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<th><strong>Title</strong></th>
<th>Method for Treatment and Control of Tuberculosis in Tanganyika</th>
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<tr>
<td><strong>Author</strong></td>
<td>Gordon, C. G. I.</td>
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<td><strong>Qualification</strong></td>
<td>PhD</td>
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<td><strong>Year</strong></td>
<td>1959</td>
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THESIS
FOR
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A METHOD OF TREATMENT AND CONTROL OF

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By C.G.I. Gordon, M.B. Ch.B. (U. Edin.),
A METHOD OF TREATMENT AND CONTROL OF TUBERCULOSIS IN TANGANYKA.

The paper sets out to describe the methods which have been adopted to deal with the situation in the Northern Province of Tanganyika Territory, East Africa, and to present the results of treatment as detailed in a series of 100 African patients treated by this method for a period of eighteen months.

HISTORICAL NOTE.

In most countries the ravages of tuberculosis can be traced from ancient records and writings. The direct cause of this nature has been discovered, so far, in Africa south of the Sahara.

There is a strong body of circumstantial evidence to suggest that tuberculosis was first brought to the East African coast by early traders.
A METHOD OF TREATMENT AND CONTROL OF TUBERCULOSIS IN TANGANYIKA.

The prevention and treatment of tuberculosis in the tropics presents many problems which are not commonly met with in Great Britain. These problems are of great diversity and range from the purely financial aspects of treatment, to difficulties arising from the customs and mode of life of the indigenous population.

This paper sets out to describe the methods which have been adopted to deal with the situation in the Northern Province of Tanganyika Territory, East Africa, in the past two years.

The pattern of control and treatment centres on a home treatment scheme based on community co-operation and the results of treatment are detailed in a series of 100 African patients treated by this method for a period of eighteen months.

HISTORICAL NOTE.

In most countries the ravages of tuberculosis can be traced from ancient records and writings. No direct evidence of this nature has been discovered, so far, in Africa south of the Sahara.

There is a strong body of circumstantial evidence to suggest that tuberculosis was first brought to the East African coast by early traders from certain Eastern
Mediterranean Countries, from Arabia and possibly from India and China.

Thus, the disease was known in China in ancient times and was called Lao-Ting. The Indo-Aryans described pulmonary tuberculosis as early as 1500 B.C. and the disease was also described by the Persians Rhazes and Avicenna. Pathological evidence of the disease has been demonstrated in Egyptian mummies who showed evidence of spinal caries. Hippocrates, (School of Cos, 460–370 B.C.) gave us the first authentic historical account of the disease, and the treatment which was sometimes advocated, was a long sea voyage.

The route to the East African islands was well known in the Eastern Mediterranean world from the late Hellinistic period to the time of Justinian. In the 1st Century A.D. the route was described in detail by the author of "Periplus of the Erythraean sea", and there was frequent coastal trade at this time between South Arabia and the Rhapta area. (Mafia and Kilwa). Ptolemaic silver coins have been discovered recently at Msasani, a village near Dar es Salaam.

It would seem likely that the disease was at first confined to the coastal belt and spread inland at a later date, along the slave and trade routes, as these developed.

However this may be, the infection was distributed widely in the Territory, by the early part of this century, though Pieper, (1910), using the Von Pirquet test in German East Africa (now Tanganyika Territory), found more positive reactors among Indians in East Africa than Africans.
The Northern Province and Tanga Province are outlined.
DEVELOPMENT, 1926 - 1956.

In 1926, attention was focused on the high incidence of tuberculosis in the Kilimanjaro area of Northern Tanganyika, as evidenced by returns from the District Hospital at Moshi. A Tuberculosis Hospital was set up in 1927, at Kibongoto, on the Western slopes of the mountain.

An important Territorial survey had been carried out between 1950 and 1956, Wilcocks (1958). This survey included the tuberculin testing of over 15,000 Africans in all Provinces of the Territory, and confirmed that tuberculous infection was present in all areas, though the incidence of infection varied considerably from District to District, being higher in the more densely populated areas and especially so in the Tanga and Northern Provinces. The coastal areas around Dar es Salaam showed a high incidence of infection, and the incidence was fairly high in the towns around the Great Lakes. The figures will be found in Appendix A.

In the 1950's, the development of tuberculosis services was curtailed by the financial stringencies of the times.

From 1955 onwards, selected cases received artificial pneumothorax treatment at Kibongoto and continued refill therapy as out-patients, under treatment and observation, at selected dispensaries in the area and at certain main centres in the Territory. A small number of beds was available for tuberculous patients at the larger Government Hospitals and certain Mission centres.

During the war years, the existing services were maintained
with restricted funds and depleted staff. The Annual Report of the Medical Department (1944) stated that...

"Specific proposals for the expansion of the tuberculosis service with a view to securing early diagnosis and treatment and minimizing family infections have been included among post war development plans." These plans were later modified and delayed, due to financial stringency.

Quite apart from the financial aspects, three main factors blocked the development of a Territorial Scheme for the treatment and control of tuberculosis and appeared to render the problem of tuberculosis insoluble. These factors will be dealt with in detail, in due course. They are:

1. The presence of a high and rising incidence of active disease.

2. A very acute type of disease reacting unfavourably to the treatment available.

3. Factors arising from the customs and mode of life of the indigenous population and from the difficult terrain.

In 1950, the advent of specific antibiotics for the treatment of disease, stimulated interest in the problem of tuberculosis, but through their inefficient use, led to further difficulties. (vide infra).

A plan for the Development of Medical Services in Tanganyika had been drafted in 1956 and stressed the growing Public Health and administrative problems associated with the high incidence of tuberculosis. The erection of additional sanatoria was proposed and tuberculosis wards were to be built at certain district hospitals. Assistance would be afforded to certain Medical Missions. The plan was adopted to the extent
of available resources.

INCIDENCE OF DISEASE.

The extent of tuberculous disease in East Africa in general and Tanganyika Territory in particular, may be judged from the results of certain surveys. Thus, Haynes (1949), estimated an incidence of 11.1 cases of active tuberculosis per thousand population in Kenya, and Wilcocks (1952), an incidence in Tanganyika of 11.5 per thousand. A recent World Health Organisation survey in four districts of Southern Tanganyika, (1958) has estimated the incidence in these areas at between 2 and 8 per thousand population.

There is considerable evidence to suggest that the disease has been on the increase in East Africa for many years.

There is no doubt that improved methods of diagnosis account for a proportion of the cases seen in recent years, but there is evidence to indicate an absolute increase in most areas.

True vital statistics are not available for the country as a whole. Hospital records and notification rates in the larger municipalities have been examined. Thus, Wilson (1944), reported a steady increase in the number of cases in the Dar es Salaam area, and in 1946, it was observed that the numbers of both notified cases and deaths from the disease had doubled in this area in the previous four years. In Tanga Province (1946), pulmonary tuberculosis was recorded as the highest single cause of death, accounting for 21% of all hospital deaths. The Senior Medical Officer, Tanga (1947), expressed anxiety at the number of cases of pulmonary tuberculosis seen at Tanga Hospital and considered that the
Northern Province - Population Densities & Tanga

Illustration 1.b.

Illustration 1 c.

Situation in 1957.

... Controlled home treatment commences in Kilimanjaro area.

... Survey in Masailand reveals low incidence of active disease in hinterland, rising incidence near towns. (1956).

... Survey in Mbulu District reveals near epidemic. District scheme commences.

... Tuberculosis beds available and in use.
disease was on the increase in the area.

In 1956, a marked increase in the number of new cases admitted to Kibongoto Hospital from the Mbulu District of Northern Tanganyika, led to a survey by the writer. It was established that an outbreak of tuberculosis of almost epidemic proportions had occurred in a tribe which had previously shown a relatively high infection rate, but average active disease rate. In the following year, a further survey was carried out by the writer, in Masai Land. Hospital records had shown that no Masai had been admitted to the Hospital prior to 1942, but that the rate of admissions was now rising rapidly. The survey proved that there was a high incidence of infection and disease amongst Masai tribesmen living within range of the larger trading centres, though the incidence of infection and disease remained low in the hinterland.

This increase in tuberculosis is not confined to Tanganyika. A study of hospital admissions in Kenya led Haynes (1949) to conclude that "The percentage of tuberculosis admissions on total admissions shows a steady and significant increase over the whole period (1930 - 1947)." Gilmour (1949), of Uganda considered that "These statistical (Hospital) returns do suggest that pulmonary tuberculosis is truly increasing. Davies (1949) in Tanganyika, concluded that tuberculosis is undoubtedly on the increase in East Africa. In this respect Appendix B is of interest.

THE DISEASE TYPE AND REACTION TO TREATMENT.

It is generally agreed that tuberculosis in the African is a more acute process than in the European, Cummins (1935), Stott (1951). Fox (1956), demonstrated the widespread nature

Illustration 3. At Closer Quarters.
of the pulmonary lesions in the African and this was confirmed by the writer (1958) in a series of 200 cases who came to operation. Vint (1937) in Kenya and Davies (1947) in Uganda, studied a series of autopsy specimens and remarked on the vast preponderance of progressive primary disease with little or no evidence of fibrosis and with extensive dissemination.

Pagel (1953) considered that this acute type of disease indicated an individual and racial susceptibility to tuberculosis. Benjamin (1957) while agreeing that racial factors play a part, stressed the effects of poor standards of living and inadequate nutrition in the production of an acute type of disease.

