COMMONWEALTH OF AUSTRALIA.
SCHOOL OF PUBLIC HEALTH AND TROPICAL MEDICINE
THE UNIVERSITY, SYDNEY

FILE OF PAPERS.

SUBJECT: SUNGEI BULOH LEPER SETTLEMENT, FEDERATED MALAY STATES.

Dr. F.W. Clements.

<table>
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<th>Letter No.</th>
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20. Nov. 1904
Sungei Buloh Leper Settlement.
Federated Malay States.

The Site.

(a) General position.

Sungei Buloh (= Bamboo Creek) Leper Settlement is a Federal institution, in that it is controlled by the Government of the Federated Malay States and is intended to accommodate lepers from all the Federated Malay States and in addition from Trengganu, Johore and Kelantan (Native States); to adequately fulfil this service it is essential that it should be placed centrally in British Malaya.

Reference to accompanying map will reveal that Sungei Buloh is about 12 miles from Kuala Lumpur, the capital of the Federated States, which, besides being the seat of Government, is the location of Institute of Medical Research - thus facilitating the execution of scientific investigations desired by the Medical Officer in charge of the lepers.

(b) The Topography of the site.

The settlement lies in a valley surrounded by densely forested hills rising some hundreds of feet above the valley. Some idea of the nature of the country can be gathered from the photographs 1 and 2.

In former times this valley was a waterlogged swamp, fed by the numerous ravines running between the hills and by the seepages from the hills themselves - thus, the whole area was a breeding ground of Anopheline mosquitoes and was in consequence either malarious or highly potentially so. Hills surround the valley on three sides, the opening being to the westward.

The settlement was built on the floor of the valley, whilst on the hills to the south the Medical Officer's and Matron's bungalows were erected.

The actual settlement is about 4 miles off the main road and about the same distance from the railway station.

Size. The settlement covers 57 acres of ground.

Soil. There is a shallow stratum of sandy loam upon a clay bed.

Water Supply. This is obtained from an exclusive catchment area in the hills. The water is stored in a reservoir
MAP I.
Showing geographical position of Sungei Buloh.
at the side of the valley and from there pipes take it to all parts of the settlement.

Sanitation. There is a complete system of sewage disposal, with automatic water flushed latrines, septic tanks and aeration beds. At the outlet are two chlorination plants which sterilise the effluent. Dry refuse is burnt in incinerators.

Illumination. Electricity is drawn at high voltage from the town supply in Kuala Lumpur and broken down at a large transformer stationed in the settlement. The wards, houses and buildings generally are supplied with electric light, and power is used for part of the large sterilizing apparatus, operating theatre, and medical-electrical treatment in the sick wards.

Anti-Malarial Measures.

When Sungei Buloh was selected as the site of the new settlement, the first necessary step was the elimination of mosquito breeding.

Before construction was commenced the area consisted of jungle covered hills, where this had been cut down secondary jungle had appeared, and in addition there was a dense swamp in the valley bed. In this state the area was a breeding place of such jungle loving mosquitoes as Anopheles aitkeni.

It was realised that as soon as clearing was commenced sunlight would be brought to the tiny jungle streams and seepages and with it would come Anopheles maculatus, the most potent vector of Malaria in Malaya.

For the satisfactory construction of the settlement all possible breeding places of mosquitoes had to be eradicated. To this end the whole valley was cleared of bushes and long grass and the slowly running swamp stream was converted into a large open concrete drain, and an extensive system of underground drains was laid along the contours of the hills and across the bottom of the valley to connect with the central drain. By this method the level of the water table was lowered and all water, except that in the central drain, placed underground.

Whilst all this permanent work was being carried out vigorous oiling of all surface water within the half mile radius of the coolie lines was practised as a temporary measure to protect the labourers.

