THE TREATMENT AND PREVENTION OF TUBERCULOSIS

IN THE TROPICS.

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INTRODUCTION.

The problems associated with the control of tuberculosis in the tropics are steadily attracting more attention.

Jameson (1934) said, following his tour of the East to investigate at first hand the public health problems to be met with there: "tuberculosis is now just as serious a killing disease in many parts of the tropics as it is in Europe".

In British Guiana, Trinidad and Jamaica the erection of tuberculosis hospitals has been commenced and it is hoped that, in time, it will be possible for other Colonies to follow this example.

The original intention of this thesis was to furnish an account of anti-tuberculosis measures in a small tropical community, to outline the problems encountered in such work and to describe the methods employed in overcoming them. Before doing this it was considered advisable to make a comparative study of the problems of other tropical countries. This involved an extensive search through numerous medical journals published in all parts of the world.

The medical officer stationed in the tropics rarely has the time or opportunity for studying the work of other investigators. Further, apart from a specialised course in tropical diseases, he has received his training from teachers unfamiliar with the aspects of disease in warm climates.

On taking up his duties abroad he finds, with respect to tuberculosis, a very different state of affairs to that which

exists in temperate climes. His resources are too often scanty, he may have to deal with a population entirely ignorant of the most elementary laws of hygiene and he will search his textbooks in vain for an answer to the problems of pathology and treatment that face him in his tuberculosis work abroad.

The first part of this thesis therefore has been devoted to selecting, as far as possible, the more important contributions regarding tuberculosis amongst coloured peoples.

Further, in certain sections, especially that on pathology, these articles have been set out in considerable detail in the hope that, ultimately, the information contained therein will be of value to those who have to wage a single handed warfare against this disease.

EPIDEMIOLOGY OF TUBERCULOSIS IN THE TROPICS.

Undoubtedly the first observer to arouse interest in this question amongst British workers was Cummins (1912) who, as a result of his observations in the Sudan, pointed out that tuberculosis was practically non-existent amongst people living under primitive conditions, but transported from their natural surroundings to a civilised habitat, these very people were far more liable to contract the disease.

In France Calmette's (1912) account of tuberculin tests (von Pirquet) in the French colonies furnished a reliable index of the extent of the disease in hitherto unsurveyed countries. Ziemann's (1913) article on tuberculosis in the tropics gave further encouragement to the view then slowly

gaining ground that tuberculosis was by no means unknown in other than temgerate climes.

Bushnell (1920) has reviewed the various contributions to medical literature during these earlier years and there is no need to cover the same ground.

The advent of the European war, however, stimulated research on a larger scale than had been possible hitherto.

Peoples of many races, Africans, Chinese, Indo-Chinese, Malagasy, Polynesians, West Indians were transported to the various theatres of war. These peoples, many of them without any previous contact with the highly tuberculised Europeans, besides being subjected to the strain of war conditions adopted perforce a mode of living entirely different from that of their natural habitat.

The result was a heavy mortality rate from tuberculosis and the consequent opportunities for pathological and clinical studies which have since formed the basis for comparison with work of a similar nature throughout the tropics.

The best known of these investigations were those of Borrel (1920) and Roubier (1920) with their detailed clinical and pathological findings on members of various coloured races. Another aspect of the question - the pathological findings in a tropical community long exposed to tuberculosis - was dealt with by Scott (1930) in his account of three hundred autopsies performed in Hong Kong.

There followed numerous researches on the part of

observers in the United States on the post mortem findings in Negroes who had succumbed to the disease.

The result of these and other findings which will be referred to later enables us to understand the force of Vassal's (1928) dictum that "tuberculosis of primitive peoples has an epidemiology of its own". Cummins (1928) pointed out that acute progressive tuberculosis is not invariable when infection takes place on virgin soil. It is not necessarily a high morbidity that is present following such an infection but a high case mortality.

If infection in this virgin soil produces latent lesions they tend to be well tolerated but should the disease become manifest then the result is serious.

If we consider the age period between early childhood and the onset of puberty we find a high degree of resistance to, and little manifestation of, tuberculosis.

The dangerous period of infancy with its acute type of tuberculosis has been left behind, in front there is the pubertial period with its threat of the adult form of phthisis, this childhood period of calm is the one at which tuberculous mortality is at its lowest. Cummins describes this as the larval period and at this stage the fate of the individual hangs so often in the balance.

In these childhood years, for the majority there is freedom from responsibility; good diet and adequate rest, coupled with healthy exercise and open air, result in physical fitness and general well being.

At puberty much of this is changed and new stresses and strains assail the body.

Here the larval stage with lesions latent and as yet unresolved results often in a considerable degree of auto-inoculation which in turn produces a high degree of tissue allergy in a short time. While side by side but infinitely more slowly there occurs the gradual formation of cellular proliferations and protective barriers of fibrotic tissue, the evidence of spontaneous healing. The existence of unnatural stress or abnormal physiological conditions during this larval period may so increase the degree of autoinoculation as to bring about not an established immunity but manifest lesions and acute disease.

This description of the onset of serious tuberculosis by Cummins is borne out by the investigations performed by the South African Institute for Medical Research amongst the mine labourers on the Witwatersrand (1932).

Here the sequence of events amongst "a relatively primitive race impelled to change its manner of living from that of a pastoral and warlike people to one of industrialism associated with increasingly close contact with Europeans and to some extent with urbanisation", throws considerable light on what has happened in many other parts of the tropics.

It was found that natives applying for employment who reacted positively to intradermal tests were more liable to develop manifest tuberculosis than those who were negative.

It appears that this allergy denoted that resistance to infection was lowered and further the greater the amountof allergy the lower the resistance.

However, that this allergy does bestow some degree of resistance is evident from the observation that the septicaemic type of tuberculosis occurred most often amongst those Natives who had not reacted to the Test.

It seems probable that the evidence of this acute phthisis occurring in Native recruits shortly after commencing their mine service can be correlated with the view that in these Natives a partially natural tuberculosis modified by environmental circumstances has attained an intermediate stage between the tuberculosis of virgin soil and the localised tuberculosis of the European.

It has been ascertained that the case mortality in the first year of employment in the mines is twice as high among the Natives as it is in White workers.

There exists a 'biological lack of resistance' quite apart from any risk associated with the mining industry and this is a biological characteristic of Africans which cannot be overcome except by contact with industrial conditions over a long period of time.

The recruits to the mines have already come into contact with the infection of tuberculosis for Allen (1932) carried out a series of tuberculin tests in the recruiting territories, the Transkei and the Ciskei, and found that 74% were positive to 0.1 c.c. 1:5000 O.T.

But this exposure to infection in their own kraals did not lead to any great degree of active disease; it did however produce latent lesions which remained controlled under the natural conditions of their home life.

Amongst those who sought employment in the mines this latent stage lead to manifest tuberculosis due to the crowding together of men in an environment where the housing conditions, the diet and the conditions of work were completely different.

As Cummins points out in the European child tuberculous infection usually occurs during the favourable period of home life and the lesions, in the majority of children, remain larval. Throughout the childhood and adolescent stages the child encounters a succession of minor re-infections and thus builds up a degree of resistance which minimises the risk of active tuberculosis.

In the African native there is no slow transition from one stage to another - the change from the natural life of the kraal to the mines is abrupt.

Further, the lack of resistance which characterises the African lessens his chances of developing the disease.

Another study of the epidemiology of tuberculosis amongst primitive peoples, though not inhabitants of the tropics is furnished by Ferguson's (1928) history of the spread of tuberculosis among the Indians of the North American continent.

Until the early years of the decade 1870-1880 tuberculosis was, from authoritative accounts, rare among the

North American Indians. By 1884 it had flared up in such a fashion as to resemble an epidemic, the death rate actually rose to 90 per 1000 in 1890. This acute phase lasted through two decades and then gradually subsided but the death rate at the time of his report still stood at 8 per 1000, almost twenty times that of the surrounding population.

In the acute phase of the invasion adenitis was the commonest manifestation and affected the Indians at all age periods; to-day the children who form the third generation rarely show any evidence of adenitis.

The first generation of the epidemic, that is, those infected for the first time in the adult age period, suffered heavily 28.86% fell victims to the disease.

The second generation who contracted the infection in childhood was even more severely afflicted and sustained a greater loss, 32.7% died of tuberculosis.

The present generation, which forms the third of the series, they are the children of parents tuberculised in childhood, has acquired a certain degree of resistance: 20.46% of these have succumbed and the ultimate mortality is not expected to exceed 22.6% by the time the fortieth year is reached.

Anderson (1928) from a study of the evolution of tuberculosis in Mauritius asserts that in a hitherto unexposed people resistance to the disease begins to be acquired within thirty years of continual exposure, is appreciable in extent

after fifty years while full resistance is developed in more than one hundred but less than two hundred years.

TUBERCULIN TESTS IN THE TROPICS.

In 1912 Calmette published the first account of tuberculin tests in the French colonial possessions, his table is of great interest in comparison with subsequent investigations.

Of those tested by the von Pirquet tuberculin test

Senegal	15.1%	pos.
Madagascar	7.0%	"
Fr.Guinea	1.8%	"
Ivory Coast	8.4%	"
Fr.W.Indies	41.0%	"
Indo China	31.4%	"
Reunion Is.	52.4%	" (mixed population, Negroes, Mulattoes, Indians and White Creoles)

It would be too great a task considering the scope of this work to tabulate all subsequent findings but a few are discussed in order to obtain some idea of the prevalence of infection in various parts of the tropics.

Toullec and Jolly (1932) tuberculin tested, method not specified, 285 African soldiers landing at Marseille direct from the Ivory Coast: of these 46% reacted positively, a markedly different result to that of Calmette twenty years earlier.

The extent of tuberculinisation in some parts of India

may be deduced from the investigations of Pai and Venugopal (1926) who carried out Von Pirquet tests on 3,372 persons in Madras city, by the end of the first year of life about 40% are infected, 57% at the end of the second year and this rises to 80% in the fifth year.

Information regarding wide scale surveys in the tropical portions of South America are lacking but the infection is considered to be widespread over most parts.

Krumdick (1931) testing 800 children in Lima by the Von Pirquet and intradermal tests found that positive reactions rose from 3.1% under twelve months to 75% between 10-15 years. On the other hand children in the sparsely populated rural areas of Peru totalled only 1% of positives.

The large series of tests performed on the mine labourers in the Witwatersrand applying for engagement gave a positive percentage of 72, to Mantoux test 0.1 c.c. 1:5000 O.T.

The investigators were of the opinion that by using a less dilute solution of Old Tuberculin the total positives would have amounted to nearly 90%.

Cummins (1934) commenting on a group of Africans tested with high dilutions noted that no fewer than 48.6% reacted to 1:10,000,000 O.T.

(1933)

Cummins and Evans tested for comparison a group of 304 male inmates of a Welsh mental hospital and only 3% reacted to the same strength of O.T. In his opinion this reaction to high dilutions on the part of the African Native suggests that he

harbours a latent infection of such intensity as to be verging on the clinical level.

A recent study carried out in Africa by three observers in widely differing localities has yielded a number of interesting results.

Burrows (1934) did a series of intradermal tests on the Dinkas of the Southern Sudan; these people are mainly cattle owners and lead a seminomadic life. Tuberculosis was unknown amongst this tribe until the early years of this century when infected aliens, traders from Northern Africa, settled in their midst. Since then the disease has slowly spread throughout the community despite the fact that their customs, habits of life and environment have undergone no change.

3,662 were tested, 0.1 cc of 1:5000 O.T.

Total positive	32.7%
Under 5 yrs.	7.5%
5-10 yrs.	19.6%
10-25 yrs.	36.1%
25 over	50.76%

Wilcocks (1934) similarly tested Africans in Tanganyika and of 523 adults, male and female -

51% were positive to 0.1 c.c. 1:500 O.T.
47% " " " 1:5000
43% " " " 1:50,000

He, too, observed that the African Native reacted to a very

much more dilute tuberculin than does the European.

Mathews (1934) in Zanzibar where a medley of races are to be found and constant immigration in small numbers is maintained, from the Orient obtained, in the town, 67% positive tuberculin tested males and 64% females.

In the rural districts 26% males and 23% females reacted positively. In the age group 20-39 yrs. amongst town dwellers 71% reacted while half of the urban children had become infected by the tenth year and two thirds by the twentieth year.

It is evident from these surveys that even in the more remote portions of Africa tuberculous infection is widespread while in those regions open to contact from other continents there is a high degree of tuberculinisation.

As Hart (1932) stated, it is difficult to make comparisons between the various tuberculin surveys because of the differences in technique and in the strength and potency of O.T. available in different parts of the world.

He advocates a uniform technique and the employment of a tuberculin standardised in terms of potency with the International Standard Tuberculin.

One of the difficulties encountered in the tropics is the necessity for making up dilutions of O.T. at frequent intervals. Diluted tuberculin should not be used after fourteen days in warm climates and has during that period to be kept in a refrigerator, a piece of apparatus not available

everywhere. The usual intradermal tests necessitate the presence of a laboratory where the solutions can be made up accurately and here they can be kept for the requisite period at a suitable temperature.

Further the actual use of a hypodermic syringe is resented in some of the more backward portions of the globe and the difficulty of persuading patients to come up for repeated tests very great.

Craig (1933) introduced a method which he claims to be simpler in technique than either the Von Pirquet or Mantoux test and as reliable. The instrument used consists of a short handle with five needle points at one end. A drop of undiluted O.T. is placed on the forearm and the instrument is placed at a right angle to the treated area and firm pressure employed until the points have penetrated the superficial layers of the skin.

This method deserves to be more widely known since it has two important points to recommend it, the use of undiluted O.T. which is unaffected by tropical conditions and the employment of an instrument less feared than the intradermal syringe.

Long (1935) would have us abandon O.T. altogether since the varying potencies of brands lead to lack of accurate comparison.

O'Brien (1925) testing twelve samples of veterinary tuberculins from Great Britain, U.S.A. and one from a European source, found a great variation in the potency of the different

samples, they varied on the potency scale from 200 to as low as 20 or less.

Long et al (1935) in their consideration of this question of a standardised tuberculin describe the method of isolating the active principle of O.T. made from cultures grown on synthetic media of known chemical composition.

The product so obtained can be used in solutions of accurately weighed amounts or it can be mixed with an inert, soluble substance, e.g. lactose and made into tablets, each containing such an amount that 0.1 cc of appropriate solutions delivers the required dose. They recommend that five minutes should be allowed for dissolving the tablet. This product is now known as P.P.D. (purified protein derivative) and as a result of its keeping properties in all conditions, its invariable potency and handy tablet form,bids well to be the preparation of choice for all tropical workers.

Surveys carried out with P.P.D. have yielded satisfactory results but Palmer et al (1936) performing comparative tests with P.P.D. and O.T. on 294 Negro school children report that the former is not, in their opinion, superior in its results to O.T. at least in the case of the Negro.

PATHOLOGY OF TUBERCULOSIS IN THE TROPICS.

No record of the spread of tuberculosis can be complete without a study of the pathology of the disease in various races and countries.

Nor is this a field of work that has been neglected, numerous workers have performed series of postmortems large and small and their findings have contributed greatly towards solving some, at least, of the epidemiological questions which confront us.

Clark (1915) analysed the records of 703 autopsies performed in the Panama Canal Zone, the majority of the subjects being Negroes from the West Indies. He recorded that as a rule tuberculosis was the cause of death and rarely a coincident disease.

Evidence of old infection in the form of calcified thoracic glands, apical scars, etc. were encountered far less frequently among Negroes than Whites.

Nor was there much evidence of fibrous tissue formation in the lungs of Negroes dying of tuberculosis apart from the obliteration of pleural cavities by adhesions.

Surgical tuberculosis was rarely seen in contrast with Europeans. Practically 50% of Negro cadavers showed that some of the abdominal organs were involved in the dissemination of tuberculosis throughout the body.

Acute miliary tuberculosis was not infrequent occurring in approximately 10% of tuberculosis deaths.

Borrel (1920) by his description of the pathological findings in native soldiers dying of tuberculosis in France during the war has placed on record for all time a picture of the state of affairs that eventuates when the seeds of disease are sown on virgin soil.

He laid great stress on the presence of one or more enlarged lymph nodes in the subclavicular region, 'ganglions susclaviculaires'. These were situated in front or behind the insertions of the sternocleidomastoid and were present in 70% of post mortems either as a primary infection or as a spread from the infected tracheobronchial nodes.

In 80% the tracheobronchial nodes were tuberculous presenting changes of caseation and were manifestly the point from which further spread took place. The extension of the disease was due either to rupture of the node or by lymphogenous or haematogenous spread. These enlarged lymph nodes varied in size from a cobnut to a hen's egg.

Caseous pneumonia of a lobe was noted in 30%, in 20% of cases caseous pneumonia with miliary spread of tubercles in the lungs was present.

Miliary tubercles were recorded as present in the lungs, spleen, liver, suprarenals, meninges in 25%, as Borrel aptly put it 'it snowed tubercles'.

In 10%there was a pleuro-peritoneal spread by contiguity. Chronic tuberculosis formed only 5% of the total findings, caseous changes were seen in the apical regions without any involvement of the mediastinal glands, cavitation was rarely present.

Abdominal tuberculosis was uncommon while surgical tuberculosis was rarely encountered.

Borrel notes that the subclavicular glands were

seen twice as frequently in the Senegalese as compared with the Malagasy.

Cleland (1912) placed on record the post mortem findings in two Australian Aborigines, a race untouched by tuberculosis. Here massive caseation was present in the lungs with caseous changes in the mediastinal glands and tubercles scattered through the spleen, kidney and liver.

Scott (1921) in his investigation into the prevalence and types of tuberculosis in Hong Kong found that,of 300 autopsies,in 72% entry was by the respiratory tract, in 12.33% by the alimentary tract.

Excluding all cases over ten years of age, the majority of the post mortems being on Chinese children, of the 225 children 65.77% exhibited a primary infection by way of the respiratory tract, 13.77 by alimentary.

He considers that it is probable that where the primary focus is located in the intestine the means of entry was by the ingestion of myco.tub. from dried sputum in infected buildings.

A study of his findings furnishes us with a standard for purposes of comparison with similar work and should not be neglected by those undertaking such work in the tropics.

A. The almost constant finding of a primary focus in the lung whenever there was involvement of the hilar nodes and the close anatomical relationship of these nodes to the primary focus. An exception to this was noted in 29 of the 225 children where caseous mediastinal nodes were present yet there

was no evidence of a focus in the lung parenchyma.

In 11 cases enlargement of the hilar nodes was probably secondary to infection of mesenteric glands.

One child had an abscess of the dorsal spine, fifteen children had miliary tubercles in the lungs. The remaining two cases had in one, involvement of the meninges and in the other miliary tubercles in the kidneys. In the former the tracheobronchial and in the latter the paratracheal, nodes were swollen and caseating but no primary lung focus was present.

B. In the great majority of cases the primary focus in the lung was single.

C. Wherever a lung focus was recorded it was accompanied by affection of the root glands.

It is interesting to note that Scott lays emphasis on the absence of the above condition in adults and its almost invariable presence in children.

A state of affairs very different as far as the adult Negro is concerned.

In children it was present in all but twelve cases and evident to the naked eye. In four of these however there was microscopical proof of infection of the lymph nodes.

In one case, that of a child three years of age tuberculous bronchopneumonia was seen with no involvement of the root nodes. In another four years old caries of spinal vertebrae was noted with tubercles in the lung but no inflammation of the drainage nodes.

Tuberculosis of bones, joints or skin was rarely encountered.

Lasnet (1922) during his tour of duty with the army of the Rhine records the presence of enormous cavities almost taking up the whole of one lobe in Senegalese who had succumbed to tuberculosis. Otherwise the pathological findings were similar to those of Borrel. In other races, Arabs, Annamites and Malagasy the post mortem findings were more in accord with those of Europeans though they showed that a more acute process had been at work.

Lambert and Filho (1925) commenting on 402 autopsies performed at a large hospital in Brazil state that the characters of the tuberculous lesions in the Brazilians, particularly those of white stock, indicate a fairly high degree of immunity comparable with that seen in Europe and N.America.

In the Negro, despite the passage of several generations in contact with other races there was marked rarity of healed lesions and noticeable frequency of a generalised pneumonic type.

Vint (1928) recording 176 post mortems on Africans of Kenya ascribes the cause of death to tuberculosis in 16 (19%). Healed lesions were rarely met with and it was unusual to find any fibrous tissue formation around the lesions. The commonest form of the disease was miliary tuberculosis. Both lungs were filled with tubercles and in eight of the cases cavities were

seen but in only two were they larger than a bean. In some the condition closely resembled a tuberculous pneumonia. No naked eye lesions were seen either in the brain or meninges even when the disease was general throughout the body. All the organs in the abdominal cavity except the pancreas were found to be invaded at one time or another.

Ukil (1929) in post mortem findings from Calcutta, Madras and Patna comprising 1,529 dissections found pleural adhesions present in a large number and these were both multiple and extensive. Enlarged bronchial nodes present in most of the fibrocaseous types, a large proportion of hilar nodes (30-50%) showed well marked caseation and little fibrosis.

The prevailing type was fibrocaseous with localisation of the disease in the lobes.

In these cavity formation was present and multiple cavities in 14%.

In the majority of the cases in the age period 15-30 years, the walls of these cavities were ragged and caseous and encircled by tubercles. Over one hundred cavity walls were sectioned and well marked development of fibrous tissue noted in 10%, moderately marked in 10% and feeble or absent in the remainder. The result was that the lesions spread extensively with involvement of both lungs 62% and miliary dissemination in 42%.

Exudative changes were a much more prominent feature

of phthisis than proliferative, the later only being found in individuals over forty years of age reared in thickly populated districts.

Tuberculous bronchopneumonia with great enlargement of the hilar nodes was seen in a few adolescents, 2-3% in the age group 15-20 years.

Ukil quotes Rogers' findings of meningeal spread in only 5.0% of Indian children under ten years of age as compared with 62.7% in London.

Opie (1930) in a small group of nine autopsies performed on members of the Negro race in Jamaica noted that five adults had pulmonary tuberculosis of the childhood type i.e. located in nonapical areas with involvement of the nodes draining the areas.

In one the lesion was in the apex but otherwise the infection was of the childhood type, in two more the pathological appearances found in the lymph nodes were intermediate between those of childhood and adult life.

In only one were the characteristics of pulmonary tuberculosis as seen in the European adult encountered.

The Witwatersrand (1932) investigations included 200 autopsies and the findings were compared with series published in England.

i. There was a far greater involvement of the lymph nodes all over the body in the Africans.

ii. Lung lesions were less extensive as well as less

constantly present in the African, while scarring, fibrosis, pleural adhesions and cavitation were less often encountered.

iii. Involvement of the spleen and liver was very much more common in the African and, in addition, tuberculous peritonitis, and infection of such abdominal organs as the suprarenals and genitals.

iv. Both laryngeal infection and meningeal lesions were less frequently recorded. This cannot be accepted as strictly accurate since these complications were not systematically sought.

Post mortem findings in a small group of Eurafricans suggest that among coloured people the type more closely approximates to the European form of the disease than to the African type, the number of dissections performed was too small to draw definite conclusions.

A terminal miliary spread was often seen when the groups of lymph nodes exhibited extensive caseation.

Tuberculous lobar pneumonia was recorded in only two cases. That a certain amount of resistance is to be found in the Africans is evident from the fact that whilst many cases had massive initial caseous lesions in the nodes especially of the tracheobronchial groups with secondary spread to the lungs or with a generalised miliary spread yet a proportion showed extensive changes in the upper lobes with little or no change in the hilar nodes.

