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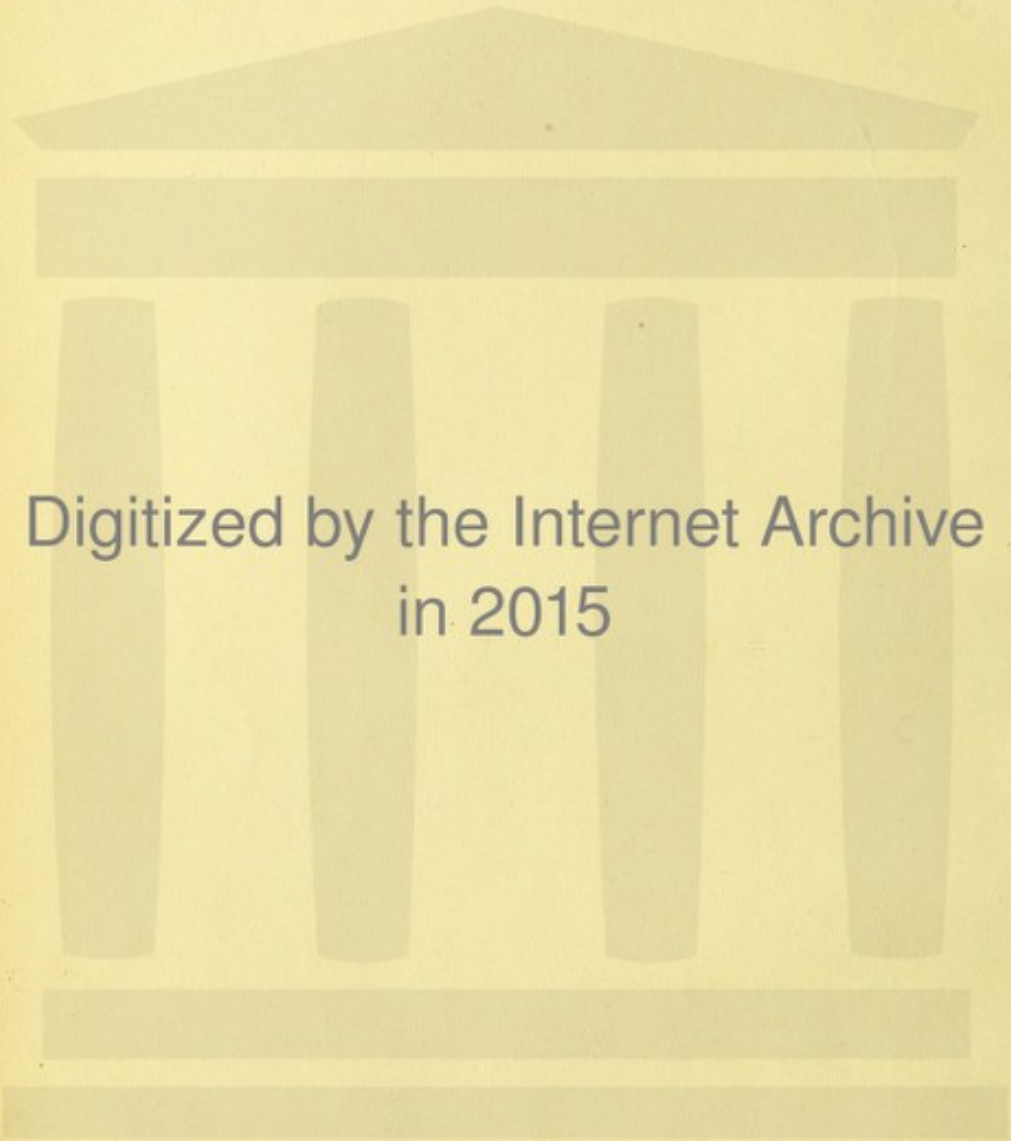

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UNION OF SOUTH AFRICA.

REPORT

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26 FEB. 1932

OF THE

TUBERCULOSIS COMMISSION.

Presented to both Houses of Parliament by Command of His Excellency the Governor-General.

1914.

CAPE TOWN:
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TUBERCULOSIS COMMISSION.

Copies of the signed evidence given before the Commission, together with all statements, annexures and correspondence, have been filed in the Office of the Department of the Interior, Pretoria.

New Law Courts,
Johannesburg, 15th May, 1914.

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UNION OF SOUTH AFRICA.

COMMISSION APPOINTED TO INQUIRE:

(a) Into the Prevalence and Spread of Tuberculosis within the Union, and

(b) Into the Health of Natives employed on the Witwatersrand Mines.

FINAL REPORT.

TO HIS EXCELLENCY THE RIGHT HONOURABLE VISCOUNT GLADSTONE, A MEMBER OF HIS MAJESTY'S MOST HONOURABLE PRIVY COUNCIL, KNIGHT GRAND CROSS OF THE MOST DISTINGUISHED ORDER OF ST. MICHAEL AND ST. GEORGE, HIGH COMMISSIONER FOR SOUTH AFRICA, GOVERNOR-GENERAL AND COMMANDER-IN-CHIEF IN AND OVER THE UNION OF SOUTH AFRICA.

MAY IT PLEASE YOUR EXCELLENCY,

We, Your Commissioners, have the honour to report on the subject of our terms of reference as follows:—

The Commission was appointed on the 26th February, 1912:—

(*a*) To inquire into and take evidence for the purpose of ascertaining the extent and causes of the prevalence and spread of Tuberculosis, in its various forms, among Europeans, Coloured persons, Natives, and Asiatics in the different areas of the Union; having regard, *inter alia* to the effect of race, immigration, occupation, housing and the concentration of persons in compounds, mission stations, and locations, and of conditions of life generally, in spreading the disease, and to report as to the steps which can be profitably taken by the Government, local authorities, and others for ameliorating the condition of those affected with the disease, and for controlling the disease in those areas in which it already prevails, and for preventing its introduction into fresh areas;

(*b*) to inquire into and take evidence for the purpose of ascertaining the extent and causes of the mortality of natives employed on the Witwatersrand Mines, and their susceptibility to pneumonia, with special reference to those coming from tropical areas, and to make recommendations thereon.

PRELIMINARY.

Interim Report on the Immigration of Tuberculous Persons.

2. On the 30th April, 1912, Your Commissioners had the honour to present to Your Excellency a First or Interim Report dealing with the effect of immigration in spreading tuberculosis within the Union. We hastened our report on this part of our Terms of Reference, in view of the fact that at the time a Bill was before Parliament to "consolidate and amend the Laws in force in the various parts of the Union relating to restriction upon immigration thereto."

3. This Bill, however, was not proceeded with in that Session, but during the Session of 1913, a similar measure was introduced and passed and became law on the 1st August, 1913, entitled an

> "Act to Consolidate and Amend the Laws in force in the various Provin-
> "ces of the Union relating to Prohibited Immigrants, to provide for
> "the Establishment of a Union Immigration Department, to regulate
> "Immigration into the Union or any Province thereof, and to provide
> "for the removal therefrom of undesirable persons."

In this Act provision is made for the promulgation of regulations dealing with the admission of tuberculous Immigrants, and such regulations were promulgated by Government Notice No. 1079 of the 11th July, 1913. These regulations appear to have been partly based on the recommendations contained in this Interim Report.

4. In submitting it we were careful to state that it "should not be considered as absolutely final on this part of our subject, except in so far as our recommendations relate to the admission of consumptive Immigrants"; we shall, therefore, during the course of the present Report, have occasion to further refer to this matter.

Scope of the present Report.

5. Your Commissioners propose in this Report to deal completely with the subject of Tuberculosis, under the several heads set forth in Part "A" of the Terms of Reference.

It is found, however, that the Mines of the Witwatersrand have a very important and far-reaching effect on the occurrence of tuberculosis in the general community, and more especially among the Native Races of the population, who leaving their kraals for varying periods of work on these mines, often return to their homes suffering from the disease

Therefore the conditions obtaining on these mines which appear to be, directly or indirectly, responsible for this result, will have to come under review, both in their relation to the causation of tuberculosis and in their effect on the general health of those engaged in the industry, who by reason of such impairment of health, may become predisposed to the disease. To this extent certain of the matters falling within the scope of Part "B" of the Terms of Reference will have to be considered in the present Report in order to arrive at our findings and recommendations regarding tuberculosis.

In this matter of the causation and spread of tuberculosis, the mines of the Witwatersrand do not stand alone, however, but, as we shall show, the same results extensively occur in the case of other Mines, especially Diamond and Coal Mines, and indeed, although to a less extent, in the case of all industrial centres for Natives and Coloured labour. It will therefore be necessary to consider as a whole the effect of industrialism on the health of the Native, with special reference to the part it plays in the causation of tuberculosis.

6. In carrying out our task we have been careful to keep in mind the fact that the battle against Tuberculosis has been long waging and is being strenuously fought at the present time by scientists and statesmen of world-wide repute. Thus many matters fundamental to our enquiry have been in large measure already settled or are in course of being successfully worked out in France, Germany, America, in Great Britain, the Australian and Canadian dominions and other Countries. It would, therefore, have been superfluous for us, especially with the inferior means at our disposal, to attempt to re-decide such questions for ourselves.

We have, therefore, mainly confined ourselves to ascertaining and appraising the conditions peculiar to South Africa, racial, social, climatic and industrial, which will determine the choice of measures for this country, and against which must be tested those principles of action that have been evolved in other Countries, so as to determine whether they will suit our own conditions, and if not, how far they must be modified or entirely discarded in favour of special methods.

Character and Extent of the Enquiry undertaken.

7. Your Commissioners have endeavoured to obtain information and elucidate the subject of their enquiry from two sources: by the collection and examination of statistics, and by taking the evidence of persons who may be presumed to have some special knowledge, local or other, regarding it.

Difficulties arising from paucity of Statistics.

From the outset your Commissioners found themselves faced with the difficulty that sufficiently accurate and comprehensive national statistics are not available. Without these it is nearly impossible to arrive at trustworty information as to the growth and present extent of the disease, or of the areas or the communities chiefly affected by it. Your Commissioners, therefore, have been obliged to rely in large measure upon personal enquiry carried out on the spot, and to the sifting

of evidence given by persons whose local knowledge and experience should entitle them to consideration. Consequently Your Commissoiners have had to visit a large number of localities in all parts of the Union, and have taken the evidence of many witnesses, medical, official and lay.

Places visited.

8. A Return detailing the places visited and the names and positions of the witnesses examined at each will be found in Annexure "B." It will be seen from this that in the aggregate your Commissioners have visited seventy-six localities and have taken evidence of six hundred and nine witnesses embodied in some 102,448 questions.

Among other places, the Commission visited in the Cape Province, East London, Queenstown, Kingwilliam's Town, Port Elizabeth, Cradock, Uitenhage, Graaff-Reinet, Oudtshoorn, Knysna, Mossel Bay, Beaufort West, Kimberley and a large number of smaller towns, covering most districts of the Province. Also a very comprehensive tour through the Transkeian Territories was carried out on the advice of the Department of Native Affairs.

In Natal were visited: Durban, Pietermaritzburg, Newcastle, Ladysmith, Dundee, and a number of other places in the Province, including Zululand; considerable attention was given to the Natal Coal Fields and the Sugar Estates, where the conditions affecting the health of Indentured Indians were investigated.

In the Orange Free State the Commission visited only Bloemfontein and Jagersfontein.

In the Transvaal, Johannesburg and the Witwatersrand necessarily occupied a large share of the time and attention of the Commission; but Pretoria, Lydenburg, the Witbank Coal Mines, Potgietersrust, Pietersburg, the Zoutpansberg and the Northern Transvaal also have been visited.

Basutoland.

9. Also, with the approval of Your Excellency, your Commissioners visited Maseru, Morija and Mafeteng in Basutoland, with the object of ascertaining the extent to which Tuberculosis prevails in that Territory, with special reference to the effect of the employment of Basutos on the Mines, where, as a tribe, as will be shown later on, they display a marked tendency to contract Pneumonia and Tuberculosis.

Your Commissioners desire to take this opportunity of expressing their thanks to His Honour, the Resident Commissioner, Sir Herbert Sloely, and to Officials, Missionaries, and others, who so kindly assisted them in their enquiry in this Territory.

Difficulties due to absence of technical research.

10. Your Commissioners much regret to have to record the fact that, in addition to the difficulty caused by the paucity of reliable statistics, they have been greatly handicapped by the absence of means for the pursuit of technical research into certain matters of a scientific nature, the solution of which is essential for the proper consideration of some of the questions involved in the Commission's Reference. These matters will be more particularly referred to in the course of this report, but it may not be out of place to indicate here some of the directions in which technical investigation is required. For example, as to the effect of the abundant sunlight and excessive dryness of the South African climate in the destruction of tuberculous infection; as to the extent to which high altitudes influence the course of the disease; as to whether there is any inherent constitutional difference in the susceptibility to Tuberculosis and Pneumonia in the different South African races, both as compared with one another and with Europeans, and if not, then to what factors the observed racial differences in incidence and course of the disease are due, and especially as to the role played by environment.

Also as to the extent to which old, latent tubercular disease exists amongst Natives, Coloured persons, and Colonial-born Europeans respectively, as compared with the experience of European Countries, and in this connection the carrying out of Tuberculin tests on a large scale is desirable, with careful investigation of the results so obtained.

Considerable pathological research is also necessary into the type of tuberculosis, as manifested by the differences seen in its course, when occurring in the

African races; also into the origin of certain obscure pathological conditions found post-mortem in the native; and into the influence of certain other diseases, in apparently predisposing to the occurrence of tuberculosis.

Again, it is desirable to investigate the extent to which human tuberculosis occurs in slaughter stock in this country, and especially among scavenging pigs.

Furthermore, extensive research is necessary into the effect in predisposing to disease in workers, of dust of different kinds.

Indeed, a long list could be enumerated, especially in connection with the health of mine labourers.

Your Commissioners desire in this connection to state that Dr. Watkins-Pitchford, formerly Government Bacteriologist, Transvaal, and now Director of the South African Institute for Medical Research, Dr. G. W. Robertson, Government Bacteriologist for the Cape Province, Dr. Park Ross, Government Bacteriologist for Natal, and Mr. William Robertson, Assistant Director of the Government Veterinary Laboratory, were all willing to assist the Commission had they had the time to do it, but their official duties already engaged their full attention.

Your Commissioners feel themselves constrained to emphasize these two matters—the want of proper statistics and the absence of necessary assistance derivable from scientific research—as they recognise that their findings have in many instances lacked definiteness owing to these handicaps.

Preliminary Review.