It will be appreciated that the high incidence of an acute tuberculous process presented very difficult therapeutic problems in the years prior to the advent of antibiotics. There were some authorities who considered that tuberculosis in the African was untreatable, and always resulted in death. Table I illustrates the sputum conversion rates obtained at Kibongoto Hospital in all pulmonary cases admitted in the years 1947 to 1952, and includes cases on artificial pneumothorax and pneumo-peritoneum therapy.

Table I. Sputum Conversion Rates (Kibongoto Hospital).

<table>
<thead>
<tr>
<th>% Sputum Conversion</th>
<th>1947</th>
<th>1948</th>
<th>1949</th>
<th>1950</th>
<th>1951</th>
<th>1952*</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.6</td>
<td>9</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>15</td>
<td>27</td>
</tr>
</tbody>
</table>

* Antibiotics were in limited use in 1952.

These sputum conversion rates may be compared with
those obtained by the writer in 1957 and 1958, when adequate dosage and combinations of antibiotics were in use. Table II.

Table II. Sputum Conversion Rates (Kibongoto Hospital).

<table>
<thead>
<tr>
<th>% Sputum Conversion</th>
<th>1957*</th>
<th>1958+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>79</td>
<td>90.3</td>
</tr>
</tbody>
</table>

* The new drug regimes were introduced in May 1957, when the writer took charge of the hospital.

+ Includes chronic resistant cases comprising 50% of the total in-patients.

There was no doubt that the African type of disease reacted very favourably to the antibiotics streptomycin, Isoniazid and Para-Amino-Salicylic Acid.

CUSTOMS AND LIVING CONDITIONS.

Heaf (1957), included among the accepted premisses of tuberculosis, that "The incidence of the disease is closely related to social and economic conditions."

The customs and living conditions of the various African tribes in Tanganyika can seriously embarrass preventive and treatment schemes and this will become clear in the text. Tribal customs are rooted in antiquity, and in general, it is better to modify a treatment scheme to suit the local conditions rather than to antagonise the people by attempts to alter their normal habits. Certain customs actively favour the spread of tuberculosis, the universal habit of spitting is one of these. In a case like this, steps must be taken to discourage the custom by health education and
Illustration 4. Mud, Clay and wattle Round House with Thatched Roof, South Pare District - 1959.

Illustration 5. A 'Bee-hive' Type Chagga House - 1959.

Illustration 6. Conical Type of 'Bee-hive' Dwelling - 1959.
propaganda, as will be seen later.

The life and customs of the Chagga tribe will serve as an example. This tribe provides some 45% of new patients entering Kibongoto Hospital. Other tribes in the area controlled from the hospital include the WaPare, the WaMeru, the WaArush, the Masai, the WaMbulu (comprising several distinct tribes) and the Barabaig, and several subgroups.

In general, it may be said that these other tribes have not yet reached the stage of development of the WaChagga.

The Chagga Tribe.

A progressive African tribe numbering about 510,000 people of mixed Bantu origin and with Nilotic-Hamitic elements. The tribe inhabits some 2000 square miles on the foothills and slopes of the volcanic Kilimanjaro range, at an altitude ranging from two to six thousand feet above sea level, and from the relatively arid plains to the lush sub-tropical rain forest area, higher up the mountain.

The staple diet is the banana, of which there are over thirty varieties and these are eaten raw, boiled, stewed or curried. Meat is consumed on an increasing scale, mainly goat, mutton and beef. The local root and leaf vegetables have been augmented in recent years by a variety of vegetables of European origin. These include cabbages, beans, potatoes, onions etc. Maize and other cereals are used to a lesser extent than by the average African tribe.

Milk is highly considered, even when sour. The women of the tribe are expected to consume a great quantity of milk and butter, both before marriage - as a fattening and beautifying process - and also in the months after
parturition. The stature of the husband is gauged by the amount of milk and butter which he provides for his wife during the period of lactation. The children are breast fed for as long as possible – up to 18 months or more, and the mother who is unable to breast feed is scorned. Twins are still regarded with disfavour as it is considered that they imply maternal promiscuity. The husband is disgraced if his wife should bear children more often than once in every two years.

The local alcoholic drink is known as 'pombe' and is prepared from small seeds (Elusine or finger millet). Vast quantities of this beer-like drink are consumed. Communal drinking vessels are passed from hand to hand and mouth to mouth according to many set customs, some of which are regrettably unhygienic. It is normal to drink until the brew is finished. The incidence of drunkenness and associated crime with violence, is very high. European type bottled beer and spirits are also consumed and on an increasing scale.

The area is almost entirely agricultural, and there is an acute shortage of land. The main crop is coffee, and some 6,000 tons are produced per year. Bananas, maize, beans and various other vegetables are also grown. Coffee prices have been abnormally high for the past decade, and though grinding poverty is common, the tribe may be classed as well off in relation to most other tribes in the Territory. The future depends to a very large extent on the price of coffee.

Many tribal traditions and customs have died out, such as the wearing of skins and the piercing and distension of the ear lobes. In certain areas, notably
the Kibosho area of Kilimanjaro, witchcraft and certain tribal rites and customs are still maintained. Goats and sheep are still sacrificed occasionally, to facilitate the removal of noxious spirits. Throughout the whole area, skin scarification and native medicines are in frequent use. Polygamy is practised on a decreasing scale by the non-Christian elements of the tribe. Males are circumcised at puberty and about 70% of the females are circumcised with due ceremony, and at the hands of selected old women of the tribe.

The male is dominant and in general, it is considered that higher female education is undesirable. The female carries out the domestic chores and in general, the greater part of the manual work on the small farms.

The traditional house is a nine to twelve foot high beehive-shaped structure, solidly constructed by communal effort, and consisting of a wooden framework, over which is laid a foot thick layer of selected grasses. There are three main types of this house, varying in size and shape. In some areas, banana thatch is used.

The interior of these houses is divided into several compartments; a fenced off area for the sheep, goats and cattle. A smaller compartment, railed off, contains wooden wall bunks for the females of the family, while the males occupy a similar section at the other side of the house. The cooking area is often central, and contains the family hearth stones, selected by the bride at marriage and retained throughout life and often for posterity. A small loft-like store completes the interior arrangements. The houses last well and are often inhabited for thirty or forty years, their solid construction is a
matter for well deserved local pride. The interior is dark and ventilation is either inadequate or absent.

In recent years, an increasing number of small European type houses have been constructed of cement block, local stone or mud and wattle, with doors and windows and corrugated iron roofs, but the traditional house still holds its own in many areas.

The last few years have seen a surge of progress and an increasing and insatiable demand for all forms of education. Many of the old customs are waning in importance and a new era has appeared, an era of increasing literacy and an emergence into modern life with all the stresses and strains that this entails.

The local administration of the area, apart from the overall British administration - consists of a Paramount Chief, The Mangi Mkuu, Marealle II, who presides over the Chagga Council, a local government body. There are also three divisional chiefs, and seventeen area chiefs, together with one hundred and sixteen headmen. These leaders of the community have a very real power and prestige among their people.

**THE AIM.**

The object of the writer, was to organise, develop and expand a system for the prevention and treatment of tuberculosis in the Northern and Tanga Province, with a view to eventual control of the disease.
Available Staff and Facilities.

Hospital Beds.

There were 304 tuberculosis beds at Kibongoto Hospital. Patients undergoing treatment in a series of Medical Research Council Therapeutic Trials occupied 25 beds. Chronic resistant cases and cases for chest surgery occupied a further 21. Bone and joint cases were treated in a further 15. A varying number of beds were in use by patients from other areas of Tanganyika, and the remainder were used for the treatment of pulmonary cases from the Northern Province. The number of beds available for the treatment of acute new cases was therefore strictly limited.

The Official Population Census (1957), had estimated the total African population of the Territory as 8,665,356. If one takes a mean figure of six cases of active tuberculosis per thousand population, there will be approximately 52,000 active cases in the Territory. Haynes estimated there were 58,000 active cases in Kenya in 1949.

The total number of beds available in the Territory for the treatment of all types of Medical and Surgical conditions, reached a total of 6,157 beds in 1957. (This total was 2,140 in 1937 and 3,959 in 1947). The beds allocated to the treatment of tuberculosis realise about one tenth of these totals.

It was obvious, therefore, that a method of tuberculosis home treatment must be employed.
A method of home treatment had been in use in preceding years, but the results had been most discouraging. Patients, on discharge from hospital, had been issued with medicines and asked to return when these were exhausted. The scheme foundered on the very definite inertia of the average African patient. This is compounded of an inherent fatalistic attitude to disease in general, an inborn lassitude, and various other components, such as a widely held belief that discharge from hospital is synonymous with cure. On the other hand, the patients did not receive detailed instruction on the necessity for continuing to take their medicines with regularity, and there is no doubt that several were genuinely confused. Other points worthy of mention are the great distances which some patients were expected to travel, and the financial considerations involved. More general factors included poor diet, inadequate housing, and a high incidence of acute and chronic illness due to unrelated blood and intestinal infestations.

Thus, of every 100 cases discharged to home treatment, 50 were never seen again, and over 40 of the remainder showed radiological deterioration at assessment, a high proportion of these proved resistant to one or more of the drugs, after further in-patient treatment. This experience is confirmed by Haddock (1957), who found that only 40% of patients attended at all at one dispensary near Tanga, and by Thurstön (1958), who noted an attendance rate of less than 50% throughout his district in Tanganyika.

