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Edited for the British Empire Leprosy Relief Association, 167 Victoria Street, London, S.W.1, by the Medical Secretary, to whom all communications should be sent. The Association does not accept responsibility for views expressed by the writers.

NOTES ON CONTRIBUTORS.

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EDITORIAL

INSECT TRANSMISSION OF LEPROSY

Dr. Moiser's paper on the transmission of leprosy infection by cockroaches suggests the implication of a new culprit. As far back as 1912 Leboeuf*, after reviewing previous records and carrying out numerous experi
insects studied the domestic fly is the insect most likely to convey the bacilli. It can absorb enormous quantities of Hansen's bacilli by feeding on leprous ulcers, and these can be recovered in large numbers from the excreta. He suggests that possibly the domestic fly plays an important part in conveying bacilli to the skin of others. "But in any case he does not believe it to be more than one mode of contagion rather than one of transmission in the proper sense. In fact everything in Caledonia [where his investigations were made] goes to prove that contagion is made directly from one patient to another, or to a limited extent by objects contaminated by the patient." Leboeuf's experiments also show that domestic flies cannot convey the disease to any great distance.

Regarding the 'oval bodies' mentioned in Dr. Moiser's paper, the editor has consulted Professor P. A. Buxton, F.R.S. who points out that a number of micro-organisms occur regularly in cockroaches and that, as these insects eat a great variety of types of food, they may be expected to swallow many types of bacteria. He feels that full consideration should be given to the possibility that some of the organisms are acid-fast; he also suggests that, as acid-fast bodies occur in a considerable proportion of Dr. Moiser's insects, it seems probable that they are normal inhabitants of these insects.

If, however, we discard the oval bodies the findings of acid-fast bacilli are of interest. It is well known by those who have worked in leprosaria in India and other places where cockroaches are common that they bite the anaesthetic limbs of sleeping patients without their being aware of it. It is doubtful, however, if the same could occur in non-lepers. While cockroaches may be the means of carrying bacilli, it is difficult to accept the contention that bacilli are regularly carried to long distances by them, or at least that this can to any great extent account for the fact that 60.9% of patients are infected without being able to give a history of previous contact with another case. It is generally found that the number of cases without contact history diminishes in direct

* *Lepra* **14**, 119.

proportion to the time spent in following them up to their former residences and enquiring into their past history. We are grateful, however, to Dr. Moiser for introducing this subject and hope that others will continue his investigations. It is important also that the new insecticides, such as D.D.T. should be used in controlling the insect pests which so often infest leprosy institutions.

PREVENTORIA

A SYMPOSIUM ON THE CARE OF THE CHILDREN OF LEPROUS PARENTS

Introduction by the Editor

It is generally accepted as a fact that children separated from leprous parents at birth and kept away from infection will not contract leprosy. Another accepted fact is that children are more susceptible to leprosy than adults.

From the prophylactic standpoint these two facts indicate how important it is that lepers, especially those with open lesions, should not have children, and if they do that the children should be removed at birth and kept away from infection. Also if isolation has not been carried out at birth it should take place as soon as possible, since continued superinfection may break down resistance which a slighter degree of infection would not have done.

To prevent the birth of children is a difficult matter. In the institutions of India and many other countries the sexes are segregated. In Korea and elsewhere sterilization of the male has been resorted to. In democratic countries this latter method must be voluntary and therefore of limited scope. Also in Roman Catholic countries it is forbidden by the tenets of the Church.

There are three possible ways of separating the child and infectious parent: to remove the patient leaving the child to be looked after by relatives or in an institution; to remove the child; to remove both patient and child, the former to a leprosarium and the latter to a preventorium. If the child can be looked after adequately at home it is better that it should stay there in its natural surroundings, to which restoration may be difficult once the links have been broken.

Preventoria are of two main kinds, the crèche in which the child is looked after till it is two or three years old, after which it is sent to relatives, and the dormitory in which children are kept till

they reach the years of usefulness, or even longer till they have learned some useful trade or other employment.

In India the latter type of preventorium is most common under the care of Missions. Due to the segregation of the sexes children are seldom born in these institutions, but patients often come with young children and admission of the adult implies care of the child. In a typical Indian institution ther
dren's quarters: for those with definite leprosy, for those under observation and with closed lesions, and for those children of leper parents who show no signs of the disease.

In Brazil, a comparatively wealthy country with a large but limited amount of leprosy and a fairly high standard of living, the provision of preventoria on an adequate scale is not so difficult. The stigma of leprosy often makes relatives refuse to take care of the children of lepers. In 1940 there were 13,500 interned lepers and it was hoped soon to have twice that number. There are 22 preventoria with over 2,500 children. The newest of these are on up-to-date lines with a nursery for infants, a dormitory for children from two to ten and dormitories for older boys and girls. There are schools and arrangements for vocational training. Buildings are separate and joined by covered porches where children can play on rainy days.

In Nige
plexing one. There is not as a rule too strong an objection by relatives to taking care of children, at least after the first two or three years of age period, but if they find willingness on the part of Mission or Government institutions to take their children they like to take advantage of it. It has been found in many cases that children who have been brought up on milk, patent foods and other delicacies in an institution are unable to stand the rougher village life later and tend to die off when returned to their relatives. Nigeria is a poor country and, though the Government is spending large sums of money on leprosy control, the support of healthy children of lepers in large numbers from birth to manhood would involve an expense heavier than the exchequer could stand. The most serious difficulty is where patients have been isolated by their clans in small communities outside the villages. This is in line with the policy adopted and makes it possible to carry out segregation on a much cheaper and therefore larger scale than if all have to be admitted to in
vision it is possible to keep these patients from mixing with the healthy villagers, but it is much more difficult to prevent small children from mixing with their leprous relatives.

The problem is lessened if isolation is applied only to open

cases. It has been suggested that children of open cases should, after weaning, be placed under the care of closed female cases; here however another danger arises, for it is difficult to keep children anywhere inside an institution without their coming in contact with open cases.

Apart from expense, the running of a preventorium, and especially of a crèche, requires very careful and sk
and it is not always easy to obtain the necessary staff.

The general principles for guidance are the following :—

(1) It is of paramount importance to keep children from contact with open cases from birth onwards.

(2) A determined effort should be made to lodge children with relatives either from birth or, failing that, from the end of infancy, the early period being spent in a well-run crèche. This is on the condition that the child is well looked after and kept from contact with infection.

(3) A crèche or preventorium badly run or insufficiently supervised is worse than none at all.

Copies of this introduction were sent to several leprosy workers asking for comments. The following contributions have been received. A previously published article by Dr. Lowe relevant to this subject is also added. *The editor will welcome further correspondence on this very important matter.*

Comments on the above by Dr. T. D. F. Money, Senior Leprosy Control Officer, Nigeria.

I should put the reason for closed cases not having children on the ground that pregnancy may exacerbate the disease. I incline to the view that closed cases are not dangerous even to infants at the breast.

It is, I think, important to stress not only the benefit to the child of being brought up in the family, provided this is in other ways satisfactory, but also the responsibility of relations in these matters. This is great and the tendency is strong in some places to thrust on the state, or voluntary bodies, not only the care of the leprous patient, but as many of the related problems as possible, and, I believe, this needs careful watching.

I think mention should be made of the difficulties of rearing children, especially in a hot climate, by artificial methods in th absence of nursing staff up to S.R.N. standards, steam sterilization laid on, etc. The danger of cross infection is high and the results disastrous. It is of interest to note that in the latest hospitals in England provision for infants takes the form of placing each

separately in what amounts virtually to a glass tube. In a word the artificial rearing of infants demands standards of skill and equipment which are not in sight except in advanced countries.

I agree with the point about the dangers on return of the artificially reared infant to its family in primitive conditions. Should infants in a "preventorium" be protected from material infection, or the risk be taken in allowing the possible development of an immunity against almost certain infection later?

An outstandng difficulty has been touched on in the use of the segregation village as a measure of prevention.

I favour prior concentration on the segregation of mothers who, having children, are open cases. I entirely agree with your summary of principles.

Further observations are :—

(*a*) In rearing unweaned infant in the absence of first-class facilities for artificial methods, wet-nursing calls for consideration, preferably by a relative, possibly by a closed case. In some places there is strong prejudice against wet-nursing as such. If wet-nursing is impracticable, placing the infant with a mother who is a closed case, to live with her may be considered. In this event the artificial food is issued to her either prepared, or unprepared, and a health visitor gives general supervision both in the home and through an infant welfare clinic.