11. Before proceeding to deal with the particular points referred to the Commission for Report, it will be of assistance to review briefly the history of the development and present position of the anti-tuberculosis campaign in other countries; and then to try to ascertain the extent to which the disease has existed in South Africa in former times, and to trace its later growth; and finally to describe the circumstances which have in this country led up to the institution of the present enquiry.

CHAPTER II.

The Development and Present Position of the Anti-Tuberculous Campaign in Other Countries.

12. The history of consumption, did we know it, is probably as old as that of man. The clinical description of the disease, set down nearly half a century before the birth of Christ, has been preserved to us and is accurate for the malady as we suffer from it to-day. The victim to consumption is succumbing to-day to the attack of organisms which are probably the lineal descendants of those which destroyed man before history began.

Owing to its ubiquity and its frequency, to its chronic course and its great fatality, to its predilection for the young and apparently healthy, to its ravage among rich and poor alike, this malady has always been one which has held in fear the people and commanded the anxious study of the physician.

Views as to its causation.

13. From ancient times the popular instinct has recognised its contagiousness, and the more acute observers from Aristotle downwards had given expression to the view that it is infectious. As far back as the seventeenth century it had even been made the subject of more or less stringent sanitary laws based upon this assumption. In Spain, in 1699, all deaths from consumption occurring in Valencia had to be notified to the authorities, and in 1751, it was proclaimed by Royal Edict of Ferdinand VI to be contagious, and the notification of cases was made compulsory under heavy fine for neglect.

Also in Italy, from the time of the renowned physician, Morgagni (1682-1768) it has always been the common belief that the disease was contagious, and in the several Italian States, in Tuscany in 1754, in Lucca in 1767, in Venice in 1772, and in Naples in 1782, enactments of varying severity were passed, declaring its infectiousness, ordering the compulsory notification of cases by the medical attendant, requiring consumptives to spit into special vessels of glass or glazed earthenware, and enforcing the destruction of clothing and effects of deceased consumptives.

And this view as to the nature of the disease continued to be accepted by the Italians throughout our own times, being sometimes displayed to the extent almost of cruelty in the harrying and expulsion of consumptive visitors to their shores.

It is remarkable, however, that this sagacious conception of the disease should have been discarded or ignored in other countries, and that the Medical profession as a body, especially in England, should have come to deny its contagiousness and to reject the teachings of popular experience, so that until recent years medical opinion as to its nature became merely a medley of heterogeneous theories, some it is true, based upon a misinterpretation of correctly observed facts, but most of them without any foundation whatever. Chief among such theories and tenaciously holding its own to the present day, to the retardation of progress, was the belief that the disease is entirely a hereditary one, and "catching cold" the factor determining its onset. This almost universal belief in its hereditary origin is not surprising, for if infection be discarded, it is only by a recourse to heredity that the facts concerning its spread in families can be explained.

14. But these views were not held by all; on the contrary, on the Continent a number of scientific leaders were working to prove the identity of the different forms of the disease which hitherto has been regarded as separate entities and to demonstrate its infective nature; facts which the inoculation and inhalation experiments carried out by numerous observers, from Villemin in 1865, to Cohnheim in 1879, would have served to establish but for the extraordinary scepticism of the bulk of the profession.

At last, however, in March, 1882, came the great discovery of Robert Koch, by means of appropriate staining agents, of the tubercle bacillus, as the *causa causans* of the disease, a discovery which profoundly affected the outlook of practical medicine not only on tuberculosis, but over the entire range of communicable disease.

15. With the establishment of this irrefragable truth of a tangible cause, sanitarians and the public began to view the subject as being one which admitted of being dealt with and controlled by State sanitary interference, yet it required nearly another decade before a volume of concerted action began to develop along recognised lines. However, for the last twenty years or more, individual, national and international effort in combating the disease has been steadily growing, until at the present time there is being directed to the subject, throughout the whole civilized world, a greater amount of attention than ever before has been concentrated on any single problem affecting man's wellbeing.

Looking back at what has been done in this period, one cannot but be impressed with the way the matter has laid hold of the public imagination and conscience, and the volume and multiplicity of the endeavour made to grapple with it. In England alone there has been for the last twenty years an almost continuous succession of Royal Commissions sitting to investigate the subject. While all over the world, in both hemispheres, in the East as in the West, governments, congresses, societies, institutions and individual workers have been strenuously engaged in the search for means for dealing with the scourge.

Incidentally it is of interest to note the marked changes that have taken place during this period in the teachings of our scientific leaders; their wholesale advocacy or adoption of methods one day, to be followed by their entire rejection on the next, only to revert to them in moderation, later on, when their true place and value has been ascertained.

The development and growth of public action.

16. At first this growth of public interest was of necessity slow, for it must always take time before the discovery of the scientist becomes incorporated in the life and thought of the people, and until the people accept a fact it cannot become translated into public progress. Yet that which strikes one in regard to the fight against tuberculosis, is that this interest having been once aroused, educated public opinion has always been far in advance of legislative and governmental action. It is, of course, a fundamental axiom that legislation should not be in advance of public opinion, but there are special reasons why in this case it has unduly lagged behind.

In the first place the question required for its solution a fuller recognition of the capacity of the State, by means of State regulation, to safeguard the public health and protect the lives of the people, and this again was dependent upon two other essential factors; the growth of the modern idea of democratic government, and a better knowledge of the general principles involved in the protection of the public health and the prevention of communicable disease.

The growth of democratic government in its application to the health of the people has been one of the salient features of the social history of all nations during the latter half of the nineteenth century, when *salus populi* has really become

suprema lex; as, without going further afield than England, is displayed in the mass of sanitary enactments, controlling the rearing and education of children; laying down the character of dwellings; ensuring healthy, well-planned towns, and suitable means for public recreation; maintaining the wholesomeness of food supplies; limiting the hours of work and supervising the occupations of the people; undertaking their care and medical treatment when sick, and providing compulsory State insurance against old age and sickness; with a host of other matters important to the wellbeing of society.

Many of these objects, however, would have been impossible of attainment without the improved knowledge made available by the more recent discoveries of the physicist, the bacteriologist and the biologist, and especially by those relating to the causes and prevention of communicable disease.

Therefore, from this aspect the history of the campaign against tuberculosis has been in many respects only an incident in the general history of the development and growth of State medicine and collective sanitary control.

17. But there have been other reasons why legislative action has been slow and halting, and is, in fact, still incomplete. In tuberculosis we have to deal with a disease which is common to cattle and many domestic animals as well as to man, and the relationship arising from this fact and the special precautionary measures rendered necessary thereby have not even yet been fully worked out.

But the most powerful factor of all in delaying action has been the magnitude of the public and private interests involved, and above all the enormous expense which would result from any thorough attempt to deal properly with all affected human beings and to eradicate by slaughter the disease in cattle. These considerations are so vast that they may well have made the most ardent administrator hesitate, and have in fact restrained successive Governments from taking action and have led to their seeking counsel in a long series of Commissions of Enquiry.

18. In following these developments it will be sufficient to consider mainly the facts as they are presented by the United Kingdom, which reflected pretty clearly the trend of other countries. We are accustomed to look upon England as leading among nations in measures for the protection of the public health, but it must be admitted that with regard to those for dealing with tuberculosis, she has been a follower—and often a tardy one—rather than a leader. Indeed, with perhaps the single exception of the installation of the tuberculosis dispensary, nearly every forward step in the campaign has been initiated by some other nation.

19. One of the earliest combined attempts to elucidate the problem of tuberculosis was made in the year following the announcement of Koch's discovery of the bacillus, by the "Collective Investigation Committee" of the British Medical Association, which endeavoured to enlist the entire medical profession in a collective enquiry into the rival views of the hereditary and infective transmission of the disease. A similar method of enquiry was extensively followed in the United States, Germany, France, Russia and Italy, but on the whole with disappointing results.

20. In July, 1888, the first Congress for the study of tuberculosis met in Paris under the ægis of the celebrated French investigators of the disease, Chauveau, Verneuil, Villemin, Nocard, Cornil and Landousy. This Congress is memorable as being the forerunner of many International meetings for the discussion of this disease, and for having made the first definite corporate pronouncement on the duty of the State as regards tuberculous food. This it did in the following resolution: "That every means, including the compensation of owners, should be taken to bring about the general application of the principle that all meat derived from tuberculous animals, whatever the gravity of the specific lesions found in those animals, should be seized and totally destroyed."*

On this resolution the French Government at once acted, the President of the Republic signing a decree while the Congress was still sitting, ordering that all animals of the bovine species suffering from tuberculosis were to be isolated, the meat to be condemned if the tubercular lesions are generalised, and the sale of milk from tuberculous cows absolutely prohibited.

The interest in this resolution lies in the fact that it was the first State

* It is interesting, in view of subsequent events, to note that four years before this Congress, in 1884, the Veterinary Medical Association of Victoria, Australia, alarmed at the increase of tuberculosis in that Colony, passed the following resolution:

"That it is the opinion of this meeting that tuberculosis in cattle is rapidly increasing throughout the Colonies, that tuberculosis is communicable from cattle to their own species as well as to man by the ingestion of the flesh and milk of affected animals, and by inoculation and inhalation, and that in the ox tribe it is both hereditary and congenital."

recognition of the danger resulting from tuberculosis in the food animals. It is only fair to add, however, that nothing very tangible appears to have resulted from the decree, and exactly ten years later, at the fourth Congress on Tuberculosis held in Paris, we find another resolution being adopted which recommended "the prohibition of the sale of tuberculous animals, *except* for butcher's meat." We shall see, however, that the indeterminate attitude of Governments and scientists to this question of tuberculous cattle has been one of the most notable features in the history of tuberculosis prevention.

In England, the Government was particularly slow in taking action in regard to tuberculosis in cattle, although British health officers and sanitary authorities were becoming increasingly insistent in the matter and were not hesitating to prevent within their jurisdictions the sale for human food of meat and milk from tuberculous animals. Their powers, however, in this respect were very indefinite and appeals to the Courts, with varying results, naturally ensued. As a result the representatives of the meat trade, becoming alarmed in their business interests, met the President of the Board of Agriculture on the subject in May, 1890, who promised as a way out of the difficulty to appoint a Royal Commission of Enquiry.

The First British Royal Commission on Tuberculosis.

21. This Commission was appointed on the 22nd July of the same year, Lord Basing being its chairman. Its reference was "to enquire into and report what is the effect, if any, of food derived from tuberculous animals on human health, and, if prejudicial, what are the circumstances and conditions with regard to Tuberculosis in the animal which produce that effect on man." The doubting character of this reference is noteworthy.

This Commission sat for close on five years, its report not being issued until April, 1895. During the enquiry, Dr. Sidney Martin, Dr. Sims Woodhead and Prof. McFadyean severally conducted on behalf of the Commission important investigations into the effect of feeding animals with food of tuberculous origin; on the effects of cooking processes upon food from tuberculous animals; and on the means of recognising tuberculosis in animals during lifetime.

Taken as a whole its findings were somewhat inconclusive and in some respects have since proved to have been inaccurate. It stated "explicitly that we regard the disease as being the same disease in man and food animals, no matter though there are differences in the one and the other in their manifestations of the disease and, whatever be its origin, to be transmissible from man to animals and from animals to animals. Of such transmissions there exists a quantity of evidence altogether conclusive, derived from experiment. It is with the transmission of the disease to man by the ingestion of food that the present Commission is concerned. We find no distinction in nature between the tuberculous diseases of man that have had their origin in tuberculous food and the tuberculous diseases of man that have been otherwise acquired."

Nevertheless, the Commission appear to have collected no evidence as to the extent to which human tuberculosis was actually due to the consumption of tuberculous food, nor, indeed, except by analogy from its effect on animals, that it ever occurred from this cause. "As to proportion," it says, "of tuberculosis acquired by man through his food or through other means, we can form no definite opinion, but we think it probable that an appreciable part of the tuberculosis that affects man is obtained through his food."

Also it was not very definite in its recommendations as to what measures should be adopted for dealing with tuberculous animals or even as to the principles that should be adopted in the choice of measures, except that milk from a cow suffering from tuberculosis of the udder should be boiled.

22. It is therefore not surprising that nothing was done on this report; and a year later (April, 1896), we find the President of the Board of Agriculture being asked in Parliament as to the action the Government proposed to take for dealing with tubercular cows, and replying that the Government had assented to the proposal to appoint another Royal Commission to consider and report on the administrative procedures necessary to give effect to the conclusion of the Commission; "and" added the President, "in the meantime the very simple process of boiling the milk would insure immunity to the consumer."

As a matter of fact the whole question of dealing with tuberculous animals and meat involve in Great Britain such huge interests, vested and pecuniary, that nothing radical was likely to be attempted nor, in fact, as we shall see, has yet been done to eradicate tuberculosis from herds. In such a case a fresh Commission afforded the Government the best means of dealing with the question.

The second British Royal Commission on Tuberculosis.

23. This second Commission was appointed in July, 1896, with Sir Herbert Maxwell as chairman, and included such authorities on the subject as Dr. Thorne Thorne, Professor G. T. Brown and Dr. Shirley F. Murphy. Its reference was "to consider what administrative procedures are available and would be desirable for controlling the danger to man through the use as food of the meat and milk of tuberculous animals; and what are the considerations which should govern the action of responsible authorities in condemning for the purpose of food supplies, animals, carcases or meat exhibiting any stage of tuberculosis."

It reported in April 1898. Its recommendations included the establishment of Public Slaughterhouses and the compulsory closing of private ones. The appointment of properly qualified meat inspectors, but not necessarily veterinary surgeons, and the destruction of carcases when tuberculosis is generalised, but if the process be localised, then the meat should be passed. The Commission was emphatic on the point that the danger from tuberculous meat had been exaggerated, and that such statistical evidence as had been laid before them failed to support the view that there was any connection between the use of such meat and tuberculosis in man. On the other hand it was equally emphatic as to the danger of consuming tuberculous milk, and in support of this view, it drew attention to the fact that while a marked diminution in the mortality from phthisis had taken place during the preceding thirty years, no corresponding diminution had occurred in that form "tabes mesenterica," which term it was considered represented more nearly than any other, tuberculous disease occurring in infancy.

It found, however, that local authorities were absolutely without powers for dealing with dairies and tuberculous cows and milk, and recommended that such powers should be granted; that all diseases of the udder and all cows showing outward signs of tuberculosis should be notified to the authorities. But that by "outward signs," the mere reacting to tuberculin was not to be understood, as tuberculin produces a reaction in "latent tuberculosis," and its use therefore has very definite limitations.

This Commission also recommended that the minimum amount of cubic space required per animal in cow sheds in populous places should be from six to eight hundred cubic feet, and in strictly rural districts such cubic space should be provided as would secure reasonable ventilation without draught.