It was considered that successful home treatment must include Health Education of the individual patient and the community in general. It was also clear that there must be control of the patient during the period of his home treatment, in order to safeguard both the individual and the community.
Available Staff.

(The details of the staff available, together with a note on Training and Educational Standards, will be found in Appendix C.)

Briefly, there was one Medical Officer, (the writer), for the first 21 months, when a second Medical Officer joined the staff for a period of 9 months, before transfer without immediate relief. There were two Nursing Sisters and one European Hospital Steward. There were two African Medical Assistants, together with four African trained male nurses, two of whom had many years experience of tuberculosis work.

In the field, there were twelve partly trained African tuberculosis home visitors. These were all of relatively low educational standard, and had been trained in tuberculin testing and case finding, and had carried out district refill therapy in preceding years.

It will be seen that there was a shortage of higher grade medical staff, capable of administering the scheme, and that a great deal of responsibility was placed on the lower grade medical staff.

In view of the fact that the higher grade staff was in short supply, it was considered essential that the scheme should be run on the simplest possible lines, and that assistance must be obtained on the executive side, that is, through the good offices of the patient's chief and headman, in order to provide some additional measure of control in the working of the scheme.

District Dispensaries.

There were 12 small District Dispensaries. These were essentially, out-patient clinics for the treatment of general

Illustration 8. Native Authority Dispensaries.
diseases, and a tuberculosis home visitor was attached to each. There was also a small clinic at Moshi, to which new cases were referred, and which had acted as a major collapse therapy centre for out-patients.

It was considered essential that treatment should be as readily available as was practicable and the number of dispensaries participating was expanded to 51 in the various districts involved. These treatment centres included Government Hospitals, and Mission and Native Authority dispensaries.

This number included two main assessment centres one at Moshi and one at Arusha, which were opened in 1957 and 1958 respectively. These were, in essence, Chest Clinics, equipped with, or having the use of, X-ray and minor laboratory facilities, and they formed the main district bases for complete routine assessment of patients, thus obviating the necessity for patients to return to the main hospital for routine assessment.

The number of home visitors was increased to 15 and a further four were later supplied by the Native Authority.

**Previous Hospital Admissions.**

The number of new cases of unclassified, active tuberculosis admitted to the hospital in the two preceding years was as follows: 1955, new cases 879 (plus 290 re-admissions), 1956, new cases 1066 (plus 440 re-admissions).

A proportion of these patients were admitted from areas outside the Northern and Tanga Provinces, and this number was expected to decrease as facilities for treatment became available elsewhere. It was anticipated that this number of cases would be balanced by an increase in the number of cases admitted from the Tanga and Northern Province, as the system expanded.
THE METHOD.

Hospital Investigation and Treatment.

It must be emphasised, that the methods of investigation and treatment which were introduced, were those considered best suited to the mass treatment of the disease, with the limited staff and facilities available.

Patients were referred to the unit from general hospitals and private practitioners, in the area. Others were referred for investigation at the chest clinics, by the tuberculosis home visitors. Still others arrived of their own accord and requested examination.

Clinic cases were transported to the unit by means of a large, open, hospital lorry.

On admission, the patient's name and address was noted, together with the name of the local chief or headman. All entries were made in large ledgers, which had served as permanent hospital records for many years. Each ledger referred to a particular area. The page number and ledger reference served as the patient's permanent unit record, and was noted on all X-ray films and correspondence concerning the patient thereafter.

A case history was taken, together with the names, ages and apparent state of health of the various members of the family. Notes were made concerning any possible contacts. A clinical examination followed.

A routine series of investigations was then carried out. A single, postero-anterior chest film was taken. The sputum was collected in a sputum carton, and a stained film prepared and examined, under the microscope. The major provincial laboratory at Moshi was unable to deal with sputum for culture.

* The X-ray machine was a small one. Tomography was not available.
and sensitivity tests from all the new cases, and sputum was sent for culture in those cases where there was a history of previous treatment, or where there was any evidence to suggest that infection had been transmitted from a known case. A Mantoux test was carried out using 0.1ml. of Burroughs Wellcome brand 'Old Tuberculin', in a dilution of 1:1000 (10 TU), intra-cutaneously. The erythrocyte sedimentation test was carried out by the Westergren method, and the blood Haemoglobin by the Sahli method.

In view of the prevalence of infestations, a routine blood slide was taken and examined for malarial parasites. The urine was examined for the presence of albumen and sugar, and microscopically for evidence of Bilharzia. Examination of the stool was undertaken to exclude the presence of intestinal parasites. The incidence of infestation will be found in Appendix D. The patient was then weighed.

The first 48 hours after admission were spent in these routine investigations, and the treatment of any incidental disease was commenced.

The patient was then brought before the 'assessment team'. This comprised the Medical Officer, at least one Medical Assistant, and the two trained male nurses.

The patients general condition was described in terms of 'poor', 'fair', and 'good', having regard to the presence or absence of fever, wasting, dyspnoea and the presence or absence of other infections or parasites. In pulmonary cases, the extent of pulmonary infection as demonstrated by the chest film, was classified for statistical purposes. The details of this classification and the classification of glandular disease will be found
The following table is to be used for recording daily observations.

<table>
<thead>
<tr>
<th>SPUTUM</th>
<th>TUBERCULIN</th>
<th>E.S.R.</th>
<th>Hb %</th>
<th>WEIGHT</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>CLINICAL CHANGE</th>
<th>X-RAY CHANGE</th>
<th>URINE</th>
<th>STOOLS</th>
<th>BLOOD SLIDE</th>
</tr>
</thead>
</table>

(1) (2)

The patient's condition is monitored through daily observations and routine medical tests. Any significant changes are noted and documented in the daily reports. The medical team reviews these observations to assess the patient's progress and adjust the treatment accordingly.
in Appendix E. The results of the investigations and assessment were inserted in the ledger, together with a small sketch of the X-ray findings. Rubber stamps had been made to order, and were used as a time saving method. (see opposite.)

Hospital treatment was allocated for an initial period of one or three months, depending on the extent of the lesion and the patient's general condition. Treatment consisted of bed rest, until the toxic symptoms had subsided and the temperature returned to normal. In the normal run of events this occupied two or three weeks, and the patient was then allowed up to toilet and later graded exercise. There were special arrangements for glandular cases and orthopaedic cases. Appendix F.

Specific antibiotic treatment consisted of one of two regimes: In 'slight' and 'moderate' cases, streptomycin was given in a dosage of 1 Gm. I.M. i.d., in combination with tabs. Isoniazid 150 mgm. B.D. orally, in adult dosage. The second regime was reserved for 'extensive' cases; cases where there was evidence of a 'destroyed' lung, and cases where there was a suspicion of bacterial resistance to one or more of the drugs. This regime consisted of the addition of P.A.S. as an aqueous mixture, given orally in a dosage of 7½ Gm. B.D. for adult cases.

The high calorie hospital diet was supplemented by the addition of cod liver oil, and vitamins A, B, C, and D, as a routine measure. The patients were weighed weekly and any complications such as haemoptysis or continued loss of weight warranted further examination and X-ray.

* A composite 5 month, combined temperature and ward treatment chart, had been printed to order. When this chart was completed, the patient was automatically referred for assessment.
All new cases were reassessed at the end of three months treatment. Those who had been ordered three months initial therapy, were examined by fluoroscopy and, provided improvement was occurring, they continued hospital treatment routinely. Cases, who had completed the one months treatment regime, were assessed with a view to their suitability for home treatment. All the investigations, with the exception of the Mantoux test, were repeated. If the patient showed both general and radiological improvement, and complications such as pleural effusion, or very recent haemoptysis were absent, then he was considered as a possible case for controlled home treatment.

The presence of a positive sputum on microscopy, was not always a contra-indication to home treatment, provided that the bacteria were few in number, and that the patient had a good grasp of the hygienic principles of sputum disposal and an adequate understanding of the safe guards to be employed (see later). Other factors were taken into account, such as the distance of the patient's house from the nearest dispensary, home conditions, and the general intelligence of the patient.

If the patient was found unsuitable for home treatment, the hospital treatment was extended for a further period, and re-examination carried out thereafter.

When the patient was found suitable for home treatment, he was issued with a specially printed home treatment card. This detailed the patient's name, address and reference number, and included a synopsis of the hospital treatment and findings. The routine out-patient treatment required, was detailed. In adult cases, this consisted of tabs. isoniazid 150 mgm. B.D. together with P.A.S. Gm. 5 B.D. taken as an oral aqueous mixture. Latterly, cachets each containing isoniazid powder 55 mgm. and P.A.S. 1.5 Gm. have been used in an adult dosage
Illustration 12. Posters as Part of a Long Term Anti-Spitting Campaign.

(The rectangle at the top was reserved for the local chief's name. The translation from Swahili would then read: "Chief ..... says, indiscriminate spitting spreads tuberculosis, don't spit").

Illustration 15. The Same Poster for the Benefit of the Asian Population.
of 4 B.D. The date of next assessment was inserted. Each patient received a weeks supply of the medicines before leaving hospital, and was instructed to report to the appropriate dispensary with his tuberculosis card.

**Instruction of Patients.**

Great importance was attached to the adequate indoctrination of the individual patient. To this effect, all patients were addressed weekly, through the medium of the hospital diffusion broadcast. In the early days of the scheme, the talks were given in the form of lectures on what to do, or not to do, and why. Latterly, a programme has been given every second or third day, which comprises interviews with selected patients, and discussion of what they will do on leaving hospital, the problems which may have to be faced, and the solution. These programmes have become very popular and are made up, to a large extent, from patients contributions and cover a wider sphere of public health and hygiene than formerly.

