out. The disease is latent in the blood of all offshoots of the family, and so, although one man may escape, his son may eventually be attacked.

Contact with a leper is regarded as a secondary cause only; leprosy can only be contracted in this way when there is a history of leprosy in the individual's anticedents. It is thus not sufficient to be sure that a prospective bride is not a leper, but it is advisable to see that none of her forbears has been infected, lest the sons of the brigegroom be attacked. Thus, villages containing a large number of lepers have a greater proportion of unmarried men and women. Heredity and susceptibility are both recognised, but are given an atmosphere of the supernatural. When leprosy breaks out in a man, it may be he himself, or it may be his ancestors that have provoked the gods to vengeance. If there is to be an attempt at cure, the aid of the priest is, therefore, necessary to discover the nature of the offence, and any treatment must be accompanied by sacrifice and penance. Such leprosy is, however, usually incurable—as a saying aptly puts it, "Death cures it."

Many are the afflictions and misfortunes in West Africa that are ascribed to poison, either in the form of noxious substances applied to, or taken into the body; or in the form of magic working at a distance; or through some charm. Mosquitos, lizards, centipedes, millipedes, bugs, cockroaches, have all been blamed for injecting poison through bites,

whilst spiders' webs and the juices of certain plants are said to have had the same effect merely by contact. It is believed that certain people can manufacture a poison, which, entering into a man can produce all the symptoms of leprosy. Such poisons can be bought—usually with an antidote to protect the buyer. A common method is to put the poison in the roof of the enemy house, when the rain will dissolve and wash the ingredients into the man's drinking pot. Again, it may be smeared on some tree that the intended victim is likely to climb. In such cases the poison works both by physical means and by magic. A frequent custom consists of tying a fine thread around a farm, with one entry known only to the owner. In this way the farm is protected from theft, for anyone entering the farm by any but the proper way will develop leprosy as a result of contact with the thread. Such leprosy may be cured, though it often becomes chronic as a result of the patient's misdeeds.

The methods of treatment are legion, but they resolve themselves into frequent bathing with medicaments prepared by the native doctor, the drinking of potions, and the scarification or cauterisation of the patches. During treatment the patient may have to live under supervision by the doctor and do work for him. The medicines used are prepared from crushed shells, crushed roots, powdered bark, leaves, fruit-juices, parts of animals and fishes, and other ingredients known only to the doctor. The patches are treated with native preparations intended to cause blistering of the skin; or burnt by rubbing with hot ashes; or fire in some other form; or scraped, with or without some form of premedication. When the wounds are healing, pigments or dyes may be rubbed in, to help to restore the normal colour.

In many cases the leper is isolated when recognised, but if his family is powerful the attempt is resisted and money is spent in making the disease non-dangerous to others. When isolation is achieved, a hut is built some distance from the town, and the leper is not allowed to leave it until the morning is well advanced. It is an evil thing if the first person seen in the morning is a leper; it is necessary to undergo some ceremonial cleansing and to sacrifice, lest the sickness result.

As the disease is so much feared, people are ever on the watch. In some towns the elders hold periodical inspections of all the inhabitants. When a man makes his overtures to the parents of his prospective bride, he goes in native dress (loin-cloth only). Until he is married he assists in the farm of his bride's parents, during which time the couple have

opportunity to assure themselves that they are both quite free from infection. No man will wrestle with a fully-clothed opponent. Anyone who is always fully-clothed is under suspicion, and at village feasts, native costume is the official dress.

The death of a leper is a sordid end to a miserable existence. In many places originally murder was the only effective prophylactic known, and many who were not lepers must have suffered this penalty. The actual customs vary, but generally the leper is not allowed to die in the town, if it can be avoided. Just before the end, men hired for the purpose and fortified with an antidote, escort the sufferer to the " bad bush," and watch that he does not return. In other cases, the grave is prepared just outside his house and the leper pushed inside whilst still alive. Immediately death takes place, the grave is closed, the house broken up, and a fire lit over the grave to destroy the sickness as it leaves the body to enter into someone else. The property of the leper goes to those who conduct the burial, with the exception of money, which alone goes to the next of kin.

It is not to be supposed that the foregoing is a complete list of all the beliefs, ideas, and customs associated with this disease, or that all that is described is common in every village. There are very many variants even within a comparatively small area.

The introduction of education and of the various European contacts has done, and is doing, much to displace long standing practices. This is a good thing, for the aetiological factors of heredity and contagion already recognised by the people need to be shorn of their clothing of magic and native religion. It is an evil thing, however, when western contacts mean that the native doctor can add to his list of medicines, potassium iodide, strong and poisonous disinfectants and liniments, and many other drugs, all of which can be procured from the leading companies, or bought in the open market. I have seen many tragedies due to the indiscriminate and ignorant use of such remedies.

It should not be difficult in a leprosy campaign to find useful material among the peoples' own ideas, on which to build. It is surprising at first perhaps that with such fears, and such methods of isolation as have been practised, leprosy should be so prevalent. It must be realised, however, that restrictions attempted in ignorance of the true dangers are bound to leave many loopholes, and that the greater commingling of the population, together with the less serious regard to the prohibitions of native tribal life, are now helping to make the problem of this disease more urgent.

*The Epidemiology of Leprosy

JOHN LOWE.

1. *Introduction.*

In this paper I attempt to outline in a general way some of the chief facts and theories regarding the epidemiology of leprosy. I am, however, not an epidemiologist, and also knowledge of this aspect of leprosy is not very extensive or accurate.

Epidemiological studies of leprosy are handicapped because statistics collected by health authorities, census officers, etc. are so inaccurate as often to be very misleading, and also because we have no test which indicates with any accuracy susceptibility or immunity to leprosy. The leprosy worker has to collect his own information and statistics by direct observation of the disease in the peoples affected.

The epidemiological study of any disease involves a study of its history. Leprosy is a disease which is constantly referred to in literature from the most ancient times to the present day, and from a study of these records classical scholars have tried to piece together a history of the disease. The following is an outline of this history based largely on that given in Rogers and Muir's *Leprosy*.

2. *Outline of the history of leprosy.*

This outline is of doubtful accuracy. The disease possibly originated in Africa. In pre-historic times it spread to India and Egypt and a very early reference to it is in the Vedas dated about 1400 B.C. In the Eber's papyrus about 1550 B.C. there are descriptions of skin diseases under the names "Uchedu," "Chon's swellings," and "Anut of Chon's swellings," the symptoms of which correspond very closely to those of leprosy. There is a questionable reference to it in the Egyptian records of 1350 B.C. in the reign of Ramesis II. Munro reads the records as indicating the presence of leprosy in Negro slaves brought from the Sudan. Whether this reading is accurate or not, there is no doubt that in ancient as well as modern times invasions and the slave trade have been important factors in the spread of leprosy from one country to another.

Thus in very ancient times leprosy was common in Central Africa, India and possibly Egypt and in these areas it is common to this day.

From India leprosy spread eastwards. The oldest

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Chinese medical writings give no definite indication of its presence, but in the writings of about 100 to 200 B.C. there are definite references to leprosy.

From Egypt the disease spread round the eastern Mediterranean. The Jewish writings of the Bible contain many references to a disease *"Zaraath,"* which is described in some places in the Bible as being highly contagious, producing patches white as snow, and being fairly readily curable. Other references in the Bible indicate the incurability of leprosy. Possibly under the one term *"Zaraath"* are included many skin diseases, such as psoriasis and leucoderma, as well as leprosy.

In 150 B.C. when the Jewish writings were translated into Greek, the word *Zaraath* was translated into the Greek term "lepra" which is used in the Hippocratic writings for a scaly disease. It is probable that in the Hippocratic era there was no true leprosy in Greece for Hippocrates described no such disease, but Aristotle about 345 B.C. has references to the disease which may, therefore, have been found only in Asia Minor. Factors which may well have contributed to the spread of leprosy were the conquest of Egypt by Cambyses, 525 B.C., the conquests of Darius in the same century and later in 480 B.C. the conquests of Xerxes. According to Herodotus, Xerxes led 6,000,000 people from Asia into Europe, many thousands of whom remained in Europe. When true leprosy appeared in Greece the term "lepra" was not applied to it but the term elephantiasis was used. The use of the word "lepra" for what we now know as leprosy probably originated in a mistake in translation. In early medical writings in Arabic the term "djudsum" is used for leprosy, and when these writings were translated into Greek by Constantine of Carthage in the tenth century, the word "lepra" was wrongly used, but the name has stuck. The Greek term for leprosy, elephantiasis, is still used in some medical writings and in Calcutta when the diagnosis has to be written without the patients or others knowing, the initials E.G. (Elephantiasis Graecorum) are often used.

Leprosy was unrecorded in Roman writings until the time of Pompey, when it is recorded as having occurred in the soldiers returning from the East in 62 B.C. In Roman history from then onwards leprosy is often referred to. The Romans introduced leprosy into other parts of Europe. Galen wrote of it in Germany in A.D. 180 and Virchow reports that by A.D. 600 there were hundreds of leper houses in Italy and Germany. In the fifth and sixth centuries Spain

was infected by Roman troops. After the fall of Rome, the conquest of Alaric and others probably helped to spread the disease. From Spain leprosy spread to France. (The Saracens invaded France from Spain early in the eighth century.) In 1757 laws were passed prohibiting the marriage of lepers and decreeing divorce of lepers.

Leprosy was probably introduced into England by the Romans. Sir G. Newman records that the first leper house in England was founded in Nottingham in the seventh century. The following are the dates of the establishment of the first leper houses:—Ireland 869, Wales 950, Scotland 1177 or 1300 (Newman). Meanwhile Norway was infected in 1266 and Shetlands, Faroe, Iceland, Greenland, Holland, Denmark, Sweden, Russia, the Baltic countries had also been infected.

Leprosy reached its height in Western Europe about 1200 though it was very common from A.D. 1000 to 1400 (2,000 leper houses in France alone). The influence of the Crusades on the incidence and the spread of leprosy has been discussed, but Newman thought that they only affected leprosy by impoverishing Western Europe.

So far the story has been one of the introduction of leprosy into previously unaffected countries, and of its spread in such countries. In the thirteenth century, however, leprosy began to decline in Western Europe and by the seventeenth century it had more or less died out in this area excepting in a few persistent foci. The "epidemic" in Europe had lasted about one thousand years.

The reasons for the dying out of leprosy in Western Europe have been discussed at great length by various writers, but no really satisfactory explanation has been given. Some students of the subject have considered that the isolation carried out in "leper houses" was responsible (there were thousands of such institutions in medieval Europe). Climate and meteorlogical changes have recently been quoted as important factors. Improved social and hygienic conditions and diet have been cited. A few writers have suggested that the Western European races gradually became immune because of the gradual dying out of the stock which was susceptible to leprosy. Other writers have considered that the tremendous mortality associated with the great plagues of the Middle Ages was an important factor. Some of these factors are discussed later. Other writers think that the reasons for the decline of leprosy in Europe are undetermined and possibly undeterminable, and quote similar phenomena seen in other diseases, such as tuberculosis and plague,

such diseases dying out gradually or suddenly with no apparent cause, sometimes when conditions appear to be most favourable for their spread. One striking example of this is the steady decline in tuberculosis in England which began about 1800 just when the industrial revolution created conditions apparently favourable to its spread. This decline started long before the establishment of any organized anti-tuberculosis work.

I think we must admit that we have no satisfactory explanation of the decline of leprosy in Europe.

While leprosy was declining in Europe it was being conveyed to other previously uninfected countries: to North America and the West Indies by immigrants from Europe and by slaves from Africa, and to South America by immigrants from Spain. In South America leprosy is still widespread, but in North America there are only a few foci of leprosy.

Even within the last half century leprosy has been introduced into previously uninfected countries, chiefly Pacific Islands. The story of leprosy in Nauru is well known to students of leprosy. Leprosy was introduced and for some years spread very little. After the influenza epidemic of 1918 however (in which an incidence of 100 per cent and a mortality rate of 30 per cent were seen) leprosy spread widely and in a few years about 20 per cent of the population was affected, the disease, however, being in a comparatively mild form. The epidemic was short-lived and is now on the decline.