Pinner and Kasper (1932) in a review of 303 autopsies

of coloured and 219 of white persons of all ages, from infancy to sexagenarians, dying of tuberculosis, tabled the occurrence of miliary tuberculosis in 37.7% of coloured persons as compared with 15.5% of whites.

Haematogenous propagation was twice as common in Negroes as in Whites except for the first decade when the percentages were equal. Also the Negro showed a far higher incidence of lymphatic spread in all age periods, even in the second decade, than did the White.

The resistance of the whites even in the first twenty years of life was superior than that shown by the Negro at all ages. The most characteristic features of tuberculosis in the adult Negro were,

i. Massive lymph node caseation.

ii. Massive exudative lesions which overlap the normal anatomical boundaries of the organs. This type of lesion was infrequently encountered but when it did occur was almost always present in the Negroes.

iii. A type of generalised tuberculosis without the formation of miliary tubercles but with irregularly scattered nodular, exudative foci. These lesions were more or less spherical measuring up to 2 cm. in diameter and scattered widely through the different organs. The distribution was densest and the lesions largest in spleen and lymph nodes and sometimes in the lung. The smaller foci were usually found in liver, kidneys, genitals and serous membranes.

No claim is made that the characteristic changes outlined above were solely to be seen in the Negro but they were very rarely seen in the White.

The type of fibrotic pulmonary tuberculosis of the European with its huge cavities, fibrous strands and thickened pleura was seen four times as frequently in the White as in the Negro.

Cavities in the Negro were frequently small, necrotic and more or less filled with liquified masses.

The authors emphasise the fact that one does meet with the chronic, fibrotic appearances in the Negro as well as caseous tuberculous lobar pneumonia in the White but the general picture obtained is the thin sprinkling of Blacks with chronic disease and the equally small number of Whites with massive exudative lesions.

Everett (1933) noted that in 402 autopsies performed tuberculosis was the cause of death in 44 coloured and 21 white persons, in two of the former tuberculous peritonitis was terminal.

As far as possible roentgenograms were obtained prior to death: these were repeated after death and then the excised lungs were inflated and X-rayed once again.

By these detailed methods of examination it was possible to obtain evidence of latent lesions in the 335 in whom tuberculosis had not been the cause of death.

It was found that of this group 197 Whites and 109

Coloured persons had latent tuberculous lesions in the lungs.

Analysis of the type of disease present in the tuberculous group demonstrated the fact that a considerable number of pulmonary lesions in Negro adults originated in the apical regions of the lungs and the adjacent lymph nodes were involved.

Thus the course of the disease in these victims was intermediate between the adult and the true childhood form.

Race.	Childhood Type. Extra Apical Lesions	Apical Lesions	Adult Type.	Abdominal	Latent Tuber-culous Lesions	Non-Tuber-culous	Total
White	1	1	19	0	197	12	230
Negro	9	13	22	2	109	17	172

The group of 22 Negroes showing lesions of the adult type ranged from 20 - 49 years.

In some there was more or less widespread tuberculous bronchopneumonia: in others, lobules or groups of lobules were the seat of the same process.

There were nine cases of massive caseous pneumonia; this was defined as massive when there was consolidation of a whole lobe or its equivalent.

All the 22 cases exhibited cavities, in 14 the walls were sharply defined organisation being present since the cavity lining was smooth. In 5 others the walls were ragged and necrotic while in the remaining 3 both states were observed.

The group of 9 Negroes with the true childhood type of the disease ranged from 17-44 years. The caseating mediastinal nodes and the affected pulmonary areas varied in size from small foci 2-3mm. across to almost homogenous masses measuring as much as 10 x 5 cm. The number of nodes showing change varied from 1-21. Five of these nine cases had cavities.

The group of 13 Negroes with localisation primarily in the apices and caseating mediastinal nodes were from 17-45 years. Massive tuberculosis pneumonia was noted in 8; all had cavities, five had necrotic walls and in 8 the walls were organised. The two cases of tuberculous peritonitis were female Negroes aged 23 and 25 respectively.

As a complication tuberculous peritonitis occurred in 5 of the 22 Negroes with childhood type of disease and in 1 of the 22 with the adult type, none was seen in the series of 21 Whites. Acute miliary tuberculosis occurred in only 2 of the whole series and in both was associated with the childhood type of extra apical tuberculosis in Negroes. Tuberculous meningitis was seen twice, both cases being in adult Whites.

Marked fibrosis was present in 14 of the 19 cases of adult type in Whites and only in 4 of the 22 Negroes, all the Whites had cavities and in only one were the walls seen to be necrotic. Long (1934) commenting on the pathology of thoracic tuberculosis said there were many cases which could not be classified on a strictly anatomical basis as either the adult or the childhood type of tuberculosis. Such cases have large

apical or subapical cavities of the adult type and with these gross enlargement and caseation of the tracheobronchial lymph nodes. This condition is frequently met with in Negroes and is not uncommon in adolescents and in Long's opinion represent a borderline type.

Burrows (1934) amongst the Dinkas found that the glandular and fulminating types of disease were not present. The disease amongst them appears to present the modified and localised appearances seen in 'salted' peoples and many chronic cases with a history of 5 years or more were found.

Wilcocks (1934) made 71 post mortem examinations in Tanganyika and of these tuberculosis was the cause of death in 11.

In 6 miliary tuberculosis was noted, in the remaining 5 little fibrotic change seen and the walls of the cavities necrotic though in 1 case there was evidence that healing had taken place in one of the lesions.

Pastor and Cestero (1936) interpreting the X-ray appearances in 1000 Puerto Rican patients with pulmonary tuberculosis maintained that no significant differences could be seen in coloured patients as distinct from white.

Of the total 809 were Whites, of Spanish stock, 159 Mulattos and 32 Negroes. The form of the disease was preponderantly fibrocaseous, in 48% exudative infiltration was diagnosed, in 52% fibrous changes were equal to or greater than the exudative changes. Massive tuberculous pneumonia was only

recorded once while miliary tuberculosis was seen in 5 cases.

Cavities were seen in 56%, the most frequent location being in the upper third, next in the middle third and relatively rare in the bases of the lungs.

Koppisch (1936) who based his findings on 628 autopsies in Puerto Rica differed considerably from the above Puerto Rican observers in his analysis of the observed changes. He found a number of lesions of the childhood type with wide dissemination and concluded that the Negroes of Puerto Rica are less resistant to tuberculosis than the Whites.

THE INFLUENCE OF RACE ON TUBERCULOSIS.

The marked differences between the mortality rates of various races living in approximately the same environment and under largely similar conditions of climate, work, etc. are recorded by Cummins (1923) whose well known table of figures relative to the different races is reproduced here.

Annual incidence and mortality from Tuberculosis per 10,000 of average annual strength in seven racial typesof British Expeditionary Force, France and Flanders, 1918.

	Cases per 10,000	Deaths per 10,000
British & Dominion Troops	6,056	.398
Portugese Troops	33,636	9,242
Chinese Labour Corps	36.355	13.433
Indian Troops	93:464	17.249
Indian Native Labour Corps	142.040	53.384
South African Native Labour Corps (Kaffirs)	290.665	221.923
Cape Colony Labour Corps (Cape Boys)	444.115	103.627

There are in existence two schools of thought with regard to the part played by a racial factor in the onset and spread of tuberculosis amongst tropical peoples.

One holds that the widespread incidence of disease amongst Africans and other peoples is due entirely to the lack of prolonged exposure to infection and is further aided by lack of hygienic surroundings. The other asserts that given centuries of exposure and a betterment of environmental conditions there still exists a racial characteristic that favours undue susceptibility to the disease.

The term 'racial factor' is not always employed accurately and as Guild (1933) points out, many workers using such a term are not referring to a true genotypic difference. Rather they have in mind the result of a relatively short period of exposure to infection: this, he states, is not a racial nor biological factor but an historical one.

Hoebeke (1934) is convinced that there is an essential racial difference, the Black makes his tuberculosis a Negro tuberculosis whatever surroundings may be envisaged. What reinforces Hoebeke in this assertion is the fact that the Negro torn away from Africa and transplanted to a strange country after a period of centuries continues to manifest this type of tuberculosis peculiar to his race.

Despite this prolonged contact the Negro still remains more sensitive to the disease than the other races dwelling around him.

That despite transplantation into alien surroundings over long periods of time the Negro maintains his biological characteristics is evidenced by Snyder's (1929) investigations into the blood groups of the Jamaicans. In Jamaica, though crossing with whites has modified the proportion of the blood groups to some extent, the Jamaican Negro, despite generations of existence in a non-African environment, shows in his blood grouping definite evidence of his African relationship.

Cummins (1934) says that the childhood type of tuberculosis seen in the African goes with a fundamental lack of resistance to the disease. He maintains that the African appears to be racially incapable of developing against the European mycobact.tub., those fibrotic barriers which localise the disease in other races.

Scott (1935) does not consider that the theory of virgin soil is a complete answer to the question as to why tuberculosis is so often severe in tropical peoples. He, too, considers that the susceptibility of the African is a racial peculiarity.

That other races apart from the White do develop a high degree of resistance is seen in Hall's and Chang's (1934) studies of latent tubercular infection in Chinese adults. They state that it appears evident that the Chinese have been exposed to infection since the days of the old Chinese civilisation. To-day the disease is of the localised type with no florid excretion of bacilli. Infection is universal

and immunity is maintained at a high level by repeated small infections while allergy is not unduly raised.

While we have ample illustration of the susceptibility of one race to tuberculosis there is not lacking proof that at least one race has a markedly heightened resistance to the disease. Arnould (1936) who investigated the incidence of tuberculosis amongst Jews, quotes the figures for the tuberculosis death rate among the Jewish and non-Jewish populations of Budapest from 1921-1934. In 1921 the rate for the Jews was 19.7 per 10,000, as compared with 43.4 per 10,000 for the non-Jewish sections. Since then the rate for both parties has fallen steadily but the Jewish rate is still far lower, 10.8 as compared with 19.5 for the non-Jewish population

He quotes the conditions in Poland to show that a lower rate is not due to better environment, there the Hebrews are amongst the poorest of the people despite this their death rate is low.

Arnould believes that the Jews as a race have acquired a special resistance during the fifteen to twenty centuries in which they have constantly huddled together in urban surroundings.

Putnam (1933) comparing the figures of 373 Italian and Hebrew families attending a tuberculosis dispensary was convinced that the type of disease differed for the two races, among Italians the disease attacked the younger group and pursued a more severe and rapidly fatal course than was the

case with the Jews. On the other hand authorities such as Boltanski (1935) do not agree with Hoebeke, he considers that tuberculosis is not a new disease of Africa and may have been present for centuries.

The spread of the disease is not due to a special racial difference but is due to circumstances parallel to those in the U.S.A. where the Negro engaged in agricultural pursuits falls a victim not necessarily because he is an African but because he becomes urbanised.

Mills (1935) believes that the basic factor at play is the energy level which in turn is definitely dependent on the degree of climatic drive imposed on the population, especially throughout childhood infection and that the racial factor is far less significant.

Another factor to be taken into consideration is the influence of cross breeding between races. Davenport and Steggerda (1929) carried out extensive researches into the effects of race crossing in Jamaica. As they point out "when two inbred varieties are crossed the offspring show unusually rapid growth, attain exceptional size and display high resistance. Such hybrid vigour is ordinarily found in the F 1 generation (pure White and pure Black) but it may appear in individuals of later generations of panmixia whenever the two causative genes are inbred in the same zygote".

They found no evidence of physical hybrid vigour in the Browns as contrasted with the Blacks and Whites.

The consensus of opinion is that the people of Mixed race tend to exhibit clinical and pathological characteristics similar to those of Whites and do not present so markedly lowered a resistance as in the case of the pure bred Negro.

Halford (1933) commenting on the many racial mixtures met with in Hawai says that such admixtures do definitely influence the correlation of mortality rates and percentages of tuberculous infection.

Pure Hawaiians have a tuberculosis death rate of 310 per 100,000 and a Mantoux positive figure of 75.9%.

In Asiatic Hawaiians the corresponding figures are 150 per 100,000 and 70.6% and in Caucasian Hawaiians 130 per 100,000 and 56.0%.

DIET.

Cobbett (1930) in his investigations into the increase of tuberculosis during the European war concluded that the interference with the food supply, especially shortage of fats and consequent lack of fat soluble vitamins, played a large part. Certain animal experiments indicate that there is ground for believing that fat soluble vitamins play a part in lessening susceptibility to tuberculous disease.

Smith and Hendrick (1925) carried out experimental tuberculous infection of albino rats and showed that they could be rendered susceptible to tuberculin shock by withholding fat soluble vitamin A. The tubercle infected rats deteriorated

more rapidly than the non-infected controls when maintained on a diet of low biological value and low in fat soluble A. A liberal allowance of vitamin A appeared to afford protection against the early deterioration.

Schütze and Silva (1927) in their experiments on guinea pigs obtained some evidence of the deleterious effect of a restricted diet on the course of tubercular disease in the guinea pig.

Otero et al (1934) in experiments on white rats depleted of vitamin A and inoculated with human, bovine and avian tubercle bacilli noted, on the other hand, that there did not appear to be any lessened degree of resistance.

The only positive finding was the appearance of caseation only in those rats completely depleted of vitamin A.

Most tropical dietaries have a deficiency of the fat soluble vitamins and not a few are deficient in other necessaries.

Allen (1932) was impressed with the part played by insufficient food in adding to the liability of mine labourers in South Africa to develop clinical tuberculosis. He further observed that ~~the~~ there was a tendency for the tubercular incidence and mortality to fall when good and sufficient nourishment was available.

Wilcocks (1934) remarks that the calorie value of the native diet in Tanganyika is adequate but there appears to be a deficiency of the fat soluble vitamins.

Geoghegan (1919) recorded that in the West Indies starchy foods predominate and proteins are limited.

HOUSING CONDITIONS.

There is now no question that bad housing conditions have a deleterious influence in the spread of tuberculosis.

Unfortunately such conditions are frequently encountered in most tropical countries.

Opie and Isaacs' (1930) picture of the housing conditions in Jamaica may be taken as typical of many other areas especially throughout the West Indies.

They are positive that the spread of tuberculosis in Jamaica is increased by the overcrowding in the tenement rooms not only in Kingston but also in the larger towns.

Pastor et al (1934) made a survey of two municipal areas in Puerto Rica, one was some distance from any large centre, had a cool and pleasant climate and while overcrowding per house was present did not have any marked congestion of buildings. The other, close to a large city, with a hot climate and a large number of buildings huddled together in a constricted area.

They considered that this overcrowding of buildings jammed together on small tracts of land, played a large part in increasing the opportunities for contagion.

SYPHILIS AND TUBERCULOSIS.

The widespread incidence of syphilis in many

tropical countries often presents a problem to the phthisiologist. Apart from the question of differential diagnosis in the rarer form of syphilis of the lung there is the difficulty of deciding how far to carry out intensive antisyphilitic treatment.in tuberculous subjects.

The subject has received considerable attention in U.S.A. especially in relation to tuberculosis work amongst Negroes. The necessity for this is shown by Giuld and Nelson (1936) who circulated a questionnaire to sixty-seven institutions in the United States involving twenty-five thousand patients. They ascertained that where serological tests were carried out the Wassermann reaction or its equivalent was positive in no less than 21% of Negroes as compared with 4.1% of Whites.

There are some authorities who hold that there is a definite relationship between tuberculosis and syphilis.

Landsberger (1923) analysed the post mortem findings in 5,323 cases in Germany and came to the conclusion that the two diseases do not co-exist more frequently than their individual incidence might explain.

On the other hand Greer (1930) who performed serological tests on 1,994 attending a tuberculosis clinic concluded that some relationship did exist since the incidence of syphilis was conspicuously higher in those with tuberculosis than in those without.

Whether it is wiser to concentrate on treating

tuberculosis and apply the minimum of treatment for syphilis when both disease are present, or to actively treat the latter is a question which deserves serious consideration.

The danger of too thorough anti-syphilitic treatment was emphasised by Potter (1916) who considered that such treatment should be administered with care. He recommended that small doses of arsenicals should be given for a short course alternating with heavy metals or with rest.

Schlesinger (1926) enunciated certain guiding principles based on his own wide experience of treatment and these form a valuable aid to those who are called upon to face the problem.

A. Late syphilis which is non-progressive clinically and complicated by recent pulmonary tuberculosis. Here the treatment should be directed to the tubercular condition and all antisyphilitic treatment dropped until the patient shows evidence of cure or at least of non-progression of the lung condition for several months. Then it may be resumed, but arsenical preparations should be eschewed and treatment limited to heavy metals.

B. Untreated late syphilis in conjunction with fibroid phthisis. There is less danger of reactivation of the lung condition but only small doses of arsenicals should be given in addition to treatment by heavy metals.

C. Fibroid phthisis and early syphilis. This depends on the degree of activity of the pulmonary disease, if there

is little chance of stirring up trouble then full anti-syphilitic treatment should be undertaken. If cavities are present or any evidence of active disease small doses of arsenicals should be instituted and the thoracic condition carefully watched for a flare up of the old lesions.

D. Early tuberculosis present with recent syphilis. The prognosis in these cases is unfavourable. Anti-syphilitic treatment takes second place.

A recent review of the whole question is furnished by Padget and Moore (1936) who from their experience of the administration of a venereal diseases clinic with 20,000 patients, 70% of them being Negroes, came to the conclusion that there was a connection between intensive antisyphilitic treatment with full doses of arsenicals and an acute onset of tuberculosis. They observed 15 cases in whom the sequence of events was strongly suggestive of a flare up of acute tuberculosis with rapid dissemination following a course of arsenical treatment. All of them were Negroes, the majority being women while 9 of them were under thirty years of age. They do not agree with those workers who hold that active tuberculosis favourably modifies the progress of syphilis but they are of the opinion that untreated syphilis has a detrimental effect on the course of tuberculosis. As they point out the recent syphilitic must be rendered non-infectious as speedily as possible for the benefit of the community and treatment has to be undertaken even in a

modified form. Further it is folly to concentrate wholly on the cure of the lung condition neglecting completely the spirochaetal infection since the end result of untreated syphilis is, too often, death.

Bauer (1934) believes that syphilis takes a modest place as one of the aggravating factors in the causation of pulmonary tuberculosis and that syphilis contracted during an active tubercular infection does not hinder the cure of the latter. The more syphilis approaches the tertiary stage the less does he fear its effect on tuberculosis.

Further he holds that the correct therapy of syphilis nearly always diminishes the evil effects of tuberculosis

MALARIA AND TUBERCULOSIS.

The interaction between malaria and tuberculosis hasattracted the attention of a number of clinicians and opinions are still divided as to the benefits or otherwise of the coexistence of these two infections.

Not only is the subject of clinical interest but it has a distinctly historical appeal. Adams (1849) in a footnote to his translation of the First Book of Epidemics remarks that certain authorities particularly of the French School believed Hippocrates definitely asserted that intermittent fevers superinduced an immunity to phthisis.

Freiman (1927) while making a study of this problem

of inter-relationship of the two diseases in Cyprus tuberculin tested (Von Pirquet) 406 persons suffering from acute or chronic malaria. In the acute cases, numbering 136, anergy was present in 91%, hypoergy in the remaining 9%. The duration of this anergic phase varied from 7-40 days. In 272 cases with chronic malaria anergy was present in every one and lasted from 20 to 200 days. He also furnishes clinical examples illustrative of the rapid onset and spread of tuberculosis in the presence of malaria. In confirmation of his views he quotes the opinions of Gracieux and Atkey who maintain, as a result of their extensive clinical and pathological observations in various tropical countries, that malaria forms a good soil for the implantation of tuberculosis and that the simultaneous presence of both disease in the same subject increases the gravity of the prognosis.

Kyriasidis (1930) investigating the subject calculated the opsonic index to myco.tub. in 128 malarial patients and also carried out tuberculin tests (Von Pirquet) on 125 adults suffering from malaria. He concluded from the results of these that malaria does not produce conditions favourable for the implantation and spread of tuberculosis. The increase in the opsonins in the serum of these cases of chronic malaria would, he opined, offer a powerful resistance to tubercular infection.

Collari (1933) is of the opinion that in a 'malarious soil' the myco.tub. develops poorly and its

virulence is definitely lessened. On the other hand he observed that if malarial infection was contracted by a tuberculous subject there was a tendency to a rapid spread of the miliary type.

Jemma (1931) considered that malaria markedly aggravated the course of tuberculosis. In children suffering from malaria he advised that a careful watch should be maintained for the onset of acute tuberculosis.

Krishnan (1936) records that in a fatal outbreak of spontaneous tuberculosis in laboratory monkeys 14 died, of these 4 had been infected with malaria and 10 were free from any such infection. A comparison of the tuberculous lesions in both groups showed that there was not much difference as regards the type of the disease since the majority of the animals evidenced the changes of acute miliary tuberculosis. In three of the monkeys however who had been inoculated with malaria there was distinct proof of fibrosis and calcification in the lungs. These monkeys had through their inoculations acquired a high degree of immunity to malarial superinfection.

Scott (1930) states that he has never seen fibroid phthisis or healed tuberculosis in monkeys.

Krishnan infers from this that the fibrosis and calcification may well be attributed to the influence of this acquired immunity to malaria.

Hodson (1929) could not find any real association between the two diseases.

COLLAPSE THERAPY IN TUBERCULOSIS. ARTIFICIAL PNEUMOTHORAX.

While the usual preventive measures have been advocated in most tropical countries it is only recently that the advantages of surgical treatment have been considered as possible of application outside of the temperate climes. There are still vast areas where the native population is denied the advantages of any form of collapse therapy.

Such a state of affairs is due partly to the great difficulty experienced in persuading the inhabitants to undergo the long period of detention required, in part to the lack of sufficient medical officers with time enough at their disposal to carry out the necessary measures.

Moreover while there are medical administrators eager to institute modern therapeutic measures they are deterred by the fact that knowledge of the efficacy of such treatment in coloured people is, to a great extent, lacking.

It will be of advantage before recording one's personal experience of this work to study some of the results in the U.S.A. We have at our disposal the accumulated knowledge of skilled workers who are treating a coloured population with an apparent lack of resistance to tuberculosis.

Chadwick et al (1933) comment on the widespread opinion in U.S.A. that tuberculosis is so prevalent amongst Negroes and so unresponsive to routine treatment that it is useless to do more than keep them in bed as the disease progresses in face of all efforts. This has not been their

experience for between January 1931 and September 1932, 263 male and 201 female Negroes with pulmonary tuberculosis from 5 - 65 years of age were hospitalised and given artificial pneumothorax treatment.

There were 10% in the minimal stage, 23% moderately advanced, and 67% far advanced. Of these 58% died, 28% apparently arrested, 5% improved and 9% not improved.

They believe prompt collapse therapy is indicated in the Negro, it definitely prevents spread of the disease and reduces toxaemia.

They also express the view that in the Negro the lack of fibrous tissue formation results in a lessening of pleural adhesions and adhesive pleuritis so that complete collapse is more often obtained than is the case with the Whites.

Brock (1933) compared the treatment of a group of Negroes 36 in all with advanced disease with that in a group of 161 Whites. In both groups cavities were present in all but 3 of the Negroes and 7 of the Whites.