(*b*) Weaned children who have not been placed with relations, but for whom care must be arranged, may be placed with mothers who are closed cases. These mothers may then live in a settlement in a special reserve from which open cases are excluded, or in an associated (for convenience of administration, staffing, etc.) institution.

(*c*) National sentiment enters into all these arrangements. No scheme will succeed in the face of maternal desire for the welfare of the child unless it inspires confidence in the woman who is being separated from her child.

(*d*) Where a mother with a child and who is a closed case, desires admission to a settlement, I favour her admission with the child, to live in a special reserve or institution associated with the settlement as referred to under (*b*) above.

As regards (a) (*b*) (*c*) and (*d*) above, I write out of my direct experience. I have found grave difficulties attaching to any arrangements for bringing up unweaned children apart from their mothers, not least of which is the dislike of a mother for her child being cared for by another. On the other hand, the policy of allowing closed cases to retain their children so far (over a period of 4 years) has appeared to justify itself.

By Dr. T. F. Davey, Medical Superintendent,
Leprosarium Uzuakoli, S.E. Nigeria.

It is generally agreed that leprosy is maintained in a community principally through those who have had intimate contact with sufferers from the disease. The children of patients are undoubtedl the most important agent in this respect, and the reduction to a minimum of infections derived from leprous parents must therefore be one of the main objectives of leprosy control.

In order to form some estimate of what this implies in the Owerri Province of Nigeria, an attempt has been made by working through patients attending leprosy clinics to discover the actual numbers of children involved. Particulars have been obtained of no less than 3,031 uninfected children of leprous parents, and these are analysed in the following tables.

TABLE I. Numbers of Uninfected Children by Age Groups.

	AGE GROUPS OF CHILDREN.								
Age	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	Total
Living with patient	404	457	358	327	244	117	44	34	1,985
Living away from patient	62	168	200	171	206	140	65	34	1,046
Total ...	466	625	558	498	450	257	109	68	3,031

TABLE II. Same Children in different age groups, according to type of leprosy from which parent is suffering.

	AGE GROUPS OF CHILDREN.								
Type of leprosy parent.	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	Total
Active Leproma.	21	41	42	46	42	26	17	11	**246**
Early Leproma.	81	98	95	73	86	47	22	14	**516**
Simple Neural	124	167	164	116	132	67	33	13	816
Tuberculoid	229	305	249	250	177	111	35	30	1,386
Unstated ...	11	14	8	13	13	6	2	—	67
Total ...	466	625	558	498	450	257	109	68	3,031

Table II. gives the complete picture. A more accurate estimate of the immediate problem is provided by Table III. which limits the analysis to cases where the child is now living with the leprous parent.

TABLE III. Children actually living with infected parent, analysed as in Table II.

	AGE GROUPS OF CHILDREN.								
Type of leprosy of parent	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	Total
Active Leproma.	20	27	18	22	17	11	8	5	**128**
Early Leproma.	65	56	48	30	37	18	4	3	**261**
Simple Neural	107	124	110	93	80	44	15	3	576
Tuberculoid	201	240	178	173	104	41	17	23	977
Unstated ...	11	10	4	9	6	3	—	—	**43**
Totals ...	404	457	358	327	244	117	44	34	1,985

The first two horizontal columns of Table III. contain the most significant figures, and in Table IV. an analysis is given of the 389 children concerned, indicating the sex of the infected parent in each case.

TABLE IV. Sex of infectious parents (Lepromatous cases).

	AGE GROUPS OF CHILDREN LIVING WITH PARENT.								
Infected parent	0-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	Total
Mother ...	46	51	31	33	25	13	4	5	208
Father ...	39	32	35	19	29	16	8	3	181
Totals ...	85	83	66	52	54	29	12	8	389

These figures indicate a formidable public health problem. It is estimated that the numbers of patients attending leprosy Clinics (14,071 when the enquiry was initiated) represent approximately one-fifth of the total number of people infected with leprosy in the Province, and therefore in order to obtain a realistic estimate of the magnitude of the problem, it is necessary to multiply the above figures by five. There are probably 15,000 uninfected children of leprous parents at the present time in the Province.

The leprosy control programme being undertaken consists in treating the problem clan by clan, its essence being the voluntary segregation of all open cases in model villages in each clan locality. Free treatment is provided locally at the leprosy clinic for all patients, and none but members of that particular clan may attend the clinic or live in the village. A survey of the clan by Central Staff and preventive workers known as Leprosy Inspectors leads to leprosy control, and this is followed up by propaganda, repeated surveys, and the observation of contacts. Welfare workers who care for the wellbeing of segregated patients and investigate their family problems now play an important part in the programme, and between the Leprosy Inspector and the Welfare Officer all cases of uninfected children can be investigated.

In the light of the above statistics, the need for vigorous preventive work among uninfected children is apparent. Some form of institution both for infants and older children is inevitable, and the following considerations arise.

1. Preventive work among uninfected children must be on a large scale. A crèche caring for 20 children or so is quite unrelated to the actual need.

2. This immediately introduces the problem of finance. Cow's milk is unobtainable. Powdered and tinned milks are costly.

3. The large staff required also represents a serious problem. In Nigeria, the upbringing of young children away from their mothers calls for devotion and skill if a high mortality is to be avoided, and a relatively large number of nurses is essential.

Where the children of lepers are concerned additional problems arise. In this Province it is extremely difficult to find healthy nurses who are prepared to give the affection and personal care without which the survival of the children is unlikely. The traditional attitude to leprosy dies hard. We have proved that a child who has already had contact with its leprous mother will not be acceptable to the nurses.

The policy being pursued attempts to adopt a realistic attitude to these problems, while working at a financial level related to that governing leprosy control work in Nigeria.

It is considered unnecessary to isolate all uninfected children from their parents in children's home , the general principle being to leave the children of closed cases with their parents, but under observation, and to make suitable provision for the children of open cases. These latter can be divided into two groups :

(1) Unweaned children.

(2) Weaned children.

1. UNWEANED CHILDREN OF OPEN CASES.

This group presents the greatest problem. Isolation of the infants from their mothers is necessary. From Table IV. it will be observed that the actual number needing immediate attention is 46. The policy adopted is to encourage the mothers to come to the Central Settlement before delivery, and have their confinement under controlled conditions. Subsequent procedure depends on the state of the mother's health. If she is regarded as highly infectious and nursing the child is likely to be inimical to her own health, there is no alternative to removing the child forthwith to a crèche of standard type where the child is reared on artificial foods entirely isolated from the mother. Nurses at this crèche are invariably ex-patients. The crèche need only be small. It also caters for orphaned infants of leprous mothers. Strict supervision by an experienced and highly qualified matron is essential.

Where milk and nipple are bacteriologically negative, and the general health of the mother is good, a simpler and more economical procedure is adopted. The child is transferred to a distinct department, the " Nursery," where suckling is permitted under strict control. The department has the following features :—

1. Children are isolated from their mothers, who are quartered a satisfactory distance away, but are allowed to attend and feed the children, a strict no-contact technique being adopted.

2. The nurses are themselves patients, closed cases suffering from inactive neural leprosy, lepromin positive, and soon liable for discharge. These live in separate quarters in the Settlement, but

when coming on duty have to bathe and change into special garments which are not removed from the department.

3. Regular examination of mothers, nurses and children is essential.

This is regarded as the main department, and in principle it has the following practical advantages over the crèche :—

(*a*) It is largely independent of artificial feeding and its problems.

(*b*) By the use of patient nurses, the problem of caring for infants who have already had contact with their mothers is overcome.

(*c*) Having suffered themselves, such nurses are likely to exhibit the care and devotion necessary.

(*d*) It can be applied on a large scale.

(*e*) It is financially economical, both in materials and staff; for the nurses are receiving treatment, and are satisfied with maintenance allowances rather than a salary.

Again strict supervision is necessary.

These arrangements are of course not ideal, but they afford the only practical means of tackling the problem on the scale which it demands.

2. WEANED CHILDREN OF OPEN CASES.

When weaned, it is the policy to send all children to the care of healthy relatives, and subject them to periodic examination by Leprosy Inspectors.

Unfortunately circumstances arise where it is impossible to carry out this policy, as in the following cases :—

(*a*) Cases where no relatives are available to care for the children.

(*b*) Orphans of leper parents.

(*c*) Cases where, on account of the death of its parents, an open case becomes responsible for a child not his own, but closely related to him. There are many instances where a responsibility of this type is hindering a patient from being segre ated, as healthy children are strictly excluded from segregated villages.