The history of leprosy is, on the whole, a history of endemicity of the disease in some parts of the world for thousands of years with its introduction from time to time into other parts where it may be seen in the form of very long period epidemics, dying out in time for no apparent reason.

3. *Transmission of leprosy.*

This matter can only be discussed very briefly here. The only mode of transmission of leprosy about which there is any certainty is transmission by direct contact with infectious cases. Even so we do not know the exact way in which the bacilli get into the body, but most workers consider that it is probably through abraded skin or through mucous membrane.

Transmission by contact with infected articles may be seen occasionally. It is extremely doubtful if the disease can be conveyed by infected air, water or food. Insect transmission appears on the whole to be improbable.

4. *The present distribution of leprosy in the world.*

Leprosy is now regarded as a tropical disease and it is found chiefly in tropical countries but it still exists to a considerable extent in some non-tropical countri
will be clear from the history of leprosy which I have given, it used to be very prevalent in many non-tropical countries. The present distribution of leprosy in the world is shown roughly in the accompanying map I. Light shading indicates presence of leprosy but in small amount, less than 1 per mille. The more heavy shading indicates a moderate incidence of leprosy, probably between 1 and 2.5 per mille. The black portion indicates an incidence of leprosy of more than 2.5 per mille. In the black areas the incidence is usually from 5 to 10 per mille but in some areas, such as portions of Central Africa, the incidence may rise as high as 50 per mille. The map shows that the chief foci of leprosy are Africa, India, China and South America, that the heavily affected areas are nearly all in the tropics but that leprosy is found sometimes a long way from the tropics and even inside the Arctic circle, for example, Greenland, Iceland, Norway, the Baltic countries and Canada.

5. *Distribution of leprosy in India.*

This is shown roughly in the accompanying map II. It will be seen that the areas with a high incidence are in the east and south, that central and western India and the Himalayan areas show a moderate incidence while the north-west of India is relatively free from leprosy. The most heavily affected areas are probably West Bengal, South Bihar, Orissa and Madras.

6. *Incidence.*

Until about 10 years ago the only information regarding incidence of leprosy in India as a whole was that available in the decennial census, which in 1921 reported a total number of 102,000 cases of leprosy, giving an incidence of .35 per mille. The highest incidence reported in any area was about 1 per mille. During the last 10 years much leprosy survey work has been done in various parts of India and it is found that the census figure for many areas needs to be multiplied by a factor which varies between 3 and 20 and averages about 8. The census return for 1931 shows a figure of 147,911, an increase on the 1921 figure of 45,398. This increase possibly does not represent a real increase of leprosy but only an increase in the accuracy of the return. On the basis of our survey findings we have concluded that

the number of cases of leprosy in India is probably not less than one million. We find, in the heavily infected parts, large areas where the incidence may be 2 per cent of the population. We find small areas where the incidence is 5 or 7 per cent. We find villages in which the incidence is 15 or 20 per cent. It is on the basis of these survey figures that the accompanying map II has been made.

7. *Types of leprosy.*

These high figures should however be explained a little. In survey work in India we find that on the whole there are about two relatively mild cases of leprosy to every severe case. In some of these mild cases, the disease is of little clinical or public health importance and in quoting these high figures these facts should be borne in mind.

8. *The age distribution of cases of leprosy.*

The age distribution of cases of leprosy in India reported in the 1921 census is shown in the accompanying graph 1. The highest number of cases is found in the middle age periods. This graph is, however, of little value in indicating the age in which the disease is contracted because leprosy is a very chronic, often non-fatal disease, which exists for many years, and a middle aged or old person suffering from leprosy may often have contracted the disease quite early in life. An indication of the age at which the disease is contracted is given in graph 2 which gives the age at which the first symptoms were noticed, in 400 unselected cases of leprosy of all ages. It will be seen that in most of the cases the symptoms were recognized by the patient before the age of 30. Slight symptoms of leprosy may be present for years before they are recognized, and also the latent period of leprosy is long, averaging possibly three or four years, so that when these facts are taken into consideration, this graph indicates that the disease is probably contracted in the great majority of cases either in childhood, adolescence or early in adult life. The chances of the disease being contracted after the age of thirty are remote, though such cases are seen rarely. The difference in susceptibility at different ages is shown by a study of leprosy in families. Adults exposed to infection show an incidence of about 5 per cent, while children similarly exposed to infe
50 per cent or more. Another finding which is made from a study of leprosy at different age periods is that leprosy contracted early in life is far more likely to take a serious form than when contracted later in life.

9. *The sex incidence of leprosy.*

It is a curious and interesting fact that in every country where leprosy is common the number of males suffering from the disease is much greater than the number of females, the proportion averaging about 2 to 1. It may be thought that these returns are due to the difficulty of examining women properly, particularly in such countries as India, but I think there is no doubt that this is not so. Similar returns are made where there is no difficulty whatever in examining women. For example, in New Guinea, where males and females always wear the minimum of clothing and where the whole population is periodically examined naked for leprosy, the incidence in males is twice as high as in females. In the same area it is found that the disease also tends to take a milder form in females than in males. Similar findings have been reported in many other countries. It therefore appears to be quite definite that males suffer from leprosy more commonly and probably more severely than do females.

It is interesting to study the sex incidence at different age periods. This has been done in various centres. It is found that in the early years of life the incidence in the two sexes is about the same and in some countries it has been found that after the age of puberty the incidence in females may actually exceed the incidence in males. Shortly after puberty, however, the incidence in females reaches a peak and then tends to fall quickly, while at the same period the incidence in males continues to rise for several years and then falls but much more slowly. A graph of the sex incidence of leprosy at different age periods has the form shown (*see* graph 3).

It is very difficult to explain the difference in incidence and severity of leprosy in the two sexes. We might for a moment consider the question of the sister disease, tuberculosis. I have reproduced here a graph 4 made by McNalty indicating the mortality rate from tuberculosis, of the two sexes at different age periods in England. (McNalty considers that the mortality rate is the most reliable index of the incidence of tuberculosis in the two sexes.) In general outline (if we ignore the early peak due to infant mortality from tuberculosis) the curves are somewhat similar to those of leprosy, the incidence of tuberculosis in females is lower than that of males at all ages except the age of adolescence and the mortality rate is also lower. Now in tuberculosis this difference in sex incidence is probably due chiefly, if not entirely, to environmental factors, namely, greater exposure to infection and to factors which predispose to tuberculosis. This is caused chiefly by industrial conditions in England.

Under other conditions the incidence of tuberculosis in the two sexes may be approximately equal; for example, in America, Robinson and Wilson investigated the incidence of tuberculosis in 20,000 industrial workers, 14,000 men and 6,000 women, and found that the incidence in women was slightly higher than in men. In India it is often said that tuberculosis is commoner in females than in males because of the unhealthly conditions of seclusion in which many women live. Therefore the reason for the difference in the sex incidence of tuberculosis is probably environmental. In leprosy, however, it is difficult or impossible to explain the lower incidence in women on this basis. Even in countries where men and women are equally exposed to infection the incidence in women is much lower.

It is a well-recognized fact that women are less susceptible to some diseases than men, but in no disease does this appear to be so marked as in leprosy. An interesting discussion on the sex incidence of the disease in general is given by Stallybrass in his book on epidemiology. I have made the following summary of this discussion:—

There are differences, sometimes quite marked, in the incidence and mortality of infectious diseases in the two sexes. Some diseases (e.g., whooping cough and acute rheumatism) are reported as being more common in females, while others (e.g., pneumonia and the middle-age form of tuberculosis) are more common in males. It is also noticeable that the sex incidence of disease often varies with age.

Nevertheless, at all age periods males show a greater incidence of infectious disease and a higher total mortality rate. This difference may be due to greater exposure or to greater susceptibility. Greater exposure may possibly explain the greater mortality in males in adult life, but it is difficult to see how it can explain greater mortality in childhood. Greater susceptibility in males may possibly be caused by sex differences; males are bigger and have a more developed musculature, which may throw a greater strain on the circulatory and excretory systems and so reduce chances of recovery when attacked. Again it is difficult to understand how this can explain the greater mortality in males in childhood.

The sex factor may be physiological rather than anatomical. The sex hormones are connected with differences in endocrine activity, as shown by the greater activity of the thyroid in women. The endocrine system is intimately connected with destruction of bacteria and their toxins. It is possible that differences in endocrine function in the two

sexes may have an influence on the susceptibility to infectious diseases.

In addition to anatomical and physiological differences in the sexes there is the cytological difference. Each cell in the female contains a group of chromomeres different from the corresponding group present in the male, and it is this group that determines sex and sex differences.

Whether these anatomical, physiological, and cytological differences between the sexes have any effect on the sex incidence of disease is uncertain.

To summarize the findings regarding the incidence of leprosy in India, we find that the incidence probably averages about 3 per mille but in some areas it is as high as 20 per mille, that about two-thirds of cases are relatively mild, that the disease is usually contracted in childhood or adolescence and that males suffer from the disease more commonly than females and tend to show a severer form of the disease.

10. *Race and leprosy.*

It has been suggested that the subsidence of leprosy in certain countries is due to the development of racial immunity due to a gradual dying out of the stock of the race which was susceptible to leprosy. This has been quoted as a possible reason why leprosy died out in Western Europe. Western European races have, however, at the present day no marked racial immunity to leprosy, since cases of leprosy occurring in such persons who go to countries where leprosy is endemic are not uncommon, and this is found in spite of the fact that such persons do not usually go to such countries until the age of the greatest susceptibility has passed. In India, for example, leprosy in Englishmen coming to the country in adult life is not so rare as one might imagine, and when such persons do develop leprosy the disease on the whole appears to take a rather severe form which would not indicate the presence of any marked immunity. It would appear that all races are susceptible to leprosy but there may be minor degrees of natural immunity. It is certainly true that leprosy shows itself rather differently in people of different races. In the Far East, the Philippines, Japan and Siam, for example, the disease appears on the whole to be more severe than it is in India, and also certain clinical manifestations of the disease which may be attributed to the relatively high resistance of Indians to leprosy are much more rarely seen in these Far Eastern countries. These differences may possibly be attributed to climatic and other factors but in countries such as Malaya or the West Indies

where the population consists of different races—Chinese, Indian and Malayan, or Indian and African—leprosy appears to show itself in forms varying somewhat according to the race of the affected person. Here climatic and other differences are largely eliminated. It does appear, therefore, that there are some grounds for believing that there are minor degrees of racial immunity to leprosy. Regarding the nature of this immunity I cannot say anything here. The question has been raised as to whether racial immunity to leprosy may partly explain the distribution of leprosy in India. Do the races of the north-west suffer much less from leprosy because they have more racial immunity than the people of the south and east? This is a question which it is impossible to answer. However we find that leprosy is quite common among Punjabis and others who have migrated to endemic areas such as Bengal, and when it occurs it may take a severe form.

11. *Climate and leprosy.*

Climate affects leprosy in two ways. First of all it may affect the transmission of the disease and secondly it may influence the course of the disease. It is certainly noticeable that leprosy is most common in hot humid climates and it is possible that the humidity is of more importance than the temperature. A study of the maps of India and of the world which I have shown indicates how in dry parts, even in the tropics, leprosy is usually uncommon, whereas in moist parts of tropical and non-tropical countries leprosy may be more common. The reasons for this are not clear. One curious thing is that in some countries, where there is a considerable number of imported cases of leprosy, many of them infectious and few of them isolated, examples of such cases infecting others are extremely rare. For example, in England there are probably about 100 cases of leprosy, many of them infectious and many not isolated, but contact cases are extremely rare. The same thing is found in New York city. Climate may also have an effect on the disease and the experience of some physicians who have dealt with leprosy in tropical and in cold countries indicates that a cold country is not favourable for the treatment of leprosy. Thus the climate of countries such as England apparently does not favour transmission of the disease, but it does favour the development of the disease when it has risen.