Around the settlement are three other ravines all within the half mile radius of the outskirts of the settlement. Consistent with the universal custom in Malaya this half mile radius was also protected. To do this it was necessary to
Diagram 1
Ground Plan
Sungei Buloh
clear and level the floors of the ravines, side drains and a central drain were dug. A plan of the drainage in Ravine "C" is shown together with a photograph showing the valley with the anti-malarial work completed.

**Construction.**

The accompanying diagram reveals the main plan of the settlement. It will be seen that it forms a great triangle.

1. **The General Outlay.**

At the apex of the triangle are the administrative buildings, the admission block and the sterilizing rooms.

Outward, along the left wing, is the segregated female section whilst in the corresponding position along the right wing are the male treatment wards.

In the middle of the triangular area the married quarters are grouped into several sections, whilst beyond, at the base of the triangle, is the area to be later developed as farming and grazing lands.

11. **Administration and Medical Buildings.**

(a) **Medical.** At the gateway are the visitors' hall, the staff cleaning room, the sterilization rooms, and the dental clinic. The reception hall is open on two sides, has a low central barrier for the protection of children. Seating accommodation is provided and there is an attendant to call those whom friends or relatives have visited. Adults are allowed into the settlement, but children are excluded, hence the barrier. Parents are permitted to see their children over the barrier - keeping at a reasonable distance.

The staff cleansing room is provided with adequate cleansing facilities, modern basins, antiseptic lotions, sterilized towels and gowns. This room, like the sterilizing room, is served by non-leper uniformed attendants (sinks).

Sterilizing rooms consist of two rooms with steam autoclaves, hot air and electric sterilizers. Here the staff gowns and gloves are sterilized daily as well as official documents, letters, money, etc.

(b) **The Leper Office** is a large 4 roomed building containing a properly equipped office for the leper staff of the stores and maintenance branch. There is a gift store where donations in kind from outside
No. 1. Appearance of Colony looking from the admission office.

No. 2. Ravine "C" showing central concrete drain and cleared floor of ravine - antimalarial work.
gift store where donations in kind from outside friends are kept before distribution. There is a fourth department for general repairs to broken equipment and where shoes are made for the inmates by patients who receive a small wage.

Photograph No. 3 shows the leper office.

III. The Housing of Lepera.

(a) Female. As can be seen from the ground plan, on the extreme left is the section housing the females. This is enclosed in a seven-strand barb wire fence 5 feet high.

The section consists of about 30 small houses each accommodating 2, 4 or 6 females. These buildings are described in detail under the section - married quarters.

There is in addition a ward for the sick patients (these include medical and surgical diseases and lepra reactions). This type of ward will be described in detail in a later section. This ward is provided with 24 iron bedsteads and bedding and is staffed by "nurses" drawn from amongst the inmates and a male dresser. These are all under the immediate supervision of the Matron.

Photographs 4 and 5 give views of the large ward.

(b) Married quarters. There are two groups of 50 houses in each. In one group are the early and early-mild cases, whilst in the other are the advanced cases.

These houses are built in groups of six in a somewhat circular-terraced plan on the side of the hill - to avoid the monotony of streets. Each group of six houses has two latrine rooms and two bath houses in the centre, whilst in the centre of the whole 50 houses is the communal laundry for the group.

The houses are built of brick, plastered inside and out and distempered yellow on the outside and cream on the inside. The roof is constructed of an outer layer of red tiles and an inner layer of asbestos sheeting to prevent heat radiation. Each is provided with electric light and power and reticulated water system. The sanitation of the latrines is water borne.

Other houses in the group are constructed to accommodate 4 and 6 persons. All houses have individual garden plots at the sides - those cultivated
No. 3. The leper office in the foreground and the outpatients’ treatment block in the middle background.

No. 4. Exterior female treatment ward.
No. 5. Interior female treatment ward.

No. 6. Exterior of cottage in married section. This cottage housed two adults and their leper child aged 5.
contained mostly flowers with a few vegetables. Although this section is subtitled "married quarters" many of the houses are tenanted by groups of males.