The Commission further advised that the Board of Agriculture should assist farmers in eliminating tuberculosis from their herds, by the process of isolating reactors, by supplying gratuituously to stock owners tuberculin and the services of veterinary surgeons.

The Commission, however, was divided on the question of compensation to butchers for the destruction of tuberculous meat, the majority report denying the right to compensation, on the grounds that in purchasing any animal the butcher accepts a trade risk as to freedom from tuberculosis, and that he can, if he wishes, protect himself against that risk, either by some form of insurance or by demanding a warranty of the seller. The dissenting Commissioners, however, recommended compensation by the Local Authority to the full value of the animal, with recovery of one-half of such payments from the Imperial Treasury.

It will be observed that the recommendations of this Commission were exceedingly moderate, in some respects falling short of the actual practice of health authorities at the time. Nor did its recommendations really do much to attack the root of the matter, that is the stamping out of tuberculosis among cattle. The importance of this is evident when it is pointed out that Professor Delepine reported at the time, of the City of Manchester, that 21 per cent. of the cows slaughtered at the municipal abattoir were tuberculous, and that one in every six of the milch cows of the district were suffering from advanced tuberculosis of the udder.

Professor Koch's announcement regarding Bovine Tuberculosis.

24. Following this Report in 1898, but little transpired that was new concerning bovine tuberculosis in its relation to the disease in man, until the year 1901. By this time it had become a generally accepted fact that the consumption of meat and of milk derived from tuberculous animals was a common cause of tuberculosis in man, and measures for the protection of the public against this risk, involving great public and private expense, were being undertaken by public authorities everywhere. It therefore came with startling effect when Professor Koch, at the International Congress on Tuberculosis held in London, in July,

1901, declared in the course of an address on measures for combating tuberculosis, that he had always doubted the identity of human and bovine tuberculosis, and that now he had arrived at the conclusion that if human beings were susceptible at all to bovine tuberculosis, their infection by this means was "but a very rare occurrence," and that on the other hand, human tuberculosis was with difficulty communicable to bovines.

This opinion was, at the discussion which followed the announcement, rejected by many high authorities, including Lord Lister, Professor Nocard, Professor Bang and Professor Sims Woodhead; and among the resolutions forthwith passed by the Congress was one that in view of the doubts thrown on the identity of human and bovine tuberculosis, it was expedient that the Government institute an immediate enquiry into the question.

The Third British Royal Commission on Tuberculosis.

25. As a consequence, the British Government in the following month (August, 1901), appointed a Royal Commission*, composed of Professors Sir Michael Foster, (Chairman), Sims Woodhead, Sidney Martin, McFadyean and Boyce, to inquire and report with respect to tuberculosis:

(1) whether the disease in animals and man is one and the same;
(2) whether animals and man can be reciprocally infected with it;
(3) under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favourable or unfavourable to such transmission.

This Commission presented its final report in June, 1911, exactly ten years later, during which time it had undertaken a mass of experiments, the result of which enabled it to state:—†

(1) That three types of tubercle bacillus exist, which are distinguished by their cultural and pathogenic characteristics; the human, the bovine, and the avian.
(2) That human tuberculosis is unquestionably in part identical with bovine tuberculosis, a considerable proportion of cases of the human disease being caused by the bovine tubercle.
(3) That mammals and man can be reciprocally infected with tuberculosis, and that many cases of fatal tuberculosis in man are produced by the bovine tubercle.
(4) That a considerable proportion of the tuberculosis affecting children is of bovine origin, more particularly that which affects primarily the abdominal organs and the cervical glands, and is to be ascribed to infection transmitted to children in meals consisting largely of the milk of the cow. It is rarely the cause of pulmonary lesions in the adult.
(5) That tubercle bacilli are apt to be abundantly present in milk when there is tuberculous disease of the udder, and they may be present in the milk of tuberculous cows presenting no evidence whatever of disease of the udder, even when examined post-mortem.
(6) That the pig, as well as conveying the bacillus of the bovine type, may have to be regarded as a possible source of disease caused by the human type of tubercle bacillus.
(7) That administrative measures should be continued and strengthened with the object of ensuring security against the risk of infection by food from tuberculous animals.

The work of this Commission demonstrated the fact that there are well-marked differences between the human and the bovine tubercle bacillus, a fact which had been pointed out by Theobald Smith five years before Koch's announcement in 1901.

It also showed that it is very doubtful if the one type of bacillus is ordinarily transmutable into the other, by either cultural or natural means.

Further, that while the bovine bacillus readily infects human beings, especially children, when ingested in large doses, as in the consumption of tuberculous milk, the infection of animals, by the human bacillus, except guinea-pigs, chimpanzees and monkeys, is difficult, and then only by means of large doses, and with the formation of localised, slight and non-progressive lesions. Thus while Koch was in this case, too hasty and sweeping in his deductions, his statement was founded on correct observation.

* At the same time the German Government appointed a Commission with a similar object.
† These findings have been summarised by ourselves.

But the ten years of work and the authoritative findings of this Commission have by no means settled the entire question, and at the present time numerous investigators are at variance as to the extent to which tuberculous food, and especially milk, is actually responsible for the production of tuberculosis in human beings.

Of 108 cases of tuberculosis in man on which the Commission based its conclusions, the bacillus present was found to be of the human type in 84 subjects, and of the bovine type in 19, while in five both the human and the bovine type of bacillus were found. The cases were classified as follows:—

Number of cases.		Human.	Bovine	Mixed.
14	Primary pulmonary tuberculosis, post-mortem ...	14	—	—
28	Pulmonary tuberculosis, no other lesions being diagnosed. All adults, mostly young. Examination of sputum	26	2	—
3	General tuberculosis. Post-mortem	3	—	—
3	Tubercular meningitis. Post-mortem	3	—	—
3	Testicle, kidney and suprarenal, one case each	3	—	—
14	Joint (scrapings from 10 joints), and bone (pus from four bone abscesses)	13	—	1
29	Primary abdominal tuberculosis (all young children)	13	14	2
5	Bronchial glands	3	—	2
9	Cervical glands. Specimens removed by operation ...	6	3	—
108		84	19	5

Broadly speaking, the bovine type is mainly confined to chronic localised tubercular manifestations in young children, associated with the alimentary tract.

Of recent years a number of results of investigations have been published in England and on the Continent, generally supporting these conclusions. Also within the last few weeks Dr. A. P. Mitchell has reported the result of an investigation into the nature of the bacillus in cases of tuberculous cervical glands in children in Edinburgh, with special reference to the character of the milk consumed by the patients.*

Of seventy-two cases of such glands examined by him he found as many as sixty-five due to the bovine type of bacillus, and in a number of these latter cases he found that unsterilised milk from tuberculous cows had been extensively consumed by the patients.

Dr. Mitchell's bovine results are greatly in excess of those of other investigators. Of 189 collected published cases of tuberculous cervical glands, in only forty-nine was the bovine type found by the investigators to be present.

It would appear, therefore, that while bovine infection is a fairly common cause of tuberculous disease in young children consuming freely unsterilised milk, the main source of infection in the lethal forms of tuberculosis and especially of phthisis in adults, is of human origin.

The preparation of Tuberculin announced by Koch.

26. Meanwhile, in August, 1890, at the International Congress of Medicine at Berlin, just after the appointment of the first of these Commissions, Robert Koch announced the completion of a curative preparation, called by him Tuberculin, of which, whatever may be the ultimate verdict of it as a general means of treatment, there can be no doubt as to it having established its value as a diagnostic agent, and especially of the disease in cattle.

It was at the conclusion of a long address on Bacteriology that Koch very briefly stated that he had elaborated a preparation of the tubercle bacillus, which he hoped would furnish a means for the cure of tuberculosis. This announcement took both the medical and the lay world by storm. It is doubtful whether Professor Koch foresaw the effect his statement would have, but the immediate result was a wild rush for treatment by the new remedy by consumptives all over the world. In the result the announcement was proved to have been premature, and subsequent investigation did not justify the hopes he had claimed for the preparation. On the contrary, our later knowledge has demonstrated that its use in the manner then contemplated was fraught with the gravest danger instead of benefit to the patient.

* *On the infection of children with the Bovine Tubercle Bacillus.* By Dr. A. P. Mitchell. *British Medical Journal*, January 17th, 1914. Vol. I., p. 125.

As a curative agent.

27. From the first its efficacy was called in question by the French School of observers, and at the second Congress for the study of tuberculosis, held in Paris in July—August, 1891, its use was strongly attacked by Verneuil, the great French authority on the disease. Not only in France was it soon distrusted, but also in England and Germany observers testified against the dangers of its use, and among the latter Professor Virchow was one of its most powerful opponents. It is therefore not surprising that it soon fell into desuetude, so that for a number of years treatment by tuberculin was practically abandoned by the majority of physicians.

Nevertheless, trial and research was steadfastly pursued at Koch's Institute in Berlin by a small group of investigators, ardent followers of the great scientist, chief among whom were Carl Spengler and Petruschky, until in the year 1901, it reappeared in the front rank of medical practice, modified and limited in its application by investigation and experience.*

But during this long interval, the general question of the effect of bacillary products in producing immunity was under investigation, and some of the main principles underlying the theory of immunisation, active and passive, were in the course of elucidation by Almroth Wright in England, by Ehrlich in Germany and by Metschnikoff in France, and it is to their inspired labours that much of the better understanding of the principles of treatment by tuberculin is to be ascribed. Yet we must never forget that to Koch and Pasteur the initial credit is due.

Nor, on the other hand, must we overlook the fact that, great as this advance has been, yet at the present time, nearly twenty-three years since tuberculin was first introduced, its efficacy as a means of treatment is far from being universally accepted, while the principles of its application are still the subject of vigorous controversy. Its uses are, indeed, denied by many good authorities, and even among those who are its strongest advocates its limitations are admitted.

As a means of diagnosis.

28. But whatever the views held as to its use in the treatment, nearly all are now in accord as to the value of tuberculin in the diagnosis of the disease, although some admit limitations even here. It was in 1891 that the view was first put forward that it would possibly prove to be a useful diagnostic agent. Although the first Royal Commission on Tuberculosis made no recommendation on the subject, Professor McFadyean, who was entrusted by the Commission with the investigation into the means of recognising tuberculosis during life, reported that he considered tuberculin to be the most valuable means which we possess, although not always trustworthy, and his opinion has since stood the test of time.

As we have seen, the second Royal Commission reported in 1898 very favourably on it, and recommended the Government to supply free of charge tuberculin and the services of veterinary surgeons for the inoculation of cattle.

In spite of this, very little was done in England to demonstrate the value of tuberculin in the early detection of the disease among cattle, although a few of the more advanced stock owners took the matter up, as for example Sir T. H. Gibson-Carmichael, who in 1895 began applying it to his famous herds of Aberdeen-Angus cattle.

Its use in the eradication of tuberculosis in dairy herds.

29. Yet long before this, in 1892, the Danish Government, acting on the advice of Professor Bang, of Copenhagen, was attempting by its means to bring

* The original preparation of Koch consisted of pure cultures of tubercle bacilli which had been grown for four to six weeks on a five per cent. glycerine-broth, and killed and filtered. Later on this preparation was used by Koch concentrated by evaporation to one-tenth its volume, thus producing a fifty per cent. glycerine solution of the soluble matters of the secretion of the living, and of the constituent of the bodies of the dead bacilli. This preparation is now known by the letters T. O. (Old Tuberculin) to distinguish it from later preparations. Nearly fifteen years later (1905) Denys reverted to the original unconcentrated form of this preparation (now known as T. O. A., or Tuberkulin-original-alt), obtaining, with improved knowledge of the principles of active immunisation, good results from its use. In 1897, Koch brought out a series of new Tuberculins which he called respectively T.-A.O. & R. It would, however, be out of place to describe here the large number of tuberculin preparations and sera which have since been elaborated and advocated. To name but some of them, there were Klebs' preparations, Tuberculocidin, Antiphthisin, Selenin and Tuberculosoxin between 1891 and 1908; Landman's Tuberculol in 1900; Beraneck's Tuberculin in 1903; Spengler's bovine Tuberculin in 1905; Behring's many preparations, Tuberculasse, Tulase and Tulase-lactin in 1906; Marmorck's Anti-tubercular serum in 1903 to 1907; Maragliano's serum in 1906; and recently Friedmann's serum. Indeed their very number and the various methods of administration is clear indication of the fact that treatment by immunisation is still unsettled and on trial.

about the freeing of this country's great dairying industry from the disease. With State assistance Bang was enabled to demonstrate the efficacy of his system, which has since been adopted by the Danish Government as the basis of its policy in this matter. This system consists in testing the entire herd with tuberculin, and at once carefully isolating all reactors from the healthy. Thereafter the test is periodically repeated on those found to be healthy. Of the reactors, those severely affected and manifestly infectious, including all cows with tuberculous udders, are promptly slaughtered. All calves born of reactors are immediately removed from their mothers and from the infected quarters and are reared on boiled milk. By this means the number of reactors steadily diminishes, and the herd is gradually freed from the disease in the course of a few years. The time required for this result is mainly dependent upon the thoroughness of the separation and isolation of all infected animals, the amount of care exercised in freeing the clean stock from further reactors when they arise, and in the precautions taken for preventing the introduction of fresh infection into the herd from outside. It has been found that under such conditions herds which originally contained reactors exceeding four-fifths of their number, have in a few years become freed, not one reactor being discoverable.

Acting on this system, by a series of enactments, beginning in 1893, and amended in 1898 and 1904, and by granting financial assistance to stock owners, Denmark has gone a long way towards eradicating tuberculosis from its dairy herds.

The Sanatorium.

30. The idea of a sanatorium originated with Dr. George Bodington, of Warwickshire, in 1840. It was not, however, favourably received, and the institution that he established eventually was converted into a lunatic asylum.

In 1859, Dr. Brehmer, apparently influenced by the teaching of Bodington, founded a sanatorium at Gorbersdorf, in Silesia, where he brought into effect many of the modern sanatorium methods of treatment.

No further development of the idea seems to have taken place until, in the early seventies, Dr. Dettweiler, who had been an assistant of Brehmer, established the famous Falkenstein institution in the Tannus Mountains, and also further developed the modern system of sanatorium treatment.

But although, as a result of these successful undertakings, a number of private concerns for the treatment of paying patients were established at different places in Germany, including, in 1888, the celebrated one of Dr. Walther, at Nordrach, in the Black Forest, and although the idea was supported by powerful advocates, among whom was Von Leyden, it was not until the year 1892 that the first peoples' sanatorium was founded at Falkenstein for the treatment of the poor.