12. *Diet.*

There has, for centuries, been a common idea throughout

the world that leprosy is influenced by diet. One of the common ideas in most countries, particularly in India, is that leprosy is connected with the eating of fish. Sir Jonathan Hutchinson took up this idea and gave it as an explanation as to why leprosy was so common in Europe in the Middle Ages when the eating of dried fish was very common, and why a high incidence of leprosy persisted so long among the fisher folk of Norway. Later he modified the idea and said that leprosy was due to eating decomposed fish and other bad food. This idea has now practically no adherents, for leprosy has been found to be common among people who never eat fish. It is however, noticeable that leprosy does appear to be commoner among those peoples whose diet is ill-balanced. In China, for instance, the disease is much more common in parts where rice forms a staple part of the diet, and where protein, fat and vitamins are little taken. The same is true of India, leprosy being common among the rice-eating people of Bengal, Bihar, Orissa and Madras and less common among the people whose staple diet consists of wheat, *jawar* and other grains richer in protein. Leprosy in also less common among those peoples in India who take milk or milk products. Similar findings have been made with regard to leprosy and diet in Africa. These things may however be pure coincidence. The difference in the incidence of leprosy in the different parts of India may be explainable on the grounds of racial, climatic and other differences and not of difference of diet. There is no doubt that a good diet is an important thing in the prevention of leprosy and in the treatment of leprosy, but the treatment of leprosy along dietetic lines has, on the whole, given disappointing results.

13. *Social and hygienic conditions.*

There is considerable evidence to show that the incidence of leprosy is markedly affected by social and hygenic conditions and that leprosy tends to die out when conditions are good. The improvement in social and hygenic conditions and diet is given by some as one of the reasons why leprosy died out in Western Europe, but the evidence to show that such very marked improvement occurred between the thirteenth and sixteenth centuries, the period during which leprosy died out, is not very strong.

It is interesting to compare the incidence of leprosy in people in the same country in different stages of civilization. In India, for example, leprosy up to the present has not been common among the aboriginals and semi-aboriginals who live on the whole a healthy outdoor life in very small settlements

and who, although they are extremely poor, not being vegetarians, often take a much more balanced diet than many other people of India. Also when cases of leprosy occur among them they are commonly ostracized and may be driven out of the community. Thus under primitive conditions in India leprosy is not common. The peoples in India who suffer most from leprosy are the outcastes, the low-caste Hindus and the poorer Mohammedans. I need not here discuss the social and economic conditions which are usually found in the poorer parts of an Indian village, and there seems to be no doubt that these conditions, combined with a poor diet and chronic ill nourishment, together with the effects of such infections as malaria, chronic dysentery and hookworm, have an influence on the incidence of leprosy. We should not, however, imagine that leprosy in India is confined to the lower castes. In the higher castes and among people who have better social and hygienic conditions and who live in better houses and take better diet, the disease is certainly less common, but the disease is actually found in all classes of society in India, from the very highest to the lowest. Cases of leprous servants infecting others living under good social conditions are far from rare, and it appears that even under the best conditions in India the presence of infectious cases is a very definite menace to healthy people, particularly young people and children.

If we try to correlate the incidence of leprosy in different parts of India with the general, social and economic conditions of the people we find it is not always easy. One of the poorer parts of India is undoubtedly West Bengal and here the incidence of leprosy is high, but it is certainly no higher than it is in some parts of Madras where on the whole the social and economic condition of the people is very much better.

The social and economic conditions of the people are of course intimately connected with diet, and many people do not take a better diet because they cannot afford it. However, a more wise use of the limited economic resources of a family would often improve the diet considerably, and a reduced consumption of carbohydrates and increased consumption of protein, fat and vitamin might render the people less susceptible to infectious diseases such as leprosy.

I think there is no doubt that in India there are two special factors which have an important bearing on the prevalence of leprosy. The first of these is religious sentiment which regards leprosy not as an infectious disease but as a visitation of the gods, a man's fate which cannot be avoided.

Religious sentiment also encourages the giving of alms to beggars, particularly lepers, as a religious duty. This fact encourages the wanderings of enormous numbers of lepers all over India, particularly to centres of religious pilgrimage, and because of this sentiment it is impossible to prevent lepers travelling on trains and public vehicles all over India, usually without payment.

The second factor is the " joint-family system " under which a father and mother and all the married sons and their families and all unmarried children share one household. If any member of the family gets leprosy in an infectious form, all the other members of the large joint family are exposed to the infection in the joint-family house, and numbers of them, chiefly children, frequently contract the disease in this way from relatives.

14. *Leprosy in rural and urban areas.*

Leprosy has up to the present been chiefly a rural problem since most of the people in India are agricultural workers living in villages. During recent years the opening up of previously secluded areas by the development of roads and railways, and the establishment of large industrial areas with large numbers of workers recruited from rural areas, have introduced a new aspect of the problem. Healthy workers from rural areas are migrating to industrial centres with their families, there getting infected with leprosy and later returning and spreading the disease in previously unaffected villages.

Conclusion.

These then are some facts and some theories regarding the epidemiology of leprosy in the world and in India. There are great gaps in our knowledge and the need for further study is obvious. There are three points which are clear and although they are elementary they need emphasis. Firstly, leprosy is an infectious disease though not highly infectious, and the conditions found in most parts of India are favourable to transmission. Secondly, while most adults are partly or completely immune to leprosy children are usually susceptible. Thirdly, the most important thing in the control of leprosy is the prevention of contact between infectious cases and children.

Native Administration Leprosy Colony, Uzuakoli.

T. F. DAVEY.

European Staff.

During the year 1936 the Colony has suffered a great loss through the resignation of Dr Brown. The first Medical Superintendent, Dr. Brown, was confronted with problems peculiar to the early development of the Colony; but with rare enthusiasm, patience, and tact, he selected and surveyed the site of the Colony when it was covered with dense bush, interviewed chiefs, and negotiated the lease of the land. He planned buildings, decided policy, and since August 1932 when the first patients were admitted, the excellence of his work established that tradition of efficiency which Uzuakoli possesses today. In this work he was ably assisted by Mrs. Brown, who made the Babies House her special charge. They left for England in July 1936, and both patients and staff, deprived of their knowledge and experience, remember them with gratitude and affection.

In February 1937 I welcomed a newcomer to the Colony in the person of Mr. F. W. Tuck, a Toc H volunteer sent out by the British Empire Leprosy Relief Association. Mr. Tuck has entered into his work with enthusiasm and is already rendering valuable service. He is now responsible for the industrial and agricultural side of the work.

Statistics.

The number of patients in residence in the colony during the year has considerably increased, as the following summary of the statistics for the year indicates:—

	Total	Males	Females
Patients resident April 1st, 1936	740	501	239
Admissions	321	243	78
Total resident	1061	744	317
Discharges	89	76	13
Deaths	71	49	22
Patients resident March 31st, 1937	901	619	282
Uninfected children	17		
Outpatients	382		

The increase which has brought the population to more than one thousand has been due almost exclusively to the admission of independent patients. These cases are admitted on very advantageous terms without reference to the quotas by which the admissions of dependent cases are controlled. They are offered the choice of two alternatives, either they

bring 5/- which is taken as a contribution towards the cost of their house and make no further payment, simply undertaking to provide their own food, or else they bring £2, 35/- of which is placed in the Colony bank on their behalf, and returned to them at 6d. per week. As some recompense for treatment they work in the Colony for two days each week, clearing bush, cutting grass, mending roads, etc., but have the rest of the week free to use as they wish, and most of them engage in trading or some kind of handcraft whereby they are able to earn sufficient to maintain themselves. So eager are the people to avail themselves of these terms that although more than 300 have been admitted during the year, this figure represents less than half of those who have applied for admission, the remainder being considered unsuitable subjects for treatment in the Colony.

The figures given for discharges include those from three different groups:—

(a) Patients discharged as disease arrested. Absence of symptoms, return of pigmentation and sensation in the patches, with repeatedly negative bacteriological examination, are the criteria whereby fitness for discharge is judged, and 17 such cases have been discharged during the year. This figure appears very small in comparison with the number of patients in residence, but it must be noted that the population of the Colony has almost doubled during the last 18 months, and cases admitted during that time have not been considered ready for discharge. There will, without doubt, be a larger number discharged during the coming year. All patients when discharged are asked to present themselves for examination at intervals of 3 months, and about half of them come when requested to do so.

(b) Cases who have gone home at their own wish, but were not considered ready for discharge. The majority of discharges come under this category.

(c) Independent cases who have exhausted their financial resources and have found no means of earning a living in the Colony. About ten of these unfortunate cases have been discharged during the year.

The deaths have been due, for the most part, to cachexia and nephritis. There has been one death from septicaemia, two have occurred from pneumonia, and one from gangrene, the patient having refused to have an operation. There have been no infectious diseases.

Out-Patients.

The work among out-patients is not of great value, but

is continued for the sake of those for whom nothing better is at present available. Every week between two and three hundred people walk to the Colony and receive out-patient treatment, and numbers of children are included amongst them. It is not possible to have accurate treatment control with these patients, and dosage is of necessity less than that commonly employed for inpatients. The number of these patients is indicative of the incidence of the disease in the immediate neighbourhood of Uzuakoli.

Medical.

All patients on admission are examined with a view to remedying as far as possible conditions other than leprosy and during their first month in the Colony take, as a routine, a course of treatment designed to eliminate yaws, malaria, helminthiasis, scabies, and anaemia, conditions universal in this country. The following is an outline of the course:—

1*st treatment.*—Worm medicine No. 1. (Ol. chenapodium cum ol. ricini),
Mist. quinine,
Sulphur treatment for scabies,
Halarsol or neosalvarsan .3gm.

2*nd treatment.*—Worm medicine No. 2. (Thymol cum milk sugar),
Mist. quinine,
Sulphur treatment for scabies,
Sobita .2gm.

3*rd treatment.*—Worm medicine No. 2,
Mist. ferri et amon. cit.,
Sobita .3gm.

4*th treatment.*—Worm medicine No. 3. (santonin cum calomel),
Mist. ferri et ammon. cit.,
Sobita .4gm.

5*th treatment.*—Mist. ferri et ammon. cit.,
Halarsol or neosalvarsan .15gm.

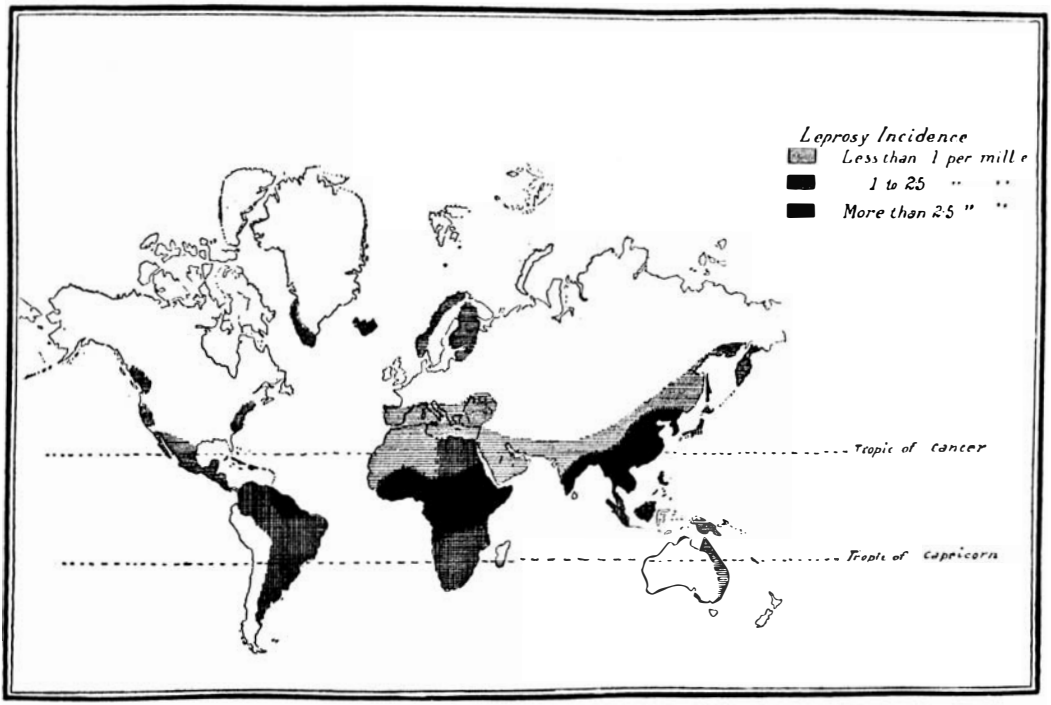
6*th treatment.*—Mist. ferri et ammon. cit.,
Sobita .5gm.