(c) Male treatment wards. Many of the "single" men are ambulatory cases and live in the married quarters, but many again occupy a bed in one of the 10 special treatment wards. These wards are specially designed to provide every facility for tropical nursing. Each ward measures 39 feet by 72½ feet. The roof is sloped, 25 feet high in the centre and constructed of an outer layer of red tiles and an inner layer of asbestos sheeting to prevent heat radiation. The side walls - except for supporting pillars - are constructed of a series of high opening "doors". These swing on either a central or a lateral pivot, thus the whole of the side wall can be converted into one long open space, allowing the maximum of air and coolness. Photographs 7, 8 and 9 show these features.

Each ward has 24 wooden beds provided with seagrass matting and red blankets. The ward staff consists of dressers drawn from the patients. These wards are devoted to special treatment and research and are grouped to form a block, a covered way joins them together. This is shown in diagram.

For the sick males there are two separate wards built in exactly the same manner as the 10 experimental wards except that these wards are mosquito proofed, and to allow this to be done the partitioned sides are pivoted at the ends thus opening as a door. The wire gauze is on the inside.

In these wards medical and surgical complications and leprosy reaction cases are treated. These are staffed as usual by patient dressers.

(d) Houses of the "better class" patients. Wealthy Chinese and Indians who have been accustomed to superior homes are accommodated in bungalows actually outside the compound. A house of this type is shown in photograph 10.

IV. Treatment dispensary. The outpatient buildings for the examination and treatment of an ambulatory group of inmates consists of a dispensary, a routine treatment block, classification rooms and a laboratory. The routine treatment department is a wide roofed building open on three sides and measuring about 20 feet by 50 feet. It is divided into a surgically clean part for routine intradermal and other injections and a separate place for the treatment of leprotic sores. The building is shown in photograph 11.
No. 7. Exterior male treatment (research) wards.

No. 8. Another view of male treatment ward.
No. 9. Interior of male treatment ward.

No. 10. Houses of the better class Chinese lepers.
Adjoining this department are the dispensary and classification rooms. In the classification rooms periodical examinations are made to estimate the progress of patients. The main room, 29 feet by 19 feet, has a non-patient side for the filing of treatment charts, indexing of groups under special treatment, and recording of the results of drug investigation.

In the laboratory routine microscopic examination of slides and sections are made and special experimental and biochemical work is undertaken. The laboratory is fully provided with special equipment, marble shelves, wash basins, and acid proof counters.

The laboratory staff consists of a technical assistant who in turn is assisted by 5 or 6 "usefuls". All these are patients. The technical assistant is a Tamil.

V. Administrative.

1. **Ration distributing office.** In what might be considered the centre of the settlement there is a building approximately 70 feet by 20 feet where the daily ration is distributed to each patient. This is a brick building having three sides open but protected by a wide overhanging roof.

2. **Police.** Close to the administration block there is a small assembly room for the Settlement Police. This is a permanent structure built of brick and plastered over.

3. **Jail.** In close proximity to the Police Barracks there is the jail, also a permanent structure. Photograph 12 shows a view of the jail.

VI. Social.

1. **Clubs.** The settlement has 5 social clubs, a women's club for both indoor and outdoor games, an Indian club and a Chinese club with books, newspapers, magazines and gramophones, an English speaking club with a Library, billiard table, two pianos, indoor games and a badminton court. Lastly there is a dramatic club where musical entertainments, dramas and conjuring shows are organised. The buildings housing these clubs are built of weatherboard and were erected and partly furnished at the expense of the inmates of the various races concerned. The Medical Superintendent arranges for newspapers, magazines and gramophone records to be added from time to time. Photograph No. 13 shows a front view of the English speaking club.
No. 11. Interior of outpatients' treatment clinic. Note it can be seen to be open on two sides.