For these exceptional cases, a Preventorium is necessary. Staffed by ex-patients, this is a home where children can be cared for up to the age of 14, receiving education and trade training. It is situated outside the Central Settlement, but is in
allow for adequate supervsion.

3. UNWEANED CHILDREN OF CLOSED CASES.

Mothers who are closed cases and are suffering from favourable types of leprosy are instructed to continue living at home with

their children. They are not allowed to be segregated with open cases in villages, Settlements, etc. Arrangements are made for the periodic examination of both mother and child. The mother is expected to attend for treatment at the local clinic, and cases of alleged hardship are investigated by welfare worker

These arrangements cover the vast majority of such cases, but circumstances arise where the mother is unable to maintain herself, being either deformed or a pauper, and it is necessary for assistance to be given to such cases. For these people a Mothers' Home is provided at the Central Settlement, away from the living quarters of other patients, where the mothers, while able to receive leprosy treatment, are isolated with their children from open cases. The department is small.

4. WEANED CHILDREN OF CLOSED CASES.

These live at home, either with their parents or with healthy relatives, and no special provision is necessary.

CHILD-WELFARE ORGANISATION

In order to carry out the policy described, it is necessary to have an effective child-welfare organisation to obtain the necessary information, maintain records up to date, and provide material for the different children's homes which are under its control. The organisation of the Department of Child-Welfare at Uzuakoli is as follows:—

A. The Central Office.

Functions:

1. A register of pregnant patients is kept up to date.
2. Cas sheets for all uninfected children are filed and periodic examinations recorded.
3. The preparation of waiting lists for the different children's homes.
4. The organisation of periodic examinations of children, mothers, nurses, etc.
5. The collation of monthly returns from outstations.
6. The organisation of propaganda.

B. Outstation work.

This is carried out by Leprosy Inspectors and welfare workers. A monthly report must be submitted to the Central Office giving the following information:—

(*a*) Patients reporting as pregnant.
(*b*) Particulars of children born to patients.
(*c*) Particulars of children for whom patients have become responsible.

(*d*) Information regarding the uninfected children of new patients.

Reports of the examinations of uninfected children must be sent to the child-welfare officer in charge of the Central Office who is himself liable to tour and investigate matters relating to the department.

The investigation of cases of alleged hardship and difficulty is an essential part of the local organisation.

C. Children's Homes.

From the foregoing it will be seen that four homes are necessary.

(1) The Crèche, where infants of highly infectious cases are isolated from birth and reared on artificial foods. A small department.

(2) The Nursery, where infants of open cases are isolated from their mothers, but these are allowed to suckle them under controlled conditions. A large department.

(3) The Preventorium, for the accommodation of weaned children where there are no suitable healthy relatives to care for them.

(4) The Mothers' Home, a small department where closed cases live with their infants, admission being limited to those mothers who by reason of poverty or deformity are unable to maintain themselves at home.

The practical operation of the complete department is still in its early stages. The Central Office is working effectively and is responsible for obtaining the information given in the tables. The outstation work is operating in many areas, but the effective development of the series of children's homes is dependent on the provision of the skilled supervision which is absolutely essential. The duplication of the series of homes in another part of the Province will allow the majority of cases needing isolation in them to be dealt with effectively.

In preventive work among uninfected children the interdependence of the public health and the social welfare aspects of leprosy control work is admirably illustrated. The solution of family difficulties by sympathetic welfare work, the creation of the right attitude on the part of nurses, the co-operation of patients everywhere, these are essential elements in achieving what must be regarded as a most important aspect of the public health.

My thanks are due to the Honourable the Director of Medical Services for permission for the publication of this article.

By Dr. Chas. M. Ross, Uzuakoli Leper Settlement, S.E. Nigeria.

Preventoria for *all* children of leper parents are not necessary. For the new-born children of infectious parents preventoria are absolutely essential, but if the mother is non-infectious and is segregated from all infectious cases the child can be allowed if necessary to remain with the mother until it is weaned. We think, however, that preventoria for children once they are weaned are to be avoided, and we also think that the sooner the child is weaned and made to live in the native village the better.

Apart from leprosy work we have known several orphan African children over a considerable number of years who have been looked after from birth in homes or institutions controlled by Europeans. We have seen in such cases a high incidence of sickness, general unfitness to resume life in their normal Africa surroundings and, in after life, inability to find employment and assume responsibility for themselves. These children seem to lose their independence and become entirely dependent on those who have been their guardians.

We have known three boys whose cases illustrate this particularly well. One of them when he went to a boarding school was a constant source of worry and trouble to his guardian. He was unable to cook his food properly and fend for himself in school life; his guardian had to keep him supplied with food and other things which he could easily have obtained for himself if he had been accustomed to do so in his home town. The boy managed after a prolonged time at school to reach Standard VI, but for a considerable time could not settle down and seemed unable to find employment. Of the other two boys the first must be now about 16 years of age; he was far outdistanced by his fellow schoolmates and after many years at school failed to pass into Standard I. He seems to have lost all natural independence. The second boy is younger but seems to be entirely in the same condition.

In Nigeria we have found a willingness in the relatives to look after the children of lepers who have been weaned in the crèche. From the crèche weaned children have been taken by relatives and, on their return for inspection, we have found them well nourished and healthy, some perhaps even more so than when they left us. If the Africans think we are willing to feed and educate the children they are very pleased to let us do so. Many of them would welcome our taking over this responsibility and a condition such as the following may result. A child had been supported many years as his father, who was a leper, was unable to look after him. When there was a possibility that the

father would soon be discharged he was told he could take his son with him. The father was very indignant and said he was no longer responsible for his son's feeding and education; the boy must be fed, clothed and educated by the people who looked after him from birth, and they must also be ready to help him all the days of his life.

In our opinion all children of leper parents should be removed to a crèche or preventorium at birth, unless the parents are non-infectious and the child can be segregated in such a way that there is no possibility of exposure to infection. We also think that all children should be weaned as soon as possible and removed from the colony or preventorium so that they can learn to adjust themselves in normal African surroundings and circumstances.

By Dr. L. H. Wharton, Mahaica Leprosy Hospital, British Guiana.

In British Guiana the problem of dealing with the children of leprous parents is not a difficult one. The leprosarium at Mahaica has 360 patients, of which only one-half are infectious cases. Although the sexes are lodged in separate compounds segregation is not absolute and births do occur, the average birth rate being 2 per year for the past 5 years. Each of these infants is given to a near relative or guardian as soon as possible after birth, usually within 7 days. Government gives an allowance of £1 0s. 10d. per month to the guardian until the patient is discharged. There has never been any difficulty in obtaining guardians for these children, even before the days of allowances. The children are examined every six months until they are 14. Most of the births in the institution occur among the 600 discharged patients. When these are due for confinement they return to the Leprosarium; they will not enter a general hospital on account of social stigma. Of these, four is the annual average for the last five years. The mothers leave the leprosarium as soon as they recover from the confinement, taking their children with them. As in the case of the in-patient's children, these are examined every six months till they are 14 years old.

As the number of these children is so small, and as the present system is working satisfactorily, there is no need in British Guiana to erect a Preventorium for this purpose.

By Dr. Robert Cochrane, Hon. Director, Leprosy Campaign, Madras Presidency, India.

The importance of child leprosy cannot be over-emphasised, but as far as India is concerned it is frequently forgotten that a

great deal of child leprosy is comparatively innocuous. A study of figures over the past eight years at the Silver Jubilee Children's Clinic, Saidapet, indicates that there is a tendency to spontaneous disappearance of neural lesion in childhood, and that of all children who acquire leprosy less than 50% progress to the more serious forms. By serious form is meant those cases which not only become lepromatous but which become mutilated. Therefore child leprosy must be looked upon in the light of that type which is serious. A further study indicates that about 7% of simple macular lesions in children become lepromatous in later life, and in all probability nearly a 100% of the incipient or pre-lepromatous—Muir's Juvenile Leprosy—develop into leproma in later life. The greatest factor in the development of lepromatous leprosy is intimate and continuous contact with an open case. In countries such as South Africa, Brazil, etc., great emphasis is laid on the separation of healthy children from infective parents, but in this country, owing to the fact that it is impossible compulsorily to segregate all infective cases and because, in most areas in India, nearly all children can be found a home, it is probably a better policy to bring up children in their own environment rather than in the artificial environment of a healthy children's home. For, if they are placed in such an institution, they become divorced from the life of their community and are liable to become institutionally-minded with the resultant problems which tend to arise in children who have become homeless. Nevertheless, it is a fundamental axiom that the child of parents with infective leprosy should be separated, preferably at birth and certainly at as early an age as possible, from the infective parent or parents. It is sometimes more practicable to remove the source of infection to an isolation centre than remove the child, and in India this frequently can be done, for there are usually relatives able to care for the child. While the segregation of healthy children of parents with leprosy has been rightly stressed, it must be remembered that possibly as many children acquire leprosy from relatives other than parents. Let me not be misunderstood, there is great scope for Healthy Children's Homes, but before sending a child to one every effort should first be made to remove the source of infection rather than the child, then if this cannot be accomplished the child must be separated from the infective person in a suitable home. Space does not permit me to enlarge on this subject, but to undertake such work means considering the question not only of the child of school age, but the infant which must be cared for in a crèche, the toddler and the young adolescent. This is a problem of much complexity and should be handled by a specially trained