7*th treatment.*—First injection of hydnocarpus oil.

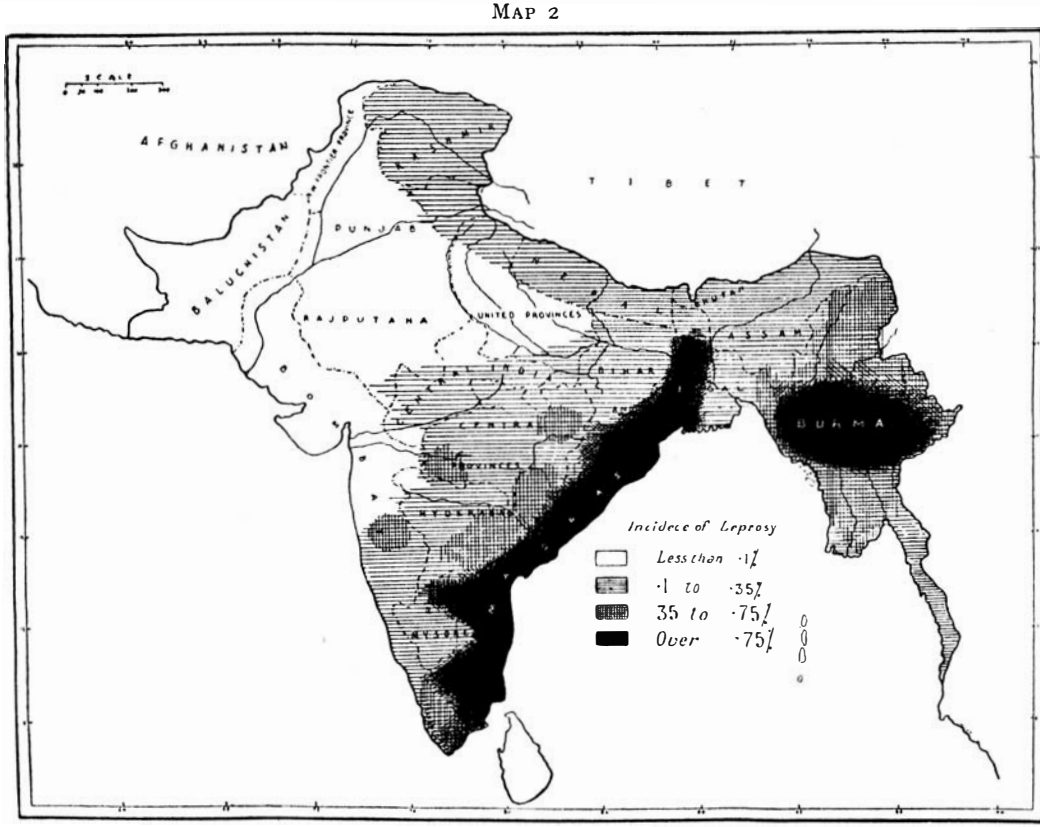
At the conclusion of this course of preliminary medication injections are commenced and are given bi-weekly. Mixtures of hydnocarpus oil and esters with creosote are used as routine according to the following formulae:—

A.	Crude hydnocarpus oil ...	25%
	Hydnocarpus esters ...	25%
	Olive oil	37½%
	Cod-liver oil	12½%
Add	Creosote	4%

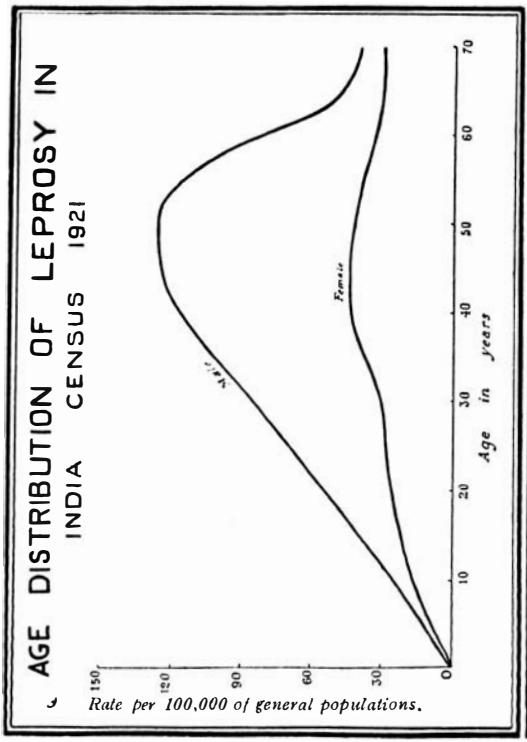
MAP 1


Leprosy Incidence
Less than 1 per mille
1 to 25 " "
More than 25 " "
Tropic of Cancer
Tropic of Capricorn

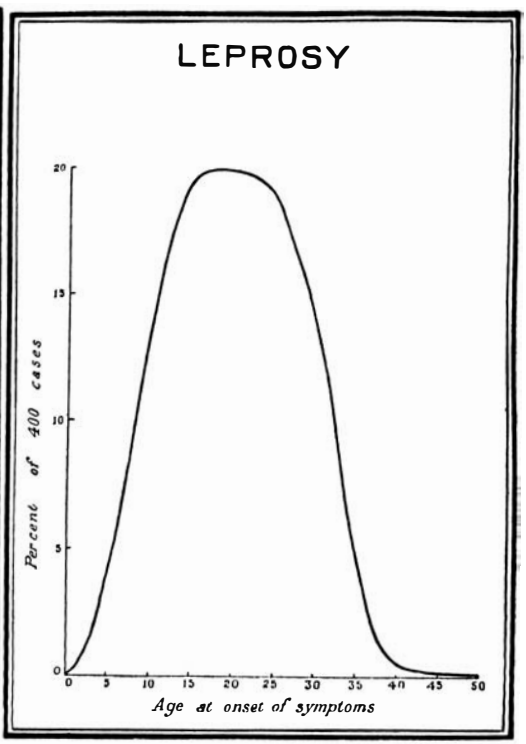
MAP 2


AFGHANISTAN
BALUCHISTAN
PUNJAB
RAJPUTANA
UNITED PROVINCES
BIHAR
ASSAM
BURMA
TIBET
HYDERABAD
MYSORE
Incidence of Leprosy
Less than ·1%
·1 to ·35%
·35 to ·75%
Over ·75%

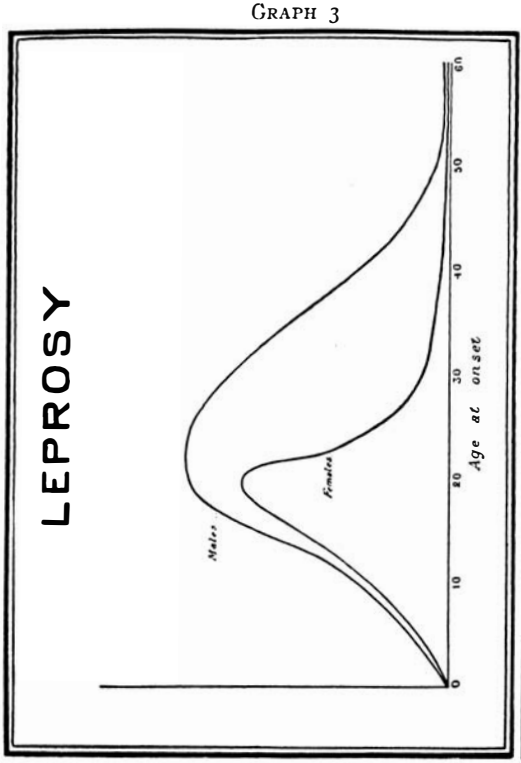
GRAPH 1



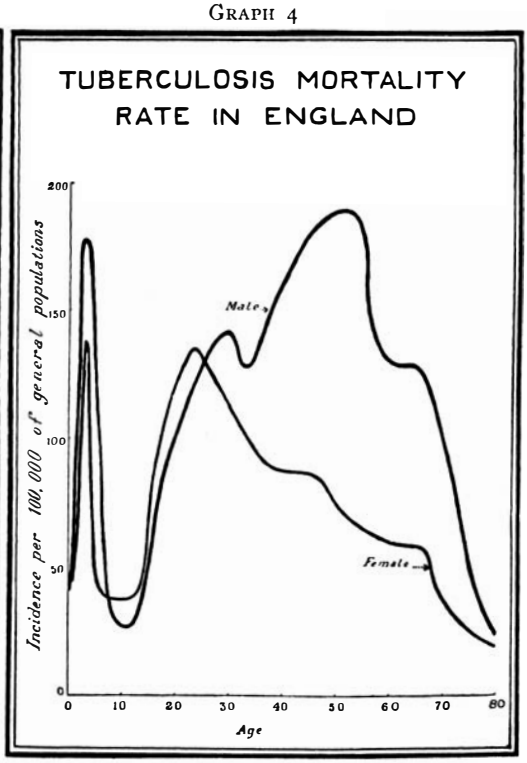
GRAPH 2



GRAPH 3



GRAPH 4



B.	Crude hydnocarpus oil ...	25%
	Hydnocarpus esters ...	50%
	Olive oil	12½%
	Cod-liver oil	12½%
Add	Creosote	4%
C.	Crude hydnocarpus oil ...	25%
	Hydnocarpus esters ...	62½%
	Cod-liver oil	12½%
Add	Creosote	4%

All esters used are prepared by the colony dispenser, the cold process being employed. The cod-liver oil was introduced into the mixture by Dr. Brown and is found to be of benefit. Dosage commences with 1 c.c. of mixture injected intradermally into the lesions, and increases by 1 c.c. up to 10 c.c., the maximum dose, which is administered on four occasions. Mixtures B and C are then given in turn, each being used exactly as Mixture A. The whole course provides treatment for five months, and is followed by one month's rest after which the course is repeated. Dosage is controlled by the reaction induced by the injection, a solitary rise of temperature to 99.2 degrees being regarded as the optimum, and this optimum is usually reached at some point in the course when dosage remains stationary for the time being. A rise of temperature to 99.6 degrees or more, or the presence of pain in the injected area, are indications for a temporary cessation of treatment. Apart from the slight pain associated with the actual injection, these mixtures have been found to be almost non-irritating and in this respect I consider them superior to alepol which has been given a further trial during the year. Other preparations used include iodised moogrol which is being used in selected cases. The actual technique of injection is carried out by a staff of leper nurses who are highly skilled at this work, and who also undertake the general nursing duties associated with the hospital.

The treatment of ulcers, both trophic and infective, is a major aspect of the medical work, and dressings are given in a special shed in the town. Various forms of treatment are used. Surgical procedures such as excision of dead bone and scraping are employed where necessary, and dressings in common use include hypertonic saline, B.I.P.P., and Z.I.P.P. Gratifying results, in chronic cases, have followed the use of strapping applied and left in situ for three weeks, when it is renewed if necessary. Apart from leprosy a number of conditions requiring surgical treatment have been dealt with during the year, and the operation theatre has been in frequent use.

In the treatment of leprosy the building up of the general resistance of the patient is of paramount importance. Fresh air, exercise, cleanliness, and good food are remedial measures at least as important as is the treatment by injections, and at Uzuakoli there is considerable organisation designed to provide this side of treatment.

Labour.

The Colony with its two towns provides scope for many types of labour. All patients are expected to work and are organised into gangs for that purpose. Those engaged in "essential services" include police, school teachers, sanitary men, nurses, temperature clerks, and court clerks. Woodcutters and sawyers are employed in the forest, cement workers and blacksmiths are in continuous demand, while all the woodwork used in the Colony, including doors and windows, is made in the carpenter's shop. One gang is responsible for the palm oil industry, another attending to the roads, while unskilled labourers are employed in house building, grass cutting, clearing bush, etc. If a patient has learned a trade he is given opportunity to ply it in the Colony. When boys leave the school efforts are made to attach them to a gang in which they will learn some useful occupation.

The women are also similarly organised, some being concerned with the palm oil industry, others with the preparation of cassava, and others with building. Even those unable to do heavy work are employed to sweep roads and keep them tidy. All this work is organised through a non-leper artisan, and all patients receive a small weekly wage.

Industry.