No. 12. Leper "policemen".
2. Churches. Within the settlement are several churches, also facilities are provided for each of the Eastern races present to conduct meetings according to their own religious rites. The Christian religion is represented by Protestant and Roman Catholic Chinese Churches, erected by the creeds concerned. The religious services within these churches are conducted by patients but frequent visits are made by clergymen from outside the Settlement.

VII. Recreation grounds. A large area at the entrance is devoted to playing fields where football, cricket, tennis and badminton are played.

VIII. Educational.

Schools. There are two schools for children patients:

(a) A Malay-English School,

(b) A Chinese-English School.

The buildings were erected and equipped by the Government. The teachers are patients.

IX. Commercial.

The Settlement Shops. There are four shops for the use of patients; these are situated in the small houses of the "married quarters" where a Chinaman has divided the front room off with a partition using part as a shop and the remainder as living quarters. No special buildings have been erected.

The shops are managed entirely by individual inmates, they are not co-operative. These shops are subject to two restrictions — that no opium nor alcohol is on sale and that nothing but metal money may pass as currency — it is easily sterilised.

Costs. The gross cost of all building construction including sewage, electric light, etc. was £839,000 or A.£125,850. This may be stated in another way — to house approximately 1,200 patients the per capita capital cost can be given as £700 or A.£104.

Staff.

The staff consists of:

(a) The Medical Superintendent, who is the officer-in-charge. His duties consist almost exclusively of treatment and research. He informed me he is not anxious to become involved with any farming
No. 13. The gaol.

arrangements. It had been the intention of the
Government to appoint a lay manager, who would
organise and control farming and stock raising,
but owing to the present financial stress this
post has not yet been filled.

The Medical Superintendent, prior to his
appointment to this position, had four years
service in Malaya as a Medical Officer, and when
appointed to Sungei Buloh had not had any previous
Leprosy experience.

(b) An Assistant Medical Officer, who is a Tamil with
a L.M.S. (Singapore). He has been stationed at
the Settlement since its inception. His duties
are the supervision of all routine treatment,
supervision of the laboratory, and he is responsible
for the discipline of the Settlement.

(c) The Matron is a European hospital trained woman
who superintends nursing in all wards but with
special attention to the female ward.

(d) Two Sikh Dresser Attendants who assist and
accompany the Medical Superintendent on his rounds.
They also act as the attendants at the Reception
Office.

All the above are free from leprosy and are
the only five persons residing at the Settlement
who are not leprotic.

(e) Stewards. The stores and general management are
in the hands of a steward who has numerous
assistants. The stores are indented for and
issued by the steward, the M.O. merely signing
the necessary forms when completed. This arrange-
ment relieves the Medical Officer of a tedious and
monotonous task allowing him to devote much more
time to treatment and research.

(f) Dressers. All dressers are patients. In each ward
there is a head dresser who has assistants and
"usefuls" under him. Case records, temperature
charts, urine examination and administration of
drugs are carried out by these dressers. In many
instances they have had experience in hospitals
and dispensaries, but many again have had no
similar experience and have been trained by the
Settlement staff.

All patients employed in wards can speak English.
(g) **Police.** There are a dozen leper "Policemen". Their work consists in organising exercise groups, helping the older people and the children and acting as messengers in the Settlement. They are elected by the inmates and are provided with a uniform. Photograph No. 14 shows the "police" lined up for inspection.

(h) **General labourers.** These include grass cutters, sanitary gangs, etc. The whole of this work is carried out by patients.

(i) **Remuneration of Staff.** The personal emolument of the permanent staff is listed separately in the estimates and is shown under.

<table>
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<tr>
<th>Post</th>
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<th>A.£</th>
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<td>1,160</td>
</tr>
<tr>
<td>Assistant Medical Officer</td>
<td>4,390</td>
<td>653</td>
</tr>
<tr>
<td>Matron</td>
<td>3,240</td>
<td>486</td>
</tr>
<tr>
<td>Chief Clerk and Steward</td>
<td>2,520</td>
<td>378</td>
</tr>
<tr>
<td>Dresser, Grade II</td>
<td>1,680</td>
<td>252</td>
</tr>
<tr>
<td>Two Dressers, Grade I</td>
<td>1,525</td>
<td>228</td>
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£21,100  £32,162.