Following this, the German Imperial Insurance Department joined in the movement and erected a sanatorium for insured persons in the Harz Mountains. Also numerous societies begun to be formed for the purpose of founding Public Sanatoria, and such well-known institutions as the Belsig and Grabowsee resulted. Eventually the activities of these societies were concentrated by the foundation in Berlin, in 1896, of the "Central Committee for the erection of Sanatoria for Pulmonary Tuberculosis," with the result that by the year 1899 there were thirty-three such institutions established in Germany.

31. But probably the most potent factor in the creation of public sanatoria in Germany was the system of compulsory insurance against sickness, which was inaugurated in 1881. This Administration was not long in discovering that about half of all the mortality, and also of incapacitation from work, among German Sick Club members arose from tuberculosis, and it was found that at least twenty-five per cent. of the deaths from pulmonary consumption might be prevented by timely treatment in sanatoria.

It may, however, be mentioned that it is asserted by some authorities that many of the cases at present sent into workmen's sanatoria as tuberculous, are not really suffering from tuberculosis, the cases being sent in at so early a stage as to render a positive diagnosis impossible. But be that as it may, the great advantages, and the decrease in the mortality which have resulted from such treatment appear to be beyond doubt.

Under the recent scheme of compulsory insurance in England, also the sanatorium takes a prominent part, the Insurance Committees being authorised to expend a considerable portion of their funds in the provision of sanatorium treatment.

32. In the meanwhile the subject also began to attract attention beyond the confines of Germany. At the Fourth Congress on Tuberculosis, which met in Paris, in July, 1898, the question of the open-air treatment of tuberculosis was made one of the official subjects for discussion. And in England, also, leading authorities on the disease, such as Dr. Theodore Williams and Dr. Arthur Ransom, took the subject up publicly.

There had been in England for many years past special hospitals for the treatment of advanced consumption, such as the Brompton Hospital, founded in 1841, and the Ventnor Royal National Hospital for Consumption, established in 1867. Also for advanced cases in the very poor, infirmary treatment was supplied to a considerable extent under the Poor Law Administration; but there was not a single institution for the open-air treatment of early consumption in the poor, and even for the well-to-do there were but two, both of which had been quite recently established.

As a result of this stimulation of public interest in the subject, the English "National Association for the Prevention of Consumption" was founded in 1898, being launched on its career at a meeting at Marlborough House, convened and presided over by the late King Edward, then Prince of Wales.

One of the chief objects of this association was "to promote the erection of sanatoria for the open-air treatment of tuberculous diseases," and at this meeting it was resolved to make a beginning by the establishment of a self-supporting sanatorium to minister to the needs of the class which lies between the rich and the poor. It may be of interest to South Africans to be reminded that Messrs. Wernher and Beit announced on this occasion their willingness to erect and equip such a sanatorium at a cost of £20,000. May we hope for the exercise of a like benevolence on the behalf of South Africa.

The example set by this association was promptly followed by the founding of affiliated associations throughout the United Kingdom, with the result that there were in 1913, thirty or more such public sanatoria, besides many private ones.

In America also the sanatoria movement has established itself. There, as elsewhere, it originated with the personal advocacy of believers in the efficacy of open-air treatment—in this case Dr. Edward Trudeau, an authority of repute, who in 1873 was sent to winter in the Adirondacks on account of the disease, and who later, in 1884, in acknowledgment of the benefit he had experienced, established a sanatorium there. In 1899, the United States Public Health and Marine Hospital Service established a sanatorium at Fort Stanton, New Mexico, for seamen of the Merchant Marine, and since then other State Departments have followed suit, with the result that together with the aid of the American National Association for the Study and Prevention of Tuberculosis, sanatoria have been established in numbers throughout the Western hemisphere.

The place of the Sanatorium in the campaign against tuberculosis.

33. There can be no doubt, however, that in the early stages of the movement, exaggerated claims were advanced on behalf of sanatoria. Great as are their uses, especially in the treatment of incipient [illegible]rly cases of the disease, and in the education of patients in the management of themselves and in the taking of precautions against spreading infection after returning to their homes, there was certainly at the beginning a tendency to greatly overrate the sanatorium, at the expense often of other more important measures.

Although in many cases a permanent cure, and in most cases a large measure of improvement is affected by treatment in a sanatorium, it is difficult to obtain reliable or consistent statistics of sanatorium results, owing to there being no common standard by which the severity of the cases on admission can be gauged —some institutions not accepting any but early, while others admit advanced cases; to the duration of treatment being limited in some institutions and in others not; to the obstacles in the way of following up the history of patients after discharge, and to the difficulty of defining exactly what is meant by cures.

At the First International Congress on Tuberculosis, which was held in Berlin in 1899, the outstanding feature was the eulogy by Professor Von Leyden and other leading speakers, of the sanatorium as a means of stamping out the disease. But at the succeeding International Congress on Tuberculosis, held in Paris in 1905, probably sounder views were voiced, as the result of a more extended experience, in the following resolutions which were adopted:—

1. The degree of utility or the necessity of dispensaries and sanatoria is open to discussion in accordance with the institutions, habits and resources of each country, but the principle of them must be recognised.

2. It is understood that dispensaries and sanatoria as means for controlling tuberculosis have about them no exclusive or predominating advantages.

Dispensaries have, for their essential object, prevention, education in hygiene and, at the same time, assistance. They can, moreover, serve as valuable channels for the diffusion of information.

Sanatoria are hospital establishments reserved for cases of pulmonary tuberculosis capable of cure or lasting improvement. They are equally the agents of prevention and popular education.

3. *The problem of the healthy dwelling will always dominate the prevention of tuberculosis.*

It is important that comprehensive views shall obtain in the administration of dispensaries and sanatoria. While conserving their autonomy and liberty they can only gain by being linked together and by being associated with kindred preventive institutions, such as bacteriological laboratories, hospital or benevolent bodies, friendly societies, insurance banks, sanitary services and anti-alcoholic societies.

34. In 1902, the Local Government Board instructed the late Dr H. Timbrell Bulstrode, one of its Inspectors, to visit public sanitoria and to report upon the various aspects of the sanatorium question. In 1908 his very exhaustive report was issued. He, however, found himself, in spite of his most careful and pains-taking investigation, unable to draw definite conclusions on the evidence so far available, as to its true merits as a curative, preventive and educational measure.

In 1908, in his work entitled "The Prevention of Tuberculosis," Dr. Arthur Newsholme has sought to show that institutional segregation has been associated with a reduction of tuberculosis in the community affected by it, and that "no influence except that of institutional segregation has appeared in actual experience in a constant relation to the amount of tuberculosis, and it must therefore be accepted as having been the predominant influence." His proofs in support of this statement appear to us to be inconclusive, and it is doubtful if such a decided view would find many supporters at the present time.

Sanatorium *treatment* has a very important place in any systematic scheme for the control and prevention of tuberculosis, but it is not by itself or taken with others, the most important of the measures for dealing with this disease.

Moveover, it is probable, that in many cases where sufficient space is available, patients could carry out in their own homes, with nearly as good results, the main principles of open-air and sanatorium treatment.

It is necessary that this fact should be clearly recognised, because of recent years there have been very strong efforts made in South Africa to get the Government to establish extensive sanatoria to which all cases of tuberculosis should be sent, on the supposition that by this means the problem of dealing with this disease will be solved.

The Tuberculosis Dispensary.

35. The tuberculosis dispensary was the conception of Dr. (now Sir) R. W. Philip of Edinburgh, where the first of its kind was established by his efforts, in the year 1887. Many years after, in 1901, Professor Calmette, of Lille in France, founded such an institution in that town, but not entirely performing the functions of Dr. Philip's conception. In 1904 the first dispensary was established in Germany, and by the year 1910 some 320 of them had been opened in that country. It was, indeed, in France and Germany that the value of the idea was first publicly recognised, authorities in England not taking the matter up until quite recently, and after it had become accepted by other countries as an important factor in the campaign against tuberculosis.

As conceived by Dr. Philip, the tuberculosis dispensary is not merely an institution for the dispensation of advice or treatment to tuberculous patients. In his scheme it is the dominant element in the anti-tuberculosis organisation, the centre whence issues the general direction of concerted measures, the agency responsible for linking up and co-ordinating the work of the other factors engaged in the control of tuberculosis.

Its functions thus comprise the treatment of tuberculous patients, the early discovery of cases by the examination of "contacts," the issue of advice, the giving of assistance in diagnosis, the supply of material aid to patients and their dependents when such is necessary, and the selection of cases for sanatorium and other

institutional treatment. In the exercise of these functions it must co-operate with the Public Health Authority, the sanatorium, the farm-colony, the hospital and infirmary, with the general medical practitioners of the district, and with any charitable and other voluntary committee whose operations may influence the crusade against the disease.

This ideal of its founder received the approval of the recent Departmental Committee on Tuberculosis and formed the basis of some of its recommendations to the English Government, and is now being officially adopted.

The English Insurance Act.

36. In 1911 the English Insurance Act was passed, coming into operation on the 15th July, 1912. It marks an important step in the anti-tuberculosis campaign, in that it establishes a National system of dealing with tuberculosis. Although only directed to the prevention of the disease in insured persons and their dependents, as the former of these number over 14,000,000, and are of the class in whom the ravages of the disease are greatest, and as the organisation it creates will undoubtedly indirectly benefit persons of the middle class not coming under the operation of the Insurance Law, it may be expected that the application of this Act will have an enormous effect in eradicating tuberculosis.

Insurance Committees under the Act are *required* to make arrangements with a view to providing treatment for insured persons suffering from tuberculosis (*a*) in sanatoria and other institutions, with persons or local authorities having the management of sanatoria or other institutions approved by the Local Government Board; or (*b*) otherwise than in sanatoria or other institutions, with persons or local authorities undertaking such treatment in a manner approved by the Local Government Board; and for the purpose of defraying the expense of providing this treatment the sum of one shilling and three pence per annum in respect of each insured person is payable out of the insurance fund. This provision amounts to close on a million annually. Further, the Insurance Committees *may*, if they think fit, extend this treatment to the dependents of insured persons.

The British Departmental Committee on Tuberculosis.

37. In view of these provisions the Imperial Treasury in February, 1912, appointed an important Departmental Committee, "to report upon the considerations of general policy in respect of the problem of tuberculosis in the United Kingdom, in its preventive, curative, and other aspects, which should guide the Government and local bodies in making or aiding provision for the treatment of tuberculosis in sanatoria or other institutions or otherwise."

This Commission, which included many leading experts and authorities, official and non-official, on tuberculosis and its prevention, issued its final report in March, 1913, and its recommendations must be taken as embodying almost the last word on the question of what are the best administrative measures for the control and eradication of tuberculosis in a closely populated country such as England, having throughout its extent an already highly organised machinery for dealing with the disease in all its phases.

We do not propose to refer in detail to the different measures recommended by this Committee to be taken for the treatment and prevention of tuberculosis, but we shall briefly indicate the main principles which seem to emerge from its recommendations, and which we think should govern the consideration of the subject in its relation to South Africa.

Principles to be followed in combating tuberculosis.

38. The first very important principle laid down by the Committee is the necessity for co-operation and co-ordination between the several constituent elements in every comprehensive scheme undertaken, and, as had been already advocated by Sir R. W. Philip (who, by the way, was himself a member of the Committee) it insisted that in each area the central co-ordinating institution through which the other agencies, institutional or personal, should work, must be the Tuberculosis Dispensary.

The function of the dispensary the Committee defined as serving as:—

(1) Receiving house and centre of diagnosis.
(2) Clearing house and centre for observation.
(3) Centre for curative treatment.
(4) Centre for examination of "contacts."
(5) Centre for "after-care."
(6) Information bureau and educational centre.

39. The second important principle it enunciated is that no campaign against tuberculosis can be instituted with reasonable prospects of success which makes provision for the treatment of a section only of the population. The first condition of any scheme should be that it applies to the whole community.

The Imperial Treasury at once gave effect to this recommendation, and at the same time acknowledged the important principle that local rates should not be expected to bear the entire financial burden of instituting measures, which it did by undertaking to pay annually to local authorities half the estimated cost of approved schemes for the general treatment of tuberculosis within their areas.

40. The third principle defined by the Committee is that "sanatorium treatment" does not necessarily mean treatment in a sanatorium; that the principles of treatment, which have been elaborated for the most part in sanatoria, have a wide application outside these special institutions, and can be applied in many instances to patients who are living in their own homes or in shelters; that under suitable conditions, especially if treatment is being carried out under the advice of a medical man having special knowledge of modern methods, home treatment may be, in all essentials, sanatorium treatment.

This principle the Treasury also at once accepted by deciding that the sum of sixpence per insured person out of the one shilling and threepence mentioned above as payable out of the insurance fund on account of sanatorium treatment, should be applied to the remuneration of general practitioners concerned with the domiciliary treatment and supervision of insured persons suffering from tuberculosis.

41. The fourth most important and far-reaching principle laid down by the Committee is the *compulsory* isolation of certain cases who are in a state of high infectivity, and, particularly, those whose surroundings are such as to increase the risk to other persons of becoming infected. It added, as a rider to this recommendation, the suggestion that, so far as may be practicable, patients should not be moved to places difficult of access from their homes, and arrangements should be made to facilitate visits from their families and friends.

It would appear that the Committee had in mind, although this statement is not made by it, the fact that the power to compulsorily isolate would in itself prove a forcible incentive to the tuberculous person to himself carry out such precaution as would obviate the necessity for placing him under compulsory isolation.

42. Finally, the Committee indicated with regard to bovine tuberculosis that whatever the measures taken to protect the public from the danger of tuberculous meat, milk, and milk products, the proper way to attain complete security is to entirely eradicate tuberculosis from the cattle of the country, and it expressed the opinion that the ultimate eradication of animal tuberculosis is not impossible of achievement, although likely to be a slow process.

The education of children in its relation to tuberculosis.

43. In concluding this account of the growth in the United Kingdom of administrative measures directed to the eradication of tuberculosis, we must refer to the notable advance which has been made in recent years in methods of school hygiene. Whereas, until a comparatively few years back, but little attention was given to the physical welfare of children in public elementary schools, at the present day this subject is receiving in England the very widest attention.

These efforts at amelioration of the physical condition of children have arisen largely as a result of the findings of recent Royal Commissions and Departmental investigations into the questions of physical training and national physical deterioration.

The advance in this direction has a very intimate connection with the prevention of tuberculosis, both by the improvement it must effect in the child's general health, and hence in his powers of resistance to the infection of tubercle; by the early detection and treatment of tuberculous infection in already infected children; and by the reductions of the sources of infection in and connected with the school.

One of the first advances made was by the Education (Provision of Meals) Act, 1906, by which enactment local education authorities were empowered to provide free meals to under-fed children, thus dealing with one of the predisposing causes of tuberculosis.