Apart from the organised work carried on by the patients for the common good, a variety of industries are encouraged The attitude of non-lepers to lepers in the Uzuakoli area involves a refusal to handle or buy anything made by a leper and it is extremely difficult, therefore, to use industry as a source of income to the Colony. A large number of patients are however able to augment their income by making useful articles and selling them to fellow patients, and this internal industry remains, therefore, largely a matter of individual initiative. Weaving, carving, tailoring, net-making, the manufacture of musical instruments, basket making, and some soap manufacture are carried on and receive encouragement. The extensive oil palm plantation is now beginning to bear fruit, and during the next year will provide an industry which will be made a source of income.

Exercise.

All patients are expected to take exercise in the open air. For many this is provided by the type of labouring work they are accustomed to do, and such work as grass-cutting, road-making, etc. meets the need, but efforts are being made to ensure that everyone is provided with suitable outdoor activity. Thus a gardening gang has been created during the year, and various schemes have been in operation for the beautifying of the Colony.

This matter is of greatest importance to those whose work keeps them indoors for the greater part of the time, and particularly to nurses, school teachers, etc., and with these people in mind sport has received every encouragement. A football field has been laid out and is in regular use, a running track has been made, while courts for volley ball and ring tennis will shortly be available.

Prominence is also given to out-door exercise in the school curriculum, and provision is made for games, gardening, and dancing.

Agriculture.

Farming constitutes one of the major aspects of the life of the Colony, and all able-bodied patients have their share in it. The individual system of farming has again been used this year and has given satisfactory results. All dependent patients receive on first admission a farm and 200 seed yams. At harvest time 20 seed yams must be returned, and are housed in a special barn together with those from the farms of patients who have left the Colony, and this stock is used to supply newcomers the following year. In succeeding years, a smaller percentage is returned. Other crops grown include cassava, coco-yams, leaves, corn, and pepper. The only communal farm in the Colony consists of two areas planted with cassava intended for the use of feeble patients.

Experiments are now being made with the use of cover crops, and ground for this purpose has recently been cleared and is being planted.

Hydnocarpus Wightiana.

An attempt has been made during the year to raise Hydnocarpus Wightiana plants from seed. 1,000 seeds were obtained from the Assistant Conservator of Forests, Sapoba, but it is as yet too early to say whether the nursery will prove a success.

Bamboo and Raphia Palm Plantations.

Arrangements have been made for making plantations

of both Bamboo and Raphia Palms so that supplies of bamboos and mats for building purposes will in time be grown in the Colony.

Building.

A number of additions and alterations have been made to the buildings in the Colony. Early in the year a rest house was built for the accommodation of European visitors, and two nurses houses in cement have been erected in the non-leper reservation. A drainage system has been built around the leper hospital, and in the Colony towns there have been various alterations, most important of which have been the building of larger carpenter's sheds and blacksmith's shops.

Work among Uninfected Children.

All children born in the Colony are separated from their mothers at birth and are taken to a special house in the non-leper reservation. The policy of permitting no contact between mother and child has been continued, children being reared on artificial foods from birth. Occasional exceptions to this rule have been made, especially in the case of very small and feeble infants, and in such an instance the mother has been permitted to feed her child for the first month of its life, suitable precautions being taken to prevent contact with the mother except at the nipple.

The food in most general use is Nestles " Milkmaid " brand, but Cow and Gate brand and unsweetened milk have also been used on occasion. After the age of 6 months, other articles of diet are introduced, and a diet as used for a child of 1 year was given in last year's report.

Care is taken to safeguard the children from avitaminosis. Great emphasis is laid on the importance of sunlight, all children being placed in the open air from 8—11 a.m. and from 3—4.30 p.m. Similarly all children receive orange juice daily, while cod-liver oil is given regularly to all over the age of 6 months.

There are at present 17 babies in our care, ages ranging from 3 weeks to 2½ years. Most of these have been born to women already resident in the Colony, but in one or two cases a mother has presented herself for admission with an infant in arms, and when this has occurred the child has been admitted to the Babies' House. Children are maintained in the department until they are able to walk and take ordinary diet, when they are placed in the care of relatives. Two such children have been discharged during the year.

Clean Dispensary.

From the beginning of its history, numbers of non-lepers have come to the Colony to consult the Medical Officer, and in order to cope with the demand for his services a small permanent hospital was built in the Clean Reservation about two and a half years ago. The buildings constitute a complete unit and consist of an outpatients' verandah, consulting room, theatre, male and female wards (10 beds) and dressing shed, with a few huts for the accommodation of ulcer cases. A special staff of nurses is employed in the hospital and during the year a considerable amount of work has been done. Many urgent and accident cases have received attention, several having been sent for treatment by the Native Administration. The following are the statistics for the year:

Inpatients—Male	116
Female	50
Children	25
Operations with anaesthetic ...	69
Operations without anaesthetic	90
Total attendance of outpatients	17,063

A small charge is made for treatment and by this means the department is made self-supporting, and any excess of income over expenditure is devoted to the Colony funds. Lectures, and classes in practical work, have been given to the nurses in the department.

Laboratory.

The laboratory has rendered the most valuable service during the year and is in the hands of a specially trained non-leper worker. Apart from the bacteriological examinations performed as routine on all cases admitted, much diagnostic work has been done. Numerous clinical laboratory procedures, including blood counts, blood examinations and examinations of faeces, urine, and pathological fluids have been carried out and have made for more efficient work.

Religious and Social Work.

The Methodist Missionary Society is responsible for the religious and social work in the Colony, and an annual grant is received from the Society towards that work. This is largely used to maintain the school, to supply occasional gifts to the most needy people, and to give everyone a present at Christmas time. Numbers of gifts and contributions have been received from private donors in England.

The discipline of the Colony has been excellent. It is worthy of note that there are at least 300 villages represented among the patients, yet in the Colony the people live in a

surprising degree of harmony, and the good spirit which prevails is largely due to the influence of the Church the organisation of which is in the hands of a Council chosen by the people themselves.

School.

There are now 170 children in the Colony, and all attend school. Some reorganisation has taken place during the year, and the educational facilities now include an infants' department and a primary school with teaching up to Standard III. There are eight school teachers, some of whom have had teaching experience before coming to the Colony. Exercise in the open air occupies an important place in the school curriculum. The present school building is now inadequate and work has commenced on the erection of a new and permanent building.

Maintenance of Law.

Cases of misdemeanour are tried by a Court consisting of the Chief assisted by a Council of headmen and a head woman. Everyone has the right of appeal to a special Court conducted by the Medical Officer but this jurisdiction is seldom necessary.

Social Work.

There have been various activities of a social nature during the year. Occasional concerts and entertainments have been given. Quarterly competitions in house and garden decoration have given the towns a neat attractive appearance. Special celebrations were held at Christmas time. These included a concert given by the school children, a very popular series of competitions in carving, weaving, clay modelling, Uri drawing and hair dressing; a distribution of gifts to everyone on Christmas Day, and a great sports day on December 26th.

Miscellaneous.

Visit of Dr. E. Muir. Early in the year the Colony was visited by Dr. E. Muir, Medical Secretary of the British Empire Leprosy Relief Association, and the valuable suggestions made by Dr. Muir have resulted in permanent benefit.

Acknowledgement. I wish to express my gratitude to the Nigerian Branch of B.E.L.R.A. for a valued gift of £50.

Comments and Future Policy.

The number of patients in the Colony is now such that the maximum population which the farmland will support

is being approached. For this reason and also from the point of view of personal attention to the patients, I do not propose to admit more than another 50-100 patients. Admissions are being strictly limited to two types of case (a) early neural cases in whom there is a likelihood of a cure, and (b) infectious nodular cases who must be segregated in the interests of public health.

The Uzuakoli Colony is situated in an area where the incidence of leprosy in all probability reaches its maximum in Nigeria. There are without doubt many thousands of lepers within a comparatively small radius, and it is quite impossible therefore for the Colony, regarded as a segregation centre, to touch more than the fringe of the problem. Even if admissions were confined to infectious cases, there would be accommodation for comparatively few. The idea of the Clan Colonies formulated in Dr. Muir's report affords the only solution to the problem of segregation and represents an urgent need.

In some parts of the Province it may be possible to develop Clan Colonies on a comprehensive basis, but the immensity of the problem in the Northern Districts of the Province is such that the cost of building model Colonies would appear to be prohibitive. The actual segregation of people with leprosy would present but few difficulties, but where treatment is concerned, I consider that the suggestion of Dr. Brown is of great practical value. He suggested that special leprosy dispensaries should be built in positions where each would be accessible to a group of leper villages. The actual supervision of the villages themselves would be in the hands of the Public Health Authorities, but the dispensaries would each be in the care of a non-leper worker trained at Uzuakoli. His work would include :—

(a) supervising treatment, the actual injections being given by lepers trained at the Provincial Colony and resident in one or other of the villages associated with the dispensary concerned.

(b) following up cases discharged from the Provincial Colony and resident in his area.

(c) reporting to the Medical Officer at the Provincial Colony cases suitable for treatment there.

With the development of this greater degree of leprosy control work, the Provincial Colony by specialising in certain ways would occupy the key position and render public service of the utmost value.

(1) As adequate means of segregating infectious cases arise, the Provincial Colony should concentrate more and

more on curative treatment, for which the detailed treatment control and the organisation providing for outdoor activity make it admirably suited.

(2) It should be a centre for research work.

(3) It should be a centre for training workers, both leper and non-leper.

With regard to (3), a start has already been made. A doctor commencing leprosy work in the Northern Provinces has spent two months at the Colony during the year. The number of leper nurses in training has increased and I am proposing to create a body of uninfectious patients who are conversant with the technique of treatment. One District Officer has sent a patient for special training, and he is now apprenticed to the head nurse. Classes are being given to the more educated members of the community in order to fit them to render service in the Clan Colonies. Laboratory facilities are being extended, and in these ways the Colony is preparing to play its part in the more intensive fight against leprosy which is imminent in Nigeria.

Notes on Babies in Leper Colonies.

L. M. RUSSELL.

[Mrs. Russell has kindly furnished the following notes on a crèche for babies separated at birth from their leper mothers. This crèche was begun by Mrs. Brown, wife of the late superintendent of the Uzuakoli Leper Settlement. The results have been very successful, and the notes by Mrs. Russell, who is now in charge, will be found useful by those who purpose forming similar crèches.]

The house at Uzuakoli is in most respects ideal. It is built of cement, about 60 by 20 ft. and about 9 ft. high. A veranda about 6 ft. wide runs the whole length of the front. There are two doors in front and one behind, and windows, 9 in all, except at one end. These are provided with excellent lattice shutters which keep out rain and wind but allow plentiful ventilation. In front is a garden, partly grass and partly sand. The addition of 8 or 10 ft. of cement to the ground immediately in front of the veranda would be a great convenience, as will the shade from two orange trees planted at the outer corners of the garden. Behind the house are a mud-built kitchen with store-room adjoining, the latter containing a food-safe.

I regard as an important, indeed necessary, addition to any quarters for babies an isolation-room large enough to accommodate, say, three cots placed not too close together.

Its windows and its broad veranda must be completely protected by wire gauze to prevent flies and mosquitoes from gaining an entrance. There should be double doors, with a space of about 4 ft. between the two, and when the room is in use, the table occupying this space will have upon it a basin of disinfectant with a towel hanging beside it. The room must contain a cupboard with complete separate equipment—blankets, hot water bottles, plates, mugs, bowl for washing-up, etc.

The ward at Uzuakoli contains 14 cots. 3½ft. is sufficient length for a cot—3 ft. for some. The mosquito-nets should be long enough to reach the ground with two or three inches to spare, for a net cannot be tucked in as under a mattress. It is best to make the cots of very smooth, hard wood as this will better resist the onslaught of bugs. A bed, preferably an iron one, must be provided for the night-nurse.

As at Uzuakoli, there must be a roomy cupboard to hold spare blankets, clothing for cold weather, medicines, etc. etc.

Each cot has an under-blanket, a macintosh sheet and a blanket. Every baby past the bottle stage has a separate mug and a separate plate. This is very important, as it is not only hygienic but inculcates good manners and prevents the older infants from bolting their food and fighting over it, as is the case when a plate is shared.

The babies are weighed every week at the same hour and the results recorded in a book.