personnel. Questions such as re-absorption into the community, marriage and training for a career, professional or otherwise, all have to be considered in the setting up of a special institutions for healthy children of parents with leprosy. Therefore the whole tendency of the policy in Madras has been to concentrate on children with leprosy and the infective parent rather than healthy children. The post-war reconstruction plan envisages the development of children's sanatoria and the prevention of leprosy in urban and rural districts. There is evidence to show that if children are separated from night contact with an open case in villages there is a fair chance of leprosy control being effected. The following table gives evidence from the Rural Prevention Unit 23 miles from Chingleput.

Village	1939 Gross incidence	1939 Open case rate	1939 Child rate	1942 Gross incidence	1942 Open case rate	1942 Child rate	1945 Gross incidence	1945 Open case rate	1945 Child rate
*Polambakam village	42.52	25.80	32.60	52.89	23.25	25.58	44.13	20.87	9.37
*Polambakam cheri	45.55	23.80	19.05	44.00	13.63	13.63	38.79	16.66	16.66
*Perambakam village	38.46	28.57	14.28	38.64	31.25	18.75	30.95	15.38	15.38
*Perambakam cheri	78.12	30.0%	50.0%	60.60	37.50	50.0%	67.16	22.22	22.22
Muluvanakaranai village	33.12	45.45	18.18	48.41	29.41	23.53	70.65	19.23	23.08
Muluvanakaranai cheri	29.12	50%	50%	56.33	30.77	38.46	49.79	25%	25%

*night segregation enforced.

It will be noted that there has been a general reduction of the incidence of leprosy in three out of the four villages in which night segregation has been enforced. The only exception is Perambakam village where the incidence has apparently increased slightly. It is of interest to note that Perambakam village only began to take night segregation measures seriously after the year 1944. A further point of interest is the marked drop in the child rate in Polambakam village between 1939 and 1945. It will be noted that the open case rate has decreased while the gross incidence has increased, this may be due to the fact that some open cases have died and others left the village and the time interval may not be long enough for fresh open cases to have developed. The open case rate has decreased in all four villages during the past five years, in two of them very markedly. On the other hand in the two villages not under night segregation the incidence of leprosy in one of them is more than doubled, and in the other more than 1½ times the incidence in 1939. Both these villages have shown a steady increase in the incidence of the disease during the past five years. The open case rate has also decreased in these two villages

owing to the death of a number of open cases and again the time interval for the development of fresh open cases may not as yet be sufficient. While no definite conclusions can be drawn, we feel that the over-all picture shows a downward trend indicating a possible favourable turn in the epidemic of leprosy in these villages and encourages the pursuance of this experiment.

While the principle is accepted that no child should be allowed to come into contact with an open case, be it a parent, a relative or a co-tenant, except under special circumstances, preventoria envisaged in Brazil are not recommended in South India, largely because children can be looked after in their own homes and because as a result of the joint family system it is not only the child of the infective case but all children within the household who are liable to infection. Great emphasis is being laid on the starting of sanatoria for children with leprosy and especially with the type which is liable to become lepromatous. Owing to the fact that many lesions of neural leprosy are benign and non-progressive, children with such lesions, provided they are not in contact with open cases, will be observed under natural conditions rather than admitted into leprosy Sanatoria.

A new venture is being inaugurated under the auspices of the Kasturba Gandhi Fund—a fund to commemorate the life and work of Gandhiji's wife. A home for women and children suffering from leprosy is to be opened on the South Arcot District of this Presidency and this work will be integrated with the whole preventive work of that district.

Urban leprosy is a more difficult problem than rural leprosy, and propaganda is being organised so that the open cases shall gradually realise the seriousness of coming into contact with healthy people especally children, and, where facilities are available and open cases refuse to segregate themselves or cannot segregate themselves, then legal measures will be adopted to force such segregation at least in the Madras Presidency. It is my firm belief that if night contact with children was prevented the epidemic of leprosy would come under control. I believe that the number of adults who get leprosy is so small that if children were prevented from getting the disease leprosy would gradually die out of India.

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In recent years increasing stress has been laid on the protection

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of children from leprous infection by early and efficient separation of children from infectious contact with their parents and others. Leprosy is not hereditary and children separated from infectious contact at birth, and brought up in healthy surroundings almost invariably remain free from leprosy. The separation of children from infectious contact at birth is therefore the ideal policy, and is sometimes practised.

Often, however, even in leprosy institutions, it is found difficult or impossible to carry out this policy, particularly in countries where artificial feeding of infants is little understood or practised. In some leprosy institutions, therefore, a compromise has been made. Mothers have been allowed to keep and suckle their children for a time until they are considered old enough for separation. The time that the mother has been allowed to keep the child has varied fairly widely between a few weeks or months and two years, but experience has shown that the longer the child is kept in infectious contact the greater is the risk to the child.

The problem has been rendered more difficult by the fact that in some leprosy institutions marriage and married life have been allowed, although in India in recent years married life in many leprosy institutions has been definitely disallowed, and where allowed it is usually confined to old married couples, and not permitted to new admissions.

A few months ago the writer paid a visit to a leprosy institution in India in which until a few years ago the policy was to allow marriage and to leave any children with the parents in the institution until the age of 18 months and then to remove them to a Healthy Children's Home. During this 18 months they have been in contact not only with the mother, who might not have been infectious, but also with other patients some of whom would be infectious. A considerable number of these children have later developed the signs of leprosy and have had to be removed to the Leper Children's Home adjoining the institution. There were twenty-five such children in the Leper Children's Home at the time of my visit. It was thought worth while to get the details regarding these twenty-five children showing signs of leprosy. These details are given below.

It is impossible on the data available to give any accurate idea of the incidence of leprosy in children separated from infectious contact at the age of 18 months. The data presented below relate only to those who have developed leprosy, and it is not known how many similar children did not develop leprosy. Nevertheless certain conclusions from these data are justified, namely, that the separation of children from infectious contact in the institution has

been done too late or too incompletely, or both, to prevent the development of leprosy in a considerable proportion of the children.

CHILDREN BORN INSIDE THE ASYLUM.

Serial No.	Date of birth.	Age of separation from parents.	Date and age at which signs of leprosy appeared.
1	1934	18 months	1941 age 7 years.
2	1935	,,	1941, ,, 6 ,,
3	1934	,,	1938, ,, 4 ,,
4	1937	,,	1941, ,, 4 ,,
5	1936	,,	1941, ,, 5 ,,
6	1938	,,	1941, ,, 3½ ,,
7	1936	,,	1940, ,, 4 ,,
8	1932	,,	1941, ,, 9 ,,
9	1932	,,	1941, ,, 9 ,,
10	1938	,,	1941, ,, 3 ,,
11	1936	,,	1939, ,, 3 ,,
12	1936	,,	1940, ,, 4 ,,
13	1930	,,	1940, ,, 10 ,,
14	1927	,,	1934, ,, 7 ,,
15	1932	,,	1939, ,, 7 ,,
16	1932	,,	1941, ,, 9 ,,
17	1935	,,	1938, ,, 3 ,,
18	1935	,,	1940, ,, 5 ,,
19	1930	,,	1938, ,, 8 ,,
20	1936	,,	1939, ,, 5 ,,
21	1928	,,	1934, ,, 6 ,,
22	1933	,,	1936, ,, 3 ,,
23	1936	,,	1941, ,, 5 ,,
24	1936	,,	1940, ,, 4 ,,
25	1935	,,	1941, ,, 6 ,,

I am informed that steps have been taken in the institution in question to remedy this state of things and that married life is reduced to a minimum and is confined almost entirely to women beyond the age of child bearing, and that separation of children is now carried out earlier and more effectively.

There are, however, even now a few leprosy institutions in India in which the state of things is far less satisfactory, and it is a warning to these institutions that this note is published. Married life such as may produce children should not be allowed.