But the most important legislative enactment was the Education (Administrative Provisions) Act, 1907, extended to Scotland by the Education (Scotland) Act, 1908. Under these Acts the duty is laid upon local education authorities of providing for the medical inspection of children immediately before or at the

time of, or as soon as possible after their admission to a public elementary school, and on such other occasions as the Board of Education directs, and the power is conferred to make approved arrangements for attending to the health and physical condition of the children.

Provision is also made for vacation schools, vacation classes and play centres.

Under these powers the systematic periodical medical examination of children is being conducted, and the diseases and defects so discovered are being treated and remedied in school clinics; and children suffering under special disabilities or from certain complaints are drafted to appropriate schools or institutions. Chief among the latter, from our present point of view, is the tuberculosis or open-air school. Also the cleansing of children and the disinfection of their clothing is being carried out and their general conditions of cleanliness improved. While a further resulting advantage has been the teaching of hygiene in schools.

To a very great extent South Africa has remained behind in these advances. This has largely been due, we believe, to the rapid expansion of the demand for elementary education entailing an enormous increase in State expenditure, and the consequent great difficulties the several education departments have experienced in merely meeting and financing increased educational requirements, without entering upon measures for dealing with the physical well-being of the increasing number of scholars.

CHAPTER III.

The Present Position of Tuberculosis Prevention in South Africa. Conclusions.

44. Having thus briefly reviewed the development of anti-tuberculosis measures in other countries, it is necessary to see what is the present position in regard to tuberculosis prevention in South Africa, and what have been the circumstances which led up to the appointment of the present Commission. Such a survey is of importance, as it will serve to indicate the attitude of local bodies and the general public in the matter of the adoption of preventive measures, and the extent of public co-operation in them that may be expected, as without such co-operation any measures which could be devised would be ineffective.

In the Cape Province.

45. It is mainly to agitation in the Province of the Cape, where tuberculosis is of longest standing and widest distribution, that the present Commission owes its origin. It was not, however, until a registration of births and deaths came into force in that Colony, in January, 1895, that the subject began to attract public attention. Up to then but little reference was made to it in official health reports of the time. In the annual reports rendered to the Cape Government by District Surgeons practically nothing regarding it is to be found. In 1893 Dr. T. N. G. te Water, then District Surgeon of Graaff-Reinet, observes that "Phthisis among natives is on the increase"; and in the same year Dr. J. Brown, District Surgeon of Sutherland, says. "Phthisis, which occurs entirely amongst the natives, is on the increase. It is impossible to say the number of cases in the district." But even such passing comment as this was rare.

As soon, however, as mortality figures became available by the registration of deaths, the extent of the evil became apparent, and we find Dr. Gregory in his Annual Report on the Health of the Colony for the year 1896, making forcible reference to it. "The excessive mortality arising in the chief towns from this cause is worthy of very serious attention. It appears that it is the coloured population that chiefly suffers from this scourge. So far as the European population is concerned we are very much better situated here than in England and Wales. Moreover, the death-rate among Europeans does not legitimately belong to our own population, much of it being due to deaths of phthisical persons coming to the Colony for relief from the disease. This fact becomes still more evident if the death-rate for the several towns of the Colony are examined separately, for it is chiefly among those which we know to be usually selected for residence by the phthisical immigrant that the bulk of the mortality among Europeans occurs. Thus the European death-rate from tuberculosis is in Cradock 6·24, in Beaufort West 7·86 and in Aliwal North 6·21 per thousand. The cause, however, of the large amount of tubercle occurring among the Coloured population is obscure, but there is no doubt that overcrowding in insanitary dwellings plays a leading part in the spread of the disease. In the case of many towns in which we know that conditions of overcrowding among the Coloured inhabitants exists to a large

extent we find that the mortality from tuberculosis is more than usually excessive. Thus in Cape Town it stands at 5·60, in Port Elizabeth at 12·43, in Graaff-Reinet at 6·46, in Oudtshoorn at 7·03, and at Beaufort West at 8·72 per thousand.

This subject, however, is one that requires investigation before any safe conclusions can be arrived at."

About a year later the Medical Officer of Health to the Municipality of Cape Town, Dr. E. B. Fuller, in his annual health report to the Council, drew attention to the subject, pointing out that during the preceding five years, 282 Europeans and 648 Coloured persons were registered in the municipal registers as having succumbed in Cape Town to phthisis, being respectively one-ninth and one-seventh of the total number of deaths from all causes, which latter numbered for Europeans, 2,598, and for Coloured 4,522.

From this time onward the subject began to attract increasing attention. Successive references to it were made in the Annual Reports to the Cape Parliament on the Health of the Colony, and Health Officers and medical men commenced to bring the matter forward at Congresses, in the medical press and in reports to public bodies.

The public, however, did not give the matter serious attention until it began to be impressed upon it by the drifting of numbers of consumptives into the larger towns as a result of the war and the acute financial depression following. Very many of these became derelicts, dependent for support upon local authorities.

Also, partly owing to the operation of the newly introduced immigration restriction laws and partly to an increasing experience of its evil effects, the public was beginning to appreciate the harm that had been caused by the stream of consumptives that had been for a number of years pouring into the country.

Moreover, the strong public movement which had been taking place in England for the prevention of the disease, had begun to be reflected here in increased public interest in the subject.

Later on, the prominence which the occurrence of Miners' Phthisis on the Rand Mines assumed, was also instrumental in bringing the question of tuberculosis to the front, owing to the confusion in the public mind regarding the real nature of silicosis.

46. At the South African Medical Congress, held in Cape Town in December, 1903, the following resolution was adopted as the result of a discussion following an address upon the subject by Dr. B. J. Guillemard: "That a provisional committee of all present be formed to take steps to secure the interest of influential members of the profession, the Government and the general public, with a view to founding a national association in South Africa for the prevention of consumption and other forms of tuberculosis."

And in June of the year following, at a largely attended public meeting held in Cape Town and presided over by His Excellency the Governor, it was resolved to form in Cape Colony an Association of the kind to be affiliated with the National Association of the same name of the United Kingdom.

This Association is still in active existence, and has been of much service in spreading a knowledge of the disease by means of lectures and literature, and generally, in arousing public interest in the subject.

In one of its main objects at the time of its inception it has, however, not succeeded. It started with the intention of promoting the establishment of sanatoria. So far none have been established.

In August of the same year an influential deputation, organised by this society, waited upon the Government to urge upon it the necessity for organising remedial measures.

47. On the 5th May, 1904, Tuberculosis—this term including all forms of the disease—was proclaimed a notifiable disease throughout Cape Colony, and towards the close of the same year, Pulmonary Tuberculosis became compulsorily notifiable throughout the greater part of Natal. In this matter these Colonies were some years in advance of England, where the disease has but recently been made universally notifiable.

48. In January, 1905, the South African Native Affairs Commission, appointed by the High Commissioner in the course of its report, drew attention to the "marked increase in consumption" among natives, which it attributed to the adoption of European clothing.

Conference of Principal Medical Officers.

49. In November, 1906, an important Conference of the Principal Medical Officers of Health of all the British South African Colonies and Territories took

place in Cape Town for the purpose of discussing matters affecting the several Public Health Administrations of South Africa, and of making recommendation in regard thereto. At this Conference the question of the spread of tuberculosis was considered and a number of important resolutions were agreed to, embodying recommendations to the several governments represented at the Conference, for dealing with the subject. It reported:—"All the representatives at the Conference are unanimous in the opinion as to the gravity of the matter, and especially as to the danger threatening the native and coloured races from the extension of the disease . . . . . and that there would appear to be no reason to doubt that the disease is steadily and, in many places,. rapidly increasing."

In its recommendations it drew attention to "the unhealthy housing and the generally insanitary conditions" in which natives and coloured persons in or near towns and in compounds and labour communities are allowed to live, and the effect of these conditions in spreading the disease.

Among the resolutions adopted were also several relating to the spread of tuberculosis "among cattle, and especially dairy herds, which is shown to be taking place in parts of South Africa, notably in the Cape Peninsula," and recommending testing with tuberculin and the dealing with reactors.

Also about this time the matter was brought before the Cape Parliament which ordered the collection of information and the submission of returns on the subject by the Government. This was done, but nothing resulted therefrom.

The Subject considered at Municipal Congresses.

50. In 1906, at a meeting in Johannesburg of the Federal Council of Municipal Associations of South Africa, this resolution, proposed by the Mayor of Cape Town, was unanimously adopted. "That the Federal Council of Municipal Associations of South Africa do approach the respective Governments of the South African Colonies urging the appointment of a Commission to inquire into and report upon the best means of dealing with the prevention of Consumption."

In May, 1907, a deputation of members of Parliament, Mayors and others, waited upon the Cape Government, urging upon it the necessity of taking steps to prevent the spread of the disease, and asking for the appointment of a Commission of inquiry into the whole matter.

Action by the Cape Town Corporation.

51. In the same year the Cape Town Municipality voted funds specially for dealing with tuberculosis, as a result of this, and subsequent action, two buildings of a temporary nature for the accommodation of ten males and ten females have been erected in connection with the City Infectious Diseases Hospital on Green Point Common.

In the meantime the Cape Government had also set aside some very inadequate and unsuitable accommodation, in the shape of a few beds in the pauper institution, known as the Old Somerset Hospital, for the treatment of such advanced, incurable and indigent cases of the disease as the Cape Peninsula Local Authorities might consider to be living under conditions dangerous to others.

These arrangements were afterwards extended by the Medical Officer of Health for the city undertaking once a week at his office, the examination and and medical supervision of tuberculous persons living within the municipal limits, by the appointment of a lady sanitary inspector to visit such patients at their homes, and by the gratuitous supply of spit-cups, disinfectants and, when necessary, food supplies.

About this time the Free Dispensary, an institution at Cape Town supported by voluntary contributions, began to direct special attention to the treatment of tuberculous persons; and in 1909, it started under its medical officer a special section devoted to the dispensary treatment of sufferers from the disease, this undertaking being subsidizal by the Government and the Cape Town Municipal Council. Here many cases, coming from all parts of the Peninsula, undergo tuberculin treatment, and those who are indigent are supplied with food and medical conforts.

In Natal.

52. Also in Natal the Medical Officer of Health for the Colony had been for a number of years in his Annual Reports making strong representations as to the increasing prevalence of the disease, especially among Indians and Natives, and in

1909 the Durban Town Council, impressed with the necessity for dealing with the disease within the borough, sought the advice of the Durban Medical Society on the best measures to adopt. In September of that year the Society drew up a comprehensive report, recommending, *inter alia*, the establishment of Sanatoria and Agricultural Colonies for the segregation and treatment of persons suffering from curable Phthisis, the provision of institutional accommodation for advanced cases, and the establishment of a tuberculosis bureau.

This report was in due course considered by a Committee of the Council, which recommended the engagement in England of a Medical Officer specially trained in the clinical work of a tuberculosis sanatorium. This recommendation was duly adopted by the Council, but it was not until April, 1911, that such an Officer was apointed in the person of Dr. Basil Adams, who has since been in charge of such a bureau. Its efforts are mostly confined to the giving of advice although in many cases treatment is prescribed. Spit-cups and disinfectants are supplied. Also to necessitous patients medicines are given. We understand, however, that the Council contemplates abolishing this office.

The Council has also set aside a site for the erection of a sanatorium for the treatment of borough cases of tuberculosis requiring medical care and isolation; but no further progress in this scheme appears to have been made.

The Native and Coloured Health Society.

53. At the close of the year 1909, the South African (Native and Coloured Health Society was founded at Lovedale, mainly on the initiative of Dr. Niel MacVicar, of Lovedale. This Society has done increasingly good work among the native races by means of Congresses and by the distribution of leaflets, picture cartoons and other publications dealing in the several South African Native languages with the treatment and prevention of consumption.

Resolutions passed at other Congresses.

54. At the South African Medical Congress held each year, the menace of tuberculosis has formed the subject of earnest discussion, and at the Twelfth, held in Cape Town in November, 1910, a resolution was unanimously agreed to requesting "the Government to appoint a Commission to investigate the amount of tuberculosis among the white and coloured races of the Union, what steps are being taken in the different Provinces to deal with the disease, and what provisions exist for research and for the treatment of tuberculosis according to the best methods known to modern science."

Also at Annual Congresses of the Municipal Corporations of Cape Colony the question of dealing with the disease has for several years past been a leading subject of discussion. At that held at Port Elizabeth in 1901, resolutions were passed in favour of the collection of statistics, the provision of means for the isolation and treatment of consumptives, and for "securing legislation of a uniform character for the Union, giving further powers to municipalities to regulate and control the treatment of advanced cases of tuberculosis, and the establishment of dispensaries for the diagnosis and treatment of cases."

And again at the Congress at Cape Town in November, 1911, it was resolved "that this Congress, recognising the calamitous results due to the spread of tuberculosis in South Africa, request the Government to take immediate steps with a view to overtaking and exterminating this terrible scourge, and that municipalities be empowered to take steps to deal with cases within their respective areas, the State to defray the cost thereof."

Also since the appointment of this Commission the subject has been raised at subsequent Municipal Congresses, and it may be mentioned, in 1911 it was referred to a Select Committee of the Cape Province Provincial Council for report.

Conclusions.

55. It will have been gathered from the above account that it is only during the last few years that public attention in South Africa has awakened to the importance of the question of tuberculosis, and to the necessity of taking measures regarding it. But speaking generally, it may be said that this awakening has not led to much more than the expression of a feeling that it is a case in which "the Government ought to do something." There has been much agitation and but little action. The position adopted may be characterised as one of expectancy.

Most local authorities have contended before the Commission that in their view it is a national evil, and as such the Government must cope wth it. Others have explained that they had not sufficient funds, and others again that they could do nothing as they possessed no legal powers for the purpose. Nevertheless in the Cape Province, at any rate, local authorities have possessed many statutory powers which might have been advantageously exercised in the control of the disease. For nearly ten years it has been in that Province a notifiable disease, but to this day few authorities make use of such notifications when made to them, while a number even discourage the making of them as they deem the notification fee of two shillings and sixpence to be a waste of money—which indeed it is if no use be made of the information that notification conveys. Also in that Province the disease is one falling under the provisions of the Public Health Acts, which confer on local authorities some very drastic powers of control.

But it is in the improvement of the very wretched conditions under which it is acknowledged the native and coloured elements of nearly all urban communities in South Africa are allowed to live, that so little has hitherto been done. In other countries improvement in housing and general sanitation has been accompanied by a material reduction in the rate of incidence of tuberculosis, along with the other preventable diseases.