The patient-workers (dressers, assistants, etc.) are given a small monthly dole (£4 - 10) in return for services rendered. Everybody has thus the opportunity of earning a little money. For example - apart from the regular dressers, etc. - a blind boy will need an attendant to feed and generally care for him, this attendant would be paid £2 - 4 a month. The system of giving patients treatment in return for work done is not considered a justifiable one. A patient who does a whole day's work in wards, etc. requires money as he is under the necessity of paying some one to cook his food.

**Patients.**

1. **Source.**

As stated in the introduction the Settlement admits lepers from the Federated Malay States and also from the Unfederated States of Trengganu, Kelantan and Johore. The patients are sent to Sungai Buloh by either a Medical Officer or a Health Officer in the state or town where the disease is detected.

2. **Legal Powers.**

A copy of the Leprosy Enactment with Amendments, as pertaining to the F.M.S., is given in Appendix 1.
3. **On Admission** a patient is taken to the observation wards for one month. Here, while he familiarises himself with his new surroundings, medical and other data pertaining to his case are gathered. His pulse and temperature are recorded twice daily, his bowel hygiene, appetite, teeth, etc. are studied and their condition noted. A detailed physical examination is made, his blood and faeces are examined microscopically a number of times, his urine tested, his haemoglobin estimated, his blood sent to the Institute for Medical Research where Wassermann and Khan reactions are done. Further special biochemical and medical tests are made when necessary. From the data thus obtained his general health is regulated and complicating diseases are cleared up before any treatment for leprosy is commenced. Treatment is given for ankylostomiasis as a routine. During this time he is seen daily by a doctor and is under ward supervision.

At the end of a month he and his condition are reviewed. The Medical Superintendent decides whether he would be suitable for special or routine treatment or whether he could be used in a research group. Furthermore, if the Medical Officer considers he would "look after" a house he is drafted into one, otherwise he is housed in a ward.

On admission every patient is presented with a case record board on which is pasted the results of all investigations together with records of treatment, temperature charts, etc. This board he retains and takes with him from ward to ward and to each interview with and examination by the Medical Officers.

4. **Rations and Clothing.**

Rations are issued daily to each patient. It has been found that if issued at longer intervals the Chinese gamble it away and the Tamils eat it all the first day.

Two suits of clothing are issued per annum to each patient.

5. **Social intercourse.**

The five clubs whose buildings were alluded to in the structural section form athletic and exercise groups, they organise inter-racial football and other games and they aid the staff by disseminating ideas on cleanliness and self respect amongst the newer patients.

Besides the periodical dramas enacted in the
Settlement itself, open air cinemas are shown from time to time. A radio with a loud speaker provides an accompaniment to the film. From time to time lectures on subjects of general or special interest are given by volunteer speakers from the capital.

6. **Education.**

   (a) **Children.** The government provides for educational facilities by employing an educated inmate as teacher for the leper children, who number over 80. Teaching materials are supplied. An English class is given for one hour daily, for the rest of the school day the children are taught in their own language.

   The school rooms were very tastefully decorated with water colours and wax flowers, the work of the children.

   An effort is made by provision of plenty of outdoor games, sport days and occasional picnics, to ensure that the children do not become bored.

   (b) **Adults.** Through the clubs the patients are taught the practical points that affect their disease, the food they should eat, cleanliness, the symptoms they should watch for. This is done both by propaganda sheets and by lectures. Particular attention is paid to early cases so that their time in the Settlement may be spent not only in eliminating both their leprosy and other concomitant ailments, but also in receiving an education in the prophylaxis and perils of their disease.

7. **The daily life of the patients.**

   It is extremely difficult to set out a routine as many and varied are the tasks and amusements of the patients.