In institutions where married life is not entirely disallowed, children should be removed as early as possible, not later than six months. During the first few months of life before separation, contacts in the institution should be kept at the very minimum necessary in the interests of the child. If the mother herself is an infectious case, the periods of contact should be confined to the actual periods of breast feeding, and during breast feeding the physical contact should be reduced to a minimum by suitable clean cloths used by both mother and child. If the mother is not an infectious case, these precautions may not be necessary, but great care is needed to prevent contact between the child and other patients who are infectious.

Probably the best interests of the child are best served by arranging for the child's adoption possibly by healthy relatives, and the complete removal of the child from the neighbourhood of the institution. If this is impossible, a crèche under a skilled nurse should be provided to look after such children and maintain separation from the parents and also other patients.

OCCUPATIONAL THERAPY IN LEPROSY INSTITUTIONS

DONALD DOW

The institutional treatment of many chronic diseases demands not only the application of specific or empirical medical treatment, but also requires certain auxiliary measures, among which occupation therapy has a high place. It is recognised as a necessary part of the regime in a sanatorium or mental hospital, and for a considerable number of years many leprosy institutions have given prominence to the question of occupational therapy.

In a discussion of this matter in relation to leprosy institutions, there are certain considerations which cannot be overlooked. Tuberculosis sanatoria are not handicapped by an 'asylum' tradition, and the psychology of the tuberculous patient is very different from that of the victim of leprosy, whilst mental hospitals have for long been managed by doctors trained to guide work along lines which are socially acceptable, and satisfying to the patient. In leprosy work the position is very different. The modern leprosy institution has grown up within recent years, and asylum ideas—long dead in mental work—are still potent factors in leprosy work. By many enlightened folks, leprosy is still considered not so much a disease as a curse; a condition demanding ostracism rather than treatment. As a consequence of leprosy being regarded as a life-long disease requiring segregation irrespective of the clinical condition of the patient, occupations have often been governed by the interests of the institutional staff and have not been primarily regarded as therapeutic agents.

In the organisation of occupational therapy there are two things which must be kept in mind :—

1. The psychology of the patient. Muir (1939) and Dow (1942) have discussed the psychological aspects of leprosy, so it is not proposed to go into that question of detail here, suffice it to say that, in our opinion, practically no patient suffering from leprosy is really healthy-minded. Crichton-Miller gives the

qualities of a healthy-minded adult as follows :—

(a) He should have the will to live.

(b) He must be able to enjoy all normal biological functioning.

(c) He must have enough feeling of self-mastery to maintain adequate independence of circumstances and environment.

(d) He must be ready to face conflict, internal and external, with a minimum of recourse to evasion.

(e) He must have a scale of values whereby experiences and memories that have purpose and significance are preferred to those that lack them.

(f) His social effectiveness must be characterised by :-

A. A reasonable trust in his fellow men.

B. A broad toleration of human idiosyncrasies.

C. That sense of social responsibility which only manifests itself in those who recognise in social contribution a prerogative rather than a duty.

Few victims of leprosy can satisfy these conditions. Superstitious ideas regarding the cause of leprosy, social ostracism, inability to obtain work and cruel treatment at the hands of relatives and friends have all combined to produce a mentality which is anything but healthy. In any scheme of occupational therapy it is thus necessary to remove the sense of frustration and help the patient to realise that he is a member of a community to which he can—and should—make a contribution ; he must be made to feel that he is regarded as a sick man and not as a social pariah, and that the various forms of treatment—including work—are designed to fit him to resume his place in society.

2. The background of the patient. The forms of occupation should be such that patients can appreciate their value. Tasks should not be allotted which the people are insufficiently educated to perform with understanding, for work which is beyond the understanding of the worker is likely to be dull and irksome and inefficiently performed. The aim must be to provide types of work which act as a physical and mental stimulus. This may mean the provision of specially qualified staff to guide and instruct in whatever types of activity are undertaken, but the results will fully justify any extra expenditure incurred.

It must be admitted that the organisation of occupational therapy designed to meet the postulates set forth is no easy task. It involves a consideration of the habits and customs of the people, their social background and their educational level ; it must take into account religious prejudices, caste (in India), and local or national traditions.

It may be worth while trying to illustrate our thesis by indi-

cating the lines on which occupational therapy is organised at the Victoria Leprosy Hospital, Dichpali, for while no claim to perfection is made and we are only too conscious of the need for constant improvement, we have attained some measure of success in accomplishing the end we had in view.

The following points were constantly in mind :—

1. Physical well-being of patients. Outdoor work is preferred to indoor, and active labour to a sedentary occupation. For these reasons we are keen on garden and farm work.
2. Psychology of patients. Tasks which the patient can perform —or learn to perform—intelligently are chosen, and selection has been made of types of occupation in which the patient feels he is making a contribution to the communal welfare. At one time brass work was carried on but it was discontinued because (a) it was a skilled occupation beyond the intelligence of many patients; (b) there was no sale for the articles because of the prejudice against leprosy and consequently patients came to feel that their labour was not appreciated; (c) patients trained in brass work could not obtain employment at the trade when they returned to their villages as the work was confined to certain castes. An account will follow of the various forms of labour which we have found beneficial.
3. Economic factors. While the welfare of the patients is the primary consideration in any hospital, it is essential that economic considerations should not be overlooked. For that reason—and because it is a sedentary occupation—weaving is not an industry here. In some institutions it may be a paying proposition, but we can purchase from local mills at special rates with which we could not hope to compete.

There are 800 patients in residence at Dichpali, of whom 150 are children, 100 women and the remainder men. Most of the patients come from villages, only a very small minority being from urban areas. The hospital serves the whole of Hyderabad State so the patients are drawn from a wide area. The general educational level is low and most of the people are engaged in agriculture, either as labourers or as small landowners. Patients receive injections twice weekly, and apart from the days on which they receive injections, all the adult patients—unless exempt on medical grounds—must do three hours' labour daily, for which no payment is made.

All labour is based on the institutional needs as this develops a communal sense, and the tasks are graded so that they may be allocated according to physical capacity. We propose to give an outline of the work programme.

1. *Children.* The tinies are looked after in a nursery school, but all the older children—boys and girls—attend school in the morning. The afternoons are devoted to garden work in the case of the boys, and sewing and mending in the case of the girls. In neither case are great demands made, but both boys and girls are engaged in tasks which interest them and in which they feel they are contributing their quota to the institution. There are two teacher members of staff engaged in the educational work but the rest of the teaching work is done by patients who render this service as their form of work.
2. *Women.* Female labour is divided into various ections :—

A. A number of women are responsible for washing and mending the children's clothes. They are assisted in mending by the girls.

B. Older women, and those with deformities or failing eyesight do light work such as a little weeding, clearing away rubbish, etc.

C. The greater part of the women do cooking work. In this hospital all the food is supplied from a large communal kitchen. One batch of women come on duty in the early morning and prepare thin porridge which is given as a morning meal. They also cook chapatties (thin flour cakes) and vegetables, and this work is continued by a second group of women who come on duty later. It is quite a task baking 1,500 odd chapatties for the mid-day meal but the women really enjoy this work.

3. *Men.* The men, like the women, are divided into various gangs for work :—

A. The afternoon cooking for the evening meal is lone by men. They are elected by their fellows, partly on a caste basis and partly because they have expressed a preference for cooking work. They are responsible for the preparation of curry and rice.

B. In addition to the cooks, there are several other gangs employed in the vicinity of the kitchen :—(a) Firewood Gang to split wood for the cooking work; (b) Cleaning Gang for the preparation of vegetables, grain, meat, etc., for the cooks; (c) Mill Gang to mill the rice and grind the flour.

C. Miscellaneous Gangs. (a) Sanitary—to see that latrines and drains are clean. (b) Watering—to water plants and shrubs in the vicinity of the hospital. (c) Anti-malarial—to carry out anti-malarial measures on the instructions of the medical staff. (d) Casual Labour—to do odd jobs such as weeding, building, cooly work, road cleaning, etc.

(b) Farm and Garden Work. The majority of the men are employed on the farm and in the gardens. This type of work demands strong physique but patients are keen to be engaged on farm work and are quick to appreciate and learn the methods which they see practised.

It will be evident that there is a great variety of tasks which the patients can undertake and all of them are of value to the whole community. Every patient on admission is given a labour classification as well as a medical one and all the jobs are catalogued so that a patient is given work suited to his particular catagory. Patients thus feel that their physical condition is appreciated and that they are likely to get a job which they can do and in which they can make a contribution to the institutional life. It is naturally difficult to assess in terms of cash the value of all the work done, but it may be worth while to give a more detailed description of the agricultural work as an example of the economic value of certain types of occupational therapy.