Of course, at the bottom of the hesitancy has been the natural unwillingness to incur expenditure, for whatever measures are adopted they must entail expense, whether by the Government, the Local Authority or the individual.

Only in Durban and Cape Town have the municipalities taken any active measures for dealing with persons suffering with the disease, but the measures taken by them have not been of very wide application. As a matter of fact a fear has been felt by those and other municipal councils that if they were to do anything really effective for the treatment of such persons, it would have the result of attracting to their towns numbers of consumptives from elsewhere, to become a burden on their finances.

In two matters affecting this disease, however, some advance has been made in several of the larger towns, namely in that of the provision of municipal slaughter-houses and the inspection of meat, and in that of the municipal control of dairies. In both of these matters Johannesburg has taken the lead, to be followed by Cape Town and Durban.

CHAPTER IV.

The Occurrence of Tuberculosis in South Africa in Early Times; and Conclusions.

Paucity of information concerning earlier years.

56. There is unfortunately but little information obtainable as to the existence, and still less as to the extent of the prevalence of tuberculosis in South Africa in early times. The greater part of our knowledge regarding it falls within the period of the last twenty or five and twenty years.

In view of its extensive occurrence from time immemorial in Europe and in Asia, it is reasonable to suppose that the disease must have been occasionally introduced into South Africa by Arab traders and other immigrants from the North and the East, communication with which regions had been carried on for many centuries. And later on, after the discovery of the Cape route by Bartholomew Diaz in 1486, Europeans must have brought it from time to time to the Cape and East Coast ports. Although it is unlikely that there would have been many suffering from phthisis in an advanced stage who would, in those early days, have taken up the callings of mariner or merchant adventurer, yet there must occasionally have been cases among sailors and seafarers.

Still later, after the year 1652, when the Dutch East India Company established a victualling, refitting and health station at the Cape, increasing numbers of tuberculous persons would have arrived here, but even then it seems unlikely that the disease existed to any extent among the aboriginal races of the continent. Even among the Malay slaves and the Hottentots who came into intimate contact with the early Dutch settlers it is doubtful if it was a common complaint. We are justified at arriving at this conclusion, although on negative evidence, because, while there have been many travellers, missionaries and others who have left behind them accounts of the condition in which they found the natives in their day, including many references to their health and prevailing diseases, little or no reference is made by them to consumption, which had it existed to any extent could hardly have escaped their notice.

Another reason for doubting an extensive prevalence is the fact that the existence of the disease has only come into prominence in South Africa comparatively recently, and it is only within the past twenty-five years or so, that it seems to have made marked and rapid progress; mainly among those natives and coloured races who have become subjected to altered conditions not generally obtaining until recent times, such as the crowding into and overcrowding in towns and labour areas, the pursuit of unhealthy occupations and the ill-advised adoption of European clothing, habits and conditions of living.

Nor was it until comparatively late years that it became a practice to send consumptives to South Africa to benefit by the climate. Fifty or sixty years ago, except by reason of our little wars, South Africa attracted but little attention in Europe, and the voyage out here was then a somewhat formidable undertaking for a sick man. So far as can be judged from the current medical literature of the time it would not appear that consumptives began to be sent here in any numbers earlier than thirty or thirty-five years ago.

Mortality returns of Cape Town in 1871.

57. Unfortunately until quite recent times there has been no system of registration of births and deaths in South Africa, so that records of the earlier years are not available from this source. Since the middle of the eighteenth century deaths had to be reported to the Master's Office, but this was only for succession purposes, and the cause of death was not recorded. There was also a registration of births and deaths kept by the Municipality of Cape Town, the records of which go back as far as 1841, but it was not until 1867 that the causes of death were entered. After that date, however, a not inconsiderable number of deaths from consumption appear in these records, but the registers were very incompletely kept, and the year 1871 is the first in regard to which anything approximately reliable can be abstracted from them. Even then, no indication of the race of the deceased is to be obtained from the entries. Although this is not very far back in the history of the subject, Your Commissioners have thought it worth while to obtain, by the courtesy of the Births and Deaths Registry in Cape Town, an abstract of these records for each of the five years 1871 to 1875, which is embodied in the following tables, numbered 1 and 2. It is to be borne in mind that they only refer to the pulmonary form of tuberculosis.

TABLE 1.—Shewing the number of Deaths and the Mortality per 1,000 of the population, occurring among all Races in Cape Town during the year 1875, from Consumption and from All Causes.

	Under 15 years.			Over 15 years.			All Ages.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Population Census, 1875:									
Europeans	3,095	3,236	6,331	6,651	5,991	12,642	9,746	9,227	19,073
Other Races	2,549	2,767	5,316	3,940	5,010	8,950	6,489	7,777	14,266
Total	5,644	6,003	11,647	10,591	11,001	21,592	16,235	17,004	33,239
Number of Deaths from:									
Consumption	9	9	18	51	33	84	60	42	102
All Causes	147	128	275	239	141	380	386	269	655
Mortality per 1,000 from:									
Consumption	1·59	1·50	1·54	4·81	2·98	3·89	3·70	2·47	3·07
All Causes	26·04	21·32	23·61	22·57	12·82	17·60	23·78	15·82	19·70

TABLE 2.—Shewing for each of the years 1871 to 1875 the number of Deaths occurring in Cape Town among all Races from Consumption and from All Causes, separately for males and females under and over 15 years of age; and the percentage proportion of deaths from Consumption to all deaths.

	1871.			1872.			1873.			1874.			1875.		
	Males.	Females.	Persons.	Males.	Females.	Persons.	Males	Females.	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.
Number of deaths from :															
Consumption :															
Under 15 years ..	23	21	44	24	21	45	6	15	21	7	6	13	9	9	18
Over 15 years ..	72	70	142	52	53	105	56	58	114	59	57	116	51	33	84
All Ages	95	91	186	76	74	150	62	73	135	66	63	129	60	42	102
All Causes :															
Under 15 years ..	295	273	568	248	271	519	123	107	230	136	97	233	147	128	275
Over 15 years ..	301	260	561	262	207	469	218	185	403	266	232	498	239	141	380
All Ages	596	533	1,129	510	478	988	341	292	633	402	329	731	386	269	655
Percentage proportion of deaths from Consumption to deaths from All Causes :															
Under 15 years ..	7·80	7·69	7·75	9·68	7·75	8·67	4·88	14·02	9·13	5·15	6·18	5·78	6·12	7·03	6·54
Over 15 years ..	23·92	26·92	25·31	19·85	25·60	22·39	25·69	31·35	28·29	22·18	24·57	23·29	21·34	23·40	22·10
All Ages	15·94	17·07	16·47	14·90	15·48	15·18	18·18	25·00	21·33	16·42	19·15	17·65	15·54	15·61	15·57

Caution must be exercised in making deductions from these figures, as any results which group together Europeans and coloured are open to the gravest fallacies. Also there is no means of ascertaining how far the causes of death registered were medically certified. It is fortunate that in 1875 a census of the population was taken, and for this year the actual rates of mortality from consumption and from all causes are given per thousand of the population of males and females above and below the age of fifteen.

According to these figures, there must have been a considerable amount of consumption at that time in Cape Town, producing a rate per thousand at all ages, of 3·70 for males and 2·47 for females.

There can be no doubt but that the actual rates for Europeans were much under these, and those for coloured persons much above. In England and Wales during the decennium 1871-80, the mortality from phthisis at all ages was 2.21 per thousand for males, and 2·03 for females, so that it is probable that there was much less consumption among Europeans than obtained at that time in England.

It will be observed that the figures for males and females over fifteen years of age appear to be inconsistent, the mortality both from phthisis and from all causes being in the males nearly double that of the females. Also that the number of the male population at that age group is much below the number of females, Such a condition can only be accounted for on the supposition of an exodus of healthy young males having occurred. Such an exodus did take place in connection with the discovery of diamonds at the Vaal River and Kimberley in 1871 and 1872, and the discovery of gold at Lydenburg in 1874.

Surveying the period of the five years, 1871 to 1875, there appears to have been a considerable and nearly continuous fall in the number of deaths both from phthisis and from all causes, but the proportion which the deaths from consumption bore to all deaths remained about the same. As will be seen later, this proportion does not greatly differ from that which obtains at the present time.

References in early writings.

58. Reverting to the more historical aspect of the subject and to such scanty writings as are available, we find that neither Herbert in his travels in 1677, nor Kolben in his "Beschrijving van de Kaap de Goede Hoop, 1727," make any mention of the disease; on the contrary, the latter when describing the health of the inhabitants, remarks of adults "one must say that among these one absolutely does not meet with any pining (chronic) diseases." Neither does J. H. B. de Saint Pierre, writing in 1771, allude to it, his observation being that "few disorders are incident to the people of the Cape." Nor does Lieutenant W. Paterson, who made "four journeys into the country of the Hottentots and Caffraria in 1777-1779" refer to its existence.

We find in Vaillant's Travels, 1780-5, speaking of the health of Cape Town, "the most cruel and dangerous disease at this place is the sore throat. People of the most robust constitutions frequently fall victims to this malady in three or four days. It is a sudden and violent stroke which gives no warning. The smallpox is another scourge to these Colonies. This part of the Globe was a stranger to it till the arrival of the Europeans."

59. The first reference to consumption, if, indeed, tuberculosis is really the disease here referred to, is found in the "Reizen na de Kaap de Goede Hoop in de jaren 1781-1797," by Cornelis de Jong, the Commander of a Dutch man-of-war. He wrote: "The most prevalent diseases are consumption, dropsy, apoplexy . . . . The first is more the disease of women, the two last those of men. And if we can believe the doctors, this consumption frequently arises from too sudden draught and cold drinks after a heated dance."

And about this time or a little later, during the first occupation by the English. Captain Robert Percival confirms this statement, in his account of the Cape of Good Hope, 1796-1801, remarking that "Consumption and ulcers seemed the only distempers attended to any extent with fatal consequences to our countrymen. In some instances the smallest sore on a man's leg has caused the loss of the limb: and the great change from hot to cold at certain periods of the year, proves at times very destructive to consumptive habits."

Also about this time Barrow in his "Account of Travels in the Interior of South Africa in 1798," has much the same to say of the Cape European. "Most of the fatal diseases," he remarks, "that prevail among the natives (Europeans) would appear to proceed rather from their habits of life than from any real unhealthiness in the climate. . . . . The sudden change of temperature, especially from heat to cold, may perhaps be one of the causes of the consumptive

complaints—which are very frequent in all classes and ages. But the common disease to which those of the middle age are subject, is the dropsy. . . . . Instances of longevity are very rare, few exceeding the period of sixty years. The mortality in Cape Town, taken on the average in the last eight years, has been about two and a half in the hundred among the white inhabitants, and under three in a hundred among the slaves."

Of Hottentots he says, "it does not appear to us that they are subject to any particular disease. Life seems to be generally terminated by a gradual decay and exhaustion of nature."

Of the "Bosjemans" or Bushmen he remarks, "The constitution of the body of this pigmy race is much stronger, and their lives are of longer duration than those of the Hottentots. Many instances of longevity are found among those who live in the families of the peasantry."

And regarding Kaffirs, "The temperate manner in which these people live, their simple diet and their duly proportioned quantity of exercise, subject them to few complaints. . . . . They do not seem to be subject to any cutaneous disease."

60. Some few years later, on the reversion of the Cape to the Dutch, Dr. Lichtenstein, records his experience between the years 1803 and 1806.* He devotes considerable space to accounts of sickness and outbreaks of acute diseases, chiefly among the troops and native regiments. These accounts are not only of interest in themselves, but also serve the purpose of enabling us to gauge the accuracy of his knowledge. Of the Europeans seeking his advice he says, "most of them were afflicted with long-standing and deep-rooted maladies, which would have required a protracted and careful attendance to afford any chance of curing them. Chronic diseases are much more frequent in this country than acute ones. For the greater part of the women labour under hysterical affections which . . . . often come to a formidable height, and end in hectic complaints, which prove fatal . . . . Gout and rheumatism are the diseases to which the Colonists are more particularly subject . . . . Children suffer much from quinsies, but this is the only disease prevalent among them; scrofula is seldom to be seen."

Of Kaffirs (Koossas or Kaussas tribe, *i.e.*, 'Xosas) he says; "Diseases are but little known among them, and their temperate modes of life, interrupted by few cares, or by violent corporal exertions, will sufficiently account for this. The most dangerous complaint to which they are subject is a violent fever attended with eruption. . . . . Intermittent fevers are unknown to the Kaffirs; their soil is dry, they have no lakes or morasses, and their huts are commonly built about three or four hundred paces from the river at which their cattle are to drink. . . . I could not find, upon the most accurate enquiries the least traces of any prevailing chronic diseases among them and the answer they made, when I questioned them upon the subject of infectious ones, lead me to suppose they were not liable to any except the small-pox. Another disease (syphilis) is here wholly unknown. . . . . A very extraordinary circumstance which I had to remark among these people is that I never knew one of them to sneeze, yawn, cough or hawk. I do not rest this entirely upon my own observation; the very same thing was remarked by our whole party. They never have colds or catarrhs, and it might be presumed according to appearances, that they are equally free from the spleen and ennui."

61. Twenty-five years later (1820-1830) Lieutenant J. W. D. Moodie, in his "Ten years in South Africa," recounts the conditions of things at that time. "The diseases of the inhabitants are seldom dangerous, and are generally caused by repletion or want of exercise . . . . Diarrhœas are very frequent in situations where sudden changes of temperature take place, as in deep valleys, near the base of mountains, or are caused by drinking bad water. They are most prevalent in the spring and autumn, but are rarely obstinate or dangerous. Pulmonary consumptions are uncommon among the Dutch and English, but very frequent among the Hottentots from a scrophulous taint and their habit of sleeping on the ground. Many of these people have also a pernicious habit of smoking a plant called "dacha," a kind of wild hemp, which is well known, even to themselves, to occasion consumption if the practice be continued for a long time. The plant produces stupefaction and in time weakens the intellect and destroys the nerves."

He observes that "the climate of the Cape is found beneficial to incipient consumption, but not in the more advanced stages of the malady."

On the road to Grahamstown he relates "we stopped for half an hour at the hut of a son of the chief Tzatzoe. We found this young man stretched out on his skins on the ground in the last stage of consumption."

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* *Travels in South Africa, 1803, 4, 5 and 6.* Henry Lichtenstein, Doctor in Medicine and Philosophy and Professor of Natural History in the University of Berlin, and formerly in the Dutch service at the Cape of Good Hope.