Small infants are fed every three hours, last feed 10 p.m. and first 6 a.m.

The meals for the one and two-year-olds are as follows:

6 a.m., 9 a.m., 3 p.m. and 6 p.m., 6 oz. milk.

7 a.m., usually a kind of porridge called Agedi made of maize flour, or rice and milk, E.G.

8 a.m., orange-juice. Usually about five oranges for 13 or 14 children.

11.30 a.m. Dinner of yam, or "foo-foo", or rice, with soup made of vegetables and meat or fish, palm-oil and Marmite. About twice a week very lightly-boiled eggs are stirred into the prepared food (usually rice) about ½ egg for each child. This meal is followed by banana or paw-paw (mashed for the smallest children) or by 6 oz. milk.

4.30 p.m. As at 11.30, without the fruit.

Clothes are worn only on cold mornings and soon taken off as the day grows warmer. Little knitted vests are the most useful, but should be knitted of unshrinkable wool. In fine weather the children must be out in the sun between 7 and 11 a.m. and about 3 to bedtime at 5.30.

Doctor's inspection once a week after the weighing.

Bath morning and evening. Hands and faces washed before and after every meal.

It is important that there should be sufficient "jerries" of a small size to accommodate practically all children simultaneously. These should be ordered from England as small sizes are unobtainable in Nigeria.

All the cement flooring is washed with disinfectant daily, beds are washed all over as required, but at least once a week, also with disinfectant, and in fine weather they are all placed in the sun for some hours every day.

The staff of five nurses is assisted by two labourers who fetch wood and water, wash floors, and cots and blankets, etc.

Unexpected visits should be paid to the babies at all hours of the day and night. It is well to make sure by personal supervision that every important instruction is really carried out. If a nurse for example has been in the habit of using one tin of milk to make a feed for 8 children, if two more children are added, she will probably only take more water. Every detail of the children's lives must be constantly watched.

REPORTS

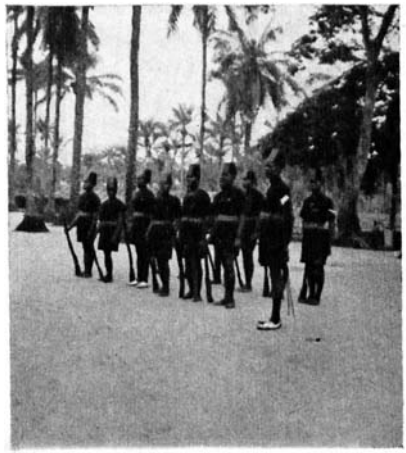
Fiwila Village of Mercy.* J.T.M.

There is a very flourishing settlement for lepers at Fiwila, Northern Rhodesia, in the primitive, out-of-the-way, Lala country. The Universities' Mission feeds, clothes, and houses at the moment thirty lepers; the nurse in charge, however, is not supported by the Mission, nor does the drug fund supply the treatments necessary for leprosy.

The Fiwila Settlement has been laid out, as far as possible, in a native manner. The houses are of the local pattern, round bee-hive shape, but instead of being of poles and mud which harbours every kind of insect pest, they are of brick, carefully plastered inside and out. The houses are built in lines as in the better Lala villages, whilst there are special open-sided huts in which the women grind their flour and the men follow simple native crafts.

The majority of the lepers are in very bad health and

* Abstracted from *Central Africa*.

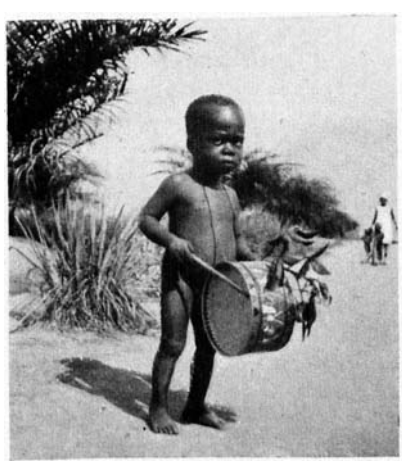


Leper Police Force

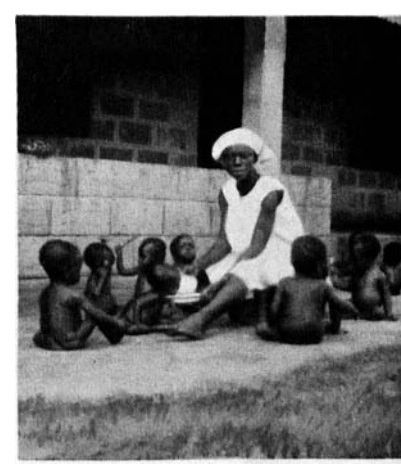
Evening Recreation

The Scout Orchestra

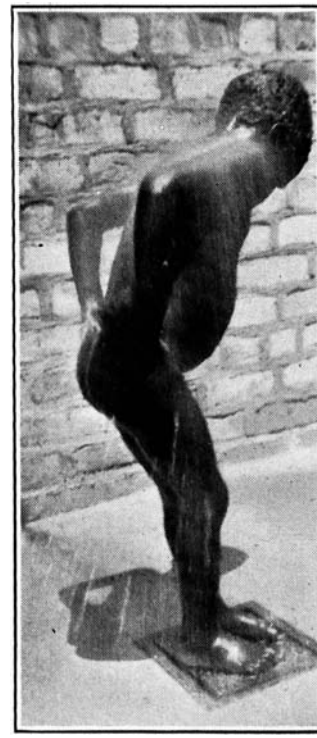
Preparing Palm Thatch



The Drummer Boy



The Crèche



A Shower Bath.

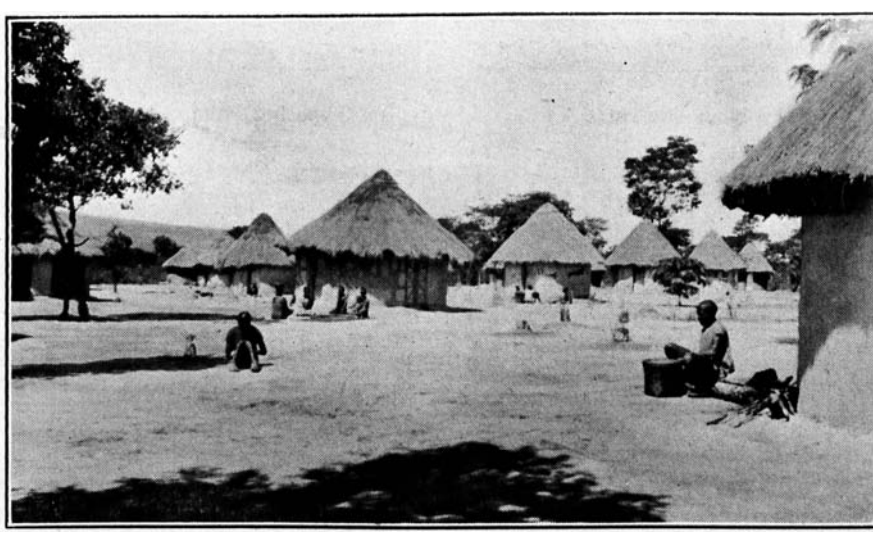


Photo by V. Davies

The Village.

cannot be expected to do really hard work such as the production of their own food, there is therefore a very difficult problem to face in trying to keep them occupied, for above all else leprosy produces a very depressed outlook in the sufferer, and the idle leper tends to become an extremely unpleasant person, a grumbler, a self-pitier and a flouter of authority. Apart from the growing of grain every possible occupation is encouraged, and in order that their outlook may be as normal as may be, all those who are in a suitable state of health are expected to marry. During the last year five kinds of fruit including a very large number of paw-paw trees have been planted and a large quantity of green-food including beans and potatoes has been grown by the people themselves.

The Lala people are in their degree great craftsmen and so every effort has been made to persuade the patients to manufacture everything which they can for their own use. In the last few months every household has made a wooden mortar for stamping maize, three drums have been made from logs for the very frequent moonlight dances, reed sleeping mats have been made in great quantities, and every woman with fingers has tried, and in most cases succeeded, in making all the pots she needs; besides this all the iron work required in the village, needles for mat making, razors, knives for paring swamp-root, and even axes; also stools and other wooden furniture have been carved.

Just before the rains a grant from the British Empire Leprosy Relief Association made it possible to build a brick dispensary; although this had to be built entirely with local labour it is hoped it may be a permanent building as only the best materials were used. Whilst this rather ugly building was being put up on the edge of the village the opportunity was taken of laying water pipes from a source some eight hundred yards away. Owing to the generosity of the Mission there are now taps for water, a washing place for clothes and a shower bath where every leper is expected to wash at least once a day.

In the last few months since the " Village of Mercy," as it is known to the Lala people, has been re-built, there has been a great interest shown by the Lala chiefs. In March it was visited by the Paramount Chief, who told us that he wished to send every leper in his country to Fiwila, but that he would do his best not to inconvenience us by sending more than ten new lepers in any one week! It is unlikely that his hopes will come to very much but we must look forward to a steady increase in numbers of patients.

Bunyonyi Leper Island, Uganda.

Important work among lepers on this Island was started by Dr. Leonard Sharp in 1930. The doctor secured the use of the Island at Bwama on Lake Bunyonyi from the Uganda Government for a settlement for lepers. Since that date annual grants for the upkeep of this work have been made by the Uganda Government, the B.E.L.R.A. and the Mission to Lepers. With these grants and personal gifts from friends at home in England, the work has been maintained. Dr. Sharp started with 25 lepers whom he brought from Kabale Hospital, the number has since increased to 600.

The system on which the work is run is as follows:— A leper is received on the island, and after a medical certificate has been made that he has leprosy, he is given a hut and a piece of land to cultivate; he is expected thus to support himself, but during the first four months he is given sufficient food money for his needs, until the crops he has sown come in. After this time his money is decreased, until he is able by his cultivation to be self-supporting. Every leper on the Island is given regular treatment and in a case of acute illness is taken into Hospital. This system has met with splendid success. Doctors from other leper institutions have been to Bwama and have gone away to put the system into practice elsewhere. Perhaps the most striking comment on this work is the fact that the lepers are prepared to remain at Bwama, and no force of any kind is required to keep them there. To those who work among lepers or have knowledge of the work elsewhere this is a most striking statement. I should here report that the number has reached 600, and we certainly have reached the maximum that it is possible to deal with at Bwama.

Perhaps there is no sounder way of securing discipline among Africans than their own time honoured system of chiefs and a council. The founders of this work have very wisely used this African custom of maintaining order on the Island, and there is a chief in charge who administers his government through a native council which meets twice a week. The European workers were quite clear that this system of local Government was very satisfactory.

All predisposing diseases are treated on admission, the chief in this District being hookworm, malaria, tuberculosis, yaws and constipation. We try and give a properly balanced diet, with meat as frequently as possible. There are regular graduated exercises for both adults and children with physical drill and football. Every leper who is not an N-3

case is encouraged to cultivate sufficient for his own needs, and we supplement where necessary. Other occupational therapy is encouraged in many ways, building, agricultural, fetching water and wood, rowing the helpless lepers. Wages are given to those who are so employed.

At the beginning of 1935 we had 210 suffering from leprotic and trophic ulcers. There are now only 91. The most successful treatment has been found to be cleaning up with hot permanganate solution and well dusting with 1 : 3 boriodoform powder. For trophic ulcers (perforating), packing the sinus with eucalyptus oil and iodoform has been found most helpful.

There is a good school for the leper children who number 162; their ages range from 4 to 16 years. As there is no compulsory segregation and we wish to delay marriage until as late as possible (as sexual activity saps vitality and we wish to prevent childbirth), we are endeavouring to keep them in the school until 17 and even 18.