From the original 50 acres donated as a site for the colony at Dichpali, the area owned by the institution has grown—partly by gift and partly by purchase— to 450 acres. A considerable part of this land is occupied by staff quarters, hospital buildings, patients' quarters, power house and workshops, playing fields, etc., but about 250 acres is devoted to agricultural pursuits—150 acres being given over to grazing and the remainder to cultivation. Most of the land was jungle when acquired and it has been a tremendous task to sink wells, make roads, level fields, plant orchards, etc., but year by year the work has gone on and the original chaos has given place to order and regularity. The labour for this work has been supplied by the patients.

The oversight of the agricultural work is in the hands of a graduate in agriculture who has three assistants, and his responsibilities include the allocation of work to the various gang, keeping records of produce, consulting with medical staff as to types of vegetables, etc., required for patients diet.

The farm has extensive grain store accommodation and has also large cart and implement sheds and byres for the housing of the 25 bulls kept for ploughing and carting. No milk cows are now kept as milk powder has proved a more economic proposition and the defective fat content is supplied in the oil used in cooking. Goats are kept for killing for food and they supply some manure.

The success of the farm depends on three factors :—

(a) Irrigation. Weather conditions in the tropics mean that for a considerable part of the year there is little rain and with the

extension of the ground under cultivation it has been necessary to increase the water supply. A small irrigation tank helps for part of the year, but in the hot weather that is dry and additional reliance has had to be placed on wells as a source of supply. In recent years several large wells have been sunk and the needs of the farm are on the way to being met. In addition to the land under crops, there are several acres of gardens and orchards and they also are supplied from wells, and in the case of the garden in the boys' compound the well water is supplemented by water which is drawn from a large pit which drains all the waste water from the women's compound. This water is raised by a small Persian wheel which the boys can operate by hand. The water for the hospital and staff compound is obtained from wells by means of electric pumps, but in the farm and gardens the drawing is done by bulls as we are anxious that the methods taught should approximate to village usage.

(b) Manuring. All the waste from the kitchen, road sweepings, dead leaves, weeds, grass, cow dung, etc., are removed to the farm and are used for the manufacture of compost. There are three compost factories—one at the farm, one at the main garden and one at the boys' garden—and a number of patients is constantly employed at these centres. These people not only do useful work, but learn the value of much that is allowed to go to waste in the villages. The compost is used to good effect in enriching the soil and in a recent year no less than 833 loads were produced. In the same year there were also 200 carts of ordinary manure and 600 carts of rich black soil added to the farm land.

(c) Tillage. Year by year more land has been cleared of wild growth, levelled, laid off in plots and tilled, and there is now about 40 acres devoted to wet land crops and 60 acres used for dry land crops. As far as weather conditions permit, tilling of the soil is carried on throughout the year. Hoeing by hand and bullock, crowbar work and ploughing is diligently pursued and the work has paid a good dividend in plentiful crops and an improvement in the physical condition of the patients engaged in agriculture.

The following list gives an idea of the produce in an average year :—

Fruits and Vegetables	83,927 lbs.
Sugar Cane	18,110 lbs.
Paddy (Rice)	39,624 lbs.
Ground Nuts	1,230 lbs.

Green Jawar	4,072 lbs.
Black Gram	1,488 lbs.
Cotton	260 lbs.
Wheat	199 lbs.
Castor Seeds	210 lbs.
Tobacco	570 lbs.
Green Gram	179 lbs.
Millet	216 lbs.
Black Seeds	610 lbs.
Millet and Rice Straw	147 Cart Loads.
Green Fodder	106,547 lbs.
Green Grass	78,185 lbs.
Field Beans	13,235 lbs.

When it is remembered that farm labour is supplied free by the patients, it will be seen that the above produce represents a considerable contribution to the hospital. Of more importance than the financial aspect, however, is the feeling of satisfaction and contentment among the patients as the result of doing interesting and productive work. It may be that weaving, handicrafts, building, etc., are possible in some institutions, and it is immaterial what types of work are provided so long as they excite wholehearted co-operation on the part of the patients.

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MODES OF TRANSMISSION OF HANSEN'S DISEASE (LEPROSY)

B. MOISER

"Hansen's disease" should replace the old term "Leprosy," and the word "leper" should be abolished completely, and the word "patient" substituted. I think that we are all agreed upon this, so that it cannot be stated too frequently, and that is my excuse for beginning this article in this vein. It will require a long time and much perseverance to put this desideratum into effect, so no opportunity should be missed.

Hansen's disease is generally believed to be spread by contact

and/or infection, not just occasional, casual contact, but long-continued, close, intimate contact. I believe this view to be wholly erroneous, and cannot accept it at all after sixteen years full time work at Ngomahuru Hospital, Southern Rhodesia.

Hansen's disease is undoubtedly a house and family disease (by the latter, I do not mean that it is hereditary, for this it certainly is not). Of this, there is ample evidence here. In one case, we have as many as six members of a native family—mother, three sons and two daughters—and several cases occur of smaller numbers.

Every patient admitted to Ngomahuru is questioned at great length as to personal and family history, and of more than two thousand cases 60.9% can give no history of the disease in the family or of any contact with another case, and I decline to believe that it is possible for any native to live with and remain ignorant of the presence of the disease in another, for any length of time.

How is infection to be accounted for in the 60.9% of cases? Surely, there must be some other form of infection than the human being. Is it possible that there is an intermediate host, or a carrier, as in so many other diseases?

At this hospital, the cockroach was singled out for investigation, mainly because it is cosmopolitan, as is the disease, but also because other workers have paid attention to various other possible vectors. Research has been going on here for the last five or six years into cockroaches, not as a full-time occupation but as part of the general work of the hospital. A Nyasaland African Hospital Orderly, Reuben Zachariah, to whom I owe much for his perseverance, enthusiasm, and trustworthy observation, was taught to use the microscope (Leitz binocular and Crouch monocular), and he has done most of the donkey-work, collecting roaches, feeding them, making slides and examining them, etc. Without his help, I could not possibly have done the work, as I am the only doctor in the place.

There are about one thousand species of cockroach, but only two are common in Southern Rhodesia—*Blatella germanica* and *Oxyhaloa Murrayi* (identified in England), the former being the more common. Many hundreds have been examined, both from the hospital area (8,400 acres), and from kraals at some distance from the hospital, and 69% of all examined show small acid-fast "oval bodies," ranging from the size of a red blood corpuscle, to that of a small bacillus, such as Hansen's. Most of the oval bodies are opaque and stain very deeply with carbol-fuchsin, but occasionally a ruptured one is found, the contents being either granular or bacillary and indistinguishable from Hansen's bacillus.

Again, some oval bodies have acid-fast facilli attached to the

surface, either parallel to the surface or grouped at any angle to it. They have the appearance of Hansen's bacilli. The oval bodies often occur in groups. These phenomena are all very suggestive of some connection with Hansen's disease, but so far there is no definite proof of this.

Oval bodies have not been found here to occur in bed bugs, ticks or flies. They have been observed occasionally in smears made from patients, but I am inclined to think that their appearance here is accidental, for a photographic dish is used for staining, four slides at a time.

Cockroaches have been fed on mealie meal to which has been added material taken from ulcerating nodules, which material has been proved to contain numerous bacilli of Hansen, and these bacilli have been found in large numbers in the gut of the cockroach, and in the dried faeces. They are sometimes in such large numbers as to suggest multiplication in the gut of the cockroach. The bacilli have been found to remain unchanged in the dried roach's droppings for 169 days (when the contents of the tube were exhausted, so that the period is probably longer than that).

Now, is it not possible that the dried droppings of cockroaches are a source of infection, and that this may explain why the disease is a house and family one? Could infection follow mere rubbing of the droppings on the skin, or follow ingestion in food? It would seem that both are possible. To my mind, this suggested mode of infection is much more plausible and likely than the long, close, intimate contact theory.

Cockroaches bite savagely at night, leaving on the African's dark skin a white, almost circular scar, often much larger than a pin's head. These white scars have been found to contain the bacilli of Hansen, so that it seems almost certain that cockroaches can convey the bacillus from man to man directly. Some of the patients from whom smears were taken from the white scars were early neurals, which were negative in the ears and nose. We have not yet succeeded in making cockroaches bite in the daytime. A sleeve of khaki material was made and applied to the arm of an early neural, with several roaches inserted, but they could not be induced to bite. What we have yet to do is to find Hansen's bacillus in a bite which has actually been observed. A wire gauze cage occupied by a patient and positive roaches at night should supply the information.