Andrew Steedman in his book "Wanderings and Adventures in the Interior of Southern Africa, 1835," quotes an interesting paper read by Dr. Morgan at the South African Institution of the Cape of Good Hope, in which the latter deals so fully and correctly with the diseases prevalent among the Amapondo Kaffirs, that we can hardly believe that he could have overlooked tuberculosis had it existed to any extent. *Inter alia* he says. "There are not many diseases peculiar to these people. The tacnia (Tape worm) appears to be the only one that can be called endemic. Dyspnoea Sicca and rheumatism are not uncommon complaints, most propably produced by smoking noxious herbs, fatigue and exposure to atmospheric changes. Paralysis and glandular swellings are also complaints to which they appear subject.'

Also in Thompson's "Travels in Southern Africa," published in 1827, the Rev. Brownlee contributes an account of the Amakosa, among whom he had resided for years, and while he deals specially with their health and sickness he makes no mention of consumption.

On the other hand, Stephen Kay, a missionary who in 1833 published his "Travels and Researches in Caffraria," mentions "the illness of one of Dushani's Captains, who had for some time been labouring under a pulmonary disease."

In this book is also given an interesting extract from the journal of Alexander Cowie, M.D., and Mr. Green, who perished in 1829 in what is now Portuguese East Africa. "As already remarked the more southerly divisions of the country are in general pretty healthy, owing to the peculiar dryness of the atmosphere and soil. Hence epidemics, at all serious, very rarely occur. There is indeed a species of intermittent fever which occasionally prevails and which is less or more fatal in the autumn and winter months. Phlebotomy is then frequently resorted to; being in general their only remedy. The cupping process is quite common; in the performance of this, after making two or three incisions, as near the seat of pain as possible, with a rude and often rusty instrument, a horn is applied, and exhausted by suction at the smaller extremity. A severe description of ophthalmia also is often distressingly prevalent in summer, particularly in the lowlands, amongst all classes. Many of the native children and some adults are greatly afflicted with worms, likewise, owing in all probability to the want of a more generous diet. Pulmonary complaints are by no means uncommon; but they generally originate in a want of caution, exposure, or sleeping in damp situations. Besides all these, however, the tribes higher up the coast are manifestly subject to others of a far more destructive character. The ground being marshy, rain more abundant, and the rivers much more extensive towards the tropics, miasmata and noxious vapours, are, of course, frequently productive of fevers that are little less than pestilential.

62. Dr. Livingstone, in his "Missionary Travels and Researches in South Africa" (1857), said that tuberculosis did not exist.

A little later than this, Dr. Hammerschmidt in his reminiscences of "Two years practice in the Western Province of the Cape of Good Hope, 1858-1860," says "Pulmonary diseases in comparison with European statistics exhibit but a remarkably low figure, as amongst a number of upwards of a thousand observed cases, only three of confirmed tuberculosis occurred, all these ending fatally, showing that although acute or inflammatory diseases of the respiratory organs are not uncommon here, yet chronic pulmonary affections occur and rapidly terminate. The above three cases of phthisis or tuberculosis pulmonum occurred all in young females."

Finally, Hirsch in his great work on "Geographical and Historical Pathology," writing in 1881, says: "In Cape Colony phthisis is oftenest met among the Hottentots inhabiting the plains nearest the coast; in other classes of the population it is much rarer than in the East African islands within the tropics just spoken of; while in the interior plateau of Southern Africa it hardly occurs at all."

As compared with the above accounts of the conditions existing but a few years back, the statement of Dr. Theal in his book published in 1910, "The Yellow and Dark Skinned People of South Africa," is of particular interest. He says of the Bantu: "Consumption, another fell disease that has worked havoc among many barbarous nations, was almost unknown in South Africa until recent years. Europeans suffering from pulmonary complaints came to this country to be cured, and if the disease was not too far advanced they were usually restored to perfect health in its warm dry air. For a long time they did not come into close contact with the Bantu, and consequently did not communicate the disease to them." And again, "Disease, however, is far more rife among them than in former times. Syphilis has spread among the Bechuana to an alarming extent,

and is seriously affecting the rate of increase of the Bantu family. Consumption seems to have taken a firm hold of the coast tribes and is producing a similar effect."

Testimony of persons having extended local knowledge.

63. In order to elucidate this matter, we endeavoured, by enquiry of persons long resident in the same district, to elicit information as to the extent to which the disease prevailed there in former years, but generally speaking, such persons either had not until recently given any particular attention to the subject, or formerly had not been in a position to acquire information concerning it, or were insufficiently equipped with knowledge of the signs of the disease. It should be stated that in every case before hearing a witness on this subject, he was questioned in order to ascertain if he knew what he was talking about and could be reasonably relied upon to be able to recognise an obvious case of consumption if he saw it.

It is evident that information of this kind can only be expected of small communities where there are no complex conditions, and the observer is in a position to acquire a general knowledge of the affairs of his neighbours. Also in considering such evidence one must bear in mind the length of time that has elapsed since the place first came under the influence of European civilization. In this respect no comparison can be made between Cape Town, for example, and the Northern Transvaal. In the following examples we have selected, therefore, the evidence available in respect of a few representative places.

Of these the Karoo towns naturally provide the most interesting evidence, having been the bourn of so many consumptives in search of a climate cure, and some of their populations showing at this day the severest incidence of the disease.

Of Cradock.

64. Thus to take Cradock, Dr. J. McCall Fehrsen informed Your Commissioners that when he first went to practise there in 1874, "there were no cases of tuberculosis among the indigenous white population," and there were very few scattered cases among the Hottentot and Bastard races in the town location. At that time consumptives began coming pretty frequently from England, travelling up to Cradock by coach. There were about six such cases when he arrived, but twenty years later there was always an average of thirty or forty in the town, and the disease has also increased enormously among the coloured population of the location. He remembered at least one instance in which the disease had been spread to members of the family of a farmer giving shelter to such consumptive immigrants. [Questions 46714-48.]

Mr. H. F. O. Hewett, Resident Magistrate of Stellenbosch, stated that when he was at Cradock where he lived several years, in 1881, there were a few cases, but they were overseas men. At that time neither Cradock nor Middelburg were looked upon as danger zones, whilst to-day they are. Young men were sent out from England, and during the three years he was there, many came out in different stages of consumption. He never heard then of the disease among coloured people. [Questions 68641-44.]

So also Dr. A. Ireland, a Medical Practitioner and Mayor of Cradock, who from what he saw thirty years ago as to the number of cases, and the number he now found, considered the disease to have increased, and to be still increasing. This gentleman had himself come out to Cradock on account of tuberculosis and had happily recovered. [Questions 82573, 82827.]

And Mr. A. Patterson, the Town Clerk, said: "I always maintain that the spread of consumption among natives—and I have been here for thirty years, and it is only within the last twenty years that there has been any spread of the disease—you take all these imported cases bringing in the disease; as they died, their clothes used to be sold here by public auction, and spread all over the location. Without disinfection; everything these unfortunates have used is sold to the natives. I know that Europeans living in the town here, where they are laid up with the disease food is taken up to them by the native servant girls, and what is left over is taken away and eaten by the girls. It is more on the increase among the coloured, not so much among the Kaffirs. You never heard of it among the Kaffirs formerly." [Questions 82828-34.]

Contrary to this view was the evidence of Mr. J. Butler, Editor of the "Midland News' of Cradock. He also had come out on account of chest trouble.

In the first instance he went to Grahamstown, in 1876, then was there much tuberculosis among the coloured and natives. His attention was drawn to it by a prominent missionary. It was believed to be due to the adoption of civilised habits. He had resided in Cradock for the past thirty-four years. The disease, when he came there, so far as he was able to recognise it, appeared to be as rife among natives as now. He saw no marked difference between then and now. Three or four of the coloured nurse girls employed in his own family had died of consumption in that time. Many Europeans consumptives used to come to Cradock. It was the Mecca of consumptives. [Questions 82866-99.]

But again, the Reverend T. F. Mtyobo, a native, a priest of the Church of England, ministering for the past twelve years in Cradock, but brought up in Grahamstown, gave it as his opinion that among natives it is quite a new disease. He gave a correct and lucid description of the course and symptoms of the disease, showing that he knew what he was referring to. Mtyobo said: "It is one of these sort of diseases that have been introduced into the Country. The duration of the disease varies from four to nine months; there are some cases of course which are a little longer than that, but I notice it generally takes from four to nine months. There was no such disease before, say, thirty years ago. In fact, I saw none thirty years back. I should say that within the last twenty years it has increased tremendously among our people." [Questions 83093-103.]

Of Grahamstown.

65. Similar views were elicited in respect of Grahamstown. Archdeacon Turpin, a sincere friend of the natives, since deceased, had resided for forty-five years in the heart of the Grahamstown Native Location. When he came to this country in 1857, fifty-six years ago, there were very few cases among natives, and these only occurred among young "School Kaffirs." It was not until fifteen to twenty-five years ago that he ever saw the disease among raw natives, after which it became prominent. He detailed instances within his own knowledge, in which entire families had succumbed to the disease; seven children in one family; the father, mother, four children and a relative in another. He had found very little tuberculosis among rural natives, and attributed the growth to contact with Europeans and the adoption of European customs. Civilization as far as the health of the body was concerned had been detrimental to them, and as regards the health of the soul they had adopted a lot of our vices. They are taking to drink more. [Questions 77624-765.]

The Reverend Father Berghegge of the Catholic Mission, who also had lived in the Grahamstown location, saw many cases when he first came there thirty years ago, but the disease had since increased and is still increasing. [Questions 78181-3.]

Dr. Becker, who had been practising as a physician in Grahamstown since 1875, informed the Commission that at that time it was rife among Hottentots and Bastards, but no Kaffirs were affected. In 1869, when he was practising at the Kowie, there were no cases among local natives, but among the convicts brought to work on the breakwater, especially those from Port Elizabeth, there were many cases. It is still scarce among the raw natives, but among the Bastards and Hottentots "tuberculosis is very prevalent and has been for some years. I think the whole of these races are doomed." [Question 78507.]

Of Beaufort West.

66. At Beaufort West, Mr. R. T. Whiley, Field Cornet, told the Commission that he came there in 1881, just after the railway was opened, and tuberculosis was then practically unknown, both among Europeans and coloured. Residents there and in the surrounding districts knew nothing about consumption. Then overseas cases gradually commenced to come. Before 1881 people had to travel by wagon and the place was inaccessible. They came on medical advice from England and Scotland, so many told him. "In fact," he continued, "I had one case of a young fellow that I had to dinner one Sunday, in a very advanced stage of the disease, and that is what he told me—that the doctor told him that if he was here for about three months he would be all right. He had dinner at my place on a Sunday and the following Wednesday he died on my stoep, knocking at the door, with a tremendous haemorrhage. And there were numbers of cases of that kind of young fellows sent out here, and in every case they had been advised by their medical man that if they could possibly manage to get to Beaufort West the climate there was so perfect that they would certainly get better." [Questions 90736-90780.]

It was only some few years back that he had noticed that the disease had got such a firm hold on the coloured population here. He remembered cases in which local European residents had acquired the disease apparently from imported cases. Imported cases generally made for the farms as tutors, and he himself, before he became aware of the danger of infection, had assisted in getting quite a number on to farms.

Of King William's Town.

67. Respecting King William's Town the following information is taken from a paper contributed in 1877 to *The Medical Times and Gazette**, by Dr. Charles J. Egan, who had been practising at that place since 1858. The statistics quoted relate to the six years 1870 to 1875, during which time he attended, out of 1,837 cases of diseases of the respiratory organs among Europeans, the follow- cases of phthisis:—1870, 4; 1871, 9; 1872, 8; 1873, 4; 1874, 5 and 1875, 11. After dicussing the other respiratory diseases, he says, "I now come to phthisis, the disease for which especially patients are recommended to come to South Africa.

"The total number of cases of this disease that have come under my notice in the six years, 1870 to 1875 is 41, and of these 13 cases were colonial-born persons, and 28 came from England, some of them especially on account of disease of the lungs.

"According to my experience, cases of phthisis in colonial-born persons are more rapid, and give less hope of amelioration by treatment or change of climate, than in home-born persons."

"Among the native population (the Kaffirs), cases resembling phthisis are often met with; but I believe that most of these are cases of pneumonia becoming chronic through neglect. This is more especially the case among Christianised Kaffirs, because the wild Kaffir wears only a blanket, and when he gets wet, as soon as he returns to his hut he throws off his blanket, and does not sit or sleep with his wet blanket round him, but lies naked on a mat before the fire. But the Christianised Kaffir, who wears European clothes, does not trouble to change them when he gets wet, as it is too much trouble, but keeps them on and sleeps in them, and is thus, through help of civilisation, more subject to bronchitis and pneumonia, the latter often through neglect terminating in abscess of the lung."

"The Hottentots and Bushman are nearly all scrofulous, and phthisis is very common among them."

Of other towns of the Cape Province.

68. Of other towns in the Cape Province, the Commission were told at Mossel Bay, by Dr. A. J. McNally, who had been practising there for the last twenty years, that when he first came there he saw practically no tuberculosis among either Europeans or coloured, although he did a considerable amount of coloured practice; but now tuberculosis was increasing among this race. The first cases occurred about eighteen years ago. He cited an instance of an entire family dying out by the disease. [Questions 81643-652.]

69. At Uitenhage where the coloured population are now very extensively affected, Dr. R. G. Lamb, the District Surgeon, thought he could say from memory—he had no actual figures—that when he first went there in 1874, the disease was almost unknown there. It was the rarest thing to come across a case of tuberculosis amongst the natives. As time went on he began to see that the disease was spreading and now would say that it was very prevalent among them and was one of the most lethal diseases. [Questions 81575-580.]

70. The Reverend Jacob Weber, a missionary of the Rhenish Missionary Society for thirty years at Stellenbosch, informed the Commission that through visiting the coloured people in that place he was able to say that the disease was now very prevalent and was increasing, whole families dying out, but that cases were very infrequent thirty years ago, and he was certain there had been a big increase. They gradually got infected. [Questions 68188-195.]

71. At Worcester, where Dr. D. Hugo is District Surgeon, and had been practising for the last twenty-eight years, he says that up to about twenty years ago they hardly had any tuberculosis. All races were singularly free, but now it is common. [Questions 88548-555.]

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* *Statistics of Disease in King William's Town, British Kaffraria*, by Chas. Jas. Egan, A.B.T.C.D., M.R.C.S., *Medical Times and Gazette*, August 4th, 1877, page 112.

72. At Oudtshoorn, where a very considerable amount of tuberculosis now exists, Dr. H. M. Truter, who had been practising there for the past twenty years, during which he was for twelve years Medical Officer of Health to the municipality, said that what surprised him when he came there was the amount of tuberculosis he found, both among Europeans and coloured, and among the former, those who were Colonial-born. He cited a case in which one such family, bijwoners on a farm, had been entirely carried off in the course of ten years. The coloured race were much the most infected and the disease was certainly increasing among them. [Questions 85236-319.]