21 Negro patients died in the first twelve months of treatment. 8 of these deaths occurred in patients with one lung affected. Satisfactory collapse was obtained in six of these unilateral cases yet spread to the contralateral lung took place even when the collapse had been maintained for some time.

Only one of the 36 cases is at work and she is a nurse, two with bilateral and seven with unilateral disease were improved. The results amongst the white patients were much

better. His experience has been that in several so called unilateral cases with good collapse evidence of commencing exudative lesions in the contralateral lung soon became apparent.

While Brock's experience is contrary to that of Chadwick's, it is to be noted that all his cases were advanced.

Those who have carried out similar measures would be very chary of recommending active intervention at an advanced stage, except for the relief of symptoms, in coloured people.

Gainesand Keller (1933) from their limited experience of artificial pneumothorax in a small group of 7 Negroes stated that such a procedure in the Negro is fraught with peril. Complications occur with greater frequency and are more serious than in other races.

However they aver that while results in collapse therapy in the case of the Negro vary considerably they approximate sufficiently closely to those obtained in white people to justify the labour and time expended. The difficulties are enumerated, namely, the Negro's dislike of hospitals, the difficulty of obtaining regular refills due partly to aversion of the needle, partly to distance from treatment centres.

Brown and Sampson (1935) consider that in the age period when exudative lesions are predominant, that is between the ages of 12 - 19 years A.P. is the treatment of

choice. They also recommend that all Negroes, irrespective of age, should be placed in this group.

Cutler et al (1934) set up a clinic in 1931 for the treatment of Negroes with A.P. They were forced, in face of a shortage of beds, to institute an ambulatory form of attention. A short period of hospitalisation at the time of induction, about one week, was followed by sending the patient home. Once at home he was instructed to remain in bed between visits to the clinic for refills and gradually permitted to increase the time spent out of bed as improvement was noted. The advantages of this treatment from the administrative viewpoint were marked, a far greater turnover of patients per bed being thus obtained. 37 adult Negroes were treated and at the time of writing 16 of these cases were either working or improved, all had negative sputum. They consider that their results justify a much wider extension of these methods.

Myers and Levine (1935) found that with progressive lesions, minimal in extent, and even in those with more advanced lesions, A.P. treatment was markedly successful with only a short period of bed rest at home or at hospital during induction. Furthermore some who refuse hospitalisation will submit to an A.P. provided they may continue their regular activities.

Of a group of 52 white patients, mainly adults and adolescents, most of whom had no bed rest or only a few weeks

4 died and 42 are working or are fit for work.

In Germany Kogan (1930) treated 33 cases by A.P. without placing them in hospital and found that the results were as good as among those who had the benefit of sanatorium treatment.

Blanchard (1935) in French West Africa performed A.P. on 52 out of 356 tubercular cases in a space of four years. Of these 32 had extensive lesions of the fibrocaseous type with haemoptyses. Of this series 3 were in an early stage, 7 moderately advanced and 42 advanced. 47 were unilateral and 5 bilateral.

In only one case was bilateral collapse induced and that because of severe haemoptysis and in this case life was prolonged for two years. Unfortunately the immediate results were so good that 48 left hospital after a dozen or so refills, confident that they were well on the road to recovery and were not traced. Of the 4 who remained it was impossible to give a definite prognosis but both clinical and X-ray evidence point to the probability of ultimate cure.

Stones (1928) demonstrates the difficulties encountered when A.P. is attempted amongst the more backward races in East Africa. He states that some were too frightened or too mystified by the idea of the treatment and that it was rare to encounter a patient in a sufficiently early stage to benefit from the procedure.

Heimann (1936) who has attempted A.P. treatment

amongst the South African Natives found that after the induction and one or two refills they left precipitately and he has given up all attempts to continue with it.

Cummins (1932) believes however that some of the Natives have reached a stage where their resistance is sufficiently high to benefit from modern treatment. It might be argued, he adds, that they were unwilling to undergo sanatorium treatment but the increased number who yearly seek hospital treatment indicates the growing confidence of the Natives in European methods.

Wilcocks (1932) reports promising results from A.P. treatment in Tanganyika. He maintains while it has the disadvantages of prolonged treatment it is a simple procedure which can be done on out patients.

In 1934 he again reports encouraging results from this form of treatment.

Pai (1927) reviews the results of A.P. treatment of 93 patients in India. These were all moderately or far advanced, in 22% the disease was arrested as compared with 14% in 344 patients receiving routine treatment only. In 53% of A.P. cases the sputum became negative as compared with 17.7% in the ordinary group.

COLLAPSE THERAPY IN TUBERCULOSIS. PHRENIC EVULSION.

In the more remote areas and amongst primitive peoples averse to prolonged attendance at a hospital phrenic

evulsion must be the operation of choice. It has certain advantages, simple of performance, complications are unusual and there is no prolonged after treatment. Originally recommended as a procedure for basal lesions its scope has been widened in more recent times and a perusal of published reports of its use in temperate and tropical areas furnishes us with an idea of its scope and its limitations.

Wolf (1928) reported 18 cases operated on in France, all with cavities in the upper lobe, of these 5 were completely cured despite the fact that in them the cavities were large and had resisted treatment for over a year. They disappeared in eight to twelve months after the operation. In 9 cases, recently operated on - oldest only six months previously - a definite amelioration of symptoms was noted, sputum was less in quantity, fever subsided and the sputum became negative while there was a partial regression of the lesions. In 4 cases there was no improvement since large cavities were present kept open by adhesions.

Matz (1936) in U.S.A. employed phrenic therapy for 233 out of 320 tuberculous patients, of these 301 were far advanced. He reports good results in overcoming symptoms including a favourable effect on haemoptysis.

For the period under review ranging from five months to six years 63 were alive (27%), of these 35 were much improved or improved, 18 were unchanged and 10 worse. There was a dimunition in size or actual disappearance of cavities

in 25 of 48 patients.

Gaines and Keller (1933) performed phrenicectomy in 25 cases of pulmonary tuberculosis in American Negroes, 6 were moderately and 19 far advanced. The results were encouraging since 44% showed definite improvement.

Blanchard (1935) gives an account of 31 phrenicectomies performed in French West Africa, mostly in patients with the fibrocaseous type of disease, bilateral and with cavities. They were undertaken in those cases in whom A.P. had failed because of adhesions. Immediate results were good after a period of dyspnoea the general condition improved, weight increased and sputum lessened though clinically and radiologically the lung condition was stationary. In only three cases were physical signs and X-ray appearances sufficiently good to allow a resumption of work. Blanchard points out that in France the results of phrenic evulsion are 10-13% of cures after a long period of observation and that his own results are therefore not unfavourable.

O'Shaughnessy (1932) working at an out station in the Sudan and unable to perform A.P. for lack of X-ray apparatus performed phrenic evulsion in 53 cases. Of these only 32 were finally traced, 3 cured, 9 improved, 7 worse and 13 dead. No attempt was made to select cases as even in the worst examples symptomatic relief was the object of the operation.

He considers that, on the whole, results were not encouraging as only 3 cures could be recorded and he feared that even in these relapse might occur in the course of time. However in the improved group there was evidence that some might ultimately obtain arrest of the disease. One or two of the results, he says, were exceptionally good and several cases were restored to normal health for a year or two before their final collapse. In many cases there was improvement of symptoms such as intractable cough.

Frimodt-Möller and Gnanamuthu (1930) record good results by phrenic exairesis as a supplement to A.P. treatment in India. Marked improvement was obtained in about half the number of cases when this procedure was followed: of 36 patients, 15 were much improved and 11 improved. In 55 cases it was the sole operation and of these 19 were much improved and 12 improved. Unfortunately the time elapsing between the operation and the publication of the results is not given. The authors point out its use in India where it is difficult for patients to continue A.P. treatment after they leave the sanatorium owing to the paucity of centres where refills might be obtained.

Leo and Chang (1934) reviewing 41 cases in China estimated that 68% benefitted as far asthe immediate results are concerned and that in 32% there was no effect or the results were adverse. The authors recommend that phrenic exairesis should be extensively employed in China where the

majority of the sufferers belong to the poor and ignorant class for whom the application of A.P. while advisable is completely impracticable. They consider that the results tend to confirm the accepted view that the operation is most beneficial in lesions which are predominantly chronic, proliferative and unilateral.

OLEOTHORAX.

This method of treatment has received very little attention in the tropics. Shrikhande (1934) reports six cases treated at the King Edward VII Sanatorium in United Provinces. Of these three are probably dead, one has lived for over three years, the other two for over one year. He considers the procedure a useful adjunct in the treatment of purulent effusions following A.P.

AUROTHERAPY.

The employment of gold salts has not been extensive, largely on account of the expense of the preparation.

Benjamin (1934) reports the treatment since 1925 of 440 inmates of the Union Mission Tuberculosis Sanatorium, South India, with sanocrysin. He encountered severe albuminuria in 3 cases, severe dermatitis in a similar number chrysiasis in 2 and stomatitis of a severe nature in 4.

He considers that when sanocrysin or other gold salt preparation is combined with collapse therapy when the contralateral lung is involved, the prognosis is improved.

Brock (1931) in U.S.A. treated a group of 17 Negroes and 29 Whites with gold salts. All the white patients did well but the results in the coloured group were disappointing. Some arrest of the disease was observed on physical examination and on an estimate of the general condition but this was not verified by X-rays for the roentgenograms showed no regression of the lesions.

Blanchard (1935) has also employed the drug in French West Africa but found large doses to be dangerous and recommends the trial of small doses intramuscularly or intravenously, 0.05 gm. to 0.25 gm. twice weekly for a total of 3.0 to 4.0 gm. In 57 cases of whom 44 were in hospital and 13 ambulatory, 17 had albuminuria and 2 severe dermatitis as a result of aurotherapy.

SODIUM MORRHUATE.

The success with which another disease, namely leprosy, has been treated by morrhuate preparations, induced workers to consider the possibility of employing the same preparations in tuberculosis.

Davies (1921) recommends its use in India and quotes one case in which marked improvement was obtained after a long course of treatment with sodium morrhuate.

However the authoritative pronouncement of Crocket (1926) who used sodium morrhuate and ethyl morrhuate over long periods of time and on a large number of patients shows that their employment is not only useless but may be harmful,

SOLAR THERAPY.

There are some workers who point out that with an abundant and constant supply of sunlight efforts should be made to take advantage of it.

Pringle (1930) voices the opinion of most phthisiologists with tropical experience when he says that the sun in South Africa is probably the most dangerous therapeutic remedy one can use unless it is supervised with very strict discipline.

Crocket (1926) pointing out that sunlight has no immunising effect on those who have not become tuberculised recommends that exposure to the sun should never be recommended in a careless fashion but always under medical supervision. He finds it most advantageous in the fibroid type of disease.

CLIMATE AND TUBERCULOSIS.

Rogers (1925) is the only worker who has thoroughly investigated the influence of climate in the tropics on tuberculosis. In his study of the incidence of tuberculosis in India in relation to the meterological data, he found a high tuberculosis rate coincident with a high rainfall and humidity. The direction, steadiness and strength of the rain-bearing winds appear to be the most important factors in addition to high rainfall and absolute humidity. It is of interest that his findings for pneumonia were diametrically opposed to those in connection with tuberculosis.

Many medical men in the tropics consider that the chances of recovery for the tuberculous patient in a warm climate are poor.

While the chances of benefitting from residence in dry, cool climate may be more favourable there are other factors to be considered.

Knopf (1935) maintains there is no specific climate for tuberculosis and that if one has to choose between having a patient under special medical supervision with mental and physical rest in his home climate or sending him even to an 'ideal' climate where he would be in strange surroundings and do as he pleased, it is preferable not to advise a change.

TUBERCULOSIS IN CHILDREN IN THE TROPICS.

The subject of pulmonary tuberculosis in children in the tropics has received scant attention. To obtain any information on this point we have to turn to the work of investigators in the U.S.A. in relation to the Negro child.

Opie (1924) came to the conclusion that the high mortality from tuberculosis in the Negro race and the prevalence of the acute forms of the disease are best explained by partial lack of immunisation. This theory was widely taken up for a time but following further investigations, he and his co-workers, Hetherington et al (1929) revised this opinion since the results of large scale investigations showed that Negro children were even more heavily infected than those children of other races. This

was verified by Aronson (1931) who tested a large number of school children in Tennessee by the intradermal method and found that a greater percentage of coloured than white children reacted positively.

Drolet (1934) similarly found a greater number of positive reactors among the coloured children in New York as compared with the white races.

Donnelly (1935) is of the opinion that first infections in coloured children are as satisfactorily overcome as is the case with white children.

Gibson (1934) painted a very gloomy picture of the reinfected Negro child. He stated that in his experience of children of the Negro race admitted to the sanatorium with the adult type of phthisis of any greater extent than minimal almost invariably failed to recover. Further that no child with a positive sputum ever recovered, a fatal termination being inevitable.

This compares unfavourably with investigations in England where Cochrane (1935) in an analysis of 710 children aged 3-15 years, all with open pulmonary tuberculosis, found that the disease was fatal in 74% of girls and 72% of boys.

EPITUBERCULOSIS.

The writer's experience in England and the tropics leads him to consider that the pathological state known as epituberculosis is more common in the latter regions.

While holding a resident post in a hospital in England for one year during which he examined hundreds of children suffering from benign and malignant forms of pulmonary tuberculosis he did not encounter a single case in which a definite diagnosis of epituberculosis could be made.

On the other hand in the tropics in only a small group of children three typical cases were seen.

Epituberculosis was first described as a clinical entity by Eliasberg and Neuland (1920). They noted that in young children reacting positively to the tuberculin test certain of them exhibited a clinical picture with distinct characteristics. On examination of the chest an impaired percussion note was present usually in the upper part of one or other lung generally the right.

On ausculatation a dimunition of breath sounds or definite tubercul ar breathing was detected, rarely there were a few superadded adventitious sounds.

The onset was subacute, the child's general condition was either very slightly or not at all impaired. Some cough was usually present but this did not form a prominent symptom.

The striking aspect of these cases was the healthy condition of the children despite the presence of extensive and prominent physical findings.

On radiographic examination a heavy, homogenous shadow was detected filling the whole or part of the upper

lobe, usually the limits of this opacity were sharply marked off from the rest of the lung shadow.

The condition remained stationary for a period varying from weeks to months and then gradually disappeared with lessening of the physical signs and progressive diminution of the shadow on serial film examination.

A differential diagnosis between it and tuberculous pneumonia is arrived at by lack of an acute onset, no marked pyrexia and the absence of the swiftly fatal termination characteristic of the latter type.

From chronic nontuberculous pneumonia it is differentiated by the absence of a history of measles, influenza or other respiratory ailment; further there are no signs of the severe constitutional disturbances and localisation of physical changes of a fibroid nature at the bases of the lungs.

The benign nature of the disease, fortunately, render most post mortems unusual but Epstein (1922) reported one such autopsy. Here a large caseous primary focus was detected in the upper part of an upper lobe, it was encircled by a number of tiny tubercles. The remainder of the lobe was atelectatic.

Goldberg and Gasul (1930) reported the occurrence of this condition in ten children aged 2-9 years in a follow up of five hundred tuberculosis contacts and their controls.

O f these 10 cases, 7 were in coloured and 3 in

white children; 3 of them had been in contact with open cases of tuberculosis, 7 had no such history. They were all positive to tuberculin tests and in all the general condition was good, the only constitutional disturbance was a slight degree of fever observed in some of them. There was the usual involvement of one lobe, most often the right upper, physical and radiological signs cleared up gradually leaving in some no trace, in others areas of calcification.

Spence (1932) furnished an account of three cases of infants exhibiting the characteristic physical and radiological appearances. Two had a history of contact, the third had a doubtful history, a sibling having died from meningitis which may possibly have been tubercular. In all three there was diminution of breath sounds. In each case a favourable course was run with little disturbance of the general condition apart from some pallor and loss of weight in the early stages. The point of interest in these cases was the performance of an exploratory thoracic puncture in one instance and the withdrawal of a small amount of caseous material. This, on examination, proved both microscopically and by animal experiment to contain myco.tub.

Reichle (1933) argues that information concerning the histological appearance of resolving tuberculosis in childhood is scanty. He states that there is little doubt that a certain number of so-called epituberculosis cases are simply tubercular pneumonia. In some atelactasis has

occurred but the majority are directly the outcome of infection by myco.tub. that is retrogressive tuberculous pneumonia. This applies especially to the cases that remain for a considerable time in a stationary phase before resolution

He maintains since resolution is possible in almost any form of tuberculous inflammation that it is superfluous to designate any unusual forms of change by a special term.

Morlock and Pinchin's (1933) account of a case of epituberculosis in a boy of fourteen years of age added considerably to our knowledge of the pathological condition underlying some, at least, of these cases. Roentgenologically the picture was typical of epituberculosis. On bronchoscopic examination a tumour was observed pressing upon the lumen of the upper bronchus of the superior right lobe and a section of this on histological examination showed the presence of lymphatic tissue. Four days later another skiagram showed resolution of the shadow and re-expansion of the lung. They considered epituberculosis was not a pathological entity but merely due to pressure and resultant atelectasis owing to enlargement of root glands obstructing a bronchus.

Prosoroff (1929) examining the radiological appearances of epituberculosis and comparing them with those seen in atelectasis in adults due to thoracic tumours found a very marked resemblance existed between both those conditions.

Parsons (1934) states that not until the tissues have

been rendered allergic does epituberculosis occur. His experience would lead him to consider epituberculosis as a benign form of tuberculosis and not a specific allergic reaction.

In a comprehensive view of the literature de Bruin (1936) defines epituberculosis as a clinical hypothesis used to explain the existence of extensive tubercular changes which cause no permanent damage in contradistinction to the hitherto accepted bad prognosis of extensive tuberculosis in children. He considers that in many cases the root cause of the changes is the collapse of portion of the lung due to obstruction of a large bronchus.

He gives examples of skiagrams in children showing

(a) the similarity in appearance between epituberculosis and atelectasis:

(b) displacement of the heart to wards the involved side:

(c) displacement of heart following an increase in the physical signs and X-ray appearance:

(d) the decrease of physical signs and X-ray shadow and simultaneous return of the heart to the normal position.

An account of a post mortem is furnished in the case of an infant of three months where the shadow appeared and disappeared only to recur again when the disease was activated by chicken pox. Death ultimately took place from tubercular meningitis and at autopsy it was seen that a primary focus had invaded the main bronchus with obstruction

and collapse of the corresponding area of the lung.

He believes that it is possible to have, in addition to atelectatic changes, definite tuberculous infiltration. He furnishes three pathological explanations of the changes seen:

i. atelectasis.

ii. infiltration of specific tuberculous tissue.

iii. perifocal reaction around a tubercular focus.

BOVINE TUBERCULOSIS.

The view hitherto widely held that bovine tuberculosis is unknown in the tropics is rapidly undergoing modification. From many areas publications on the question have shown that while the disease is uncommon, it is by no means non-existent and is becoming a problem in a few countries.

A number of experiments and observations carried out on indigenous cattle, show that these have a certain resistance to myco.tub. this is particularly the case with the Zebu cattle, which are to be found in many parts of the tropics.

Liston and Soparkar (1917) in the course of their experiments inoculated Indian calves, buffalo and cow, with 50 mgms. of a culture of bovine myco.tub. At least 50% of the calves lived for many days, and when killed, showed tubercular lesions that were either healed or definitely retrogressing.

They held that it confirmed the general experience that Indian cattle are less commonly affected by tuberculosis. Further the result lends support to the opinion that the rare appearance of the disease among cattle in India may be ascribed to a natural resistance rather than to any difference in the methods of tending or housing cattle as compared with similar procedures in Great Britain.

Hornby (1934) from his experience affirms that tuberculosis is an unimportant cause of death in cattle in Central Africa. However he quotes Curasson's opinion that in French West Africa bovine tuberculosis occurred more frequently than had been suspected hitherto.

He, also, is of the opinion that the native races of cattle and particularly the Zebu strain are more resistant to infection than European cattle.

He maintains that the fact of such cattle being largely kept out in the open air is one of the deciding factors in this freedom from infection.

Cornell (1934) gives an interesting account of the manner in which the people of the Wachagga tribe in Tanganyika tend their cattle, also of the Zebu strain.

These beasts throughout their life are kept in the huts of their owners, tied by the neck to a stall and fed with hand-cut fodder. The huts shelter both humans and cattle under the same roof and there is no partition between the animals and their owners. He tested 156 animals kept in huts belonging to

native families of which one member had been found to be suffering from open pulmonary tuberculosis.

These cattle were tested by the double intradermal test and only two (1.5%) reacted positively.

Hall (1931) reports the occurrence of tuberculosis in a native ox in Nigeria, none had hitherto been reported in the indigenous cattle. The results of the guinea pig and rabbit inoculations and the type of lesions produced pointed to the organism being of the bovine type.

Pawan (1927) in Trinidad tested 75 head of cattle, type not stated, by the ophthalmic tuberculin test and found that as many as 13.3% were positive and post mortem examination confirmed the presence of tuberculosis. He has never found the bovine type of bacillus in any human case in Trinidad.

Manley (1929) draws attention to the danger of indigenous cattle being infected by the importation of tainted animals from other countries.

On a stock farm in the Cameroons he found practically 50% reactors in one herd nearly all cross bred cattle which were kept under extremely good hygienic conditions.

He traced the source of the infection back several years to pure bred cattle imported from Germany. He asserts that bovine tuberculosis can infect cattle in the tropics to a severe degree even when kept in an hygienic manner and that no animals should be imported into the tropics unless they have previously passed a rigorous tuberculin test.

Purchase (1929) came across a similar state of affairs when tuberculin testing a herd in N.Rhodesia composed chiefly of local cattle crossed with Hereford and Shorthorn bulls, of 222 beasts, 45 (20%). were positive. He suggests that native cattle are more susceptible to the relatively newly introduced disease. That in certain regions bovine tuberculosis has become widespread is shown by Legendre's (1922) account of the disease in Madagascar. The infection was formerly confined to the southern portion of the island but during recent years it had spread all over. He complains that veterinary prophylaxis against tuberculosis in the tropics is even more neglected than human prophylaxis.

Surgical tuberculosis in the tropics is not common though by no means unknown even in remote parts as instanced by Ferguson's (1927) statement that while travelling through the bush in W.Africa he frequently observed Natives with tuberculosis of the spine,

So far Soparkar (1929) has been the only observer to record in India a case of tuberculosis in a human in which the causative organism was of the bovine type.

The material from which the myco.tub. was isolated consisted of caseating cervical glands, unfortunately no clinical history was available.

PART II.

TUBERCULOSIS IN BRITISH GUIANA.

BRITISH GUIANA.

British Guiana is situated on the North East coast of South America and is the only British possession on that continent. It lies between latitudes 1° to 8° N, the coast line, which contains the majority of the population, is flat and below sea level. Before European adventurers commenced to seek for gold within its boundaries it was an unknown country, the home of large numbers of Carib, Arawak and other Aboriginal Indian tribes. In the years following Sir Walter Raleigh's search in 1595 for the mythical El Dorado the country was the scene of almost continuous warfare waged between English, French and Dutch in turn. The country finally passed into the hands of the British and colonisation was commenced in earnest, and with it the importation of African slaves, about 1740. The importation of slaves from West Africa proceeded apace until in the closing years of the eighteenth century it reached a rate of approximately 5000 per annum. The abolition of the slave trade in 1807 put an end to this forced migration. The present African population are the descendants of these slaves and are to be found in urban and rural areas, they form the principal portion of the population of Georgetown the capital.