Each patient was thus well versed in the part he had to play in his own treatment, and in the protection of the community, by the time he left hospital. The subject was reiterated on assessment prior to discharge, and latterly, each patient was asked to pass an oral examination in the methods to be employed, before he was allowed to proceed home. On discharge, each patient received a pamphlet on the subject in Kiswahili.

**Community Health Education.**

Before the scheme commenced, the community leaders, -usually the chiefs, sub-chiefs and headmen, - were invited to attend a series of meetings at which the nature of tuberculosis and the proposed method of control and treat-

(Look, to spit indiscriminately is a habit of the unclean, (Kisheni also means primitive, illiterate etc. and is a derisive term) people who/now better, do not spit).

Illustrations 15 and 16. The left hand reproduction stated (Fever? Chest trouble? Go to hospital, perhaps it is tuberculosis.). The right hand poster was for the benefit of patients on treatment. (So! You are being treated for tuberculosis? Always remember, you can be cured if you follow the instructions you have been given.).
were explained. These meetings were attended by members of the Administrative Service, and by the area Social Welfare Officers and staff from the Public Relations Department. These officers, greatly assisted in explaining the situation.

The disease, and its transmission, were demonstrated with the aid of a number of films. Two of these had been made at the hospital. An exhibition of diagnostic and treatment methods was included. Lectures and talks on public hygiene were given with special reference to tuberculosis.

The community leaders were asked to co-operate in the functioning of the controlled home treatment scheme. It was stressed that the scheme depended on their co-operation and that they could best assist by helping to trace patients who failed to attend, and in sternly warning those who were irregular in taking their medicines. They were also asked to ensure that patients did not attend crowded gatherings and 'pombe' parties. To this extent each chief was sent a monthly list containing the names and addresses of patients undergoing home treatment in his area.

A general tuberculosis prevention campaign was commenced through the good offices of the Social Development Department, and films on tuberculosis were shown to the Africans in the area through the medium of a travelling cinema. Talks were also given and the problem received some attention on the wireless.

A long term preventive scheme was also introduced. This included the continued distribution of posters on selected themes such as the dangers of spitting, and the need for early diagnosis of tuberculosis. These were printed through the good offices of the Health Education Department.

Simple facts about tuberculosis, were included in the
The Role of the Tuberculosis Home Visitor.

Home visitors were recruited from the male nursing orderly staff of the hospital, in most instances. In essence they were expected to continue the duties of hospital supervision and treatment in the home environment, and to refer the patient to hospital; or to one of the main chest clinics, at once, if there were any complications.

They were also expected to advise patients on essential home hygiene, and to instruct the families and contacts on early symptomatology, dietary requirements for good health, and, in general, to disseminate health propaganda. They were trained in tuberculin testing and participated in B.C.G. campaigns under supervision. Until recently they were also trained in refill therapy, but this requisite has now been dropped from the course. They were expected to dispense certain simple cough mixtures and also P.A.S. mixture, and were instructed in the issue of weekly medicines to the patients. They were also taught the routine use of the urinary ferric chloride test (Appendix G.), and were expected to make a surprise visit to patients homes at least once a month to carry out this test.

The home visitor worked in conjunction with the chief or headman when patients were irregular in attending, or when suspected new cases refused to go to hospital. Finally, the weekly weight and other findings were recorded in the patient's home treatment card and this was filed at the dispensary, together with a register of families and contacts and their general and tuberculin state, and record of attendances. A monthly report was required.
Candidates were required to pass a simple written, practical and oral examination, and were then posted, in the first instance, to one of the main clinics, in order to gain practical experience in the field.

There is no doubt that the tuberculosis home visitor was essential to the working of the scheme. This will be appreciated from Appendix II. If the chief was uncooperative then the home visitor was at a distinct disadvantage. (See Kibosho area below).

Mission Doctors and Private Practitioners.

In preceding years, a number of African pulmonary cases had been admitted to the unit after a certain amount of uncontrolled therapy at the hands of Mission Medical Officers or Private Practitioners in the area. It was found that a large number of these patients had been rendered resistant to one or more of the antibiotics by this means.

All these medical practitioners were circularised and the dangers of antibiotic resistance were explained. It was requested that all African patients suffering from tuberculosis should be referred to Kibongoto Hospital, unless the practitioner was satisfied that the patient was willing and had the financial means, to complete treatment at the Mission or in private.

Home Treatment Methods and Follow Up.

A week after discharge from hospital, the patient attended at his local dispensary, where the tuberculosis home visitor took over.

The patient was interrogated with regard to any symptoms, weighed, and the urine tested for P.A.S. The results were entered in the patient's card. The patient was then issued with
medicines sufficient for a further week. If the ferric chloride test gave a negative result, the patient was sternly warned, and if the test was negative on a second occasion, the patient was taken to the headman or chief for further reprimand. In practice, it was found that one warning was often sufficient. Persistent offenders were returned to hospital, and such was the spirit of co-operation that it was not unusual for the chief to bring the patient to the main clinic in his own transport.

On the patient's first visit to the dispensary the home visitor made arrangements to visit the patient's home.

All the dispensaries were visited by the Medical Officer and a Medical Assistant, monthly. This involved an 8 day safari covering an area somewhat larger than Wales. A hospital landrover was always used, as communications were extremely bad in some areas. The safari always visited the dispensary in each locality on the same day and at the same time each month. This enabled families and contacts to attend for examination by the safari team. Especial attention was paid to contacts who showed a strong positive Mantoux reaction, and if there was suspicion of active disease they were asked to attend at the main clinic for X-ray examination. Negative Mantoux reactors were vaccinated with freeze-dried B.C.G. vaccine. (Pasteur). All contacts were asked to attend two monthly at the dispensary for clinical observation and examination for a period of one year.

The patients' home treatment cards were then examined and the drug stocks closely inspected, and further issues made. The home visitors monthly report was then taken, so that the appropriate information therein could be inscribed in the permanent hospital ledgers.
After three months of home treatment the patients reported to the nearest chest clinic, on certain clinic days. Patients, whose homes were nearer the hospital, reported there.

The examination followed the pattern of those previously described. The patient was brought before the assessment team, and the general condition/patient and the laboratory findings, were compared with those prior to treatment and the findings at the last assessment. Change in the general condition was classed according to the method used by the Medical Research Council, and was noted as: No change or 0. Slight improvement or +1. Moderate improvement or +2. Considerable improvement or +3. In the same manner patients who showed a change for the worse were classified as -1, -2 and -3. The X-ray findings were compared to the initial X-ray and the X-ray film at last assessment and the improvement, if any, was classified in exactly the same manner.

Provided the patient showed satisfactory progress, he was allowed to return home for a further three months treatment. This process was repeated every three months until such time as the radiological and clinical improvement indicated apparent cure. The patient was then asked to attend at the dispensary every month, where he was weighed and any symptoms noted, and he was again assessed after this three month period without medicines. If his condition was maintained, he was observed two monthly in the same manner and assessed after six months, and so on.
Financial Assistance.

The Government of Tanganyika Territory provided the complete treatment free of all charge. In addition, an arrangement was made with the District Commissioners in the various areas, whereby patients on active treatment were exempted from paying the annual 'Native Poll Tax', if their means were inadequate.

It became apparent that some patients were unable to afford the expense of travelling to and from the main clinic every three months, and the Native Authorities in the various areas were approached. It was agreed that the Native Authorities would pay the transport charges of genuine destitutes travelling to and from the main clinics.

Patients in hospital were encouraged to earn a little money during their stay, by weaving baskets, embroidery work etc. The results of this occupational therapy were sold later, and the profit, minus the cost of materials, was given to the patient.

A rehabilitation scheme was initiated and will be described later.

The Aim and the Method in Distant Areas.

The growth and expansion of the scheme will have been noted from Illustration 1. Briefly, the method was introduced in the Kilimanjaro and North Pare areas in May, 1957. It was expanded to take in the Arusha and Meru District in early 1958, and in 1959 the scheme extended to take in the whole South Pare area, in addition.

The scheme now operates in an area some 250 miles in diameter, with a population of about 600,000 Africans.
It was necessary that tuberculosis treatment schemes should be organised in the more distant areas, such as Mbulu, Tanga and Lushoto districts. It was equally important from an administrative point of view, that these areas should be largely self contained, in that the patients would be assessed at the various district hospitals, if and when X-ray facilities were available. Complex cases and cases requiring surgery would be sent to Kibongoto Hospital.

It was arranged, therefore, that the District Medical Officers from Tanga, Lushoto, Korogwe, Mbulu and Masailand, together with certain medical personnel from mission units, would come to Kibongoto in rotation, for a short period, in order to study the organisation and methods employed in the hospital and in the home treatment scheme.

This enabled the Medical Officers to draw up their own district plans, based on the Kibongoto pattern and tailored to meet the needs of the particular districts.

This method was not entirely satisfactory as the doctors proceeded on home leave or transfer, and the programme had to be repeated with each successor. This lack of continuity was a serious handicap. African nursing orderlies were sent to Kibongoto from these areas, for training as tuberculosis home visitors, and it was hoped that at a later date, it might be possible to train a number of African Medical Assistants as semi-permanent operators in these areas, to ensure continuity in the treatment schemes, under the aegis of successive medical officers.