Unfortunately there are also 39 children under 4 years of age infected. In one case with a leprous mother and non-leprous father the child was showing a definite N-1 patch at 4 months of age. Treatment with alepol was kept up regularly, but the patch has gradually increased and another C-1 patch developed. Another child was diagnosed at nine months. Father N-3 Mother C-3 N-3. Regular treatment has been given for five years, but the child still shows increasing symptoms. Yet another child of the same family, under treatment for 2 years, is now symptom-free at 4 years of age. In 1934 a crèche was opened for untainted children and 15, all over 3 years of age, were placed there. This was needed because of the hostility of the parents and the fact that we were unable to use compulsion. Within a few months every child showed either N-1 or C-1 patches and had to be removed. In May 1936 another attempt was made. Owing to our gradually having won the trust and appreciation of the parents we were able with a little persuasion to take in 26 children about 2 years of age. Gradually others as they reach 21 months are being taken in, and now we have 33. Last month they were all very carefully examined and there was not a trace of leprosy on any one of them. We are hoping gradually to admit them younger, but have to proceed step by step. There is a very optimistic outlook at present, not one so far shows symptoms. The parents are allowed to see their children once a day, but not to touch them.

The crèche is in charge of a nurse trained at one of our

Mission Hospitals and three other younger girls who we are training. There is a large ward for the boys and one for the girls and a nurse sleeps in each ward at night. As their general condition was very poor they have been having cod liver oil and malt night and morning, meat, fresh vegetables and native porridge. A great improvement can be seen in the sturdiness of the limbs and in every way. Each child is examined every morning and evening when bathed for suspicious patches, and reported immediately for further examination if anything is seen. At first we had a great deal of fuss and argument with the parents, but this is gradually dying down and their confidence in the scheme is being won. The hospital accommodates 54 patients, chiefly those who need constant care and attention and those who for any special reason should not walk about. The orderlies who attend to the dressings are themselves all lepers who have been trained to do this work and also to give injections under my supervision.

The staff consists of a Mission doctor who visits once a week; two trained nurses, one who acts as Lady Superintendent and has also had experience in the Southern Sudan in leper work; a European Lady worker who takes charge of the school.

Owing to the lack of funds when the Colony was first started the huts were built of grass like the ordinary native huts. This has been found both unhygenic and unpractical because they have to be renewed every second year. With the financial help of the B.E.L.R.A. we have rebuilt some of the huts with brick and thatch, so that they will be in a measure permanent. Last year the Governor of Uganda, Sir Phillip Mitchell, and the Director of Medical Services brought forward a scheme to supply a certain sum of money each year to help us to replace all the old huts on the Island with new ones of burnt brick and corrugated iron roofs. These will not harbour rats or other creatures that may be a source of infection. Within 5 years we hope to rebuild all the huts.

I consider that one of the chief reasons for the increase of the work on Bunyonyi is the propaganda in the villages among the chiefs and other intelligent natives which brings about a more effective knowledge of the disease and the danger of contagion.

Our plan has been to make the Island as like an African village as possible without its drawbacks. We have a Chief who is assisted by a number of lepers who meet regularly and settle all disputes and cases of discipline and bring

before the other lepers any new rule that it is thought necessary to make for the good of the community in general.

Garkida Leper Colony, N. Nigeria. Report for 1936.

This Colony has about 600 patients. The following are interesting items of news:—

"Mothers with babies have been sent home until the babies were large enough to live on native food. This is not a satisfactory way of caring for them but we feel it better not to allow them to live in the colony under such highly infectious conditions since children are so susceptible to leprosy. We expect a nurse soon who will help care for the babies in a nursery.

"During the past year we have decentralized our colony by building three new villages within a radius of one-half mile. These have been located in the best farming areas and have proven to be superior to one large central settlement. Since the patients were nearer their farms the area under cultivation was doubled during this last rainy season. Each village has its own chapel and dispensary with its own officials for government and sanitation. The dispenser and church leaders are resident in the village in which they work. This system develops a community spirit which they did not have when all tribes were centralized in one large village.

"We have tried to improve our system of segregation. A canteen has been supplied so that there is no necessity for patients going outside the colony to buy supplies. A supervised market has been established in which the lepers can buy food and native products, but nothing is allowed to be taken out again. Any article not purchased by the lepers is bought by the canteen at market prices. No lepers from the colony are allowed in other markets.

"A new community building is under construction that is to be used for general assemblies, injections and the native court. It is our aim to furnish community entertainment for the social uplift of the colony in this building."

Beautiful Isle of Lost Hope.* KEITH CAIRNS.

Nature made Peel Island one of the most beautiful of the many beautiful islands in Moreton Bay, but the dread scourge of leprosy has made it Australia's most pitiable isle, an island peopled by exiles for whom life is made livable only because they cherish dreams of cure and freedom.

Here in a paradise of trees, flowers, and birds, such as exists only in tropical Queensland, are 68 lepers, whites and aborigines, for whom even the best is not good enough, but whose tragedy is that for the majority—though happily, they do not know it—their dreams of cure are founded on false fantasies of hope. Only a small percentage will ever see their dreams materialise.

Twenty-three miles from Brisbane by train and five miles

* Abstracted from the *Adelaide Mail*.

across the glistening millpond which is Moreton Bay, is Peel Island, whose richly verdured slopes cloak from the eyes of passers its unfortunate population.

Here, in single huts, were 43 aborigines and 25 whites of both sexes and all ages, infected with the dreaded disease of leprosy, but a disease which, without doubt, is the subject of a more popular misunderstanding than any other, whose incidence is among the lowest of all diseases.

Today, if the disease is discovered in its primary, non-infectious stage, complete cure is practically assured. Several of these patients are in that stage, and will probably be discharged during the next 12 months. Many of the others, principally the coloured patients, whose standard of living aggravated their condition, are incurable.

Although it is that nauseating oil of China's chaulmoogra tree that is the commonly known therapeutic, also an integral part of the Peel Island's cure is psychology, exemplified in the superintendent's statement that " nothing is too good for the leper."

One of the most forcible ways of engendering a realisation of the practical effect of this attitude is to survey the inmates' daily menus. The day begins with cereals, eggs, and meat, and fruit. Dinner, we enjoyed precisely the same fare as the patients—was a roast joint, three varieties of vegetables, and two of sweets, and for tea cold meats and salads, and, of course, bread, butter, jam, and tea or coffee with each meal. That is merely the weekday meal. On Sunday the formidable dinner consists of the choice of soup, roast pork or other joint, and four varities of sweets.

Not only do they enjoy the best cuisine that three very efficient cooks are able to provide, but ample supplies of tobacco and other little luxuries are always available, while the annual allowance for the white women is £18, for the men £16, and for the aborigines £12.

During a conversation with a coloured inmate who was sitting cross-legged on his bed playing Hawaiian records on a portable gramophone, I discerned traces of the white patients' influence in his well-memorised philosophy.

I had inquired whether he would not have preferred to break the monotony of the days by working about the settlement. Rubbing his broad, flat nose with an oily hand and grinning broadly, he replied, " No fear boss; 'm soona stop here. Gov'ment put'm here, Gov'ment look after'm."

The Superintendent explained that this was the attitude of the majority of the white section, who preferred to play tennis, cricket, football, or billiards, or swim or fish, and who,

if approached to do a job, spontaneously demanded, " What's it worth?" Believing themselves to have been wrongfully isolated by the Government, they considered it logical to do nothing towards reducing the cost of their upkeep. All Peel Island's patients, even the coloured section, are strenuously " agin the Government."

The futility of speaking to these people in platitudinous terms of their idyllic surroundings, of their amazing food, and of the surety of their recovery was quickly apparent.

The white men and women—the aborigines were either too shy or apathetic—were pitifully eager for news from the mainland, clearly visible yet only a mirage.

They plied me with questions—questions whose answers, coming from one from the mainland, had a greater ring of reality than did the " tinned " news received on their crystal sets. Besides, a visitor to their settlement was not an every-day event, for their own friends are allowed to visit them only once a month, and then not at the settlement, but at the landing 2½ miles away.

But one very old man there did not seek information. With almost brutal simplicity he told his poignant story, a story that explained his aged appearance, for he was not yet 70. This is the story as he told it :—

" Several years ago my boy was sent down here. His mother was dead, and when I retired from the public service I came down to be with him, to read to him, and wait on him. He is all I have now. But he is very ill and I am very old. We continually disagree. Neither of us can help it. We have agreed that it would be better for me to go away. I don't know where I will go, but because he wants it I am going."

The old man left the island the day after my visit. His son will never leave.

REVIEWS.

International Journal of Leprosy, Vol. V, No. 2, April-June, 1937.

The first article by M. L. R. Montel and J. Bablet describes *Tuberculoid Leprosy in Cochin China.* Three questions are asked and discussed :—Is " tuberculoid leprosy " a special form of leprosy? Is it of the nerve or

cutaneous type? Is it a transition between these two types? After an excellent and picturesque description of the appearances of tuberculoid lesions he sums up as follows: " The histological appearance of the leprides called tuberculoid is not that of an evolving lesion but of one in a state of equilibrium, perhaps provisional, between aggression and defence. It seems that the bacillary multiplication becomes arrested by tissue reaction, by a defensive organisation particularly effective where the nodules with giant cells play the rôle of centres of resistance." He mentions that occasionally he has found typical tuberculoid lesions transforming themselves into lepromatous lesions of the cutaneous type. He describes and illustrates with excellent photographs a case of the advanced cutaneous leprosy which after treatment with methylene blue developed tuberculoid nodules in the hands, the two types of lesions being present at the same time, cutaneous leprosy in the face and especially the ear lobes, and tuberculoid leprosy in the extremities. [This offers additional evidence: (a) that as the process of healing of advanced cutaneous leprosy takes place (whether spontaneously or as the result of treatment) the disease in the extremities takes on the neural type; (b) that the neural type is possibly always of " tuberculoid " nature.]

J. L. Maxwell gives *A Statistical Review of 1,379 cases of Leprosy in China,* information having been obtained through a questionaire. There were 1,091 males to 288 females; he remarks: " It is certain that this is not the true state among the lepers of China. Because of the greater provision in this country for the medical treatment of men than for women, and the general rule that men come for treatment for most diseases in larger proportion than do women, the relative proportion of males is greatly exaggerated. In clinics where the provision for the treatment of women is the same as that for men the difference is much less striking." Under " occupation," 88 per cent. were among farmers, labourers, herdsmen, hawkers, fisherman and sailors. The age at which the disease was most frequently first noticed was between 15 and 19 (20 per cent.). Thirty five per cent. showed their first signs in the buttock and lower extremity. Regarding classification Dr. Maxwell truly remarks: " Our own experience is that even those with expert knowledge will often differ with regard to the subtype to which a case should be assigned, and that classification by a single observer will itself vary with his increasing ability in securing positive bacteriological examination."

G. A. Emerson in a paper dealing with this subject shows that " Comparison of toxicity curves indicates that chaulmoogra oil given orally is appreciably more toxic when preceded by parenteral injection of dehydrocholic acid, presumably through promotion of intestinal absorption."

A. J. Salle and J. R. Moser write on *Influence of environment on the Phenomenon of Acid-fastness.* In a previous paper it was considered that human and rat leprosy are caused by the same organism, as acid-fast rods morphologically and physiologically identical had been grown from human and rat leprous lesion. " However, it is doubtful if the true leprosy bacillus has been cultivated, because it appears that no two workers have isolated the same organism in culture." Regarding the subject of the present paper it is concluded regarding four strains of diphtheroids, " that for the production of acid-fast forms from these organisms two factors are essential: (a) The medium must be of such composition as to foster the growth of the organisms to the stage at which they are capable of becoming acid-fast. (b) Cholesterol or some other substance must be supplied in the medium when this stage is reached."

Leprosy in India, Vol. IX., No. 1. Jan. 1937

In the Editorial Dr. Lowe states : " I have recently visited various parts of India and seen many different institutions and clinics. Though the visits were made with other ends in view, I took the opportunity of investigating in a cursory way the clinical manifestations of leprosy as seen in various parts of India. My own previous general impressions, and also the findings of Wade, were confirmed. There seems to be no doubt whatever that Calcutta is peculiar in producing so many cases of tuberculoid leprosy and also such marked forms of it. This, however, is only one side of the picture. The other side shows that in other parts of India tuberculoid leprosy, while not nearly so common as in Calcutta, is still of not infrequent occurrence, patients with such lesions forming in many places 10% to 25% of the patients attending a clinic, and that the true nature of the condition is often not realised by the doctor in charge, cases being classified as 'C' cases because of the thickening and erythema of the skin. On one occasion a doctor said ' Yes. we see "tuberculoid" macules but we don't find the thick cutaneous nerves and nerve abscess which you write about in Calcutta.' However, when we came to examine his cases, we did find thickening of the cutaneous nerves supplying the macules, and also one case of nerve abscess. The cases had not been properly examined. I had other similar experiences."