These freed slaves formed companies and bought with their savings such plantations as were abandoned and sold after the Emancipation. From these sprung the villages that cover the coast line ranging from hamlets to small townships.

The drift ever since the end of slavery has been towards the towns and now the main population of Georgetown, the capital, and New Amsterdam the next largest centre, consists of Negroes.

The result of this termination of the slave industry was a need for other labour to replace those Africans who had left to live on their own plots of land, various countries furnished immigrants during the remainder of the nineteenth century. Madeira supplied a large number, between 1835 and 1880, 30,645 Portuguese entered the Colony from there.

Another source of supply was the East Coast of India, indentured labour was obtainable until 1917 and up to that year a total of 238,979 indentured immigrants had been registered. The few original labourers and their descendants are known as East Indians. In addition, from 1850 to 1875, 13,500 Chinese immigrants arrived and migration from the West Indian Islands, the latter mostly negroes, added thousands to the population.

A ten yearly census has been taken ever since 1861, except for 1911, and the population, unlike that of most tropical countries, is therefore accurately estimated. This advantage cannot be too highly stressed, in many tropical regions the extent of tuberculous infection and its relation to other diseases is impossible of estimation and its menace overlooked because it cannot be accurately measured.

In Britsh Guiana, thanks to accurate statistics, it is possible to gauge with confidence the extent and distribu-

tion of this and other diseases.

The population (1934) was estimated at 323,171, of this Georgetown held 63,080. The two main sections are the Blacks (the official designation of the people of African descent) and the East Indians, approximately 120,000 of each: next come the Mixed, Aboriginal Indians, Portugese, Chinese and a small number of British.

The principal industry is the cultivation of the sugar cane and the manufacture and export of sugar, the growing of rice and a number of other agricultural pursuits are followed. In the Interior gold and diamond mining, timber felling, and cattle rearing are the main occupations. The country possesses no large industrial concerns and the gold-mining is alluvial so that there is no occupation predisposing to the spread of tuberculous disease.

On the coastal regions there is an annual rainfall of 85 to 95 inches and the seasons are divided into a long wet, a long dry, a short wet and a short dry period respectively.

The mean shade temperature is 79°-82° F. mean maximum being 83°-87° F. mean minimum 74.5°-76.5° F. respectively.

The variation of temperature is very small even in the hottest months 89° F. shade temperature is rarely reached while it is unusual for it to fall below 73°F. at night.

Average relative humidity 7.0 a.m. is 81%, 1.0 p.m. 70.9% and 6.0 p.m. 81.8%.

Fresh sea breezes blow steadily during the day for the greater part of the year and on the whole the climate is one of the most pleasant of all the tropical regions.

The Colony is divided into three counties, the most populous being the County of Demerara which is separated by the Demerara river into East and West Demerara, the County of Berbice and the County of Essequibo, the latter is the least populous and the majority of inhabitants East Indians.

OUTLINE OF ANTI-TUBERCULOSIS MEASURES.

The British Guiana Society for the Prevention and Treatment of Tuberculosis was founded in 1907 largely through the efforts of the then Surgeon General, Sir J.E. Godfrey, following a public meeting in the Town Hall, Georgetown.

An Executive Committee was appointed and a private residence acquired in the heart of the city and opened as a dispensary for the diagnosis and treatment of tuberculosis.

This was staffed by medical men who voluntarily gave their services, the first physician being Dr. W de W. Wishart, the present M.O.H. of the City of Georgetown.

The principle of the Society, then enunciated and strictly adhered to since the inception, is the free treatment of all persons, irrespective of race, creed or financial status.

In 1911 a Health Visitor was appointed after a short spell of training at the Public Hospital, Georgetown.

In that year it is of interest to note that, of 118 patients entered on the register as tuberculous, no fewer than 86 had a history of contact.

In 1912 a second Health Visitor was added to the dispensary staff.

The work of the Society rapidly enlarged and in 1912 no fewer than 1,227 persons attended the dispensary for the first time for advice and examination, a figure that was not exceeded until another twenty years had elapsed.

In 1913 a dispensary was erected on a vacant plot of land in the city within easy reach of all and named the King Edward VII Memorial Tuberculosis Dispensary.

The cost of building and equipping this dispensary was met by subscriptions received from within the Colony combined with a government donation.

In this year an important public health measure was enacted, the compulsory notification of all forms of tuberculosis.

The onset of the European war did not interrupt the work of the Society but it had its inevitable repercussions in reducing the numbers of medical men available for dispensary attendance and in increasing the price of drugs.

In 1917 two more Health Visitors were added to the staff and they were detailed to visit the rural distrincts in East and West Demerara respectively. They were women of African descent and were recruited from the ranks of the

teaching profession. After an ample period of training at the Public Hospital they obtained the Health Visitor's Certificate of the Royal Sanitary Institute.

In 1918 a branch dispensary was set up in the town of New Amsterdam in the County of Berbice and a fifth Health Visitor appointed to deal with tuberculosis work in that area. In the same year branch dispensaries were also established in the villages of Mahaica, East Demerara and Schoon Ord, West Demerara under the supervision of the District Government Medical Officers.

The period 1914-1918 showed a further fall in the tuberculosis death rate contrary to the experience in Europe. This appears to have been due to an era of prosperity consequent upon the demand for sugar and a resultant rise in the standard of living which benefited all sections of the community.

By 1919 the Society was in a flourishing condition and the Executive Committee and Officers numbered 27 as compared with the original number of 12, all sections of the community were represented upon it.

The Society was also fortunate in 1917 in securing as President the late Mr. M. Gonsalves, a Portugese merchant of Georgetown, whose interest in and generosity towards the suffering poor inspired him to guide with wisdom and enthusiasm the activities of the Society until his death in 1936.

He had, prior to accepting the office of President, been a member of the Executive Committee since 1912.

In 1921 a tuberculosis hospital was opened at Best on the opposite bank of the Demerara river to Georgetown and accessible by means of a steamer ferry running at frequent intervals.

It was originally part of the quarantine hospital and its adaptation was made possible by the gift of £2,500 from the Red Cross Association and the Society of St. John of Jerusalem; it accommodated at that time twenty male and twenty female beds.

In 1922 another branch dispensary was opened in the village of Buxton, East Demerara, the largest village in the Colony.

A further addition to the number of tuberculosis beds available was made possible in 1924 by the gift of £1,500 from a leading resident of Berbice, Government granted an additional sum and a new wing was added to the New Amsterdam Hospital thus providing two wards of nine beds each for male and female tubercular patients. In 1925 with the establishment of yet another branch dispensary, this time at Leonora, West Demerara, the Society was responsible for six dispensaries A main dispensary in Georgetown, four branch dispensaries in the rural areas of the County of Demerara and one dispensary in the County of Berbice.

At no time in the Society's history has the incidence

of tuberculosis in the County of Essequibo justified the setting up of a dispensary and the employment of a whole time Health Visitor there.

In 1931 the Society celebrated its twenty-fifth year of work by the issue of a Silver Jubilee Supplement to its annual report and made a special appeal for funds.

In 1932 with the addition of two more Health Officers to the staff of the Government Public Health Department, it was found possible to devote more time to the work of the dispensary. Of late years it had been increasingly difficult for private practitioners to attend regularly on dispensary afternoons and this resulted in a falling off in the numbers of new cases seeking advice.

Since 1920 the position of Honorary Secretary to the Society had been filled by the Government M.O.H. and he was also one of the Dispensary Physicians but it was not possible for him, in view of his other duties, to attend the dispensary more than once a week. At the end of 1932 one Health Officer was detailed to attend twice a week at the Georgetown dispensary and this regular attendance lead to an increase in the numbers; they rose from 723 in 1931 to 1,011 in 1932, i.e. persons attending for the first time.

In addition, a retired Government Medical Officer, Dr. F.T. Wills, an African, specially interested in tuberculosis work was appointed Hon.Physician.

The establishment of continuity of service and the

appointment of physicians with special knowledge of tuberculosis made it possible to reorganise the work of the dispensary.

Contact work which had hitherto been impossible to carry out persistently owing to the continual changing of the medical personnel of the dispensary was commenced, 324 contacts were examined in 1933 as compared with 40 in 1932. Follow up examinations were organised and contact children and adolescents were, as far as possible, re-examined at regular intervals.

Also in 1933 in cooperation with the staff of the Georgetown Public Hospital patients were sent from the dispensary to the radiological department for X-ray examination and 163 cases were dealt with in that year.

Collapse therapy was also instituted and ten cases were treated by Artificial Pneumothorax and two by Phrenic Evulsion.

These new departures in diagnosis and treatment roused widespread interest and cases flocked to the dispensary for examination; in 1934 the attendance of new cases was 1,445 while in 1935 it rose to 1,640.

The average annual attendance since 1920 had been in the neighbourhood of 750.

ORGANISATION AND ADMINISTRATION.

The work of the Society is administered by an

Executive Committee which consists of a President, 2 Vice-Presidents, Honorary Secretary, Treasurer and twelve members.

The Senior Vice-President is always the Surgeon General, the Honorary Secretary has been for some years, as mentioned above, an M.O.H. from the Government Public Health Department.

The Executive Committee is widely representative of all sections and races in the community.

The Georgetown Town Council is represented by one Councillor, lately the Mayor himself has joined the committee, and the municipal M.O.H. Teachers, business men, private practitioners, a newspaper editor and a prominent lady social worker are all to be found taking part in the work of the Executive. The organisation of the dispensaries and the supervision of the Health Visitors is in the hands of the Honorary Secretary. Committee meetings are held monthly to which representatives of the press are invited, thus keeping the work of the Society before the public.

FINANCIAL.

It became evident soon after the Society commenced operations that if the scope of the work was to be widened further support than that derived from public subscriptions was a necessity. In 1911 Government gave a grant in aid of £150 annually and the Georgetown Town Council donated a similar grant of £50, the total income for that year was £240 while the expenditure came to £150.

In 1916 the Government grant rose to £250 and the Town Council's donation to £70, while the expenditure amounted to £300.

By 1919 the grants in aid totalled £670 and just balanced the expenses.

In 1923 the Society reached the peak of its financial activities: the Government grant was £800, of which £200 was allotted to the Berbice branch while the Town Council gave £300. The expenditure, exclusive of the Berbice branch, came to £1,100 of which £160 was spent in drugs and £100 in the issue of milk, in this year the register showed an attendance of 990 persons.

In 1929 due to the economic depression the Government grant was reduced to £750, and ultimately in 1932 to £650 but the Town Council grant remained at the same figure, £300.

The result of this reduction was a deficit in the balance sheet annually during the period 1929-1931 and the rapid absorption of the small reserve which had been created.

The reorganisation of dispensary methods was therefore directed along financial lines as well as medical.

Hitherto each dispensary had paid a part time dispenser for compounding the medicines issued, in 1932 all these part time employees' services were terminated and one was retained at the Georgetown dispensary to make up stock mixtures which could be sent out to the branches as required.

Also all persons attending had been given a bottle of medicine irrespective of the fact that they might be suffering from tuberculosis or from some other complaint. It was felt that this was not in accordance with the usual routine of tuberculosis dispensaries and instructions were issued that only tubercular cases, or those under observation, were to receive drugs in any form. There were those who did not hesitate to prophesy that such an unpopular step would adversely affect the attendance. Steps were taken to explain to those who were not tubercular that they were free from this disease and if they were ill they were referred to a practitioner or to the public hospital for treatment. In a remarkably short time persons attending realised that the examination was the main object of their attendance and were quite satisfied to be sent away with a clean sheet and without the usual bottle of medicine and the attendances, despite the prophecies, rose tremendously and the drug bill fell.

Further, a pint of milk daily was issued through the agency of the Salvation Army to tubercular patients domiciled at home. This list was carefully pruned and another needful economy instituted.

In 1933 one Health Visitor resigned to take up another appointment and it was felt that her work could be shared out among the remaining four Health Visitors.

Despite the extra financial burden thrown upon the Society by the purchase and upkeep of artificial pneumothorax

apparatus, X-ray films, gold salts, etc. these necessary and harmless economies considerably reduced the overhead expenses and the balance sheet has since shown a credit sum annually with the consequent restoration of a reserve fund for emergencies.

In 1935 when the work was far greater than it had ever been, the income was £1,150, including official grants and donations, and the expenditure £1,050.

The main items were, Health Visitors' salaries, £500, appliances and miscellaneous £50, milk £50, drugs £50, X-ray films £35. Thus the total expenditure of the main dispensary and five branch dispensaries responsible for the tuberculosis work of the whole Colony only amounted to £1,050 per annum.

MEDICAL STAFF.

The small expenditure for an undertaking of this size is largely due to the fact that since the inception medical men have given gratuitous service.

As the majority of these men are full time Government officers it appears only right that their services should be utilised for a public health measure of such importance but it might also be mentioned that besides the gratuitous service of these men given willingly there are also a small number of private practitioners who have rendered yeoman service.

During 1932-1934 two Honorary Physicians were in

attendance at the Georgetown dispensary three afternoons a week, a Health Officer from the Government Public Health Department and a retired Government Medical Officer. The branch dispensaries were visited once weekly by the District Medical Officers. It was felt however that it would be of benefit to practitioners and public alike if some of the younger medical men were given a share in the work. In 1935 two recently qualified general practitioners volunteered and during that year regularly attended the dispensary and the X-ray clinic and dealt with cases under the supervision of one of the Honorary Physicians. After a considerable period of training it was obvious both from their ability and enthusiasm that such a step had met with complete success and they were appointed Honorary Physicians in 1936.

Landis (1926) describing his work among Negroes in Philadelphia found that little progress was made until Negro physicians and nurses were put on the staff.

Cummins (1932) in his comments on work in South Africa suggests that anti-tuberculosis measures amongst coloured people would benefit if such work were left to medical staff other than Europeans.

Such a measure may be of benefit in communities where the Negro appears to be at a disadvantage as compared with other races: it is doubtful if the best work can be done in the face of such racial discriminations, especially does this apply to the Colonies.

During 1932-1935 a European Health Officer and a doctor of African descent were dispensary physicians assisted later by two medical men, one of African descent, the other of Mixed race, while the Artificial Pneumothorax refills were carried out by an East Indian doctor. The work went on harmoniously and members of the team worked side by side with benefit to themselves and their advice was sought by all without thought of race.

DISPENSARY ROUTINE.

All newcomers attending the dispensary have their names entered on the register and their particulars on a case sheet which is handed to the physician.

Any case which, in his opinion, requires further investigation after clinical examination, is given a form for the X-ray department and informed of the time for attendance. Cases which require no further investigation by the department are sent away if well and if they are in need of attention referred to a private practitioner or to the hospital.

All contact cases are sent to the X-ray department for routine fluoroscopic examination, their names are entered on the special register for contacts and records are kept of regular re-examination.

Sputum investigation is carried out in the laboratory attached to the public health department.

RADIOLOGICAL EXAMINATION.

In a dispensary such as this only a tiny minority of those attending was referred by practitioners, over 90% came of their own accord or were brought up by Health Visitors on account of a contact history.

The result was that a considerable number needed only a thorough clinical examination to ensure the absence of active disease but the difficulties of deciding this without radiological evidence were great.

On the other hand to make a skiagram of all cases would have been unjustifiable on the score of expense since, on the average, the proportion of tubercular cases was about 10%.

To meet this difficulty examination by fluoroscopy was instituted in the middle of 1934.

All patients referred to the X-ray department were screened first and if there was any evidence of abnormal thoracic findings a skiagram was made.

In 1935, 795 persons were screened and in approximately 40% of these were roentgenograms made.

Hetherington and Flahiff (1933) compared the results of the examination of 347 young adults with the fluoroscope and by stereoscopic X-ray films. Fluoroscopic examination frequently failed to detect pulmonary infiltration above the clavicle but in most cases detected more extensive infiltrations.

Soper and Wilson (1932) X-rayed all positive reactors among students entering Yale University. Fluoroscopic examination was employed and stereoscopic films taken of the first 300 in order to check the screen findings.

Among these 300 sets of films 4 pairs were noted in which frank minimal lesions were present which had been missed on the screen. The densities escaping detection were those of slight degree in the outer 1st and 2nd interspaces or above the clavicle. They recommend the routine employment of films or at least paper films.

Fellows (1934) describes the routine examination by the Metropolitan Life Insurance of applicants for employment where fluoroscopy has been used since 1927. Of the group of cases in whom tuberculosis was detected an encouragingly large proportion of minimal cases was noted, the majority of these were diagnosed before any physical signs became apparent.

Weber (1935) believes that fluoroscopic examination fulfils its purpose admirably provided one has had some experience with it; it reduces to a minimum the cost of carrying on a survey thus providing a means of detection well within the budget limitations of any community.

The writer's experience with some 1200 fluoroscopic examinations has been that no case so examined has been returned as tuberculous less than nine months after being passed on screen examination as free from active disease.

TREATMENT.

In the case of necessitous children exposed to infection by an open case a daily allowance of milk was granted and cod liver oil prescribed on condition that they came up for inspection regularly.

In other cases where it appeared desirable to institute a period of observation symptomatic treatment was carried out until such time as a definite diagnosis was attained

Tubercular cases were notified and visits immediately paid to their homes by a Health Visitor who furnished a report on their home conditions to the Honorary Secretary.

These reports were studied in conjunction with the medical reports and those cases who might be expected to benefit from treatment or whose home conditions were not good were urged to enter hospital.

HOSPITAL ACCOMMODATION.

The Best Tuberculosis Hospital had accommodation for 36 cases, this included private wards for those able to pay two shillings a day.

The Public Hospital had a tuberculosis ward with beds for 11 males and 6 females, in addition 6 beds for each sex in the Isolation wards were reserved for patients sent in for collapse therapy or for short periods of observation.

In New Amsterdam 18 beds were available in the Tuberculosis block.

This gave a total of 83 beds set apart for the use of

tubercular patients, an average of 0.35 beds for each death from tuberculosis annually.

As far as possible cases in urgent need of admission were accommodated in the general wards of the public hospitals until vacancies could be obtained in the special wards.

The beds in the Tuberculosis ward were occupied by those too advanced to benefit from treatment and whose home conditions were bad. Those for whom collapse therapy was indicated were admitted to the Isolation ward, following induction or operation with definite improvement they were transferred to Best Hospital.

Other cases sent to Best Hospital included tuberculous pleural effusions and cases with bilateral disease showing evidence of sufficient resistance to benefit from bed treatment. This method of allotting patients to different wards had definite drawbacks and entailed the reduplication of work, especially in connection with A.P. refills but it is a distinct advance on the practice of some hospitals in the tropics which refuse admission to any ward except that set aside, if such a one does exist, for tubercular cases.

The patients advised to enter the tuberculosis ward of the public hospital were reluctant to do so and it required considerable persuasion to prevail on them to do so. They were fully aware that entry to that wardwas an indication of the advanced stage of their disease. The ward itself was by no means pleasantly sited or attractive in appearance as it had been erected many years before. Some addition to the routine

diet, regular visits by dispensary physicians and health visitors to note progress in addition to care by the hospital staff and frank explanation of the danger of contact for their friends and relatives sufficed to induce the majority of the inmates to remain.

By 1932 the Best Hospital had acquired a somewhat unhappy reputation, its distance from the city and the consequent cost of transport to relatives on visiting days formed the usual excuse to refuse the opportunity of hospitalisation.

The diet was ordinary hospital fare, sufficient but monotonous and there was no occupation for those who were not on bed rest. Moreover few patients had thepatience to lie in bed month after month without any auxiliary treatment. The introduction of collapse therapy and refusal to admit any advanced case soon brought about a change. The hospital acquired an entirely different reputation and it was held by most patients that transfer to Best meant that there was a definite hope of recovery.

The former reluctance to enter gave way to an increasing demand for admission and the beds were always full and a waiting list was not unusual.

No form of occupational therapy was instituted on account of plans being drawn up for the erection of a complete tuberculosis hospital. It was felt that the expense of inaugurating such a measure would be unjustifiable until such time as the erection of the new building on another site had been completed.

A.P. REFILLS.

In the absence of occupational therapy it was obviously impossible to keep the cases under treatment for any prolonged period in hospital. Every effort was made to persuade them to stay in and about half of them remained in for nine months to one year. Others asked to be discharged after three or six months and if they were sputum negative and could be supported at home this was not refused.

In order to deal with these discharged cases a clinic was set up at the Public Hospital as being the most central point and refills were given once a week. Most of the patients attended regularly but there was always some defaulter and the Health Visitor was detailed to deal with such a case.

If such a case was persistently slack in attendance he or she was visited by a dispensary physician and dealt with by a threat to withdraw all attention. This always succeeded and no case, so far, has failed to attend for refills though some are less regular than others.

All cases were screened once a month in order to note progress.

AFTER CARE.

Prior to the introduction of collapse therapy the need for after care arrangements was scanty, the survivors too few to present any real problem. Since then the question has become acute, discharged cases are referred to the Poor Law Commissioners who grant them support but the increase in numbers

makes it essential that some plan should be drawn up to give reasonable employment to those fit for light work.

HEALTH VISITORS.

The duties of the Health Visitors were much the same as those performed by the staff of tuberculosis centres in this country.

Visitation of homes of tuberculous persons, explanation to the inmates of the methods of prevention of the infection, help in arranging accommodation for patients in their homes in order to obtain as complete isolation as possible.

The explanation to contacts of the dangers of contagion and arrangements for bringing them to the dispensary for examination.

Regular visits to tubercular patients to note progress and notification to the municipal or government sanitary inspectors of removal or death of a patient so that house disinfection might be carried out.

Once a week the Health Visitors met together and handed in their reports on cases notified during the past week to the Honorary Secretary. They also brought up for inspection their record of visits paid during the week so that their work might be checked. At these meetings the Honorary Secretary gave an informal talk on some aspect of tuberculosis and there was general discussion of any problems that might have arisen in connection with the work.

Two of the Health Visitors were allotted to rural

districts where they attended the branch dispensaries as well as doing domiciliary visiting. The Chief Health Visitor and the junior Health Visitor were responsible for the work in Georgetown. In addition the Chief Health Visitor had to do the clerical work of the dispensary. The pay commenced at £75 per annum rising to £125 conditional on obtaining the Health Visitor Certificate of the Royal Sanitary Institute, the salary of the Chief Health Visitor was £170 per annum.

Their still is present in the minds of many a degree of doubt as to the possibility of a really high standard of work being attained by a coloured subordinate staff especially Africans. The experience gained in supervising the work of the Health Visitors is sufficient to answer that question as far as personal opinion is concerned.

These women were chosen for the posts on the basis of education and character and then given the opportunity to take up their training first in general nursing and then in health work. Now there are quite a number of fully trained nurses with Health Visitors' Certificates available and there should be no difficulty in filling any vacancy that might occur. These women, who are all of African descent, except for one of Mixed race, have proved to be excellent workers.

By their quiet, unobstrusive methods they gained the confidence of all sections and there were signs that even amongst the poorer Portugese who are racially antagonistic to the Negro their work was making remarkable headway. Over 90% of contacts came up for examination in 1935 due to the tactful and

persuasive methods of these workers.

As far as the West Indies and British Guiana are concerned it is certain that women locally recruited are quite as capable, under efficient supervision, of performing nursing and health duties as women of any other country provided a really good type of worker is chosen.

If they had a failing it was to lose heart when the work of the Society was not showing real activity and when supervising officers were disinterested, a failing common to the generality of mankind. Once given a lead and made to understand the importance of their work, they needed no driving but entered into their work with zest, enduring long hours of work and travel with quiet patience.