In recent months, an additional tuberculosis officer has been transferred to Tanga Province and has taken over responsibility in the Tanga, Korogwe, Lushoto and Handeni areas,
thus permitting the writer to concentrate on the North and South Pare area of Tanga Province and the Northern Province as a whole.*

**EARLY RESULTS.**

In order to analyse the early results of the controlled home treatment scheme and for the purposes of this paper, the first consecutive one hundred African new cases of active pulmonary tuberculosis admitted to the unit from the area of the scheme, during and after May, 1957, have been followed up.

Asian, Arab and Somali cases were excluded from this series as the type of disease frequently differs from the hyper-acute African type disease.

The cases comprised all types and degrees of severity, normally seen at the hospital, and the type of disease will be readily seen from the attached illustrations.

Cases were required to show a positive sputum on routine microscopy on admission, and cases where there was any doubt as to the diagnosis were excluded.

* Other duties included the routine administration of the large hospital, chest surgical procedures, and the responsibility for a general out-patient dispensary which treats some 50,000 patients a year, with the inevitable emergency work entailed, together with a 10 bedded male general ward and a 10 bedded midwifery ward.
Illustration 17. An example of the acute type of pulmonary disease encountered. The case is not one of the present series.

On Admission.

Illustration 18. The same case. After 9 months daily antibiotics a persistent upper lobe cavity was dealt with by extra-pleural pneumolysis. Photograph taken two years after operation.

Illustration 19. The refills of air have now been stopped, and there is residual extra-pleural fibrosis, with no evidence of pulmonary activity. Patient well and working.
Cases who had received specific treatment prior to admission were excluded, as were a number of patients admitted to a concurrent Medical Research Council Therapeutic trial at the hospital.

There were fifty seven males and forty three females in the series. The patients age ranged from 5 years to about 65 years. (The average older African is unable to state his age with exactitude). The greater number of cases fell between the ages of 16 and 50 years (48). The age and sex ratios correspond very closely to the normal hospital admission ratios of 5 males to 3½ females, with the greater number of cases occurring in the 15 to 55 years age group. (Table III).

Table III. Age and Sex.

<table>
<thead>
<tr>
<th>AGE GROUPS IN YEARS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15</td>
<td>16 - 50</td>
</tr>
<tr>
<td>Sex</td>
<td>M</td>
</tr>
<tr>
<td>Number</td>
<td>15</td>
</tr>
<tr>
<td>%</td>
<td>15</td>
</tr>
</tbody>
</table>

General Condition On Admission.

The general condition of the patient was judged by the method previously described. The general condition was poor in 58 cases; fair in 57, and the appearance was good or normal in only 25.

The temperature was invariably raised at some period in the first week after admission, but settled completely in over 95% of cases within three weeks of

Illustration 21. Case M.B. Extensive bilateral disease, with multiple cavitation, thin walled and with fluid levels. After 4 months hospital routine and 18 months total antibiotics, shows residual fibrosis with small cavity left upper outer zone, moderately improved, will probably require thoracoplasty.
commencing treatment. The haemoglobin was below 50% in 14 cases, and it was exceptional to find a haemoglobin level of over 80% on admission. The erythrocyte sedimentation rate (uncorrected for anaemia) was raised above 15 mm. in 90 cases, whilst it was below this figure in only 8 cases. The test was not performed in 2 cases. In general, the sedimentation rate was high and reflected the acute type of lesions exhibited by the group. The sputum was often heavily infected on first admission.

Routine stool and urinary examination revealed a high percentage of infestation. Ascariasis was demonstrated in 51 cases, and hook worm ova were present in 22%. In a further 15 trichuris ova were demonstrated, and ova of taenia, strongyloides, and schistosoma Mansoni in several others. Urinary bilharzia was not common in this group. Malaria parasites were present in the blood slides from 4% of the patients on admission. (See also Appendix D).

Other major conditions which were apparent at admission or developed during hospital treatment included one case of chronic asthma, one case of typhoid, and one case of chronic bronchitis. Three female patients were pregnant on admission.

Other concomitant tuberculose conditions included one with spinal disease and another with tuberculose cervical adenitis.

Radiological Findings.

In 89 cases, X-ray showed the classical fulminating broncho-pneumonic type of infiltration, and the greater number showed acute thin walled cavitation (74). A further five showed additional lobar atalectatic consolidation. There were two cases who demonstrated virtually destroyed
lungs on one side, and both of these cases showed contralateral acute infiltration. There was only one case of miliary disease. There was evidence of previous attempts at regeneration, as evidenced by the presence of fibrosis, in only three cases, one of whom showed patchy evidence of calcification in the hilar areas. Definite cavitation was present in 78 cases and the lesions were bilateral in 57 patients.

The extent of the disease was classed as slight in 4%, moderately advanced in 44%, and 52% showed extensive or far advanced disease. (Classification, Appendix E.).

Table V. Findings on Admission.

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Condition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Fair</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>Good</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>Haemoglobin (Sahli)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 50%</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>50 - 79%</td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td>80% &amp; Above</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>E.S.R. (Westergren)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 15mm./hr.</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>15mm. or less.</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Not performed.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sputum</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>100</td>
<td>100*</td>
</tr>
<tr>
<td>Slight</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>X-ray</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>44</td>
<td>44+</td>
</tr>
<tr>
<td>Advanced</td>
<td>52</td>
<td>52@</td>
</tr>
</tbody>
</table>

* Selected as such on routine microscopy.
+ Moderately advanced, including 21 bilateral.
@ Extensive, including 36 bilateral cases.
Illustration 22. Case M.A. Hyper acute, bilateral basal disease with acute cavitation left outer mid-zone. After 1 month hospital routine and 15 months home treatment regime, there is residual patchy and discrete fibrosis at the right base with no evidence of activity. Continued treatment a further 5 months. Considerable improvement, well and at work.

Illustration 23. Case B.D. Acute bilateral bronchopneumonia with atelectatic consolidation and cavitation of right upper lobe. 2 months hospital and 18 months total antibiotics. Considered +5, continues medicines, well and at work.
**Duration of Hospital Treatment.**

In some instances, the severity of the disease was such that at least three months of in-patient treatment was indicated. In other cases, even with advanced disease, the degree of clearing after one month was so dramatic that home treatment could be undertaken with apparent safety. A total of 55 were discharged to home treatment after one month, and 48 after between one and three months in hospital. A further 19 remained in-patients for over three months. (Table VI). In most instances, prolongation of the patients stay in hospital for over three months was due either to difficulties at home, such as the distance to the nearest dispensary, or other conditions in the patient which made home treatment undesirable at an earlier date. In this respect there were three cases of moderately advanced pregnancy and the intelligence of a further two was so low that it was considered they should have prolonged hospital treatment. In eight of the 19 cases, the delay was inevitable, as the controlled home treatment scheme had not at that time expanded to their particular area. (Table VII).

**Table VII.**
Duration of Initial Hospital Treatment.

<table>
<thead>
<tr>
<th>Duration in Months</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

* To the nearest month.

**Re-admission to Hospital.**

A total of 11 cases were re-admitted to hospital during the eighteen months under review. In 4 patients, return to hospital was indicated as the dispensary records showed
gross irregularity in attendance despite warnings.
(5 of these patients came from the Kibosho area, see
below), the cause in 1 case was inherent mental instab-
ility. A further case was re-admitted on account of
suspected pre-treatment resistance to either isoniazid
or P.A.S. in that there had been slight improvement
after one months hospital treatment, but no further
change after three months home treatment. (later found
resistant to isoniazid). Two others were re-admitted
for treatment of a pellagrous skin condition of the
forearms neck and face, which was assumed to be due
to isoniazid. In both cases the lung lesions were
considerably improved. The condition had appeared after
approximately five months treatment in one case and after
ten months in the other. The condition cleared rapidly
on treatment with vitamin B complex. The patients received
streptomycin and P.A.S. for three months in hospital. One
case was then observed as apparently cured, and the other
continued isoniazid and P.A.S. treatment at home with the
addition of tabs. yeast and tabs. pyridoxine (Benadon)each
2 F/D, with no recurrence.

Haemoptysis accounted for a further admission, and one
case was re-admitted on account of severe asthmatic attacks.
Two cases were re-admitted on account of radiological
deterioration. Both had completed the antibiotic treatment
and were under observation. One had received a total of
eleven months antibiotics and it was realised that this was
insufficient on follow up. The other showed fluctuations in
the size of a thin walled cyst on the site of original
cavitation. The patient had a concurrent chronic bronchitis,
and had received a total of fourteen months antibiotics.
There was no other definite evidence of activity, but it
was considered that further antibiotics were required. The patient continued on home treatment after a further one month in hospital.

**Bacterial Sensitivity to Antibiotics.**

As mentioned before, this could not, at the time, be performed as a routine on all new cases. It was, however, a routine procedure on re-admission. The sputum of four patients was found to be resistant to one or more of the antibiotics, as follows: 3 resistant to isoniazid only and 1 resistant to both isoniazid and P.A.S. 1 was considered pre-treatment resistant to isoniazid (vide supra), the other 3 had all shown over five negative ferric chloride tests, as evidenced by their home treatment cards. (2 were from Kibosho area and 1 mentally unstable).

**Other Major Treatment.**

Extra-pleural pneumolysis was performed in three cases. This was an unduly high proportion as compared to the number who came to operation in the following year. The indication in all three was persistent cavitation in the upper lobe, and two of them showed bacterial resistance to isoniazid. Two have now recovered sufficiently to stop their antibiotics, but continue on refill therapy and observation. The third continues on antibiotics only, as the space was lost after three months.