   All patients must be out of bed at 7 a.m. The police patrol all houses at this hour, and remove any lingerers unless they are sick when they are taken to hospital. It is not compulsory for all to work, but every English speaking male is given something to do in the wards. From the others remaining labour gangs are recruited, but many, especially the older Chinese, do not work, and one suspects that they augment their savings with a little quiet gambling. Married women are not expected to work except to care for their houses and do the cooking. Single women are recruited for ward work, work in the sewing room, etc. Children attend school.

   No attempt has been made at collective farming, a few enterprising householders growing vegetables, etc., for
their own use. As pointed out above, this is due to lack of staff - there is ample ground available when a lay superintendent has been appointed.

Although a barbed wire fence surrounds the Settlement and there is a guarded gate this is not to keep patients in but rather to keep hawkers out. The Medical Superintendent lays stress upon the fact that the lepers are free to leave when they like but very few ever avail themselves of the offer; this is probably because of the absence of restraint.

If a patient does run away he invariably returns for most of them recognise that within the Settlement they are better fed, better housed and better clothed than ever they were before, and furthermore most of them realise that without treatment they will not get better, probably the reverse, and that it is only within the Settlement that treatment can be obtained.

It is easy to see that public opinion runs very strongly through the Settlement and nearly all inmates realise that certain things are simply not done. All this, I am sure, depends on the standard of hope, of respect and of contentment set by the personality of the Superintendent.

8. The remuneration of the patients.

All patients who work are paid something. It varies from £2 - 10 per month depending on the nature and extent of the work.

9. The problem of Marriage.

The problem of control of a mixed leper settlement inevitably raises the question of the advisability of marriage amongst lepers. It is admitted that no child is ever born with leprosy, and the newly born children have, therefore, to be separated from their leprous parents in order to prevent them becoming lepers.

It is recognised that in this mixed community any measure short of complete sterilization of all males (which is impracticable) will not make the slightest difference on the birth rate. Permission is therefore given for marriage within the settlement.

Married quarters are supplied in each section. The cases in the married quarters have their food better cooked, their houses and gardens are kept with cleanliness and care, and they seem to benefit more from treatment and they lend stability and tone to the general atmosphere.
The resulting birth rate is extremely low. Children born in the Settlement are removed after two weeks to the General Hospital, Kuala Lumpur, and either cared for there until their parents release or adopted by philanthropic families outside.

The Future? - Hope of Discharge.

Patients are encouraged to look forward to ultimate discharge. They are considered ready to leave the Settlement after being clinically and bacteriologically free from symptoms for six months. Three full examinations are made during that period. On discharge a patient is given a railway ticket to his home and a certificate to his previous employer. For those who wish, and who are otherwise suitable, a passage to India or China is given. In cases out of economic touch with the outside world, an effort is made to find suitable employment. Such cases as remain in Malaya on discharge are under the supervision of the local Health Authority.

The discharge rate.

The following is the list of discharges during the second six months of 1933:

<table>
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<th>Date</th>
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<th>Tamil</th>
<th>Malay</th>
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<td>18. 7.33</td>
<td>1</td>
<td>1</td>
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<td>20. 7.33</td>
<td>1</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>9. 9.33</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>12. 9.33</td>
<td>-</td>
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<tr>
<td>15. 9.33</td>
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<tr>
<td>10.10.33</td>
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<td>4.11.33</td>
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<tr>
<td>25.11.33</td>
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</table>

Total: 11 Chinese, 8 Tamil, 7 Malay = 26.

Number of Patients on 8. 6.1934.

| Chinese | 933. |
| Tamil   | 173. |
| Malay   | 53.  |
| Javanese| 9.  |
| Eurasians| 10. |
| Others  | 1.  |

Total: 1,179.
Treatment.

After the month spent in the admission ward and the line of future treatment has been determined, the patients are drafted into their respective treatment groups.

Routine treatment.