LEGISLATION.

The Public Health Ordinance 1934 provided for the compulsory detention of open tuberculosis cases whose home conditions were poor. Such a case can be compelled on the order of a justice of the peace to enter hospital and to remain there for a period not exceeding six months. After the expiration of that time the Surgeon General may, if he thinks fit, order that he be detained for a further six months when the case will be again reviewed.

Compulsory detention is so powerful and two-edged a weapon that one hesitates to make use of it except in extreme cases. Actually only one case has been detained under this section since the Ordinance became law but its existence has

sufficient to persuade the reluctant sufferer to enter hospital voluntarily rather than under an order.

TUBERCULOSIS MORTALITY AND MORBIDITY IN BRITISH GUIANA.

Various attempts have been made to carry out a series of tuberculin tests in conjunction with the dispensary work to enable some estimate to be made of the extent of tuberculinisation in British Guiana. Unfortunately they have all been frustrated for a reason only too common in the tropics, lack of staff. It was found impossible to spare enough time from routine health duties to do any school tuberculin testing.

Ultimately only a small group of 15 adults and 35 children, all with no known history of tuberculosis contact, were tested by Craig's Multiple Puncture method with O.T. (Parke Davis & Co.) The adults who were females, 20-25 mainly of Negro race from Georgetown furnished 75% positive reactors while the children both East Indians and Negroes from town and rural districts had in the age group 2-5 years 40% positives.

The series was too small to draw any accurate conclusions: one can only say that tuberculinisation appears to be general in the Colony.

The crude death rates and the tuberculosis death rates for the whole Colony and for Georgetown are set out in quinquennial periods.

	Crude Death Georgetown	Rate Colony	Tuberculosis Georgetown	Death rate Colony.
1869-1873	-	-	5.2	2.4
1874-1878	-	-	5.9	2.52
1879-1883	-	-	6.6	2.45
1884-1888	-	-	6.0	3.19
1889-1893	41.2	37.9	6.7	3.19
1894-1898	40.5	30.2	6.2	2.88
1899-1903	39.4	27.0	5.8	2.57
1904-1908	43.0	30.5	4.3	2.36
1909-1913	31.2	29.9	3.5	2.0
1914-1918	33.1	30.1	3.3	1.6
1919-1923	31.1	30.8	2.7	1.4
1924-1928	26.7	25.8	1.9	1.1
1929-1933	20.9	22.8	1.4	.9

It is so often maintained that all the credit for a lessened tuberculosis rate must be ascribed to the increase in the standard of living and general sanitary improvement while specific anti-tuberculosis measures have no direct share in this fall. While it is not possible to prove on the basis of statistically significant data that the work of the Society had a direct influence in lowering the tuberculosis death rate the following facts are of interest.

The peak period for the tuberculosis mortality was in 1889-1893, during the twenty years following this until 1909-1913 no anti-tuberculosis measures were carried out. True the

Society was founded in 1907 but its influence during the first three or four years may be discounted. In this twenty year period the tuberculosis mortality for Georgetown and for the whole Colony steadily fell despite the lack of dispensaries etc. In the period 1913-1933 when the Society's work was in full swing the rate fell still further and, it is important to note, more swiftly than in the preceding twenty years despite the severe depression that set in after the European war.

In the period 1893-1913 the tuberculosis death rate for the Colony fell by 38% and for Georgetown by 48%.

In the years 1913-1933 it fell for the whole Colony by 55% and for Georgetown by 60%.

Nor was this due to the fall in the crude death rate being equally rapid as this has lagged considerably behind the tuberculosis death rate.

HISTORICAL AND RACIAL INFLUENCES.

It appears probable that setting free of thousands of slaves who left the sheltered life of the plantations for community life with its multiple opportunities for infection was the starting point of a great increase in tuberculosis mortality.

Daniels (1912) throws an interesting sidelight on this question for he reports that analysis of post mortem records in 1847 showed that of some 1,400 autopsies in British Guiana only in 29 was pulmonary tuberculosis a cause of death and these were persons who had not been born in the Colony but immigrant from Madeira or elsewhere. In 1902-1905 Daniels' own post mortem

records revealed that 25% and over of the autopsies showed that tuberculosis was the cause of death.

Further it was the indigenous population that was suffering, mainly Negroes, and the immigrants were far less affected. Thus, in addition to a change in the lives of these freed Negro slaves there came the menace of an invasion by immigrants from heavily tuberculised countries and with this combination it is obvious that the hitherto non-immune and probably highly allergic Negroes were stricken in their thousands.

Grieve (1890) pointed out that amongst the Negroes of British Guiana tuberculosis was rapidly progressive in the form of caseous pneumonia while in the case of the East Indians it presented clinically and pathologically the appearance of fibroid phthisis. He states that the conditions under which both races lived were practically identical and concludes that the differences depend on racial characteristics.

There still exists a disparity between the races as regards the incidence of tuberculosis and before it is tabulated it might be advantageous to describe any environmental difference there may be.

The race that suffers most heavily is the Aboriginal Indian despite the fact that they have ten reserves, ample in extent and remote from the towns. As far as possible they are prevented from mingling too intimately with other races by various regulations; in Georgetown a special depot is provided

for them where they may stay while in the city.

This isolation is not complete for a number of them leave the reserves and work as carriers for expeditions, or for balata concerns or in timber felling and come into contact with other workers mainly Negroes. Also between spells of work they enter Georgetown either to sign on for more work or to spend their earnings. When one falls ill he returns to his reserve and so spreads the infection through his home circle. Nothing has been done by the Society for these people because their reserves are too distant for visitation but indirectly efforts are made to help them by hospitalising advanced cases and preventing, by persuasion, a return to their homes.

The Negro population which comes next on the list is divided into urban and rural dwellers but the rate for the two sections does not differ very greatly.

Similarly the East Indian who is usually an inhabitant of the rural areas has only a slightly increased rate in the towns as far as can be ascertained from the small sample of town dwellers.

The Portugese rate is almost as high as that of the Negroes, they are the shopkeepers of the Colony and their shops are often to be found in the poorest and most densely populated part of the town while amongst the lower classes the housing conditions are very bad.

The Chinese population has a low rate largely due to the admixture of immigrant adults who have passed the dangerous adolescent period and to the reasonably high standard of living

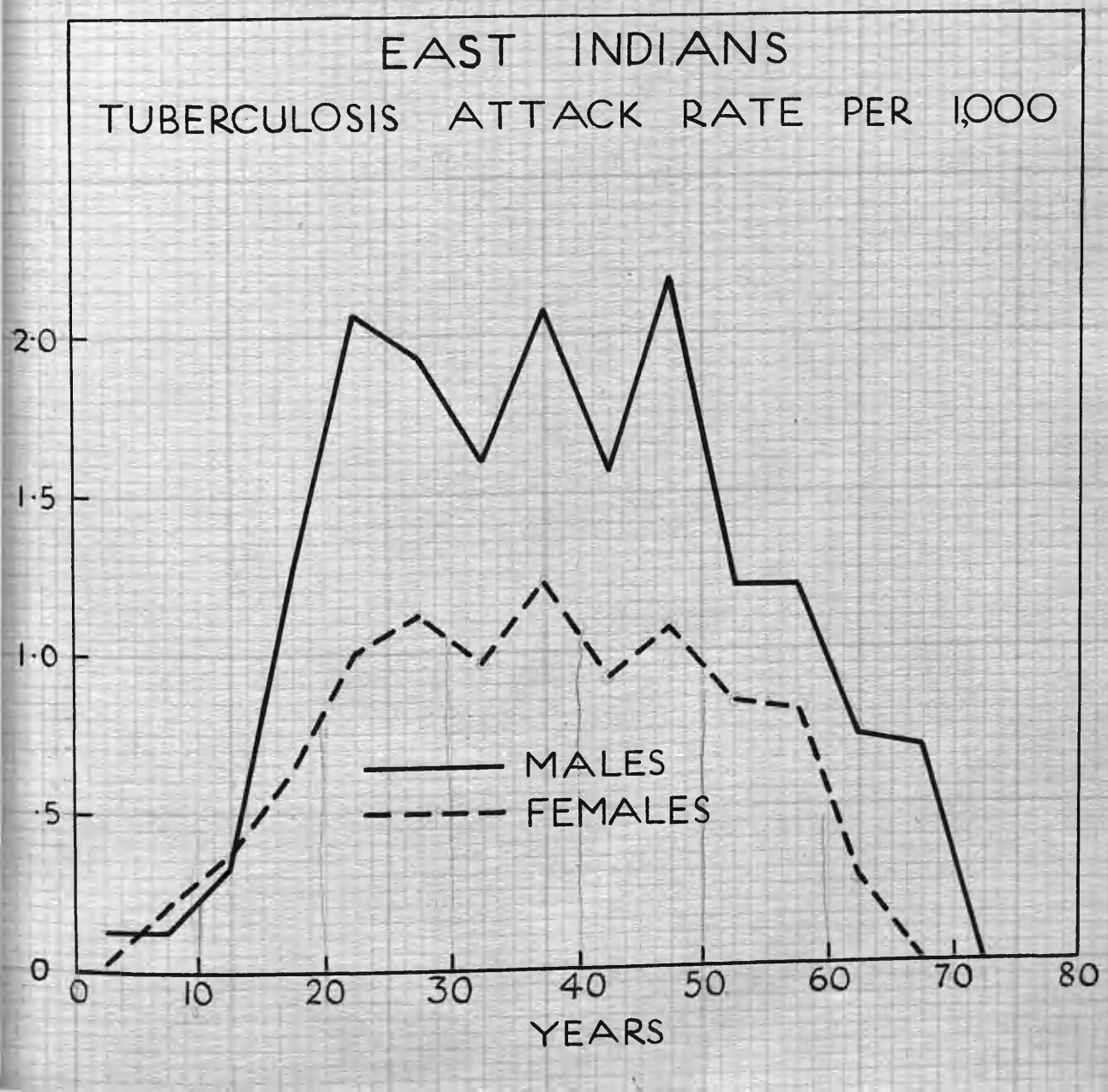
present in their small community.

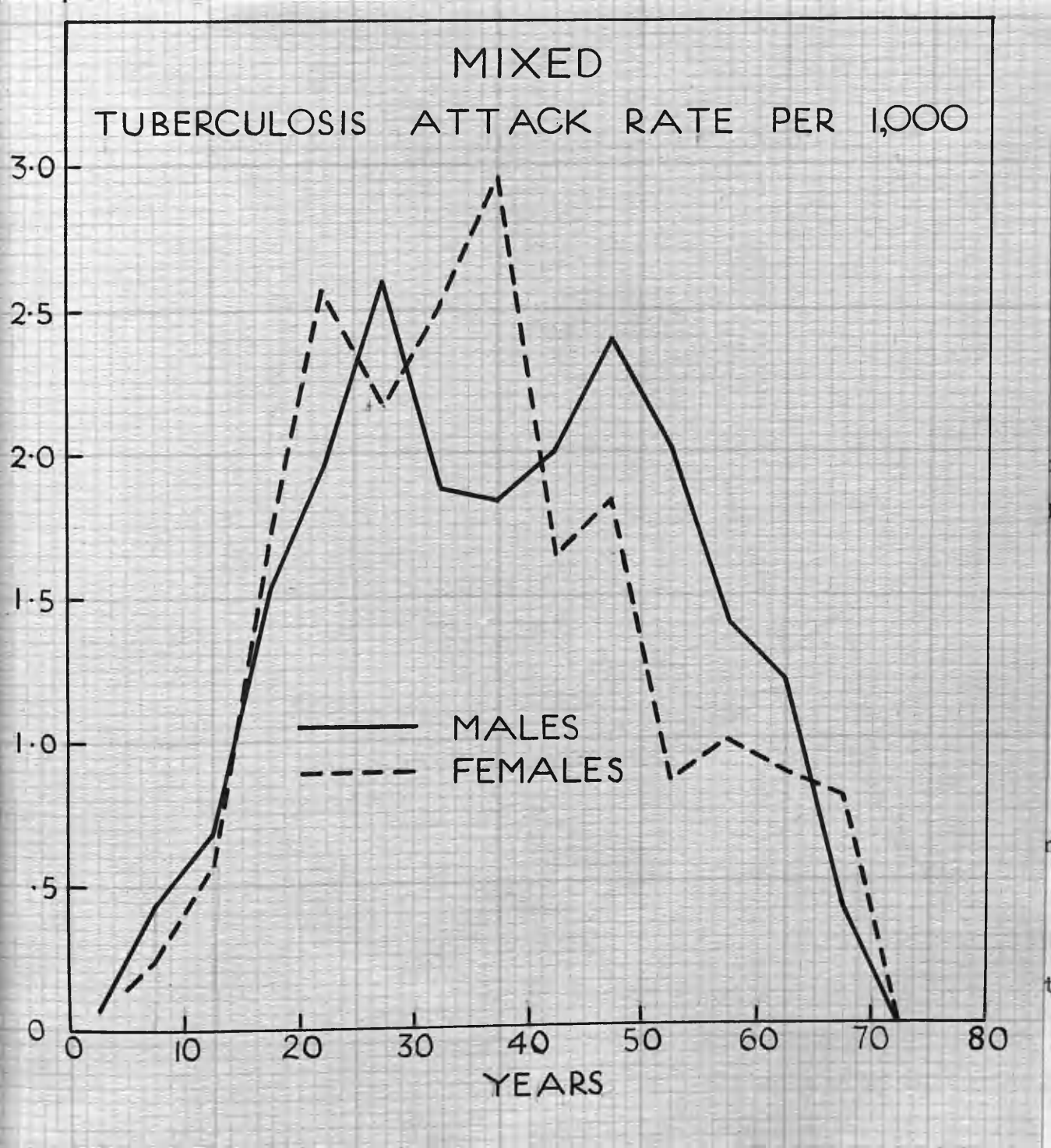
The number of Europeans apart from Portugese is too small to furnish rates and moreover a large proportion are selected since they have to pass a medical examination before leaving England.

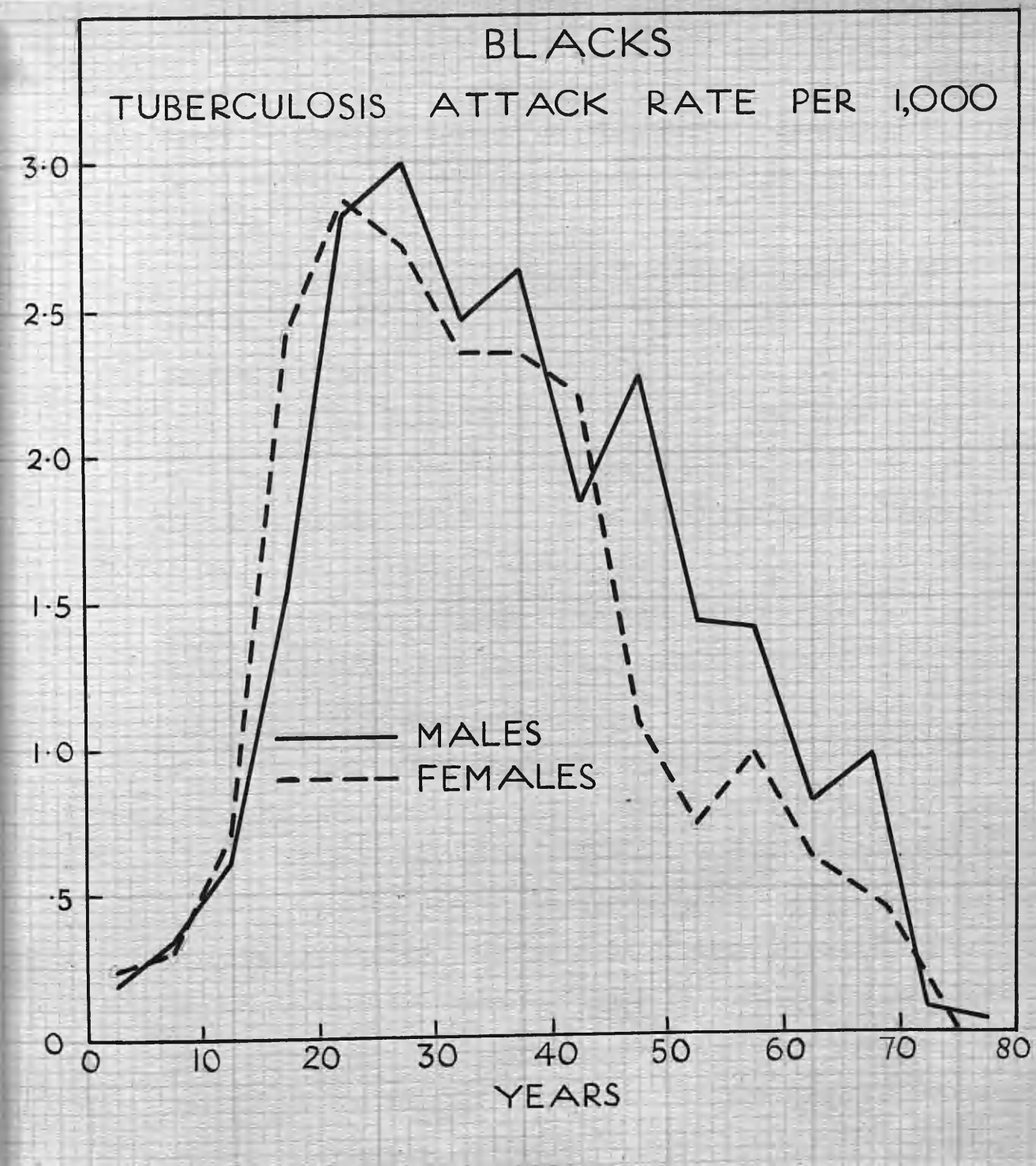
Death rate from tuberculosis according to race (1922-1931).

Aboriginal Indians	1.9 per 1000
Negroes	1.3 per 1000
Portugese	1.2 per 1000
Mixed	1.0 per 1000
East Indians	0.8 per 1000
Chinese	0.8 per 1000

The incidence amongst the two sexes differs in different races. Amongst the Negroes the women have a higher rate than the men, largely, it seems, because life is harder for them economically than it is for the male. Fifty per cent of the births are illegitimate, even where the parents are married they too often separate by mutual consent and in addition to the strain of childbearing the woman has to work to support the children. Domestic service is practically the only occupation open to women and more women are driven to seek work in the town with consequently increased exposure. Amongst East Indians the incidence falls more heavily on the males, it is impossible to single out any single factor to account for this especially as the women work on the plantations as well as the males. It is noticeable that the physique generally of the


EAST INDIANS
TUBERCULOSIS ATTACK RATE PER 1,000
2·0
1·5
1·0
·5
0
MALES
FEMALES
0
10
20
30
40
50
60
70
80
YEARS


MIXED
TUBERCULOSIS ATTACK RATE PER 1,000
3·0
2·5
2·0
1·5
1·0
·5
0
MALES
FEMALES
0
10
20
30
40
50
60
70
80
YEARS


BLACKS
TUBERCULOSIS ATTACK RATE PER 1,000
3·0
2·5
2·0
1·5
1·0
·5
0
0
10
20
30
40
50
60
70
80
YEARS
MALES
FEMALES

women is superior to that of the males. Family life is much more strictly observed amongst them than is the case with the Negroes.

Aboriginal Indians have a heavier male incidence as the men have to go out and seek employment while the women work in the reserves.

The females of Mixed race are also more heavily affected than the males and here the main causal factors are the same as for the Negro. In other races the sex disproportion is not so clearly marked.

The age incidence has been recorded on the accompanying graphs for three races, namely, Negroes, East Indians and Mixed and for both sexes.

These figures were calculated not on the death rate but from notifications in the period 1922-1931.

The course of the disease chronic in one race and acute in another would give an inaccurate interpretation of the age incidence of the disease if the deaths at ages were taken, so notifications have been selected instead. Since ten per cent of the death certificates are not signed by a medical man it is reasonable to consider that the notification figures are as accurate as the mortality returns. As one would expect the rise is rapid for the Blacks (the term used in the census returns) and falls away rapidly after the 30th year while the East Indian shows the rises in later years characteristic of races long in contact with tuberculosis.

The second rise in the case of the women of Mixed

race is not capable of a definite explanation but it has been observed that women around the 30-40 year period however small an admixture of European blood there may be in their ancestry insist on being entered as Mixed and not as Black.

A number who from their physical appearance would be classified as Negroes are therefore returned as of Mixed race. It may be that this personal insistence on race distinction however slight accounts for the rise in females of Mixed race at this age when there is ~~no~~ a lesser ~~corresponding~~ rise amongst the males.

HOUSING AS A FACTOR.

One of the duties of the Health Visitors was to render a return of the home conditions of every notified case. This report specified the type of dwelling, the number of rooms, number of persons in the rooms and their age and sex.

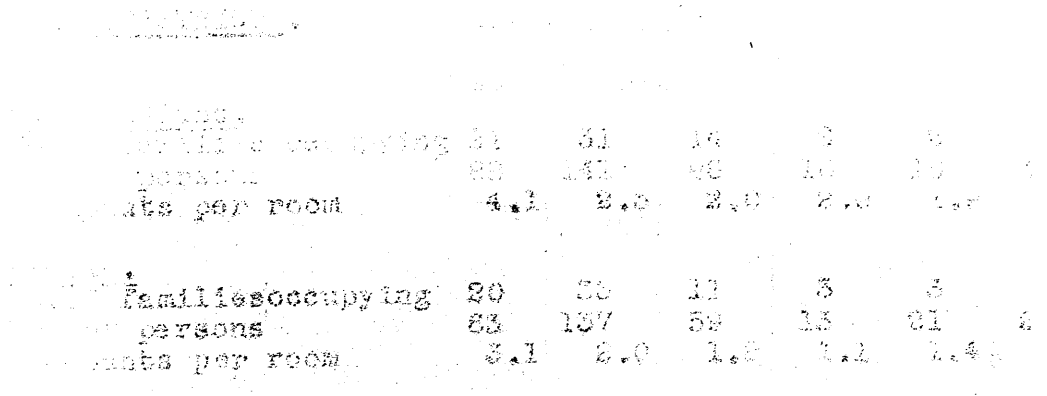
An accurate impression was therefore obtained of the housing conditions of such cases. In Georgetown many of the poor are housed in ranges, long barrack-like tenements slightly raised off the ground and divided by flimsy partitions into single dwellings. These ranges some of them two storied and some back to back are ill lit and the ventilation largely depends on the state of the building. The more dilapidated the building the more cracks in the woodwork and consequent improvement in ventilation.

Other buildings consisted of two roomed wooden houses but many were occupied by two families one to each room so that

the degree of overcrowding was excessive in these as well as in the ranges. Further there was a considerable degree of congestion, the number of buildings to the acre being considerable though the municipal regulations prevented too much crowding together of the buildings.

In rural districts while many of the houses stood well away from others the overcrowding per room was still present. The table furnished herewith gives the number of persons per room in families one member of which has been notified as tubercular in the period 1933-1935.

The investigation has been made on the basis of race in order to ascertain if any race has more favourable living conditions than the others.



HOUSING CONDITIONS IN CONTACT FAMILIES.

GEORGETOWN.