The role of chest surgery is discussed later.

A pneumoperitoneum was induced in four cases. The indication in three of these was the presence of acute cavitating basal disease with repeated haemoptysis, and in the fourth there was a persistent cavity in the right lower lobe after eight months antibiotics. A phrenic crush was added in this case.
Illustration 26. Case E.M. Moderately advanced bilateral disease, with cavitation left upper lobe. 3 months hospital, 9 months home treatment. Observed and is well and now considered +3 to cure. Latest X-ray (poor film not reproduced, shows complete resolution).

Illustration 27. Case E.N. Acute bilateral infiltration with giant cavity system left upper lobe and small acute cavity apex of left lower lobe. (Bilateral extensive). 5 months hospital, 18 months home treatment. Considerable improvement, small residual cavity left apex with surrounding fibrosis. Symptom free continues medicines, working.
Two of these cases were able to stop refills after two months. The third ceased refills after six months and the last case continues refills. All four have now stopped routine antibiotics, are considerably improved and continue under observation.

Results at Eighteen Months.

At assessment after a total period of eighteen months, 94 patients in the series remained. Two had died (1 from a severe haemoptysis after only three weeks home treatment, 1 from eclampsia, which was not, apparently connected with the tuberculous condition, and the patient's lung lesion was considerably improved, and she was on observation only.). One case was discharged from the scheme for disciplinary reasons, in that he would not take his medicines, and was hopelessly irregular in attendance. One case was transferred to another area after 15 months treatment and considerably improved. Contact has since been lost. 2 were lost, (1 was known to have gone to Kenya, and the other had never returned home after leaving hospital.).

The duration of treatment in these six cases and their condition at last assessment will be found in Table VIII.

Table VIII. Condition of Six Patients at Last Assessment.

<table>
<thead>
<tr>
<th>Fate</th>
<th>Total Months tr.</th>
<th>Condition at Last Assessment.</th>
<th>Sputum*</th>
<th>General Cond†</th>
<th>X-ray Condition+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Died</td>
<td>18</td>
<td>neg.</td>
<td>+2@</td>
<td>+5</td>
<td>+1@</td>
</tr>
<tr>
<td>Discharged</td>
<td>7</td>
<td>pos.</td>
<td></td>
<td>+1</td>
<td>-2</td>
</tr>
<tr>
<td>Transferred</td>
<td>13</td>
<td>neg.</td>
<td></td>
<td>+5</td>
<td>+5</td>
</tr>
<tr>
<td>Lost</td>
<td>9</td>
<td>pos.</td>
<td>+2</td>
<td>+1</td>
<td>+5</td>
</tr>
</tbody>
</table>

*Routine microscopy. + In relation to admission. @ Appdx. E.
Table IX. Condition at Eighteen Months.

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>% of 94 remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General condition</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(improvement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slight</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>moderate</td>
<td>11</td>
<td>11.7</td>
</tr>
<tr>
<td>Considerable</td>
<td>81</td>
<td>86.2</td>
</tr>
<tr>
<td><strong>Haemoglobin</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>7</td>
<td>7.4</td>
</tr>
<tr>
<td>No change</td>
<td>20</td>
<td>21.5</td>
</tr>
<tr>
<td>Gain</td>
<td>67</td>
<td>71.5</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss</td>
<td>5</td>
<td>5.2</td>
</tr>
<tr>
<td>No change</td>
<td>10</td>
<td>10.6</td>
</tr>
<tr>
<td>Slight gain</td>
<td>10</td>
<td>10.6</td>
</tr>
<tr>
<td>Moderate gain</td>
<td>27</td>
<td>29.3</td>
</tr>
<tr>
<td>Consider. gain</td>
<td>44</td>
<td>45.8</td>
</tr>
<tr>
<td><strong>Sputum</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>2</td>
<td>2.1</td>
</tr>
<tr>
<td>Negative</td>
<td>92</td>
<td>97.9</td>
</tr>
<tr>
<td><strong>X-ray</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly worse</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Slight improvement</td>
<td>1</td>
<td>1.1</td>
</tr>
<tr>
<td>Moderate do.</td>
<td>4</td>
<td>4.2</td>
</tr>
<tr>
<td>Considerable</td>
<td>88</td>
<td>95.6</td>
</tr>
</tbody>
</table>

* Within 5% Sahli.  + i.e. 2-6 lbs.
@ 7-15 lbs.  & 14 lbs. or more.
The condition of the remaining 94 patients on assessment at eighteen months, will be seen in Table IX. All the patients showed some improvement in their general condition as compared to the condition on first admission. This improvement was only slight in 2 cases, it was classed as moderate in 11 others and there was considerable general improvement in 81 cases. The haemoglobin showed a percentage increase in 67 cases, and there was no obvious change in the haemoglobin level in a further 20 cases. 7 patients demonstrated a decrease in the haemoglobin level as compared to first admission. In 4 of these cases the decrease could be ascribed to a recurring hook worm infestation. In 2 others, dietary insufficiency was diagnosed and the remaining case showed chronic resistant tuberculosis.

The erythrocyte sedimentation rate was more variable. This was carried out in 92 of the 94 cases, and was raised above 15 mm. in 22 cases whereas the rate was 15 mm. or less in 70 others.

A total of 81 patients showed some gain in weight, there was no obvious gain or loss in a further 20 and the remaining 3 cases showed a slight loss in weight of up to five pounds. It is noteworthy that 47% of this group showed a weight gain of over 14 lbs.

The sputum was negative on microscopy in 92 cases. The sputum was positive in 1 case who had a virtually destroyed lung on admission and in one other case who was resistant to both isoniazid and P.A.S.

The radiological improvement at eighteen months was very marked in 88 of the remaining patients (95.6%), and this improvement was considered to amount to cure in 82 of these cases, with the reservation that 'cure' is used in the context more as a guide for future statistical analyses of
Illustration 28. Case M.M. Acute bilateral disease with cavitation, 5 months treatment, and 10 months home treatment. Observed and further progress made. Now considered +5 to cure.

Illustration 29. Case Z.A. Acute bilateral disease, with acute cavitation apex left upper and lower lobe, 2 months hospital, and 15 months home treatment. Considerable improvement but residual foci left upper lobe. Continued medicines.
the efficiency of the assessment system rather than a definite conclusion at this comparatively early date. There was moderate improvement in a further 4 cases, 2 of these cases demonstrated large thin walled cyst like shadows at the site of a previous cavity, 1 had demonstrated a virtually destroyed lung on admission, and the last case, previously referred to, showed radiological relapse at 14 months with a concomitant chronic bronchitis. All 4 cases demonstrated the need for tomographic examination.

Slight radiographic improvement was apparent in 1 case, who had been grossly irregular in attendance and was later found to be resistant to isoniazid. In one further case there was definite, but slight, change for the worse at eighteen months. This patient had gone to Kenya after only five months treatment and was classed as lost. He returned after a further ten months and continues home treatment at present.

**Duration of Antbiotic treatment.**

It was found possible to stop antibiotic therapy in 1 case who had demonstrated only slight initial disease, after a period of only 6 months treatment, and a further 20 patients received only 9 months daily antibiotic treatment. 45 completed one year and 16 a period of 18 months. The remaining 12 continue treatment. In general, the duration of antibiotic therapy has lengthened in the light of experience, and it is now very unusual for a patient to have less than one years continuous therapy, and a large proportion complete two years or more.
Irregularity in Taking Medicines.

A study of the 94 remaining patients home treatment cards revealed that 41 had shown a negative urinary P.A.S. test on at least one occasion, (45.6%). The greater number of the patients 28 or 68.5% of those irregular showed a negative at only one examination. 9 patients demonstrated a negative on examination on two to four occasions, and 4 others on five or more examinations. Table X.

Table X. Negative Ferric Chloride Tests.

<table>
<thead>
<tr>
<th>Number of occasions negative</th>
<th>Number of patients</th>
<th>% of those negative</th>
<th>% of 94 remaining patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28</td>
<td>68.5</td>
<td>29.8</td>
</tr>
<tr>
<td>2-4</td>
<td>9</td>
<td>21.9</td>
<td>9.6</td>
</tr>
<tr>
<td>5 or more</td>
<td>4</td>
<td>9.8</td>
<td>4.2</td>
</tr>
<tr>
<td>Total...41</td>
<td>100</td>
<td>45.6</td>
<td></td>
</tr>
</tbody>
</table>

Reference has been made to the Kibosho area of Kilimanjaro. In this one particular area, the chief was either unwilling or unable to lend his authority to the working of the treatment scheme. The native population of the area are backward and uncooperative. It is noteworthy that the Germans executed the chief of this area, in the first years of this century, for inefficiency and non-cooperation. The task of the home visitors was made well nigh impossible, as a large proportion of the patients refused to attend the dispensary, and it was apparently useless to appeal to the chief. At the present time discussions are taking place with the District Commissioner to see whether it would be advisable to introduce legislation contained
in the "Infectious Disease Ordinance" (Appendix I), in order to compel the patients to attend as a public health measure. The present series of patients contained an unduly high proportion of cases from this area (16). It is of interest to compare the results in this small group at eighteen months, with the results in the group as a whole. Table XI.

Table XI. Observations on a Group of 16 Patients from the Kibosho Area, at 18 months.