The skin of an early negative neural case was scarified, and inoculated with positive powdered roach faeces, the scar was found to contain Hansen's bacilli, on the next day, but was negative on the eighth day, when, however, one doubtful "oval body" with bipolar staining was observed. This was in December, 1944,

and now, at the end of June, 1945, the inoculation scar has faded, and the patient shows no additional signs and symptoms.

In another experiment, the dried faeces of cockroaches left in water for one hour and a half showed no oval bodies, but large number of Hansen's bacilli (query). Had the oval bodies dissolved in the water and set free the Hansen's bacilli (query)?

On 23rd March, 1945 several roaches were caught in Reuben's own house which is within the Hospital grounds, but at least 400 yards from the nearest patient's hut, and in one of them bacilli indistinguishable from Hansen's bacillus were found, the first time that they had been found in an unfed roach. This observation was repeated on 19th April, 1945, in the case of one roach caught in " Dem Good's " hut, about seven miles from here, where no case of Hansen's disease has ever occurred to our knowledge. The bacilli were numerous, and occurred both in groups and singly.

On 9th June, 1945, of nine Blatellae caught in the house of a European patient, one was found to contain Hansen's bacilli. It had possibly fed on the patient. Of 230 roaches, caught in various native patients' huts and not fed specially on leprous material, 55 were found positive for Hansen's bacilli. Three out of four scars of roach bites on the arm of a young native girl in the " nodular " village of the Hospital were positive for Hansen's bacilli.

Of six cockroaches fed once with infected material, and which were kept in separate bottles, the faeces being removed daily, all faeces had become negative to Hansen's bacillus on the eighteenth day. In another batch of nine roaches, the faeces had become negative on the thirteenth day, and in another lot on the nineteenth day, and in yet another batch on the ninth day. So that Hansen's bacilli do not appear to last long within the roach (average in these experiments 14¾ days), though they remain unchanged in dried droppings for a very much longer time.

I am informed that cockroaches are, according to the Fossil Records, among the most ancient of insects; in the carboniferous period they were by far the most dominant group. Leprosy also is ancient, though in some cases the disease referred to in early records may have been some other disease.

CONCLUSION

I think these investigations give some reason to doubt an exclusive contagion and infection theory of the transmission of Hansen's disease from man to man, and give hope that further investigation of cockroaches may produce evidence that the disease is occasionally transmitted by the bite of the roach, and possibly by its dried faeces coming into contact with the skin or being ingested with food.

PALM OIL IN LEPROSY

L. LENGAUER

This is the tale of a visit to a self-created leper village and native treatment of leprosy.

Leprosy is very prevalent in Kukuruku of Benin province (S. Nigeria), but the chiefs are anxious to stamp out its progress, the population is willing to co-operate and lepers eagerly seek treatment. Naturally I was very keen to start the work there, and now we have already three leper villages functioning, two are under construction and two more have been asked for recently. The population of these lepers' villages is growing steadily.

Healthy people became interested in European approach to this problem and even volunteered to give information about destitute lepers, native treatment and their ways of isolating lepers. (Some years ago lepers were simply driven away by the chiefs into the bush and many of them committed suicide).

Recently I heard an interesting story about a village which was founded by an ex-leper. The man was suffering from leprosy and left "from shame" his own village.

He came to live far away on the river bank, made himself a little hut and accepted his fate.

There are many palm trees around, which is rather exceptional for this area. The man collected kernals and made the oil to increase his food without expense. Once he tried to rub the oil into the skin and found it pleasant. He continued this practice. Soon he noticed that his health was improving. The only thing which was new to his life was palm oil used for rubbing and taking in bigger doses than natives normally use. Also often he did not bother to cook it but drank it "as God made it."

He concluded that improvement of health was due to palm oil. Then deliberately, he started his treatment by palm oil; every day after taking a bath in the stream he rubbed his body with palm oil, then he drank a measure equal to a half tea cup of palm oil, not forgetting to pray God for cure.

At the end of the year he was cured and decided to help other lepers. He called one or two whom he knew and applied the treatment; it was successful. That was enough; lepers started coming to the native "leper doctor" and a real village has grown round his solitary hut. I heard the story of this village from a leprosy-minded District Officer. After swearing him to secrecy not to disclose my being a doctor, I accompanied him to this village

merely as a curious white woman, a friend or relation of the District Officer. The interpreter had been warned not to call me "Dr." but "Ma," and we started. After 35 miles in the car, we had to take a bush path and then after a mile or so, an unexpected obstacle awaited us. The rain had swollen a little stream, and water swift and muddy reached to above our knees. Help came from a native who was going in the opposite direction, who offered to carry us across on his back. The District Officer went first and then I followed, slightly self-conscious but grateful that the District Officer discreetly did not look. After 2 to 3 more miles of rather thick bush we arrived at a very clean native village, where we were immediately surrounded by a crowd. No wonder: I was the first European woman who had visited this place The natives very willingly led us to the lepers' village situated on the outskirts of their own village and surrounded by a hedge of dry palm leaves. The huts were very miserable, small, made of palm leaves, but spotlessly clean, dry and well ventilated. There were no flies or any objectionable smells. There were about 100 lepers and I was surprised to see how well they all looked. There were lepromatous and neural forms. Some had leprotic ulcers, but these ulcers were obviously healing; they were not bandaged, only painted with palm oil. The feature common to all of them was a very peculiar aspect of skin: not one of them was fat, but the skin was smooth, almost velvety, and leprotic tubercules and macules looked flattened, almost as if dissolved. I talked to several of the inmates. All of them denied emphatically that "Doctor" takes fees or adds some medicine to the oil. "He only says a prayer over the oil," which is then collected and distributed for daily dosing and rubbing after the morning bath. They have no other occupation than to clean their homes, bring fire wood and cook their food; apparently most of them have means to buy food during the cure. The lepers were confident and happy. They showed me those who had just arrived and a woman who was ready to leave, cured; some of them told me in what condition they had arrived and pointed out improvements. I found their statements quite correct.

Unfortunately the "Doctor" himself was away. The lepers had only one fear, that the District Officer would forbid this village.

I asked him to limit the sphere of activity of the "doctor" in order to prevent travelling of lepers from very far and thus spreading the disease; and now only lepers of neighbouring clans are allowed to settle in this village.

I decided to try palm oil treatment myself. I prepared ointment from palm oil, mixed with oxide of zinc powder for the

treatment of chronic ulcers, and. now I use it exclusively as it proves extremely satisfactory.

During the war I had already substituted palm oil for cod liver oil with success, giving two table.spoons of fresh palm oil per day. But this time I decided to give the same dose as my native colleague. I have taken several bad cases and they received from me (they had to drink it in my presence) ½ a cigarette and a cup of palm oil. I dreaded indigestion a little, b t only one very advanced case complained of nausea and I stopped him, the others reported that the first 2 to 3 days they had wonderful cleansing of the bowels, as one told me "plenty of black stones." Constipation in bad forms of leprosy is frequent and is a very undesirable complication. After cleansing, normal function is established. One may say that natives use palm oil ordinarily. Yes, but not enough and over-cooked and mixed with spices. Most of my cases aided with palm oil improved very much before I left on leave.

Besides this new therapy (which is reasonable and cheap) the little village gives us several other useful conclusions: (1) Lepers are not adverse to segregation, providing that treatment is offered; (2) the prayers of native doctors have a response in the religious craving of Africans and are a psychologic factor. To cure a leper one must make him happy. Religious life in the leper settlements and villages is necessary for this happiness. And lastly everybody agrees that our efforts to cure lepers are handicapped by food deficiency. All Africans are under-nourished, some because of ignorance, others because of tribal taboos, again others from inertia and conservatism. There is a new class of Africans who try to imitate European catering and from snobishness would buy tinned salmon, corned beef, tinned tomato sauce, etc., but they omit useful items of European dieting. Under-nourishment can be fought partly by propaganda, and education. But we must not forget that there are also real paupers amongst lepers who suffer not from deficiency of food but simply from starvation; they cannot afford to spent even 1/- per week for food. They are children, women, men who cannot farm, and if we do not support them with food our medical efforts are useless. With 1/6 per week a leper can receive adequate food from a common kitchen in the Settlement. I am sure many would contribute if they saw lepers knocking at the entrance of the Settlement, imploring assistance.

REVIEWS

Leprosy in India, Vol. XVI, No. 4, Oct. 1944.