	1 room	2 rooms	3 rooms	4 rooms	5 rooms	Total.
Portugese.						
No.of families occupying	7	3	1	4		15
No. of persons	29	18	10	18		75
Occupants per room	4.1	3.0	3.1	1.1		
Mixed.						
No.of families occupying	16	10	3	9	3	42
No. of persons	55	53	13	56	18	205
Occupants per room	3.5	2.6	1.4	1.6	1.2	
Blacks.						
No.of families occupying	94	27	6	12	1	104
No. of persons	335	150	29	65	10	589
Occupants per room	3.5	2.8	1.6	1.3	2.0	
East Indians.						
No.of families occupying	5	6	2	4	1	18
No. of persons	15	36	9	27	7	94
Occupants per room	3.0	3.0	1.5	1.7	1.4	

RURAL DISTRICTS.

East Indians.						
No.of families occupying	21	31	14	2	2	70
No. of persons	88	141	86	16	19	350
Occupants per room	4.1	2.3	2.0	2.0	1.9	
Blacks.						
No.of families occupying	20	33	11	3	3	70
No. of persons	63	137	59	13	21	293
Occupants per room	3.1	2.0	1.8	1.1	1.4	

This composite picture of the housing conditions in rural and urban districts of 355 families comprising 1606 individuals gives some idea of the condition of overcrowding met with in tropical regions.

Actually it underestimates the degree of overcrowding since of 94 Negro families living in one room 31 (33%) were composed of four or more persons, adults and children and similar conditions were observed in other races. The worst examples of overcrowding were found in the fifteen Portugese families in Georgetown, such bad environmental conditions go far to explain the high incidence of tuberculosis in a race long exposed to infection.

While the East Indian in rural districts also showed a considerable degree of overcrowding it is noticeable that of a total of 70 families no fewer than 49 lived in houses of two or more rooms. Again despite the heavy incidence of the disease amongst the Negroes in rural as well as in urban areas, the housing conditions in the former districts were reasonably satisfactory.

DIET.

No detailed reports on the diet are available but personal observation leads one to believe that, on the whole, the diet of the poorer classes of all races is deficient in proteins and in fat soluble vitamins.

Cochrane (1936) investigated the incidence of tuberculosis amongst the East Indians in relation to diet.

The Hindu religion has most adherents but a considerable number are Mohammedans or Christians and it was thought that there might be a higher incidence in either the vegetarian or flesh eating communities. Actually it was ascertained that there was no appreciable difference in incidence.

PATHOLOGICAL NOTES.

Soon after taking up work at the tuberculosis dispensary the writer felt that more use might be made of the post mortem material available as a result of the tuberculosis mortality. It was hoped that a study of such material as was available would help to throw some light on the reasons for the racial differences observed even in the narrow scope of dispensary practice.

Permission was sought from the Government pathologist, Dr. G.H. Stevens to attend the post mortems at the Public Hospital, Georgetown, and I wish to express my thanks to this Officer for his generous co-operation.

During the greater part of 1933 and 1934 a total of 538 autopsies were attended, a considerable number of these were performed by the writer.

No attempt was made to carry out the dissections with the attention to detail seen in the work of the American observers. In the first place their work did not come to the writer's notice until late in 1934; further, the greater part of these examinations were carried out at midday when an hour could be snatched from one's spare time and detailed dissection

in that short time was impossible. Moreover a number were performed some hours after death, often as much as twenty-four, which is not conducive to prolonged investigation in hot climates.

No effort therefore was made to discover to what extent evidence of primary infection was present in these cases and attention was confined to making notes of the thoracic and abdominal conditions and the type of lesion present. In only a few cases did time permit of a complete examination so that the scanty notes on meningeal findings have been omitted. In a total of 538 autopsies 98 furnished evidence of tubercular infection and these will be described according to racial classification.

This ratio of tuberculous to non-tuberculous cases must not be taken as representative of the normal ratio. When more than two post mortems had to be done and time was limited those cases with a clinical diagnosis of tuberculosis were selected. It is obvious from a study of the notes that acute tuberculous processes were detected in all races but that the most acute forms and the greater proportion of childhood types were encountered in the descendants of Africans. This despite the fact that climatic and environmental conditions generally did not differ greatly in the various races.

On the other hand there was not the same proportion of cases showing massive pneumonic changes and wide dissemination in the abdominal organs, such findings were much less frequent in the Negroes of British Guiana than is recorded elsewhere.

That post mortems amongst children, the majority belonging to the Negro race, showed no higher incidence than is seen in Great Britain, points to the fact that first infections are no more dangerous amongst these races than they are in the White race.

NEGROES.

Tuberculosis was present in 42 of the autopsies performed on Negro adults, in 40 of these it was the cause of death. This group was made up of 21 males and 21 females, the age grouping was as follows: 1 under 20, 13 in 20-29, 15 in 30-39, 8 in 40-49, 4 in 50-59 and 1 over 60.

The pathological classification was as follows, fibrocaseous 20, childhood type with lesions commencing elsewhere than the apices of upper lobes accompanied by caseation of hilar nodes 3, childhood type with lesions in the apical portions of upper lobes 9, miliary 4, abdominal 2, renal 1, spine 1, latent 2.

In the fibrocaseous group the lesions were predominantly acute and caseating with very little evidence of extensive fibrotic changes except in 3 cases when the fibrosis was marked. All presented cavities and for the most part typical of lack of organisation with the usual ragged, necrotic walls.

The findings in the two cases that had healed lesions were as follows.

Female 32 years. The apices of both lungs had slight adhesions and showed puckering and scarring extending downwards

for about ¾ inch. At the Lt. apex a small calcified nodule was found. Cause of death, puerperal septicaemia.

Female 63 years. Slight adhesions at both apices, more marked at the Lt. Half an inch below the summit of the Lt. apex there was a small depressed area about half an inch in diameter which was markedly thickened and fibrotic and was gritty on section. Cause of death, myocardial failure.

In one of the cases in the fibrocaseous group there had been evidence of a healed lesion in one lung with reactivation of the process following pregnancy.

Female 36 years. Lt. lung densely adherent. On section there was an encapsulated caseous area partially calcified measuring 1" x ¾" at the Lt. apex.

The lower lobe of the Rt. lung showed large caseous deposits with commencing cavitation and a spread of tubercles into the middle lobe.

She gave a history of normal health until 6 weeks previously when following the birth of a healthy child fever and cough set in.

Of the cases in the group with evidence of the childhood type of disease 7 were resident in Georgetown, 4 came from rural areas and 1 had migrated from the island of Grenada three years previously.

Notes on 3 cases showing true childhood type of disease.

Female 23 years, resident in Georgetown. No history of contact; had been ill for six months, commenced with cough

and loss of weight, soon after high fever and sweats. Both lungs had slender adhesions in the lower halves, most evident at Lt. base. All the hilar nodes were enlarged and showing varying degrees of caseation. In the Lt. lower lobe there was marked consolidation and caseation while the remainder of the lung and upper lobe of Rt. lung had numerous patches of tuberculous broncho-pneumonia.

Female 46 years, resident in Georgetown. Died one week after admission to hospital complaining of 'fever'.

Massive enlargement of the Lt. tracheobronchial nodes, more marked in the inferior group. Upper third of apex of lower lobe caseous deposits, in lower half of upper lobe mass of tubercles spreading out fanwise from the hilar nodes.

Female 38 years, resident in Georgetown. History of six months illness, no history of contact.

Lt. lung thickened pleura. Rt. lung, hilar glands enlarged and caseating, caseous deposit occupying approximately half the middle lobe with tubercles spreading through the remainder of the lung. Scanty tubercles in spleen but fairly profuse throughout both kidneys.

Cases intermediate between true childhood and adult types.

These 9 cases varied from 18-46 years of age, in three of this group tubercular deposits were seen in the abdominal organs, in the spleen in all three and in addition in the liver in one.

Male 46 years, resident in a large village on the coast.

History of four weeks illness only. All the mediastinal glands were markedly enlarged and caseating, those of the tracheobronchial group on the Lt. side were in two instances over one inch in diameter. Breaking down caseous deposits in both lungs, most marked on Lt.

Female 25 years, no history obtained. Tracheobronchial nodes of Rt. lung affected. The upper lobe of the Rt. lung was a consolidated, caseating mass practically throughout. Despite this the subject was well developed and fat verging on actual obesity.

The remainder of this group showed the usual appearance of this condition, caseation varying in degree with similar changes in the hilar glands.

Spontaneous pneumothorax was the immediate cause of death in 2 cases, one in the chronic group and one in the miliary group. The two cases who died of tubercular peritonitis were both 20 years of age, one male and one female, no history of contact.

EAST INDIANS.

Tuberculosis was present in 21 of the autopsies performed on East Indian adults, in 15 of these it was the cause of death. This group was made up of 17 males and 4 females, 5 in the age group 20-29, 2 in 30-39, 9 in 40-49 and 5 in 50-69.

The pathological classification was as follows: fibrocaseous 9, childhood type with lesions in the upper lobes and enlargement and caseation of the hilar nodes 3, healed

tubercular lesions 6, miliary 2 and abdominal 1.

Of these showing fibrocaseous changes all had cavities, in most cases these were multiple, in 2 the process was fairly acute, the cavities had ragged necrotic walls, in the remainder there was evidence of a considerable degree of organisation, smooth walled cavities and extensive fibrosis.

Those with evidence of old tuberculous lesions were all over forty years of age. In view of the theory that malaria has a benign effect on the course of tuberculosis notes were made of evidence of chronic malarial infection but it was relatively no higher in this group than in the group with active, fatal lesions.

E.I. 55 years, male. At the apex of the upper lobe of the Rt. lung there was an area of caseation about the size of a walnut. On section it was apparent by the gritty sensation that extensive calcification was present and the centre of the area contained a tiny cavity about the size of a pea filled with liquid caseous matter.

Cause of death, cerebral haemorrhage.

E.I. 45 years, male. There was a small area of fibrosis and calcification $\frac{3}{4}$-in. below the apex of the upper lobe of the Rt. lung. Marked thickening of the pleura with adhesions over the upper half of the Rt. lung.

Cause of death, chronic nephritis.

E.I. 45 years, male. At summit of apex of the upper lobe of the Rt. lung there was a small cavity $\frac{1}{2}$" x $\frac{1}{4}$" almost completely filled by a calcified mass. The upper half of the

upper lobe of the Lt. lung showed evidence of old fibrotic changes and there were heavy adhesions on both sides.

Cause of death, chronic malaria and cardiac failure.

This case came from a remote and sparsely populated district. Two more cases had similar healed lesions both in the Rt. apex.

E.I. 56 years, male. A small adhesion was present stretching out from the middle third of the Lt. lung.

In the upper lobe of the Lt. lung there were five caseous areas ranging from a pea to a walnut in size and showing a varying amount of calcareous change.

Cause of death, acute bacillary dysentery.

The following notes on those cases with the childhood type of disease are of interest.

E.I. 33 years, male. Labourer on sugar plantation, former history not known. There were extensive adhesions on the Rt. side.

Lymph nodes. Some enlargement of the Rt. paratracheal nodes without caseation. Gross enlargement and caseation of the superior tracho bronchial and intrapulmonary nodes on the Rt. side.

The upper two thirds of the Rt. lung were almost filled with a consolidated caseating mass.

On the Lt. side there were a few small tubercles at the apex but no involvement of the nodes apart from some enlargement of the extra pulmonary group.

E.I. 68 years, male. Resided in a distant hamlet, no other history. Extensive adhesions on the Rt. side and also a few easily torn strands in the upper half of the Lt. side.

Lymph nodes. The paratracheal and superior tracheobronchial nodes on the Rt. were enlarged, about size of chestnut they all had caseous areas but none was fully caseated.

In the Rt. upper lobe there was a large cavity filling most of the apex, its walls were necrotic and there was evidence of recent haemorrhage.

E.I. 21 years, female. Resided in Georgetown. Lt. lung densely adherent to the chest wall, the whole of the upper lobe formed one immense cavity and was torn away on attempting to dissect it out.

The inferior tracheobroncial nodes on the left side were enlarged, size of cobnut, and were caseating throughout.

In view of the difficulties of dissection it was not possible to determine in which portion of the lobe the disease had commenced.

In one of the two miliary cases the immediate cause of death was a spontaneous pneumothorax on the right side.

The case of tubercular peritonitis was a male, 28 years of age who lived in a suburb of Georgetown, no definite source of infection could be traced. The abdominal cavity was simply a mass of cement like adhesions with tubercles scattered all over.

MIXED.

Tuberculosis was present in 12 of the autopsies performed on adults of Mixed race, in 11 of these it was the cause of death. This group was made up of 9 males and 3 females the age grouping was as follows: 3 under 20, 5 in 20-29, 2 in 40-49 and 2 over 50.

The pathological classification was as follows: Fibrocaseous 8, childhood type with lesions commencing in the apical portions of the upper lobes and caseation of the hilar nodes 2, miliary 1, latent 1. In 6 of the 8 in the first group there was a European strain, in the remaining two the parents were Negroes and East Indians. Three of the fibrocaseous group had marked fibrosis, the remainder approximated more closely to the acute form.

Two of them, a female aged 42 years, and a male aged 61 years, in whom the admixture of European race was very slight showed massive caseation involving the pericardium.

One case a male aged 55 years died as a result of rupture of aneurysm of the aorta and on examination a caseous patch encircled by a ring of tubercles was detected in the Lt. apex.

Spontaneous pneumothorax was present in the case of miliary tuberculosis but was not the immediate cause of death.

Childhood type. Male 19 years, resident in Georgetown. Father Chinese, Mother East Indian. History of cough with expectoration and haemoptysis, no history of contact but was a

vagrant. There were adhesions present at both apices, stronger on the Rt. Superior tracheobronchial nodes on the Rt. were enlarged and caseating, two of them measured approximately ¾" x ½". The upper Rt. lobe contained three cavities, one at the apex, one at the anterior border of the middle of the lobe and one at the base. The remainder of the lung had caseous deposits

The left superior tracheobronchial group was also enlarged with here and there a pinpoint of caseation while there were caseous tubercles scattered through the upper half of the Lt. lung.

Male, 29 years, resident in Georgetown. No history. Caseous deposits and cavitation commencing in upper halves of both lungs with caseation of the hilar glands. There were a number of tuberculous ulcers scattered through the intestines and the mesenteric glands were enlarged and caseating.

PORTUGESE.

Only two subjects were examined in one, a male, 58 years there was the usual type of fibroid phthisis seen in Europe, in the other a male, 23 years, where the cause of death was typhoid fever an encapsuled caseous nodule was detected at the apex of the Lt. lung.

CHINESE.

One male, 66 years. He had left China at the age of 20 and resided in Georgetown ever since. Despite his age post mortem examination revealed the presence of tuberculous bronchopneumonia.

ABORIGINAL INDIANS.

Three autopsies were performed they had all reported ill at the depot for Aboriginal Indians in Georgetown and no definite history was obtained.

Male 19 years. Massive tuberculous pneumonia of the upper and middle lobes of the Rt. lung with commencing cavitation.

Male 19 years. This case should be classified in the Mixed group but is dealt with here to emphasise the apparent effect of race on the pathology of tuberculosis in some instances.

On external examination he presented the typical physique and facial features common to aboriginal hill and jungle tribes all over the world.

On inspection of the lungs however instead of finding an acute tubercular infection there was present marked fibrosis in both lungs more marked in the left with the heart deflected to the left side. There were two small cavities in the left upper lobe with smooth, well organised walls and a similar cavity in the Rt. lung.

On enquiry it was ascertained that his father was an East Indian who had a small holding on a remote creek and his mother was an Aboriginal Indian.

Male 20 years. A few adhesions were present on both lungs most marked at the Rt. apex.

The lymph nodes presented just the picture one expects to encounter when a member of a primitive race encounters

tuberculosis for the first time and succumbs to the infection. Cervical, subclavicular, mediastinal, retroperitoneal and mesenteric glands were all enlarged and with various degrees of caseation. There was caseous consolidation of the upper lobe of the Rt. lung and caseous deposits scattered through the remainder of both lungs and in the spleen.

The writer has only once before witnessed a similar case and that was in a young Dusun male from a remote district in British North Borneo.

CHILDREN.

A total of 103 autopsies were performed on children ranging from 7 weeks to 13 years of age, tuberculous lesions were present in 17 of these and in 14 were the cause of death. Of this total 66 were Negroes, 21 East Indians and 16 of Mixed race.

The heaviest death rate was in children under 4 years of age; there were 8 infants in this group of whom 7 died as a result of tuberculosis, in the older group 4-13 years, 5 out of 8 died from a similar cause.

Of the total series 16.54% were found to have tuberculous lesions, in the younger age group these were fatal in 87.5% and in the older group in 62.5%.

It is of interest to note how closely these figures in this small series coincide with those in Blacklock's (1932) well known series. Of 1800 post mortems performed on children in Glasgow, 283 (15.7%) had tuberculous lesions, in the first 2

years of life they were fatal in 97.4%, in the 3rd year in 94.9% and 4-13 years in 75%.

Of the 17 children 12 were of Negro race, 3 Mixed and 2 East Indian.

In 8 of them pulmonary lesions were the main manifestations of the tuberculous infection, 5 had tubercular peritonitis 1 tuberculoma and 3 had tuberculosis, but this was not the cause of death.

Negro, female 5 years. Small caseous deposit at upper lobe of Rt. lung with miliary tubercles throughout both lungs.

All hilar nodes enlarged, caseation most advanced in superior Rt. tracheobronchial group.

Negro, female 6 years. Miliary tubercles throughout both lungs, in this case the primary focus was a similar area of caseation in the Lt. upper lobe.

Hilar nodes on both sides enlarged and caseating more marked on the Lt. side.

East Indian, male 7 years. Caseous pneumonic consolidation of almost whole of Rt. upper lobe with enlargement and caseation of tracheobronchial nodes on that side.

Negro, male 4 months. History of cold on chest for two weeks, died day after admission to hospital.

Commencing caseation of tracheobronchial nodes on Rt. side but little enlargement, lower group of intrapulmonary nodes more obviously caseated but of no great size.

Rt. lower lobe had an adhesion posteriorly and one inch from margin there was a caseous mass $\frac{1}{2}$" in diameter with a

spread of tubercles through Rt. lung and a few in the Lt. lung.

Negro, female 4 months. Father open pulmonary tuberculosis. Rt. pleura slightly adherent in the upper half.

Caseous consolidation of the lower half of Rt. upper lobe with a few tubercles extending into lower lobe.

No naked eye evidence of infection of nodes.

Another case was also recorded in which, in an infant, contact with an open case appeared to produce so acute an infection as to prevent the appearance of naked eye changes in the nodes.

Negro, male 2½ months. Mother died of open pulmonary tuberculosis one month previously.

Slight generalised miliary tuberculosis no change in lymph nodes of lung and mediastinum.

Mixed, female 1½ years. No special history.

Lt. hilar glands completely caseated and matted together. Tubercles thickly scattered through Lt. lung, scanty in Rt. lung.

Negro, female 2 years. Mother died 6 months previously X-ray report just prior to death 'heavy exudative deposits through both lungs'.

One thin pleural adhesion Lt. lower lobe.

Lt. tracheobronchial nodes fully caseated, lower group more markedly enlarged. Some caseation and increase in size of Rt. hilar nodes. At the base of the Lt. lower lobe caseous mass with cavitation at centre, tiny cavity in upper lobe close to root, remainder of lung infiltrated with tubercles. Rt.

lung many tubercles. Spleen, a few scattered tubercles.

Mesenteric nodes enlarged and caseous, tubercles scattered over peritoneum with commencing adhesions.

Of the group of children succumbing to abdominal tuberculosis the ages were as follows: 7, 8, 10 and 14 months and 5½ years. They were all Negro children, and came from Georgetown. As the consumption of cow's milk is unknown amongst their class the infection undenbtedly was due to infected food or articles or dust gaining access by the alimentary route.

One East Indian child had tuberculoma of the Rt. half of the cerebellum, a primary focus was present in the Rt. upper lobe. Of the three cases in which tuberculosis was not the cause of death one was a Negro and the other two of Mixed race. Their ages were 3½ years, 5½ years and 13 years and in each case evidence of a partially resolved primary lung focus with varying degrees of enlargement and caseation of the lymph nodes draining the area was obtained. In two the cause of death was acute malaria, in one lobar pneumonia.

COURSE OF THE DISEASE.

In order to obtain some information on the course of the disease the notes of two hundred cases on the register of the Georgetown dispensary have been analysed.

The cases have been taken in serial order only untraced cases and those notified subsequent to March 1935 being omitted.

As a result of persistent follow ups very few cases are returned as untraced only those returning to remote parts of

the Colony being lost sight of, the majority of these were Aboriginal Indians.

NEGROES.

The main group consists of Negroes as this race forms the largest section of the Georgetown population.

The numbers recorded are 116, of which 66 are females and 50 males.

Age groups.	Males,	Females.
0-9 years	2	4
10-19	7	8
20-29	20	27
30-39	13	18
40-49	6	4
50-59	1	4
60-69	1	1
	50	66 ..... 116.

Of these 116 cases 35 had a history of contact with an open case of tuberculosis (30.17%).

Of 66 females 24 had a contact history (36.36%)

Of 50 males 11 had a contact history (22%).

There is little doubt that the percentage of contacts is actually higher but the looseness of the family ties results in members drifting apart and if they do subsequently die of tuberculosis the fact is not known. There was also considerable reluctance to divulge such a history but the Health

Visitors were often able to obtain hints that the disease had existed in the family and persistently investigated these clues until the statement was verified or disproved.

The following table classifies them into the usual stages according to physical and radiological examination of the lungs.

	Stage I.	Stage II.	Stage III.
Males	8 (16.0%)	12 (24.0%)	30 (60.0%)
Females	11 (16.6%)	17 (25.7%)	38 (57.6%)

All the adult cases with two exceptions had a positive sputum on one or more occasions and the majority excreted a fair number of bacilli.

An attempt was made to perform regular Gaffky counts but the laboratory was not able to cope with the extra work.

SYMPTOMS.

The predominant symptom was cough, without exception every patient complained of cough and even other symptoms such as pain or staining would take second place in their minds. A small number gave a clear history of 'emetic cough' and would state that they "coughed till they were sick".

Fever was another symptom largely complained of but little reliance could be placed on this since malaria and filaria are common complaints and the value of irregular pyrexia as an early symptom considerably nullified.

Loss of weight while significant could rarely be given its proper valuation as few of the patients seeking advice had ever weighed regularly.

The most important symptom was, of course, haemoptysis and the presence of this was generally sufficient to frighten patients into seeking advice.

Of the males 12 (24%) and of the females 11 (16.6%) gave a history of haemoptysis; in most cases either staining or slight haemoptysis was complained of and in only 4 of the total series was there a history of haemoptysis exceeding four ounces (approximately).

SIGNS.

Clinical examination did not differ in its findings from the usual run of cases encountered in Europe except on one point. It was the rule in all but the chronic cases to encounter a definite alteration in the appearance of the skin, in place of the glossy sheen usual on a heavily pigmented skin there was an earthy, dull wrinkled surface most marked over the front of the chest and less noticeable on the back. The phenomenon is so often present that on more than one occasion when the physical signs were otherwise difficult of interpretation pulmonary tuberculosis was diagnosed solely on its presence and subsequently verified on the skiagram.

X-RAY APPEARANCES.

The common appearance seen in the majority of cases was that of heavy deposits filling a considerable portion of one or both lungs, generally the latter, and usually with evidence of cavitation.

It was of interest to note how often these deposits

spread outwards from the mediastinum with marked increase of the mediastinal shadow.

In 10 of the series the typical appearance of miliary tuberculosis was observed.