<table>
<thead>
<tr>
<th>Irregular attenders</th>
<th>General condition</th>
<th>X-ray appearance</th>
<th>continuing medicines</th>
<th>number resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>cure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+3</td>
<td>+2</td>
<td>+1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is no doubt that a certain minimum level of intelligence is required of the tuberculous patient and this together with the other factors involved will be discussed later.

It is of interest to note that there are only 22 patients out of a total of 1500 under home treatment who are not attending at the dispensaries and whose whereabouts are unknown. 16 of these patients come from the Kibosho area which provides less than 11% of the total number of patients under treatment.

**ACTIVE PREVENTION.**

Reference has been made to certain preventive measures which were undertaken. These include individual and community health education by such means as talks, demonstrations, film shows, wireless broadcasts, poster displays etc.

It was decided that all school children in the areas
concerned should be given added protection through the medium of B.C.G. vaccination, in addition to the tuberculin negative contacts of known cases.

There was a total of approximately 67,000 school children in the various districts. The Native Authorities were approached and readily agreed to provide the cost of the vaccine.

Freeze Dried B.C.G. Vaccine (Pasteur), in a strength of 1 mgm. per ml. was injected intradermally. The methods employed and the early results of vaccination are contained in a manuscript by the writer and Dr. J.H. Shelley recently submitted for publication in 'Tubercle'.

Vaccination commenced in November 1958, and at the date of writing 56,000 children have been dealt with. It is hoped to complete the initial vaccination programme in the course of the next two months.

It is intended that vaccination of new school entrants will take place each year and to this effect a further 9,017 children have just been vaccinated.

The tuberculin recconversion rate will be studied during the next few years and re-vaccination is planned.

REHABILITATION.

Over 90% of the African patients admitted to hospital are agricultural workers. The greater number of these are enabled to return to work after a few months of treatment.

Quite a large number of cases, either possess a very small acreage or none at all. Other cases, and especially those who have been physically incapacitated by the disease, require training in occupations more suited to
their disabilities.

It was considered that there was a definite need for a Rehabilitation Scheme. To this effect a committee was formed in 1957, consisting of local European farmers, together with representatives from the Asian and African communities, who were interested in the work of the hospital and in the welfare of the patients.

With generous help from the farmers, a part of the extensive hospital grounds was ploughed and planted with coffee trees and cash crops.

It is planned that a rehabilitation centre will be built with the money obtained. The centre will contain equipment and machinery which will be used for the instruction and training of patients in a variety of trades. It is anticipated that building will commence in 1960. In the meantime, patients assist in the care of the growing coffee and are distributed to the various departments of the hospital for convalescent training in various trades (tailoring, carpentry etc.). Firms in the area have been approached and have expressed their willingness to assist in placing partly trained ex-patients in suitable occupations.

By these methods it is hoped that a system of after-care of tuberculous patients may gradually be built up. There is no doubt that after care is urgently required to maintain the patients resistance and to prevent a recurrence of his disease. The possibility of forming voluntary tuberculosis societies to assist in this field is at present under consideration.
The Role of Chest Surgery.

This paper would be incomplete without reference to the part which can be played by chest surgery in the treatment of the tuberculous African.

With the limited methods of assessment available, it is estimated that about 5% of new (untreated) pulmonary cases admitted to this hospital would benefit from major chest surgery as an adjunct to antibiotics. This percentage is made up from those cases who have atelectatic fibrotic cavitated lobes or a virtually destroyed lung, cases either pre-treatment resistant to more than one of the three routine antibiotics, and cases who have become resistant through taking their treatment irregularly or in inadequate dosage.

At least 15% of cases referred here from other hospitals, after treatment in areas outside the present scheme, are considered candidates for major surgery.

A number of these cases have been dealt with by the operation of extrapleural pneumolysis with a good measure of success in carefully selected cases. The majority, however, require either thoracoplasty or resection for their chronic fibrotic lesions. Facilities for these two major operations are at present limited.

The situation is somewhat different to that in the United Kingdom, where it is possible to treat a chronic resistant case with a series of alternative, though very expensive antibiotics. A number of chronic antibiotic resistant cases have been treated daily for a period of almost three years with isoniazid and P.A.S. or with isoniazid and thiosemicarbazone, but the results
do not exceed 50% apparent cure, and it has been noted that the average African patient tends to lose heart, not unnaturally, on this prolonged therapy. The most that can be achieved in some of these cases is the doubtful benefit of catalase negative bacteria.

**Collapse Therapy.**

Very few cases are now treated by artificial pneumoperitoneum. An occasional patient receives pneumoperitoneum refills for a short time to assist in the control of persistent haemoptysis. In the same way a few of the chronic resistant cases appear to derive some benefit from this method of treatment.

Artificial pneumothorax therapy is now a rarity.

**DISCUSSION AND CONCLUSIONS.**

The economy of Tanganyika Territory is very limited by European standards. The problem of tuberculosis resolves into the question of whether it is wise to engage in mass preventive and treatment schemes with the limited trained staff, finance and facilities available. There are many other urgent medical and public health problems, such as malaria, leprosy, and intestinal infestations, which might well be solved with the money voted for the treatment of tubercle.

It has been seen in preceding pages, however, that there is every indication that tuberculosis is on the increase in East Africa. The increasing incidence of this deadly and infectious disease, in a population with a low individual and racial resistance, presents an increasingly serious public health problem with every passing year.
families and contacts involved. Almost all the practitioners readily concurred with this centralisation of treatment.

The question then arose, whether pulmonary patients could be treated from the beginning as out-patients. This would have represented very considerable savings in hospital costs, and indeed the function of the hospital would have changed completely, as only complex and complicated cases would have been admitted. In this respect Kay (1957), described a trial conducted by the Research Committee of the Tuberculosis Society of Scotland. This involved the treatment of two groups of not clearly infectious patients. Both received isoniazid and P.A.S., but one group was treated for at least three months in hospital or in bed at home, whereas the other patients continued to lead a normal life. Clinical and radiographic changes were similar at the end of each three month period up to one year. It was considered that the hyper-acute African type of disease with its tendency to haemoptysis and marked systemic reaction would not lend itself well to the initial introduction of home treatment, especially under the home conditions which have been described. The African patient requires a great deal of indoctrination before he can be expected to fulfil the hygienic requirements expected of him, and life long habits, such as indiscriminate spitting, cannot be eradicated as the result of one interview. In brief, it was considered essential that patients should have an initial period in hospital, for rest, eradication of incidental infestations and illnesses and for intensive therapy and preparation for their later home treatment.
The co-operation of the community leaders and, indeed, the good will of the community as a whole, was vital to the success of the scheme. The African respects his elders and will almost always obey the orders of his chief. It was most gratifying to observe the keen interest which these community leaders displayed at the demonstrations and lectures which were delivered to them and the genuine desire to help in stamping out a disease which has been a danger to the community for so long. The effect on the working of the scheme, of one uncooperative chief has been described. The question has arisen whether force should be used to compel the patients in this particular to follow the pattern of treatment. It is considered that there is every legal justification for doing so, but, it is also felt that compulsion of this nature may only succeed in frightening away new cases. Constant propaganda is having a slow but definite effect in this area, and the attendance figures this year show a very definite improvement on those of 1957 (87% as opposed to 64% in 1957). Nothing succeeds like success, and one of the most potent incentives to regular attendance has been that the patient has been enabled to observe the apparent cure of regular attenders and conversely, the poor results in the chronic offender.

There are now some 1,500 patients on home treatment and in the other areas it is almost exceptional to find defaulters.

The tuberculosis home visitor has a most important role to play, and it is considered that a truly comprehensive prevention and treatment scheme cannot be effected in the absence of this type of health orderly.
time it would appear that there still remains a small, but definite field for chest surgery as an adjunct to antibiotic therapy in the African patient.

There is no doubt that tuberculosis will remain a formidable disease in East Africa until such time as the standards of living are raised. B.C.G. vaccination of the school children as a continued long term policy would appear to offer the best means of raising the communities resistance in the interim. This policy has been put into effect.

A beginning has been made and much remains to be done.

**SUMMARY.**

A part of the history of tuberculosis in East Africa and Tanganyika Territory has been described, together with the growth and development of the tuberculosis services in the Territory.

The organisation, development and administration of a comprehensive treatment and preventive scheme in a part of the Territory is described, and the local conditions and difficulties depicted.

A controlled home treatment scheme has depended, to a large extent, on the cooperation of the patients own community leaders, in conjunction with the medical staff. It is submitted that the average African patient must, at present, be actively persuaded to participate in his own cure.

A series of 100 pulmonary cases, analysed after a period of eighteen months, demonstrates a sputum conversion
rate of 97.9% in those remaining, or 92% of the whole group. Considerable radiological clearing was evident in 95.6%, or 88% of the whole series.

ACKNOWLEDGEMENTS.

My thanks are due to the Permanent Secretary to the Ministry of Health, (formerly the Director of Medical Services), Dr. J.M. Liston, who approved the methods employed and whose continued interest has greatly helped the writer.

My thanks are also due to Dr. J.H. Shelley and Mr. E.C. Banks for technical assistance with the photographic reproductions.

These acknowledgements would not be complete without reference to the faithful African staff who made the scheme possible and to the Chiefs and community leaders, and the members of other departments in the Territory who gave valuable assistance.
REFERENCES.


Annual Report of the Medical Department, Tanganyika (1937); (1944); (1946); (1947); (1957). Govt. Printer Dar es Salaam.