Dr. Shama Rao describe a method of iodising hydnocarpus oil by dissolving 40 grs. of iodine in 10 drs. of ether and then adding this solution to one pound of sterilised oil. The editor, however, comments that the usual method of adding iodine to oil and then raising the temperature of the oil to 140° C. is better, as it effects combination of the oil and iodine and gives a solution less painful on injection.

Dr. Santra describes a survey of the Garh al State in the United Provinces. He found over 2% of leprosy in some selected areas. The difficulty of leprosy control by the local authorities is made clear by the following quotation :—

"A real attempt by the State to control the disease began in 1916. A census of lepers was made in that year, and 473 cases were recorded. On 26th May, 1916, the Regency Council passed a resolution on the prevention and treatment of leprosy, and a leper asylum was opened at Barahat in Uttar Kashi. The custom of isolating cases of leprosy in the outskirts of villages was to be practised more rigorously; the relatives of the patients were tied by a bond to observe the restrictions, and if they failed the leper was to be taken by force to Barahat colony and maintained there at the cost of the relatives. On the 31st January, 1917, the President of the Council paid a flying visit to Barahat; he found only 19 inmates although it was believed to have 117. He remarked that the phenomenal decrease was due to the fact that the monthly charge of Rs. 5 from the relatives of the patient for his maintenance was not paid and he was taken away home."

Leprosy in India, Vol. XVII, No. 1, Jan. 1945.

An editorial reviews the meaning of positive Wassermann and Kahn Tests in leprosy. Positive results were found in Carville in 60° of cases, the proportion of positive being in direct ratio to the gravity of the case. Cochrane found 41% of positives in L 3 cases, 21% in L2, 12% in L1 and 4.5% in neural. Positive cases becoming negative depends on improvement of the leprosy condition and not on anti-syphilitic treatment. The conclusion arrived at is that :

"All the above observations lend strong support to the view that a positive Wassermann or Kahn test may be caused by leprosy itself, and that in a case of leprosy a positive result does not necessarily indicate the presence of syphilis. Therefore, in the absence of clinical signs or of a definite history of infection, it is not justifiable to give anti-syphilitic treatment in leprosy simply on the strength of a positive Wassermann or Kahn test."

Doctors Dharmendra and Santra report the results of intensive leprosy surveys in small selected areas in different parts of India The following are some of the more interesting deductions :—

"The incidence of leprosy in the area surveyed varied from 0.17 to 6.6%. The areas surveyed have been deliberately selected, places known

to have a high incidence of leprosy being selected. The figures for incidence, therefore, do not apply to the provinces as a whole.

" Most of the areas included in the present surveys had been surveyed previously by the same worker. Those previous surveys were rough sample surveys of more extensive areas. During the present intensive surveys, the figures for gross incidence have been much higher, and the figures for the lepromatous-rate much lower, than similar figures obtained in the rough surveys. This has a bearing on the probable total number of cases of leprosy in the whole of India. On the basis of rough surveys it was estimated that there may be about 1 million cases of leprosy in India, but the findings made in the present surveys indicate that this number is an under-estimate.

" It has been possible to study the epidemiological features of leprosy in people of the same races living in different areas. The epidemiological features in the same race vary from place to place, and there is no one picture characteristic of the race as a whole. It would thus appear that it is impossible to explain the observed variations on the basis of racial differences alone.

" The findings made in the different racial groups living side by side in the same area indicate that the observed epidemiological variations cannot be explained on climatic grounds alone.

" A factor which appears to have a bearing on the observed variations is the attitude of the people towards leprosy, and the presence or absence of a custom of isolation of leprosy patients in a community. In areas in which there exists ostracism of the leprosy cases, and where some sort of isolation is practised, a high lepromatous-rate is associated with a low gross incidence, and a low child-rate. On the other hand, in the areas where no isolation is practised, a lower lepromatous-rate is associated with a higher gross incidence, and a higher child-rate."

Leprosy in India, Vol. XVII, No. 2, April, 1945.

Drs. Dharmendra and S. N. Chatterji describe a case of trigeminal neuritis resembling leprosy. Anaesthesia, analgesia and loss of thermal sensation corresponded exactly with the skin distribution of the three branches of the left 5th nerve, except for that of the ear. The history was that of severe pain in the parts affected, coming on after smoking cannabis indica. The pain was later followed by the loss of sensation. The main points in differential diagnosis are :—

" The above history and findings did not justify a diagnosis of leprosy. The history of onset is not like that in leprosy; in leprosy pain is not a prominent feature, and is seen only when a nerve is inflamed and thickened during the course of the disease; in the case under report acute pain was the first sign, and anaesthesia came on only later. The findings in the case did not fit in with the diagnosis of leprosy; if it were a case of leprosy, with such an extensive anaesthesia one would expect to find thickening of some of the branches of the trigeminal nerve, some local changes in the skin of the affected part, and some paresis of the eye muscles."

A description is given of the action taken by the people of Purulia to deal with the surplus lepers who could not be admitted to the Mission Leprosy Home for want of room, and who were accustomed to wander about the town and beg.

' This problem exercised the mind of both the officials and the citizens of Purulia for several years, and ultimately a Leprosy Relief Association was formed in Purulia in 1936, with the object of checking the spread of infection by the mendicant lepers It was decided to obtain a site at a little distance from the town, and to build sheds there so that the leper beggars may have a shelter at night, and may not sleep on the verandahs of private houses, market places and railway stations, etc.

These efforts resulted in the foundation in 1937 of the Naba-Kustha-Nibas (the new leper home) which stands on the bank of the river Kosai, about 4 miles from the town. The management of the Naba-Kustha-Nibas was later placed in the hands of a joint committee appointed by the Manbhum District Board and Purulia Municipality.

The Naba-Kustha-Nibas was originally intended to be a shelter at night for leper beggars of Purulia, but in practice the scheme has gone far beyond this. The Nibas is now a regular home where the patients live a communal life, and get all the benefits of treatment. Originally there was accommodation for only 90 patients, but at present there are about 250 inmates, and at one time their number was much higher.

The Naba-Kustha-Nibas has removed a long-felt need of Purulia. This is an institution which has risen and grown to meet local needs and as a result of local efforts, both official and non-official. It has clearly demonstrated what local efforts can achieve in the field of leprosy. At the start many people regarded the scheme as impracticable, but the sincere efforts of the organisers have belied all the misgivings."

Leprosy in India, Vol. XVII, No. 3, July, 1945.

This number contains a paper by Dr. Dharmendra on recent synthetic drugs and future lines of investigation. After reviewing diasone, promin, promizole and other drugs, he says :—

" We have seen that on the whole the sulphonamide group of drugs have not proved highly effective in the treatment of leprosy and tuberculosis. This feeble activity of several members of this group towards mycobacterial diseases, notwithstanding their efficacy in other bacterial infections, may possibly be related to the high lipoid content of the mycobacteria. It is possible that the outer ' waxy ' layer of these organisms prevents access of the drugs into their interior. If it were so, any change in the molecular architecture of the sulphonamides which makes them lipophilic will be expected to make them mycobactericidal, since once the outer layer is penetrated the mycobacteria may succumb to the further action of the chemotherapeutic agents, or their active derivatives elaborated **in vivo.**

"In the light of the information already available, it is conceivable that some potent mycobactericidals may be found in the group of the lipophilic sulphonamides mentioned above. In this connection the chaulmoogric derivatives are of special interest. It is possible that by incorporating the active principles of the chaulmoogra oil in the sulphonamide molecule, we may be able to get the combined effect of the two well-known remedies.

" It is also likely that lipophilic derivatives of the diamino-diphenyl sulphone group may offer advantages in the matter of greater efficacy and lesser toxicity over promin, diasone or promizole.

" In a scheme of research concerned with the chemotherapy of leprosy it would be most interesting to study the efficacy in leprosy of the following compounds:—

1. Sulphonamides of proved value after they have been rendered lipophilic by the incorporation of their molecules of long chain alkyl and acyl groupings, including those derived from chaulmoogric and hydnocarpic acids, the active principles of chaulmoogric oil.

2. Substances related to 4 : 4'-diamino-diphenyl sulphone, and their lipophilic derivatives."

ERRATA.

1. By mistake it was stated in the last number of the Review that it was edited by Sir Leonard Rogers. Actually it was edited by Dr. Ernest Muir, the Medical Secretary, for whom Sir Leonard had kindly acted as editor during his absence up to February 1945.

2. In the last number of the Review on page 6, lines and 9 should read as follows:—

" In patients with Hb percentages of less than 71