This is administered to those not deemed suitable for special research. The treatment consists of bi-weekly intramuscular injections of the iodised ethyl esters of Chaulmoogra Oil, commencing with a small dose and working up to a maximum, which is determined according to weight and age.

In addition to the intramuscular injections, suitable cases are also given a weekly intradermal injection of the iodised esters into the lesion according to the standard technique.

The course of the intramuscular injections lasts six months, and then the patient is given a month's rest, and his case is reviewed and if necessary further treatment initiated.

Those patients suffering from advanced kidney involvement or pulmonary tuberculosis are given smaller-than-usual doses of the whole Chaulmoogra Oil, it being deemed less toxic than the esters.

Research.

As was stated previously the cases for special treatment with drugs under investigation are housed in the ten special investigation wards where they are weighed, a smear made from the centre, and the periphery of the lesion, and the blood sedimentation rate recorded every ten days.

Dr. Ririe, the Medical Officer in Charge, has for some time been experimenting with various dyestuffs. Brilliant green, trypan blue and others have been tried, only to be abandoned. In the case of trypan blue, investigation shows that 30% of the supposed cures relapsed within one year. After reviewing his results, Ririe has come to the conclusion that no dye so far used by him in the treatment of leprosy is of any lasting value.

Recently a fresh attempt has been made - on this occasion with a derivative of florescence - namely phthalic acid. The experiment is not yet completed, the cases being still under treatment, but results so far available suggest that it may be of definite value in the treatment of leprosy. Smears and sections examined after a course of treatment and
No. 15. Patient showing white areola around areas treated with phthalic acid 5 months before. Method of administration was intradermal.

No. 16. Showing cutaneous lesion on skin of male leper. The flattened area in the centre is the site of intradermal injections four months previously. This area of skin is now apparently normal. Phthalic acid was used for the intradermal injection.
No. 17. Showing administration of intradermal injection.

No. 18. Another view of an intradermal injection.
in many cases only after part of a course of treatment show the bacilli to be broken up into fine granules - suggesting the disintegration of the organism. The course of treatment consists of a bi-weekly intravenous injection of 20 ccs. of a 2% solution continued for three months. Also the drug can be used for intradermal injections. It is noticed in some cases receiving intradermal injections that a white areola appears around the nodule treated - especially this so after the nodule has disappeared. Dr. Ririe suggests that this is due to a local nase-constriction. Photograph No. 16 shows lesions treated with phthalic acid.

Out of a group of 40 cases being treated with phthalic acid, in one Chinese (older than the average) the treatment had to be suspended because he became weaker and nauseous and vomiting set in. Otherwise most of the patients on the treatment show a marked general improvement and many put on weight. In most cases the results were very satisfactory, in a few cases no improvement was to be seen after three months treatment.

There is a definite febrile reaction after an injection of phthalic acid, sometimes the temperature lasting three or four days, falling by lysis. It has been observed at Sungei Buloh that during a lepra reaction there is a retention of calcium in the body, for no calcium is excreted in the urine.

\[
\begin{align*}
\text{Gross cost of construction) } & \quad \£&39,000. \\
\text{Buildings, Sewage, etc.} & \quad \£&125,850. \\
\text{Annually recurrent expenditure.} & \\
\text{Personal emoluments} & \quad \£&21,100 \quad \£&3,162. \\
\text{(see under Staff)} & \\
\text{Transport and travelling} & \quad \£&580 \quad \£&92. \\
\text{Maintenance of Lepers} & \quad \£&171,000 \quad \£&25,650. \\
\text{Maintenance of non-leprous children of leprous parents} & \quad \£&4,200 \quad \£&630. \\
\text{Total} & \quad \£&196,880. \quad \£&29,534.
\end{align*}
\]

This may be stated as a per capita cost per day, of approximately 50 cents. Of this 50 cents, 18 cents represent food and drugs and the remaining 32 cents represents wages and maintenance. In Australian currency 50 cents is worth about 1/6d. and 18 cents equals 6½d.