The great majority of the lesions were most marked in the upper portions of the lungs but in 4 cases the lesions were basal, twice on each side and in 5 the lesions were in the middle thirds of the lung, twice on the Rt. and three times on the Lt.

COMPLICATIONS.

Both laryngitis and enteritis were common complications but meningitis was very rarely seen as a terminal event.

Hughes (1935) also reports the extreme rarity of this event in the Punjab and Lambert (1932) in French West Africa also remarks on this in an account of pulmonary tuberculosis in an African male aged 40 years in whose case meningitis was terminal.

PERIOD OF SURVIVAL.

The average life of the males from the time of notification until death was 10 months.

In 35% of cases life was prolonged for one year or more. The average life of the females from the time of notification until death was 7.1 months.

In their case 31% lived for one year or more.

END RESULTS.

	Much Improved.		Improved.	I.S.Q.	Worse.	Died.
Males	14	(28%)	1	-	2	33 (66%)
Females	15	(22.7%)	2	-	6	43 (65.2%)

If we exclude all children with benign tuberculosis and those adults improved as a result of treatment the results are even less satisfactory.

	Much Improved.		Died.	
Males	8	(18.2%)	33	(75%)
Females	5	(8.9%)	43	(77.1%)

CLINICAL NOTES.

A few notes on cases are appended in order to illustrate cases of interest.

J.B. male, 33 years. Vagrant. No history of contact. Notified in July 1933 after examination which he had sought on account of cough. X-ray showed dense shadow in cranial third of upper lobe on Rt. After a few weeks in hospital discharged himself and was lost sight of until January 1935 when he was persuaded to come up for re-examination and the X-ray revealed an almost identical shadow in the Lt. upper lobe which appeared to be resolving, general condition was good. This case supports Jaikaran's (1934) contention that the condition of epituberculosis may be found in adults.

V.B. male, 19 years. One of the two negative adult cases, included on account of his family history, his mother and three maternal uncles died of phthisis while he was an

infant. Notified as he had a massive pleural effusion on the Rt. and detained at the Best Hospital for six months, since in good health.

I.P. female, 24 years. Notified in June 1933, complained of cough for 3 weeks. X-ray showed an area of increased density in the outer half of the Lt. infraclavicular space. Another X-ray, she had refused treatment, exactly 3 months later showed a large thick walled cavity in the infra-clavicular space with mottling in the remainder of the lung. She died one year after notification.

Fishberg and Shamaskin (1929) in their now classical series of 1000 roentgenograms pointed out the malign significance of these early infraclavicular lesions.

J.M. male, 22 years. Notified inFebruary 1933, complained of cough and malaise for 3 weeks. X-ray showed heavy exudative deposits throughout Lt. lung and at apex of Rt. he died six months later. This man was a professional pugilist and the writer had seen him winning a hard fought twelve round contest four weeks before he presented himself for examination. He insisted when questioned on this point that he felt quite well then.

Walsh and Mason (1935) in U.S.A. put forward as a possible explanation for the Negro presenting himself for treatment so late in the disease that he may suffer from advanced disease without becoming aware of it.

K.J. male,17 years. Was seen after entering hospital

complaining of fever following six months in the bush prospecting for gold. He had an intermittent fever but the blood findings were negative and the physical signs equally so. The writer on being consulted advised that a skiagram of the chest should be obtained. This was done and a large wedge shaped shadow seen in the lower lobe of the Rt. lung. He reacted strongly to Craig's tuberculin test. More detailed enquiries into his history revealed the fact that he had slept in a small shelter shared with a friend for the whole of the six months. At the time of the enquiry this friend had recently had A.P. treatment for a moderately advanced lesion in one lung.

His subsequent course was uneventful and the lesion completely cleared up and he has remained well for three years.

A.P. male, 28 years. Sent by a private practitioner with a history of the acute onset of tuberculosis following intensive treatment by arsenicals for a fresh syphilitic infection. He had received four injections of 914. He looked very ill and clinical and X-ray examination revealed heavy deposits in the upper two thirds of the Lt. lung with a large cavity. He was told to go home and stay in bed as home conditions were fairly good. The advice was taken in part and he presented himself for examination at irregular intervals. Two years later the general condition was much improved and X-ray showed considerable fibrosis of the Lt. lung, with heart to that side and cavity almost closed.

The case illustrates the dangers of intensive arsenical treatment and also the fact that the Negro can, on

occasion, produce enough resistance to overcome a very marked degree of tuberculous invasion.

MIXED.

The majority of the 45 cases comprising the Mixed group consisted of persons of European and African ancestry, 3 were half Aboriginal Indian, 1 was of European and East Indian and 1 of Chinese and East Indian parentage.

The group was made up of 23 males and 22 females.

Age groups.	Males.	Females.	
0-9 years	1	0	
10-19 "	3	4	
20-29 "	5	8	
30-39 "	9	8	
40-49	5	2	
	23	22	 45

Of these 45 cases 15 had a history of contact with an open cases of tuberculosis (33.3%).

Of 22 females 11 had a contact history (50%).

Of 23 males 4 had a contact history (17.4%).

Stage of disease on examination at the dispensary.

	Stage I.	Stage II.	Stage III.
Males	3 (13.04%)	11 (47.83%)	9 (39.13%)
Females	4 (18.18%)	9 (40.9%)	9 (40.9%)

All the adult cases had a positive sputum and the symptoms differed in no way from the account furnished for the

Negro section, except for the incidence of haemoptysis.

Only 3 makes gave a history of haemoptysis prior to examination while 7 females complained of its occurrence.

In this group of 10 unlike the Negroes the haemoptysis was more profuse, only 2 gave a history of staining while the remainder had frank haemoptyses.

X-RAY APPEARANCES.

While a considerable proportion of the cases had the usual appearances of acute tuberculosis exudative deposits throughout the upper portions of the lungs, it was noted that evidence of fibrosis was much more common in this group.

Nor were there any cases with thelesions commencing in the non-apical portions of the lung and miliary tuberculosis was not encountered.

PERIOD OF SURVIVAL.

The average life of the males from the time of notification until death was 17.1 months and for the females 9.5 months.

End results.

	Much Improved.	Improved.	I.S.Q.	Worse.	Died.
Males	11 (47.8%)	1	-	1	10 (43.5%)
Females	3 (13.7%)	-	-	1	18 (81.8%)

There were no female children with negative tuberculosis nor any females benefiting from collapse therapy.

Excluding children and treated cases from the male series the results were

	Much Improved.	Died
Males	6 (33%)	10 (55.5%)

The differences between the mortality rates for the two sexes are considerable and it is significant that of the 23 males no fewer than 16 were light-coloured with an obvious admixture of European blood, while of the 22 females only 7 were light-coloured, the remainder were markedly negroid in features and degree of pigmentation.

CLINICAL NOTES.

S.R. female, 32 years. Father Mixed, European and Ab. Indian, Mother Ab. Indian. Came down country to the dispensary for advice following frank haemoptysis. Notified on 1.8.33 clinical and radiological findings of fairly early disease Lt. upper lobe. Refused to go into hospital for collapse treatment and returned to remote hamlet up creek. Re-visited the dispensary in August 1935 said she was willing to enter hospital for treatment. Skiagram showed disease was by now advanced and bilateral and she died one month later. The case is reported since it furnishes definite evidence of the time taken for the disease to progress to a fatal termination in a person with an interesting parental history.

EAST INDIANS.

These formed a small group of 20 cases, 14 males and 6 females. Of these 8 (40%) had a history of contact 6 males,

(42.85%) and 2 females (33.3%).

The stage of disease on notification was as follows:

	Stage I.	Stage II.	Stage III.
Males	3 (21.4%)	2 (14.3%)	9 (64.3%)
Females	-	3 (50%)	3 (50%)

The general course of the disease, period of survival and X-ray appearances showed that the disease was less acute in the East Indians than in the Negroes but the difference was not marked. This was largely due to the fact that it was only the young adult who attended the dispensary, the older East Indians lived in the suburbs and were reluctant to travel any distance to receive attention.

Ten of the males and five of the females were under 30 years of age.

Haemoptysis was only recorded in 2 out of the 20 cases and then was only in the form of staining. This lessened frequency of haemorrhage has also been remarked on by Powell (1922), who stated that he found haemoptysis very rare amongst Indians in the earlier stages and in the majority never seen at any stage. In 1000 cases only 5% complained of this symptom on seeking advice.

End Results.

Ten of the males died and four were much improved: in two of these A.P. had been responsible for the betterment of their condition.

Of the females five out of the six died so that in

both sexes the case mortality rate was 83.3%.

There were no cases of special clinical interest.

PORTUGESE.

There were 13 in this group of which 9 were males and 4 females. There was a history of contact in 3 cases (23.1%). There is no doubt that this is an underestimate of the influence of contact in the causation of tuberculosis amongst the Portugese community. The patients were all drawn from the poorer class and considerable reluctance was shown to furnishing any history of family disease. Further, owing to the racial antagonism that exists between Negroes and Portugese the Health Visitors who were of African descent did not obtain the entry to Portugese homes to the same extent as with other races and there was less chance of information being obtained through their personal enquiries.

In 4 instances (30.8%) a history of haemoptysis was recorded.

	Much Improved.	Worse.	Died.
Males	3 (22.2%)	1	6 (66.6%)
Females	2 (50%)		2 (50%)

The general course of the disease was fairly chronic but dispensary aid was sought at a later stage than in other races: 3 were in Stage II and 10 in Stage III.

CHINESE.

Four Chinese males aged 58, 50, 42 and 28 years

respectively. It is naturally to be expected that the middle aged type of phthisis would be met with in this section of the community as the younger adults are emigrants from China and only those in good health migrate.

In two of these cases the disease ran an acute course, in the remaining two it was very chronic with recovery in one.

ABORIGINAL INDIANS.

There were only two Aboriginal Indians who were traced out of the total of seven seeking advice during the period under review. Both these were females, 40 and 26 years respectively. A history of contact was present in both cases.

B.A. female, 40 years. Mother died of phthisis 7 years previously. She was notified on 3.10.33 and X-ray showed large exudative deposits in the upper two thirds of both lungs. Through the courtesy of the Government Dispenser information was received that she died on 23.3.34. after her return to the Reserve.

I.L. female, 26 years. A brother died of tuberculosis some years before. X-ray showed consolidation in the upper lobe of the Rt. lung and an A.P. was attempted but failed on account of adhesions. She was sent into the Best Hospital and kept on strict bed for four months. The general condition improved and she put on over 14 lbs. in weight. The subsequent skiagrams showed that the lesion was not spreading but up to the time of this report there was no definite evidence of resolution and sputum was irregularly positive with scanty myco.tub.

CHILDREN.

In view of the scanty information available regarding the progress of pulmonary tuberculosis in children in the tropics, it may be of advantage to set out in full the clinical histories of the small group of 17 children entered on the dispensary register. Three infants exhibited the characteristic appearances seen in acute phthisis of early life.

I.G. Negro male, 14 months. Mother advanced case of pulmonary tuberculosis.

X-ray showed presence of miliary tuberculosis. The child was examined as a contact and notified on 12.1.33 and died on 20.1.33.

G.S. Negro, female, 7 months. Mother open pulmonary tuberculosis. Examined as a contact and X-ray showed deposits extending out from hilum into both lungs, 26.6.34. Died on 3.7.34.

B.S. Portugese male, 7 months. Lodger in same house died of pulmonary tuberculosis on 23.5.34. Child brought up for contact examination 11.10.34. X-ray showed heavy deposits at Rt. hilum spreading out into lung parenchyma. Died 7.2.35.

The following three cases all present points of similarity, all were Negro children, in each there was a history of contact with an open case, the general condition was good but the physical and radiological findings were those of Epituberculosis, subsequent course uneventful.

N.D. Negro male, 1½ years. History of contact with an open case in the same tenement. Brought to dispensary on

account of cough. General condition was good while examination revealed impaired percussion note and tubular breathing in the Rt. upper lobe.

X-ray revealed large dense shadow clearly defined in upper half of Rt. upper lobe. Serial examinations demonstrated the gradual disappearance of this shadow in 8 months leaving a faint area of calcification. Notified 8.3.33.

O.R. Negro male, 11 years. Brother died of phthisis 2 years before. Clinically and radiologically epituberculosis of Rt. upper lobe. Condition cleared up in 5 months leaving no trace.

O.S. Negro female, 9 years. Grandfather open case of pulmonary tuberculosis. Child on contact examination found to have epituberculosis of Lt. upper lobe with typical clinical and roentgenological appearances. Notified on 12.3.35 and sent to Best Hospital in spite of good general condition because of bad home conditions and danger of exposure to reinfection.

Subsequent course in hospital uneventful and discharged after 6 months with complete resolution of lesion.

Another three cases show that pulmonary tuberculosis may take a benign course in coloured children as well as in white children.

L.B. Negro female, 12 years. Examined as a contact, an uncle returned from New York in 1930 with phthisis and before his death had fatally infected two other members of the family. While general condition apart from underfeeding was fair, X-ray showed small resolving shadow in lower lobe ofRt. lung and

apparent enlargement of tracheobronchial nodes. Notified on 24.1.33. Complete recovery.

S.E. Negro female, 8 years. Mother died of open tuberculosis in 1932. Contact examination while negative clinically revealed on X-ray scattered deposits in Lt. lung. Sputum negative.

Sent to Best Hospital and made good recovery after 7 months' stay with complete clearance of lesions.

R.H. Mixed male, 7 years. Contact case. No physical signs but on X-ray deposit seen in upper lobe of Rt. lung in the basal portion adjacent to hilum with evidence of enlarged hilar nodes. Resolution in 3 months.

The difficulty of distinguishing between a benign form of tuberculosis and one that may eventually run a fatal course is illustrated by the following case.

S.H. Negro male, 12 years. Uncle inmate of same house died of phthisis. Brought to the dispensary because of staining 2 weeks previously also gave a history of cough and fever for 3 weeks.

Physical examination furnished evidence of disease in upper half of Rt. lung. X-ray, deposits in upper half of Rt. lung with small thick walled cavity infraclavicularly near sternum. Notified 4.7.33. No sputum could be got for examination. Permission to put him into hospital refused. Came up for re-examination at irregular intervals, family opposed to any assistance. On 23.11.34. X-ray showed almost complete resolution and commencing calcification. On 19.7.35.

the Health Visitor brought him for re-examination as he was obviously in impaired health and this time a lesion was found on the Lt. side. X-ray showed a heavy deposit in the upper third of Lt. lung with a small cavity at the outer end of the infra-clavicular space.

General condition has since improved but mother still refuses to allow him to enter hospital and it is doubtful what the ultimate result will be.

The remaining 7 cases are all sputum positive cases.

[redacted].

E.M. Negro female, 13 years. Father and mother died of pulmonary tuberculosis in 1927, since then 2 uncles and 1 brother succumbed to the disease. Notified 7.1.33. after being brought to the dispensary on account of a small haemoptysis one week previously.

Xray deposit in the lower Rt. lobe with mottling around it. Sputum positive. The patient was kept in Best Hospital for one year here progress while slow was good, serial skiagrams showed that the lesion was fibrosing and the heart was drawn slightly to the Rt. The sputum became negative and she was discharged as quiescent. She has since remained well and the disease appears to be arrested, two years having elapsed since discharge from hospital.

P.M. Negro female, 8 years, cousin of the above. She was also in contact with the open cases.

Subsequent to an operation for enlarged tonsils she had irregular pyrexia. X-ray revealed two small cavities bordering

the hilar region in the upper part of the Lt. lung. Sputum positive. Notified on 26.6.34 and sent into the Best Hospital with the intention of having an A.P. performed. Unfortunately she was so frightened of any surgical interference that nothing could be done. Despite strict bed rest her general condition retrogressed slowly with gradual spread of the lesion. To date, July 1936, she is reported to be worse though the condition has not yet spread beyond the Lt. lung. Improvement may eventually take place in view of the chonicity of the disease though this is doubtful.

E.O. Negro female, 14 years. No history of contact. Brought up for reexamination as she had been notified in September 1931 as tubercular. No X-ray had been taken but the case sheet recorded a positive sputum.

She was then (March 1933) well developed and healthy looking and had no complaint but a skiagram showed that the Lt. lung was largely obscured with marked evidence of fibrosis, the heart and trachea being drawn to the Lt. There was a small cavity at the Lt. apex. Present condition, disease arrested.

H.H. Negro male, 14 years. No history of contact. Attended complaining of cough, fever, loss of weight and dyspnoea for six months. Clinical and radiological examination revealed an extensive pleural effusion on the Lt. side with active lesions in the Rt. upper lobe. Sputum positive. Notified 22.11.32. steady deterioration and died 3.9.33.

S.B. East Indian female, 13 years. No history of contact. Complained of fever and cough for 5 months. Advanced case died a few weeks after notification.

A.S. Mixed male, 14 years. No history of contact. Complained of fever, cough and dyspnoea for 3 months. Clinically and radiologically massive Lt. pleural effusion. Sent to Best Hospital after being notifed on 30.11.33. Deteriorated steadily and deposits appeared in the Rt. lung. Sputum positive. Died on 4.2.35.

M.A. Mixed female, 12 years. This case was detected by the writer during a routine school examination, the physical signs were well marked and X-ray showed a dense deposit in the upper half of the Rt. lung with a small cavity in the middle and early deposits in the Lt. apex. She was immediately sent into hospital and died two weeks later from profuse haemoptysis.

Beyond a little cough she had, despite the amount of disease present, suffered no discomfort nor malaise. Neither her relatives nor her teachers noticed anything untoward in her general condition.

In this series of 17 children with pulmonary tuberculosis 11 (64.7%) had a history of contact with an open case of pulmonary tuberculosis. Recovery is recorded in 8 of the series, death occurred in 7 and in 2 the position is still doubtful.

It is interesting to note that of 4 Negro children with positive sputum 2 are well on the way to recovery and that

the results of this small series show that pulmonary tuberculosis follows in coloured children practically the same course as it does in white children as far as the ultimate results are concerned.

COURSE OF THE DISEASE IN 200 PATIENTS ON THE REGISTER OF THE TUBERCULOSIS DISPENSARY.

These 200 cases of all races consisted of 100 males and 100 females, the fact that the numbers for both sexes are equal is purely by chance and not the result of selection.

Age Groups.	Males.	Females.
0-9 years	4	4
10-19 "	13	15
20-29 "	35	40
30-39 "	29	27
40-49 "	13	8
50-59 "	4	5
60-69 "	2	1
	100	100 200

Of these cases a total of 63 (31.5%) had a history of contact made up of 24 males (24%) and 39 females (39%).

CONDITION ON NOTIFICATION.

Stage I.	Stage II.	Stage III.
30 (15%)	58 (29%)	112 (56%)

There has been no differentiation into sexes as the percentage at each stage was approximately the same for both.

END RESULTS.

Much Improved.	Improved.	I.S.Q.	Worse.	Died.
53 (26.5%)	4	1	11	131 (65.5%).

These results include the benign cases in children and those who have benefited from collapse therapy otherwise the number of fatal cases would be approximately 80%.

TREATMENT BY COLLAPSE THERAPY.

Between May 1933 and July 1935 forty two patients, all open cases, were treated by collapse therapy.

Of these 31 had an artificial pneumothorax performed, 3 had both artificial pneumothorax and phrenic evulsion and in 8 phrenic evulsion was the sole method of treatment.

The distribution of the artificial pneumothorax cases was as follows,

	Males.	Females.
Negro.	7	9
East Indian.	3	3
Mixed.	6	1
Portuguese	2	-

When the treatment was commenced really early cases were rare but as more people attended the dispensary and contact work became firmly established cases were detected at an earlier stage than had been possible in the beginning.

StageI.	Stage II.	Stage III.
9.(29.03%)	17.(54.84%)	5.(16.13%).

As has been described earlier on the patients were admitted to the Public Hospital and induction was performed

there, when sufficient progress had been made and refills were only needed once a week they were transferred to the Best Hospital.

No special precautions were taken for the inductions, they were carried out on the same lines as in this country.

Before the patients' consent was obtained the process was carefully explained and they were given a day or two to think things over after which the whole affair was discussed freely with them The result was that in not a single case did a patient show any signs of fear or shock when the collapse was induced.

Care was taken to thoroughly anaesthetise the chest wall in the beginning but once the weekly refill was established no more local anaesthetic was employed and the patients became quite acc--ustomed to the process.

No complications occurred during the 31 inductions but in five other instances extensive pleural adhesions prevented the establishment of any degree of collapse.

Pleural effusions occurred during the course of treatment in 9 (29%) of cases, slight in 7 and moderate in 2.

The main complication was adhesive pleuritis, in only 7 (22.5%) was a complete collapse obtained and 5 of the artificial pneumothoraces were abondoned after one year due to extensive adhesions.

As far as local experience is concerned those of Negro race were just as liable to have adhesions as any other race.

In one case bilateral artificial pneumothorax was performed, an East Indian male aged 17 years, was treated for

a lesion of the Rt. apex on 22.6.33. After a few months at the Best Hospital he became dissatisfied and was dis--charged but attended regularly for refills.

However he had gone back to work and was not living quietly and a screen examination on 1.8.34. revealed that there had been a spread to the contralateral lung. He was promptly sent into hospital and collapse induced in the Lt.Lung. A partial collapse was kept up in the first affected lung for three more months and then it was grad--ually allowed to expand and it was found that the old lesion had, apparently, become quiescent.

He is now back at work which is of a clerical nature and doing well.

END RESULTS OF A.P.TREATMENT.

Full work.	Light work.	Improved.	Worse.	Died.
2	11	7	4	7.

As between the two sexes the males have shown better results 72% have improved to varying extent amongst the former and only 55% among the latter. In two of the females pregnancy interfered with their progress and largely nullified the benefit gained from treatment.

The numbers are too small to estimate results for the different races, actually the Negroes have the best percen--tage of results, 12 out of 16 are improved or at work (75%). Artificial Pneumothorax and Phrenic Evulsion were performed in two males of Mixed race and one East Indian.

In two cases it was performed on account of extensive adhesive pleuritis preventing successful refills after a

period of eight months treatment, both these men are on light work.

In the third case artificial pneumothorax was per-formed on the Rt. side and phrenic evulsion two weeks later on the Lt. side.

This bilateral collapse was in the nature of a gamble but the patient was of good class and desperately anxious that something should be done despite the fact that he had bilateral lesions.

He received some benefit and lived for sixteen months finally dying of a terminal haemoptysis.

He was classified as in Stage III, the other two were in Stage II.

Phrenic evulsion was performed on 8 patients, 6 males and 2 females. The racial distribution was Portuguese 3, Chinese 2, Mixed 1, East Indian 1, and Negro 1.

Stage I.	Stage II.	Stage III.
3.	3	2

In 2 the disease has been completed arrested, 2 on light work, 2 much improved and 2 died.

The later were both advanced cases and operation was performed more as a palliative than for curative purposes.

ANALYSIS OF 42 CASES TREATED BY COLLAPSE THERAPY.

	Males.	Females.
Negro.	8	9
Mixed	8	2
East Indian	5	3
Portuguese	4	1
Chinese	2	0
	27.	15.

EXTENT OF THE DISEASE.

Stage I.	Stage II.	Stage III.
12.(28.6%)	22.(52.4%)	8. (19.0%)

END RESULTS.

Full work.	Light work.	Improved.	Worse.	Died.
4.(9.6%)	15 (35.7%)	9.(21.4%)	4.(9.6%)	10.(23.8%)

In the total series 66.6% improved as a result of the collapse therapy.