Kibongoto Hospital (1926 -1956); (1947-1958) MS Annual Reports to the Government of Tanganyika.


**APPENDIX A.**

A synopsis of the tuberculin results obtained by Dr. C. Wilcocks in different areas of Tanganyika Territory between 1930 and 1936.

Technique, Mantoux 1:1000 O.T. (10T.U.)

<table>
<thead>
<tr>
<th>Area</th>
<th>Age Groups in Years.</th>
<th>Males and Females Combined, (Percent positive only)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6-15</td>
<td>16-25</td>
</tr>
<tr>
<td>Dodoma</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>Kiomboi</td>
<td>25</td>
<td>49</td>
</tr>
<tr>
<td>Handeni</td>
<td>18</td>
<td>40</td>
</tr>
<tr>
<td>Kilimanjaro</td>
<td>39</td>
<td>47</td>
</tr>
<tr>
<td>Kilimanjaro East</td>
<td>53</td>
<td>63</td>
</tr>
<tr>
<td>Meru</td>
<td>28</td>
<td>59</td>
</tr>
<tr>
<td>Mbulu</td>
<td>80</td>
<td>35</td>
</tr>
<tr>
<td>Pare</td>
<td>35</td>
<td>43</td>
</tr>
<tr>
<td>Usambara</td>
<td>30</td>
<td>36</td>
</tr>
<tr>
<td>Iringa</td>
<td>26</td>
<td>61</td>
</tr>
<tr>
<td>Njombe</td>
<td>33</td>
<td>42</td>
</tr>
<tr>
<td>Lake Nyasa (inland)</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>Lake Nyasa (shore)</td>
<td>10</td>
<td>29</td>
</tr>
<tr>
<td>Lake Victoria</td>
<td>27</td>
<td>42</td>
</tr>
<tr>
<td>Tanga</td>
<td>35</td>
<td>70</td>
</tr>
</tbody>
</table>
APPENDIX B.

Admission figures at Kibongoto Hospital and twelve other main centres in the Territory for the period 1926 -1956. (The figures from the other centres are notifications only.).

<table>
<thead>
<tr>
<th>Year</th>
<th>Kibongoto</th>
<th>12 other centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1926</td>
<td>45</td>
<td>401</td>
</tr>
<tr>
<td>1927</td>
<td>522</td>
<td>566</td>
</tr>
<tr>
<td>1928</td>
<td>756</td>
<td>626</td>
</tr>
<tr>
<td>1929</td>
<td>499</td>
<td>535</td>
</tr>
<tr>
<td>1930</td>
<td>559</td>
<td>740</td>
</tr>
<tr>
<td>1931</td>
<td>671</td>
<td>821</td>
</tr>
<tr>
<td>1932</td>
<td>725</td>
<td>805</td>
</tr>
<tr>
<td>1933</td>
<td>1045</td>
<td>1124</td>
</tr>
<tr>
<td>1934</td>
<td>1569</td>
<td>1106</td>
</tr>
<tr>
<td>1935</td>
<td>1586</td>
<td>805</td>
</tr>
<tr>
<td>1936</td>
<td>2154</td>
<td>997</td>
</tr>
</tbody>
</table>
Appendix C.

Available Staff.

The European staff consisted of one medical officer, one nursing sister, and one hospital steward. An additional medical officer was posted to the hospital for a period of 9 months, but has since been transferred without relief. An additional nursing sister has also been transferred without relief.

The African staff comprised two medical assistants on the tuberculosis side of the hospital and a third who was in charge of the general medical and surgical out-patient department and also an 11 bed midwifery ward and an 11 bed ward for general medical and surgical male cases. African medical assistants receive a 4½ year course of training and instruction at a training centre in Dar es Salaam or at certain mission centres.

There were 4 trained male nurses. One was in charge of the hospital pharmacy, another supervised the nursing orderlies in the three male wards. Two staff did preliminary examination of patients and documented cases on admission and at assessment. Through long experience and training at the hospital they had become highly efficient at certain technical procedures such as pleural aspiration, intubations of pneumothorax and pneumoperitoneum, and diagnostic fluoroscopy.

There was one female trained nurse. Trained nurses receive three years instruction at a training centre in Dar es Salaam, together with practical instruction at certain hospitals during this period.

There were also trained and untrained laboratory, theatre, X-ray and clerical staff, and the usual establishment of cooks, laundry staff, etc.

Male and female nursing orderlies were recruited from the local population. In the last two years candidates have been required to show a pass in the standard 8 Territorial examination. (The standards range from school entrants at standard 1, to standard 12 which is the equivalent of the Cambridge school leaving certificate.)

Tuberculosis home visitors were recruited from the male nursing orderly staff.
Appendix D.

Incidence of infestation.

Routine stool and urine examination showed a high incidence of infestation.

The 100 pulmonary cases under review demonstrated the following parasites on examination of a single specimen:

- **Ascariasis**: 51%
- **Hookworm ova**: 22%
- **Trichuris ova**: 13%
- **Taenia ova**: 4%
- **Strongyloides**: 5%
- **Schistosoma Mans**: 3%

Multiple infestation was quite common. Malaria parasites were present in 4% of the blood slides examined on admission.

Appendix E.

Classification of Pulmonary Tuberculosis.

The classification used in Great Britain and approved by the Ministry of Health (1947) was utilised. Cases in the series fall into categories, B1, B2, B3, or slight, moderate, and advanced.

Classification of Glandular Disease.

A simple method of glandular disease classification was introduced by the writer. The extent of glandular involvement was first noted as 'slight', 'moderate' or 'considerable'.

1. 'Slight'. A small degree of enlargement occurring in one to three glands of one glandular group only, with no clinical evidence of caseation.

2. 'Moderate'. A greater degree of enlargement than in one, involving more than three glands in one group, or involving the glands in other groups to a slight degree. Glands showing evidence of fluctuation but without marked skin involvement were classed in this group.

3. 'Considerable'. Extensive glandular enlargement, or marked involvement of several groups of glands. Cases with frank skin involvement with or without sinus formation were included in this group.
Cases were further classified in relation to whether the glands were 'mobile' or 'fixed', on palpation.

Thus the degrees of involvement were noted as follows:

- Slight, mobile or fixed.
- Moderate, mobile or fixed.
- Considerable, mobile or fixed.

Improvement under treatment was classified in the same manner as for pulmonary cases.

Treatment of Glandular Cases.

Cases with co-existing pulmonary disease, and cases where there was marked skin involvement were treated in hospital, in exactly the same manner as pulmonary cases.

Surgery was seldom resorted to, save for the treatment of an unusually persistent gland or sinus.

Abscesses were aspirated and skin lesions treated with a 1% isoniazid paste.

When the home treatment scheme commenced, all glandular cases were first admitted to hospital for at least a month. Recently, it has been found possible to discharge uncomplicated cases direct to home treatment.

The improvement in glandular cases after three months was so considerable that treatment was stopped in a number of cases who were then observed closely. Mild relapse occurred in about 8%, and the routine treatment now extends to at least six months daily antibiotics and often nine months. No relapse has been noted to date after nine months therapy.

Appendix F.

Orthopaedic Cases.

These represent about 3-4% of the total cases seen. The greater proportion involving the spine. The great majority demonstrate advanced bony involvement with destruction of the joint.

Preliminary antibiotic treatment is carried out in the hospital, together with the application of Plaster of Paris.

A fair proportion are enabled to continue treatment at home, after at least three months in hospital and usually six months. The daily antibiotics are continued for an average duration of eighteen months.

A proportion are referred to other hospitals for operation.
Appendix G.

The Ferric Chloride Test.

The presence of P.A.S. in the urine was established by taking a 2 cc. specimen of fresh urine, adding one drop of dilute acid and five drops of a 10% aqueous solution of ferric chloride.

In the presence of P.A.S. the sample changed to a red purple colour varying in intensity with the amount of the drug present.

Fallacious results due to the presence of salicylates, occurred occasionally in hospital patients.

Appendix H.

Examples of the Value of Tuberculosis Home Visitors.

In the early days of the scheme in Arusha district, only one home visitor could be spared for the area. His time was fully occupied with managing the combined dispensary and clinic.

Attendance was very poor (about 65%), and there was a relatively high incidence of negative P.A.S. tests, in those cases attending.

A second home visitor became available, and working in cooperation with the local chief transformed the situation. Within a matter of months there were only two patients out of a total of 194 who were not attending and these had both moved to Kenya. In addition frequent surprise visits were made to the patients homes and the urine tested.

The incidence of negative P.A.S. tests is now very low and there are many patients who have completed antibiotic therapy and remain on observation only.

In another area, North Pare, the home visitor, who was admittedly the most efficient member of this group of staff, had established such a close and avuncular relationship with the local population and the leaders of the community, that new cases were referred for investigation at a comparatively early stage of the disease.

At the end of a two year period there is some evidence to suggest that the incidence of active disease is decreasing in this area, as evidenced by a definite reduction in the number of new cases admitted to hospital over a period of months.
Appendix I.

Legal Aspects: The Infectious Disease Ordinance.


Tuberculosis is included in the schedule of diseases, when it can be proved that there exists "an unusual prevalence" or an "unusually large number of deaths from..." the disease. 5 : (1).

Penalties for wilful obstruction include: "... imprisonment of either description for a term not exceeding six months or a fine not exceeding two thousand shillings."

The Native Authority Ordinances make similar provisions.

It has not been considered either necessary or desirable to make use of these ordinances to date.