Wade describing the result of his visit to India remarks on the comparative frequency of the tuberculoid type of leprosy in North India and especially at the Calcutta clinic. He also writes of the diffuse type of leprosy as found in India :

" However, there is another phase of leprosy in that country that is striking to an outsider, and in discussing the peculiarities of the disease there it should be mentioned. This refers to that form of the cutaneous type of the disease in which bacilli can be obtained from almost any part of the body surface, though there may be no definite infiltration to lead one to suspect their presence. To one accustomed to working with lighter-skinned people in whom one expects to find at least definite erythema if not frank infiltration in areas from which bacilli can be found, it is somewhat bewildering to be shown many cases that have widespread leprotic involvement but little or no suggestion of infiltration of much of the involved surfaces (especially of the trunk) only a peculiar indefinite mottling, perhaps due to slight erythema under the pigment but not definitely pathognomonic, and at most a slight shininess. Muir ascribes this to (a) a lack of general resistance to the infection that permits the bacillus to multiply generally throughout the skin, and (b) to lack of local response to its presence that results in failure to produce infiltrations and nodules. Apparently no detailed comparative study has yet been made of the pathology of these cases and of the more ordinary ones, but material has been collected for such a study."

Wade stresses the importance of transfer of workers, quoting from the Leonard Wood Memorial Conference Report:

" It not infrequently happens that the results obtained by a worker or a group of workers in one country are not confirmed by those working in other countries. Whether this is due to peculiarities of conditions prevailing, or to the personal equation, or to other factors, it is usually not apparent. Progress toward the clarification of questions of regional differences could undoubtedly be accelerated were it possible for persons who have carried out studies in one region to be transferred to another in order to continue or repeat such studies there or to undertake correlative investigations. It is deemed desirable to bring the possibilities of such a plan to the notice of institutions and organisations concerned with the study of leprosy."

H. H. Gass writing on *A Neural case* says:

" I do not think it wise to remove parts of phalanges or metatarsals or metacarpals. Very seldom have we gotten healing following such a procedure. Even though merely the head of a metatarsal seems to be involved, I prefer to disarticulate the entire bone. Results have borne out the advisability of this. In the beginning of my experience I was prone to be too conservative, and removed only those parts which seemed, upon close inspection, to be involved."

Leprosy in India, Vol. IX., No. 2. April, 1937.

An article appears by H. W. Wade and J. Lowe on *Type-Distribution of patients at the Purulia Leper Colony.* The last two paragraphs are of particular interest and may be quoted in full:

" In both Purulia and Calcutta among the cases recorded as cutaneous, an outstanding feature was the common occurrence of the 'diffuse' form (26 out of 74 cases in Purulia). In several instances it would have been very difficult to say from superficial observation

that there was anything wrong with the patients. Many of these cases showed the typical persistence of the diffuse condition of the trunk after fairly conspicuous infiltrations and even nodules had appeared elsewhere. It would be of interest to obtain data on prognosis on these cases as compared with those with lesions of more limited distribution, in which the lepromatous process is more active and produces evident infiltration more promptly.

Another interesting group among the cutaneous cases there are those which may be called 'secondary cutaneous', i.e., those in which there was evidence of neural-type lesions (macules) precedent to the development of the cutaneous form of the infection. The number was not large (12 in Purulia and 5 in Calcutta), but it was enough to suggest that among such cases the cutaneous-type skin affection often does not become widely distributed, or diffuse. This leads to the question whether, in cases becoming cutaneous by conversion from a well-established neural-type phase, the prognosis is better than in those that either become cutaneous after an indefinite 'incipient' stage, or else are frankly cutaneous from the outset."

There is an interesting article on *Tests of the Suitability of Hydnocarpus Oil for Injection,* which we hope to reprint in this Journal at a later date.

I. Santra writes on *Leprosy in the Eastern States Agency.* Frequently it was found that yaws and leprosy had been confused.

Leprosy, a practical text-book for use in China by J. L. Maxwell.

This is a practical text-book of some 100 pages and many well-produced illustrations. While written with special reference to China it will be found useful by anti-leprosy workers throughout the world. Regarding the distribution of the disease Dr. Maxwell says:

"Writers of works on leprosy have a way of suggesting that climatic factors are of considerable importance in the prevalence of the disease and that low lying, damp, tropical, areas are particularly the places where leprosy is to be found. The distribution outlined above is sufficient evidence that any statements of this nature are to be looked on with great suspicion. There is no single climatic factor that is common to the areas where leprosy is of high incidence in China. The disease is very prevalent in the low, hot, tropical, steamy delta of the Canton rivers. It is equally prevalent in the highlands of tropical Yunnan and in the dry sandy northern plains of Shantung. It is common in the low, hot, coastal regions of Canton and Shantung and in the cold, high mountainous areas of western Szechwan and Eastern Tibet. Indeed we can point to a valley in the former province among the eternal snow clad mountains of the 'Roof of the World' known among the inhabitants as 'the leper valley'. Leprosy is common in the southern alluvial plains and in the north-western loess steppes. It seems quite hopeless to associate the disease with any climatic factors.

Dietetic factors (see Chapter IX) may possibly be of more importance but, interesting though certain suggestions are along this line, the knowledge we have of the vitamin and caloric values of the diets of the people is too scanty to allow of anything but quite unjustifiable

speculations. Rice as a principal article of diet has been suggested, in India, as a contributing factor and its extremely low protein content has been associated with this suggestion. In China, while the large bulk of the cases are found in the rice eating districts, the disease is also prevalent in areas where kao-liang (sorghum), millet and maize form the staple foods, these being of a somewhat higher though still low protein contents.

Speculation along these lines is little more at the moment than waste of time but the matter deserves further investigation and the possibility of an a-vitaminosis factor in the development of leprosy needs careful consideration. It is at least suggestive that leprosy is said to be on the increase in the province of Hupeh since the flood disaster and subsequent famines of 1931, and there are some suggestions that the disease has become more common in the Swatow region of Kwangtung following on the appalling typhoon destruction of 1922."

Regarding staff and management he says:

"The most successful leper settlement that we know has, apart from the visiting doctor, only one non-leper on the staff—the business manager. This is quite the ideal for the settlement that is to be run on economical and practical lines. Nurses and technicians can be chosen among the lepers themselves and trained. The cooks should be leper inmates best chosen by the patients themselves. All coolie work should be done by lepers. Carpenters, masons, tin-smiths and other craftsmen can usually be found among the inmates. All this takes time to establish and it may be necessary when the settlement is begun to employ outside help but this should be dispensed with at the earliest possible date. This is especially the difficulty of the small settlement but as the numbers grow it is practically always possible to find craftsmen and other workers among the inmates.

The one great problem of management is to secure the right man for general-superintendent. Such men are few and far between and the settlement is happy that can get the ideal man. His qualifications have to be rather numerous, the ability to handle men and keep them working, the knowledge of agriculture and how best to plan the available ground for vegetable crops, the power to keep every inmate at work and happy over his or her work, the genius for enforcing discipline without the use of force and keeping the whole place clean and tidy without constant nagging."

Lupus Vulgaris Treated by Intradermal Injection of Hydnocarpates by E. Wallace. B.M.J. June 5th, 1937, page 1151

Fifteen cases were treated by this method, first iodized moogrol and later phenyl-ethyl hydnocarpates being used. Of these 7 became quiescent, 2 quiescent except for a few active nodules, 3 much improved and 3 only slightly improved. The length of treatment varied from six months to three years. Subsequent infiltrations were only given when all reactive signs of previous injections had disappeared. "Progress has undoubtedly been more rapid than that made by artificial light treatment alone." The author states that, as the esters are absorbed very slowly from the skin and their effect on lupoid tissue is continued long after

the purely irritant reaction has passed off, he hesitates to regard the action entirely as a non-specific one.

We might suggest as a likely hypothesis that possibly the action of hydnocarpus preparations in lupus and in leprosy, may be to stimulate the tissue cells to active phagocytoses of the mycobacteria present in very small numbers in the lesions. If this is so then the disappearance of clinical signs would be dependent on the gradual resolution of the granuloma, which would begin only after the germs had been destroyed.

Damien the Leper by John V. Farrow (Burns Oates and Washbourne, Ltd.), with a foreword by Hugh Walpole.

Mr. Farrow's first interest in leprosy dates from a time when he was marooned on a beautiful island and found that he had unwittingly slept in a bed formerly occupied by a leper. A friend of this leper had been born in Molokai, Damien's leper island, and spoke with great reverence of Kamiano—the native name for Damien. Thereafter the writer made investigations at Hawaii and in Belgium, where Damien was born, and the interest thus aroused resulted in this book.

Damien, a young Catholic priest, offered, when his brother was prevented by an attack of typhus from going abroad, to take his place as a missionary to the South Seas. He volunteered for service in Molokai the leper island in Hawaii. There he lived among the lepers, tended them, fed with them and in the end acquired their disease. Gradually the disease advanced, but he stayed with his fellow sufferers till the end heroically ministering to their physical and spiritual needs as long as he had strength. Great and noble as was Damien's service to lepers during his life, he served their cause still more in death. In reply to an ignoble attack on the life and character of this devoted man, Robert Louis Stevenson wrote his famous open letter which roused the whole civilized world to do something to alleviate the sad lot of those suffering from this terrible plague. Stevenson's letter forms a land-mark in the history of leprosy from which date innumerable humanitarian efforts.

The old type of leper refuge was indeed a place of extreme horror and distress, very different from the modern leper settlement of the best type where the atmosphere of fatalistic despair has been replaced by one of hope and happy industry. But the transformation is largely due to those who, like Damien, have given their lives to the service of these poor people despised and spurned by their fellow creatures.

Correspondence

Dear Dr. Muir,

. . . . . I am contemplating committing the offence of closing my babies house. You may be surprised, and before doing so I shall appreciate your advice. The facts are these.

The babies house is extremely efficient in Mrs Russell's hands and I am really proud of it, so much so that I doubt whether it would be possible to manage a babies house more efficiently in Nigeria. With every economy it costs me however at least £150 a year, quite apart from any such consideration as an English sister in charge. Every year about three or four babies are sent out to relatives when they are about three years old. They leave the care and attention which they receive here, and which are vital to their existence in the absence of their mothers, and go to filthy villages where care is nil. Further the incidence of leprosy in the villages is surely 30 times as great as it is in India. Of 5 babies sent out during the last two years, two are known to have died. One child sent out before that has been readmitted with leprosy. These children cost me about £50 each, and for every one sent out I could admit into the colony 25 infectious cases of leprosy who are infecting numerous children in the villages. I feel that in the present state of the country I am now being kind to the few at the expense of the many. Surely it is more in the interests of leprosy to segregate 75 infectious lepers than to send out into their villages 3 children who are then exposed to infection and whose chance of survival is not very good. Later on, in say five or ten years time, when some degree of control exists, a babies house is surely indicated, but at present I doubt whether it represents a fair expenditure of money. Mrs. Russell quite agrees with me.

Of course, I should keep any children born to lepers in the colony in a village where only cases with negative bacteriological findings are living, and I shall create such a village in the colony. Further, non-infectious leper nurses will be trained to help. I shall be glad of your opinion. . . . . .

T. FRANK DAVEY,
Medical Superintendent.

Native Administration Leper Settlement,
Uzuakoli, S. Nigeria.

[This question is discussed in the Editorial—EDITOR.]

Correction.

The following is extracted from a letter received from Mr. W. B. Elliott:

"My attention has been drawn to an article written by you on Purulia for *Leprosy Review* (April, 1937). I note that in this you speak of 'the Home as supported by capitation grants from the Bihar Government and by grants from the Mission to Lepers'." . . . "The facts are that Purulia always has been, and still is, the property and entire financial responsibility of The Mission to Lepers—including the payment of personnel. Government Grants are, of course, received, but your article reads as though the Purulia Home was but one of the many 'aided' Institutions of the Mission!"

[We regret if a wrong impression has been given by the statement referred to above appearing on page 86 of the April, 1937 issue.—*Editor.*]

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