TREATMENT BY GOLD SALTS AND SODIUM MORRHUATE.

A group of eight patients was selected for treatment with myocrisin and sanocrysin .

Four of these were bilateral cases exhibiting some degree of resistance, the rest unilateral cases undergoing some form of collapse therapy. Six of the eight cases were Negroes, one was Mixed, and the other a Portuguese.

The dosage of the gold salts whether administered intra-muscularly or intraveously was commenced at 0.05 gm. and given once every ten days.

It soon became apparent that the drug was having an adverse effect on the Negroes, in all six albuminuria continued, in some it steadily increased in quantity.

No more serious complications were encountered because the dosage was not increased and after some weeks the treatment as far as Negroes was concerned, was abandoned.

There did not appear to be the slightest benefit either locally or generally while the deleterious influence of the drug was manifest.

In the Portuguese case some benefit was obtained after a long course of myocrysin amounting to 3.5 gms. in all but the ultimate good results must be ascribed to the collapse therapy.

A similar course of sanocrysin was tried out on a female of Mixed race with exudative lesions in both lungs. The final results were encouraging, in the Rt. lung the lesions cleared up while evidence of fibrosis was to be seen in the other lung, the general condition, including a tubercular laryngitis showed a marked degree of improvement.

Whether the African has an actual idiosyncrasy for gold salts cannot be proved by this small series of cases but the writer has completely abandoned all forms of gold therapy in those of Negro race, reserving it for those of European race or with a strong mixture of European blood.

A similar group of eight cases was treated with sodium morrhuate intravenously. It had been used for years at the Best Hospital in small doses intramuscularly and certain benefits claimed for it by some doctors though these were by no means apparent to everyone.

The writer decided to administer much larger doses by the intravenous route. An initial dose of 2.0 cc. was given intravenously, then weekly doses increased by 2.0 cc. until 10 cc. was reached which was the maximum dose. By the time the dosage had reached this figure the veins showed a considerable degree of sclerosis but in some 10.0 cc. was given for three or four weeks.

In no case was any definite benefit to be found, an occasional slight rise in weight, which may have been due to

other factors, was observed but no other advantage and no improvement in the pulmonary condition.

BOVINE TUBERCULOSIS.

Approximately 2% of the annual notifications were due to tuberculosis of the bones and joints, mainly of the spine.

It is extremely doubtful if any of these was due to the bovine form of myco.tub. though so far no experiments have been carried out to decide this point.

Bovine tuberculosis is common in the Colony, since 1924 5% of the cattle and pigs condemned on post mortem inspection as unfit for human consumption have been rejected on the score of tuberculous disease.

No large scale tuberculin testing has been carried out and the source of the infection may have originally been imported stock but little attention appears to have been given to the question.

The Zebu strain is common all over the Colony but is as liable to tuberculous disease as the other cattle.

While it is an economic question it is not of great importance from the public health point of view since all milk is boiled before use, in order to increase its keeping powers, while all stock is inspected by sanitary inspectors before and after being slaughtered.

PART III.

CONTROL OF TUBERCULOSIS IN THE TROPICS.

CONTROL OF TUBERCULOSIS IN THE TROPICS.

In dealing with the control of tuberculosis in the tropics we have to visualise a variety of situations, methods that would be of avail in an urbanised or semi-urbanised community composed of races partly or largely immunised by centuries of exposure, would prove worse than useless in a primitive community in whose midst the disease is beginning to make headway.

Further any methods of prevention must be outlined in relation to the existence of other preventable disease, the tropical sanitarian is beset with so many problems in respect to the prevention of disease that the addition of yet another bids fair to be the straw that broke the camel's back.

However the basis of anti-tuberculosis measures differs in no respect from that for other diseases namely good housing, correct feeding and sound sanitation.

As Crocket (1933) puts it tuberculosis is an index disease pointing to the conditions of life and work prevailing in any region. When the death rate for tuberculosis is falling it is proof that sanitation is receiving efficient attention on the part of the responsible authority.

There are some workers who would leave the matter in the hands of the sanitarians since they are convinced that essential sanitary reforms, even in the absence of specific measures, will suffice to eradicate the malady in time.

Winchester (1934) draws attention to the fact that the tuberculosis death rate in the Straits Settlements has steadily diminished since the early years of this century, moreover its decline has been steeper than that of the general death rate. The fall has been most marked in Singapore Island where the percentage of people living under rural conditions is low. He maintains that any anti-tuberculosis measures apart from housing and town planning schemes are of little avail. The process of urbanisation will, he thinks, solve the problem by allowing a more complete infection of all the population and thus hasten the elimination of the weakly immune.

Since it has taken the Jews two thousand years to attain this stage it would appear desirable to, at least, attempt to reach it somewhat earlier.

CONTROL OF BOVINE TUBERCULOSIS IN THE TROPICS.

Before considering the human aspect of the problem it is necessary to mention the need for veterinary prophylaxis. In many colonies particularly in Africa a strict watch is being maintained on the incidence of tuberculosis in cattle. That this is essential is shown by the comparatively high rate of infection amongst cattle in British Guiana, the disease has now been allowed to spread to such an extent that eradication by slaughtering will be an expensive measure.

Consistent and widescale tuberculin testing even though it may appear expensive will pay in the end if it eliminates the few infected beasts before the disease commences to spread.

Nor should the thorough testing of imported cattle be omitted since importation of bulls from the United Kingdom is often carried out in order to improve the local breeds.

Further even where milk is not an article of diet the persistent propaganda of health departments that milk is the perfect food is introducing the milk drinking habit and to replace malnutrition by bovine tubercle will not reflect credit on any propagandist. So that the time is ripe for more attention to be paid to this question lest it produces another problem for the tropical hygienist.

CONTROL OF TUBERCULOSIS IN BACKWARD COMMUNITIES.

Communities are still to be found where ignorance and prejudice prevail to such an extent that any measure of control appears almost impossible of application. The first point to consider is whether tuberculosis exists to any great extent in such a community. The hospital records are not always to be depended on to furnish very accurate returns, in the first place the rapidly fatal case common in primitive communities never enters hospital, secondly with a busy out patient department and crowded wards differential diagnosis is not easy and the diagnosis of bronchitis not infequently conceals the damage which should be laid to the credit of tuberculosis.

The only certain methods of ascertaining, with some degree of accuracy, the amount of tuberculosis present are by the tuberculin test and post mortems. The technical difficulties in the way of tuberculin testing have already been discussed and their solution by the adoption of new methods advocated. Local prejudice is less easy of solution but as long as schools, police forces and jails exist material will be found for investigation. Where an aversion to the introduction of medicines under the skin is met with Craig's test is especially useful as the extra O.T. is wiped off and the puncture does not appear to the untrained observer to introduce the material into the body. Actually in most parts of the tropics injections are largely demanded by the inhabitants who see in this method of administering medicaments a great improvement on the old fashioned way of merely swallowing them so that intradermal tests should not arouse any great antipathy.

The acquisition of information through the medium of post mortems is sadly hampered in many parts especially where the population is of the Mohammedan faith. Routine autopsies are out of the question but the keen medical officer will always be on the look-out for opportunities furnished by post mortems required to be done in the interests of the law. The records of these can often furnish a good deal of information if they are performed with an eye to general interest as well as the ascertainment of the actual cause of death.

Again a considerable amount of information may be acquired by the use of the X-ray examinations. It is true there are still areas where no X-ray apparatus is available but these are becoming fewer in number and time spent on carrying out as large a series of screenings as possible would yield a great deal of valuable information. The correct assessment of the presence or absence of thoracic disease requires practice but experience soon brings a reasonably high standard of proficiency. Nowadays there are screens on the market which give as clear a picture as one could possibly desire.

Once information has been acquired regarding the amount and type of tuberculosis present measures have to be considered in relation to the control of the disease if it is, or threatens to be, a public health problem of any magnitude.

In work of this nature there is only one royal road to success and that is concentration on the family as a unit not the infected individual alone. This is especially necessary in communities where the people live in rural or semi-rural conditions.

As soon as an open case is detected every effort should be made to carry out as efficient isolation as may be obtained. Conditions vary so much that it would be foolish to lay down any specified methods, there are places where the disease is regarded with so much horror that the unfortunate sufferer is practically left to care for himself; elsewhere

no notice is taken of the condition and the whole family is exposed to intense infection. As far as possible two measures should be enforced, namely the cleanly disposal of sputum and the placing of the patient in the open air for as many hours of the day as possible but guarded from the direct rays of the sun.

In some cases an ordinary calabash filled with wood ash forms an excellent receptacle for sputum or an issue of old tins containing a small amount of liquid disinfectant will suffice.

Where feasible the contacts should be tuberculin tested and screened and the regular issue of a little medicine especially cod liver oil, to the children often suffices to ensure their regular attendance at a hospital out patient department for a considerable period thus enabling them to be kept under observation.

In a community such as outlined here the tuberculosis dispensary can serve no good purpose, its place as a clearing centre can be filled to better purpose by the district hospital. To set up a dispensary before its proper function is appreciated by the population it is intended to serve would merely be a waste of time and money. It resolves itself into keeping up another out patient department as those with all and every ailment would go to it for treatment.

Once simple anti-tuberculosis measures are set

going over a wide area and the inhabitants begin to appreciate their signifance then the time is ripe for the first step in organised work, the erection of the tuberculosis dispensary. Nor does this entail considerable expense: the erection of a simple structure with room for expansion is much more desirable than the usual type where limited waiting accommodation aids the spread of infection, patients, healthy adults and children may have to crowd in together and the dispensary unwittingly becomes the centre for further dissemination of infection.

The best type of building is that built well off the ground so that shelter from rain or sun may be obtained under the structure with no restriction on ventilation. It should be in a central position easy of access though not on too commanding a site in order to avoid attracting undesirable publicity. On the other hand to site such a dispensary in some remote corner on the farther edge of town or village encourages people to be secretive and the idea that tuberculosis is something to be ashamed of gains ground.

In the early stages any attempt at introducing treatment requiring regular attendance is likely to meet with failure; the unsophisticated native is at a loss to understand either the nature of the treatment or the need for its repetition.

A judicious selection of cases with minimal progressive lesions for treatment by phrenic evulsion is

recommended, it only requires a few successes to induce others to come forward.

However in these more backward communities there is always one section that will respond to intelligent propaganda and seek treatment namely the clerical and administrative subordinate staff and school teachers. If only a start can be made by detecting early cases amongst this class and active collapse instituted the results will attract widespread attention.

Patients drawn from this class ensure better results, they are capable of understanding the principles of treatment and their circumstances are such as to permit of rest for a prolonged period and a reasonable standard of nourishment.

Such cases amply repay the trouble and care expended on them if they are carefully selected and their progress attentively watched. One demonstration of the efficacy of artificial pneumothorax is worth a score of hygiene talks. Hitherto in many parts even amongst the educated natives their attitude has been that tuberculosis is one hundred per cent fatal and while they may seek advice it is only in the last stages when despair drives them to try medicines in which they have no real faith.

The infiltration of the news amongst the better educated portions of the populace soon extends even to the most ignorant.

Once the desire for treatment is aroused in the minds of the people the question is how to carry on such treatment in circumstances that will make the patient feel at ease and yet will enable the medical man to administer it under optimum conditions.

The answer appears to be the setting up of small communities where sufferers may live under conditions resembling their habitual environment and yet permitting of reasonable isolation and continued attention. Cummins (1934) describes the work of Swiss missionaries in Portuguese East Africa who have developed a 'tuberculosis village' in which the patients are cared for and fed by their own relatives and yet treated and supervised by medical men who understand them and can appreciate their prejudices and anxieties, instilling confidence in them by this appreciation of their mental processes.

The huts are inexpensive to construct and when vacated on account of death or removal can be burnt down.

Stones (1932) discussing the problem of tuberculosis in Uganda suggests that sanatorium treatment will not suit African needs but village settlements appear to be the solution. The patient, once treatment is successfully under way, could carry on trades as is done in settlements at home especially such employment as is suited to his needs and training. He quotes the suitability of experimental smallholding schemes of the Uganda Department of Agriculture for such settlements. He puts the matter very aptly when

he says "segregation with contentment should be our watchword".

The excellent work done by missions in connection with the maintenance and treatment of lepers might well be extended to village settlements for the tuberculous.

The above measures, elementary though they appear, if energetically carried out should have a decisive effect in checking the extension of active disease. In no part of the world save, perhaps, amongst a few primitive hill tribes or remote jungle dwellers will tuberculosis ever sweep through the community as it did among the North American Indians, infection is now too general.

Kleine (1930) commenting on anti-tuberculosis work carried on in Africa, with especial reference to that of Wilcocks, asserts that any fear of the disease assuming epidemic proportions even in remote regions of East Africa is groundless. The slow gradual infection of whole populations that is taking place is a sufficient guarantee against the repetition of the disasters seen in the past.

CONTROL OF TUBERCULOSIS IN DEVELOPING COMMUNITIES

As these communities develop and present possibilities of gain to the pioneers of commerce and industry the problems of defence against tuberculosis become more difficult.

One of the most important sources of infection from outside is the entrance of the petty trader, so often one of the Oriental races, who carries with him the organisms of disease readily enough but fails to bestow along with these unwelcome gifts those elements so necessary for rapid

and effective immunisation.

This invasion mainly by Indian and Arab traders is general throughout Africa. The Writer has watched the spread of tuberculosis through an area in British North Borneo densely pupulated by a primitive tribe following the setting up, on the outskirts, of a small Chinese trading shack.

In areas where traders are already established in large numbers little can be done in the way of special prevention by forbidding their entry but in sheltered communities any infiltration by such traders should be more strictly controlled by the medical department.

The part that should be played Government control during this evolutionary process is admirably set out by Young (1934) who, as the result of his experience in West Africa, affirms the theory that equality cannot be present as between immune and nonimmune peoples.

This lack of resistance clearly renders rapid urbanisation a most undesirable process for native races. Young would reverse the usual process of bringing the native to the city by erecting townships in outlying districts. In planning for these the density of the population would be limited by restricting the number of buildings to be erected on any given area. Moreover he would place upon industry the burden of housing its workers in decent manner. These two measures would lead to the setting up of small townships extending out into the bush instead of becoming grossly overcrowded at the centre.

No industrial concern would be allowed to commence operations until it owned, or obtained an option on, land in its immediate vicinity to supply sufficient accommodation for houses for all its workers and their families. This measure would prevent the setting up of new works in the heart of an already overcrowded town and the enticement of rural dwellers to flock to the town and enter the unhealthy environment associated with urban employment.

If groups of industries were established along these lines small townships, limited in size, could be set up which would be sufficiently near the agricultural areas to enable workers to obtain their natural foodstuffs cheaply and further would not estrange them entirely from their old methods of living.

It is in these gradually evolving communities that survey methods are so necessary, by tuberculin test and fluoroscopy it should be possible to watch the progress of infection and to circumscribe the more dangerous foci of disease.

The establishment of a tuberculosis dispensary would be a measure of great practical value, the community has now outgrown the limited resources of the district hospital and its individual members have attained the stage where they may be expected to make intelligent use of such a centre.

Along with the erection of a dispensary comes the question of a subordinate staff and the problem of obtaining

an efficient personnel for such a staff from among the local inhabitants.

To expect to be able to produce a highly trained and certificated staff from a community slowly evolving from a primitive state would be foolish. On the other hand to import such a staff from Great Britain would be beyond the means of most communities if it were to be devoted entirely to tuberculosis work.

It is not necessary to demand a high standard of training for such Health Visitors, in the first place a course of training in the local hospital of sufficient duration to enable them to understand the elementary facts about the treatment and prevention of disease should be arranged. To undergo this training women should be selected who have had a reasonable degree of education, possessed of common sense and of a good moral standard. The mission or religious body that cannot produce such women nowadays from amongst its adherents is rare indeed. They need not be capable of solving difficult nursing problems but they must be able to do hard work, face rebuffs with quiet patience and show a quick sympathy and understanding and unquestioning loyalty.

Given these qualities the development of such a woman, of whatever race, into a first class social worker is a matter of time and largely dependent on the ability of the medical officers to mould her into the desired pattern.

The presence of a dispensary raises the question

of hospitalisation and this should be met at this stage by granting accommodation in the general wards of the district hospital to cases fit for collapse therapy and if possible the erection of a separate ward for advanced cases requiring isolation.

The gradual introduction of artificial pneumothorax treatment would probably meet with a reasonable degree of success since in a community developing along normal lines there is a greater tendency for the population to become fixed and a lessened desire on the part of individuals to bolt into the bush when they encounter something they do not understand.

THE CONTROL OF TUBERCULOSIS IN MUNICIPALITIES AND TOWNSHIPS.

In an established and long urbanised community the interested medical officer needs to search no longer for the existence of tuberculosis but it is more necessary for him to study the trend of the disease in relation to economic and racial factors.

Crocket (1928) emphasises this fact when he says that despite the exposure of many successive generations and the improvement in the standard of living in the United Kingdom the incidence of the disease is no less.

What has altered is the character of the malady since the rapidly progressive case is less often encountered but much of the disease is of the concealed or latent variety.

The need for careful surveys and examination of all

available pathological evidence still continues and should not be neglected, if time is available, simply because routine methods of treatment have been organised along recognised lines and it is felt that there are no new fields to conquer.

In any urban area the establishment of a tuberculosis dispensary should be an accomplished fact whether the local authorities or Government are responsible for its upkeep. The number of large towns throughout the tropics without any tuberculosis centres is appalling especially as many are quite capable of undertaking the financial responsibility for such a project. It is more often due to fear of heavy financial commitments than to actual apathy, few realise that a dispensary can be run without any exaggerated expenditure. There must be few tropical countries whose financial resources are as strained as in British Guiana yet there tuberculosis work is carried on along modern lines without excessive financial strain. In urban communities where there is a responsible and well-to-do section, every effort should be made to encourage these better class people to take a share in the work by financial aid and by working on committees in connection with the dispensary. Nor should the dispensary physician be content to work only at the dispensary: other preventive measures should be encouraged. The routine examination of school children might well include monthly weigh-ins and children who have lost weight examined clinically and by fluoroscopy.

Hetherington (1927) states that latent apical tuberculosis of adolescents causes moderate loss of weight in some but not in all cases. As a rule however the writer has found that the scales form a good guide and indicate the necessity or otherwise for further examination. Another method of prevention should be the fluoroscopic examination of school teachers at regular intervals, not only will this aid detection of cases but it has definite value as a propaganda and interests the teachers in the question of tuberculosis. By now the standards required of Health Visitors may well be raised and efforts made to obtain women who are fully trained nurses and if possible in possession of the certificate of the RoyalSanitary Institute.

Nor is the tuberculosis village alone able to meet the demands of such a community; institutional treatment has to be considered. There is no doubt in the minds of most tropical workers that the results of treatment are sufficiently good to justify the provision of tuberculosis institutions.

Frimodt-Möller (1926) claims that of 807 patients traced after their discharge from his sanatorium in India after five years 54.5% were still alive. Results such as these indicate that it is wrong to adopt the hopeless attitude so common in the past. If institutional treatment is to be carried out and the necessary resources are available the erection of a hospital for all types of cases is

indicated and not just a sanatorium for treated cases.

Crocket (1934) advocates the establishment of a sanatorium to deal with all stages of the disease, from the hospital for its advanced cases to the labour colony for the convalescent cases. Those are exactly the lines that should be followed in the tropics. To build in one corner a lazaret for the dying and to erect on a different site a sanatorium for those who improve means that the advanced case will never seek hospitalisation unless he is absolutely forced by legal or economic requirements.

But if within the same compound we have all the necessary accommodation for each stage of the disease the sufferer will readily seek admission, even if he is assigned to the advanced wards he sees about him those who have improved and the hope that it will not be long before he is able to cross the compound into the convalescent wards is ever present with him.

Such a hospital should be as near to the town as is consistent with ample accommodation and grounds, distance means transport and few natives are sufficiently well off to pay regularly even the few cents required to transport them any distance. This means that visits by friends and relatives are limited and furnishes an additional reason for not entering hospital.

Even in tropical countries where sites are available in the hills it appears inadvisable to make use of such sites on account of their distance except for those able to

afford the cost of transport.

No tuberculosis hospital is going to get the best results if it can only obtain its cases when they have reached an advanced stage. The best way of obtaining cases in a reasonably early stage apart from contact work is by continuous propaganda. The tuberculosis officer must be prepared to speak in season and out of season; to-day in the tropics there are springing up innumerable societies for young men and women and these always welcome health talks Propaganda amongst school teachers is one that brings the best returns, the teacher holds a very definite position amongst his or her neighbours and his advice is more often sought than may be the case in this country.

As far as possible pictorial propaganda should be employed extensively, posters, magic lantern slides, cinematograph shows have all a great appeal. One thing they require however is local appeal, as far as possible they should be produced locally, those from home often fail to impress natives as they portray surroundings unfamiliar to them.

In view of the fact that early and energetic treatment is producing good results even amongst the less resistant races it is necessary to consider the question of after care.

Carter (1926) who had a wide experience of tuberculosis among the Negroes of U.S.A. said that tuberculosis is

curable in the Negro but that he is so prone to return to his careless habits and to enter unsuitable occupations that the mortality after leaving the sanatorium is frightfully high.

Frimodt-Möller (1924) at the Union Mission Sanatorium in the Madras Presidency has set up the small nucleus of a tuberculosis colony to provide a living for poorer patients who leave the sanatorium in sufficiently good health not to require further treatment but as yet not fit to earn their living by ordinary means. A small silk farm has been established and the product enables eight patients to earn a sum of money equivalent to what they would gain in ordinary manual employment elsewhere.

In order therefore to give patients time to be completely restored to health every effort should be made to establish after-care centres where remunerative and useful employment may be obtained.

The place of legislation in the anti-tuberculosis scheme requires careful consideration and Mathews (1934) has summed it up in a sentence that every tuberculosis worker would do well to commit to memory "when a native thinks his disease can be cured or materially eased by medical aid no law will be required to make him seek it".

The usefulness of legislation has been discussed in Part II and the writer adheres to his view that it is a useful weapon to have in reserve but it should be employed

only as a last resource.

There are still many parts of the tropics where the native denied the treatment necessary for the arrest of tuberculosis would, if he but knew them, echo in heartfelt manner those well known sentences of Trudeau who recounts in his autobiography something of his feelings on being told that he had pulmonary tuberculosis.

"Black despair filled my heart, I think I know something of the feelings of the man at the Bar who is told he is to be hanged on a given date, for in those days pulmonary consumption was considered as absolutely fatal".

Today much is being done to remove that feeling of hopelessness still present in less fortunate lands.

Blanchard (1935) outlining the measures employed in French West Africa says that expansion of facilities for hospitalisation and treatment is being actively pursued in all the French colonies.

It has been the writer's endeavour to show in these preceding pages how, in a country where poverty is extreme, government financial resources.scanty and largely populated by a race that still lacks a full degree of resistance, work has been done that definitely assists in controlling one of the many plagues that afflict the dweller in the tropics.

More remains to be done in areas yet untouched and the words of Hoebeke are a timely reminder of the duty the great Colonial Powers owe to their native peoples.

"Nous avons combattu avec acharnement le pian,

la syphilis, la trypanosomiase, la malaria, la fièvre jaune, que nous considérons comme des maladies exotiques. La tuberculose, vielle connaissance d'Europe, ne nous a pas émue. Elle a pourtant tout lieu et droit de nous émouvoir. Elle a aussi sa petite allure exotique. Il est temps de s'en préoccuper.

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