73. At Alice, Dr. MacVicar, Medical Officer of the Lovedale Mission Station and Hospital, expressed it as his view, based on an experience of about fourteen years at Blantyre and Lovedale, and as the result of enquiry, that the Bantu people were formerly free from the disease, but that, speaking generaly, there was as much tuberculosis ten years ago as now. The late Dr. Stewart, Superintendent of Lovedale, had told him that there was plenty of consumption in the district forty years ago. He gave him this opinion in connection with a thesis on the disease which he knew Dr. MacVicar was preparing. [Questions 77341-48.] Your Commissioners, however, believe it probable that the Lovedale Institute is itself the source of tuberculous infection.

Dr. MacVicar further said that during the four years he was at Blantyre he never saw a case of consumption—neither pulmonary, nor glandular, nor other forms. He remembered one case of consumption and one glandular being imported. In this connection reference may be made to paragraph 81, in which the condition of Nyasaland as regards tuberculosis is dealt with.

Of Durban.

74. Regarding Durban we have not much evidence, but Dr. D. Birtwell, for thirty-six years a District Surgeon in Natal, of which twenty-three years have been spent as District Surgeon and Indian Medical Officer for Durban, said that a few years back he saw very few cases among natives. He saw more now, and he considered the disease was increasing among natives and Indians. [Questions 18966-19172.]

Also Dr. S. G. Campbell, formerly, for ten years, Medical Officer of Health for Durban, said that up the Natal Coast twenty-five or twenty-six years ago one very rarely came across a case of the disease among the natives, although one saw a certain amount of the glandular form. His experience was that when he first practised in this country he found no tuberculosis among Natal-born Europeans, but gradually the disease sprang up, owing, in his opinion, to the influx of tuberculous immigrants. [Questions 19393-19419.]

Of Natives in Native Reserves.

75. With regard to the occurrence of tuberculosis among the raw native living more or less in his natural state under tribal conditions, the following evidence relates to those areas which are mainly reserved to and occupied by natives under tribal tenure. In these areas there are scattered a number of mission stations, mostly long established; and a small, but varying proportion, of Europeans: officials, traders and others.

The Native Territories of the Cape.

76. In the Cape Transkeian Territories, Mr. W. M. Liefeldt, living at Willowvale, a retired Resident Magistrate of great native experience and who had spent a lifetime in the Territories, said that it was only within the last ten years that the presence of the disease had come prominently to his notice, although it was in the district earlier, but not to the extent as to be brought specially to his notice. He regretted to say it now was increasing very rapidly. [Question 38791.]

Fragments of two reports by Mr. William Girdwood, on the work of the "Fingo Dispensary" for the two years 1872-3 and 1873-4, have been consulted by the Commission. They contain certain figures relating to tuberculosis. This Mission Dispensary was established by Mr. Girdwood, at Nqamakwe in the Transkei, on the 18th May, 1872, on the invitation of the natives themselves. The Fingoes, it may be mentioned, are descendants of the tribes driven South by the Zulus, and at the date of these reports were already noted for "their exceptional intelligence and progress in civilisation."*

* Report on the census of the Cape of Good Hope, 1875.

In these years there were treated, respectively, 1,297 and 1,339 cases. It is not clear from the reports whether "cases" means actual individuals or merely occasions upon which an individual was treated. The actual cases treated consisted of Europeans, red natives and school natives. The following are the details of them:—

	1872-3.	1873-4
Diseases of the digestive organs...	226	140
Diseases of the nervous system	65	29
Diseases of the skin (including leprosy) ...	67	174
Diseases of the genito-urinary organs	79	109
Venereal disease	99	297
Other diseases, etc....	469	427

Diseases of the Respiratory System:—

	1872-3,		1873-4,	
Phthisis	55		33	
Laryngitis	10		3	
Tonsilitis	—		2	
Bronchitis.	59		34	
Asthma	28		10	
Pleurisy	5		5	
Pneumonia	19		35	
Catarrh	116	292	41	163
		1,297		1,339

Regarding the cases in 1873-4, Mr. Girdwood remarks in his report: "To give an idea of the proportion of English and native patients, I may mention that out of the last two hundred and fifty recorded, I find one hundred and eighteen are red heathen, ninety are school people, and forty-two are English residents; and of the forty-two pulmonary cases, four are English, seventeen are red and twenty-one are school people; or still more specifically: Phthisis, one red, six school. Asthma, no reds, five school. Pneumonia, six reds, three school."

In his report for 1872-3 he says: "There being unquestionably a larger percentage of chest diseases among native Christians than among reds or heathens, shows that there is something radically wrong. What is the explanation? Is it not, that in native christians we have men and women changing their habits of life, leaving off red clay, grease, and cow-hide, which nature taught them to use to counteract the evils of their damp huts and low-lying mats, and putting on European clothing while yet living in the same huts, sleeping on the same mats upon the damp earth, and as careless of wetting as if they still went about in greasy skins."

But Dr. C. A. Lumley, for eighteen years District Surgeon of Idutywa, stated that he saw no tuberculosis eighteen years ago, but he was now of opinion that the disease was increasing. [Question 38343.]

Dr. A. J. H. Thornton, for sixteen years District Surgeon, Mount Currie, said that the disease prevailed in Kokstad very extensively among the Griquas or Bastard Hottentots, of whom there was a considerable number; on the other hand he did not remember treating cases among natives when he first came there, but during the last five years he has seen quite a number, and he is fairly satisfied that the disease is prevalent among natives and is largely increasing. He has always put the spread of the disease as being from mine boys. He has seen about fifteen to twenty cases of phthisis among mine boys simply passing through the district. [Questions 26303-317.]

Mr. G. Trow, a trader and labour agent of long standing at Butterworth in the Transkei, a part of the Territories longest under Euopean influence, gave it as his opinion that only since the native started to go away to labour centres to work, had tuberculosis increased among the red Kaffirs. When he went to the Transkei, about thirty-two years ago, he seldom heard of consumption. [Question 41927.]

Mr. F. Fennell, another trader of forty years residence in the Territories, of which twenty-five have been spent in the Butterworth district, informed the Commission that tuberculosis was not apparent until about 1877, when the native started to wear European clothing. This he considered was a great factor in the spread of the disease, and one of the reasons why the red Kaffir, who had not

adopted the custom to the same extent, did not appear to suffer so much. [Question 41959-69.]

77. In Pietersburg, the centre of the great native area of the Northern Transvaal, an old resident of considerable experience and a large native recruiter, stated that thirty years ago tuberculosis was unknown in the Zoutpansberg, but even now he only got one per cent. of his recruits rejected on account of tuberculosis. He attributes the occurrence of tuberculosis to work on the mines. He had not personal knowledge of any cases in Europeans. [Questions 102236-241.]

The Natives of Natal and Zululand.

78. Concerning the conditions as regards tuberculosis of the natives in Natal, the Commission had the evidence of the late Mr. A. J. Shepstone, C.M.G., Acting Chief Native Commissioner for Natal since Union, and who prior to Union, was Secretary for Native Affairs, and had held official positions in the Native Affairs Department of Natal since 1887. Before that he was intimately associated with Zululand and its native population. He said: "I am able to say without fear of exaggeration that this disease (tuberculosis) is seriously on the increase among them. I think it is more common among the Natal natives, and for this reason —that the Natal natives are more accustomed to going out to work, and they make more use of European clothing than the Zulus do; but it is spreading in Zululand as well." He was quite convinced that the disease was increasing and that it exists to a very considerable extent. He could not say when his attention was first drawn to the increase. It was some years ago, and for several years past he had noticed it. He did a good deal of travelling about before he entered the Government Service, and from 1883 to 1887 he took gangs of about 200 natives to Kimberley and worked them himself. Asked whether when he travelled about in Zululand at that time, he ever saw anything like a chronic chest disease, he said "No. Then there was another explanation I might give of that. If there was a chronic sufferer he would probably be put out of the way, so as not to be a trouble to his relations. If a man was no use to himself or anyone else, they did not trouble much about him; he was usually disposed of. They would either leave him to die, or else knock him on the head." [Questions 27390-491.]

At Eshowe, in Southern Zululand, the register of the Norwegian Mission Station was submitted to the Commission. The causes of death were not medically certified, but the misionaries appeared to have a reliable knowledge of what was tuberculosis. Deaths from phthisis or consumption are entered as "Taering," and tuberculosis of other parts, glands, etc., are entered as "tuberculosis." Some half dozen active cases of the disease (mostly glandular) were submitted for examination by the Commission, which appeared to have been correctly diagnosed. The register was stated to be a complete record since the beginning of the Institution in 1868. They got as far back as 1868. From the year 1899 to June 1912, out of a total of 210 deaths, 29 were given as having been caused by consumption and four by tuberculosis. The average number living on the station was 950. [Questions 23218-242.]

Your Commissioners were told at this station that there is more consumption there than formerly. That boys came back from work in towns, chiefly Johannesburg and Durban, bringing consumption with them.

Mr. E. A. Brunner, a member of the late Natal Ministry and a trader at Eshowe, who had resided on and off in Zululand for the last forty years, stated that when he went there the great complaint among the natives was "Isifuba," which, as a layman, he considered to be consumption. Very few women got the complaint. Dagga smoking was exceedingly common among the men. Women did not smoke. [Questions 20053-065.]

On the other hand, Dr. F. W. Walters, a medical missionary and District Surgeon stationed at Nongoma in Zululand, about a hundred miles north of Eshowe, dissented from the evidence of the last mentioned witness, although he would not go so far as to say that the witness had been misled, because the fact that Eshowe was in the coastal belt might make a difference. He had been in Zululand for the past twenty years, during nineteen of which he had been stationed at Nongoma. His entire area embraced 22,000 natives, of which 12,000 were in the Nongoma district, at the Government Dispensary of which, from 1894 to 1912, there had been treated twenty-five cases of phthisis, men, women and children, and twenty-three cases of tuberculous glands in children. [Questions 21106-151.]

In Basutoland.

79. In Basutoland, Dr. H. M. Macfarlane, Government Medical Officer at Leribe, the largest medical district in Basutoland, said that the disease was not prevalent in Basutoland in 1895, and it was not until after 1903 that cases became at all numerous. (Question 94524).

In Morija Your Commissioners were informed by Mrs. Mabille, the widow of the founder of the French Protestant Mission in Basutoland, that when she and her husband came there about fifty years ago, tuberculosis was unknown among the natives, and this statement was borne out by the evidence of Mr. Christellier, one of the heads of the mission, who said from his own experience that twenty years ago tuberculosis was unknown in the area in which this mission operates. He also stated that there were many cases of consumption amongst boys who returned from Lovedale, which place had a very bad name among his people for consumption. (Questions 95282-95505).

In Southern Rhodesia.

80. Regarding Southern Rhodesia, the Commission had the advantage of hearing Dr. A. M. Fleming, C.M.G., Medical Director of that Territory for the past fifteen years. He stated that there is very little tuberculosis at the present time among Europeans, and that such few cases as exist are imported. Among natives nearly all that are seen occur among mine boys and those coming into contact with civilisation, as in the towns. In the children of such it is chiefly in the glandular form. Among the raw natives he considers it to be practically non-existent, but the Medical Officer of one of the native dispensaries has drawn his attention just lately to two cases of phthisis among native females in their kraals. Among mine boys he is inclined to think it is decreasing owing to improved sanitary conditions, as in 1907 out of 26,000 boys employed, 250 cases were recorded, while in 1911 out of 37,000 boys there were only 151 cases; of which 61 died, the others being returned to their kraals. (Questions 6061-6245).

In Nyasaland.

81. The Commission has been furnished with some important information regarding the occurrence of tuberculosis in Nyasaland by Dr. Hugh S. Stannus, Medical Officer at Zomba, Dr. R. M. Macfarlane of The Mission, Blantyre, and Dr. Robert Laws of Livingstonia. The full reports will be found printed in Annexure "A."

Dr. Stannus dates his experience from 1905. He states that cases are to be found in most districts; most of the cases being tubercular bone diseases. It is uncertain how long the disease has been in existence in the country. It is suspected that a number of cases have gained their infection in South Africa.

Dr. R. M. Macfarlane says, "tuberculosis prevails to a somewhat limited, but rapidly increasing extent among the natives in Nyasaland. The number has increased quite noticeably in my seven years' experience of the country. During the earlier days of the mission tuberculosis was, I believe, rarely, if ever, seen. It has been in existence probably for about twelve years in the Blantyre district.

The general cause of its present prevalence is the opening up of the country to communication with outside Territories. The chief source of infection I consider to be natives returned from work of various kinds in South Africa. There have been many instances in proof of this. The influx of Indian traders into the country has also doubtless had an influence, for phthisis is fairly common among them, and they associate a good deal with them."

Dr. Robert Laws, speaking of the Lake Nyasa district, says that the disease as yet is not widely prevalent among natives, but its incidence varies in different districts. The first one he had to deal with in the country was a native who came from South Africa is 1876 and died in 1877. This was at the south end of Lake Nyasa. In 1881 he found the disease confined to one or two families on the west side of the lake, at Bandawe. Within the last ten years it has been increasing in the district, which may be partly accounted for by more cases becoming known, and cases due to importation from South Africa. A number of cases have been natives who went to South Africa, chiefly working on the mines, and who have returned infected by the disease. Some thus infected died on their way home. As these cases coming from the South were increasing in number we reported the danger to Zomba, and the first batch of natives arriving from South Africa after that were examined, and eight found to be infected.

Conclusions.

82. Such evidence as the foregoing is open, of course, to the criticism that it mainly consists of impressions—in some cases, perhaps of the impressions of impressionable persons. And in this connection due allowance must be made for the fact that in recent years the subject of tuberculosis and its prevention has become a public topic all over the world, so that the most impartial observer may well be biassed in his appreciation of the present as compared with the past. Yet on the whole the belief in its comparatively recent appearance and especially in its recent increasing prevalence is too widely held to be disregarded.

Extent of prevalence of Tuberculosis in the past.

Reviewing then the evidence on the subject Your Commissioners think they are justified in saying that a couple of generations back there was not a great deal of tuberculosis in South Africa, and that in this respect different parts of the Continent varied greatly. In the old established coastal communities there was doubtless always a certain amount, but if we exclude imported cases, never much of the disease among the Europeans, although to a greater extent among those natives and coloured races closely associated with them. Thus in and around Cape Town and in the Western Province there was probably a not inconsiderable amount among the Malays, Hottentots and Bastards, who, having once become infected, spread the disease among themselves, as we believe, they do to-day. The same may be said of those earlier settled portions of the Continent, Graaff-Reinet and Oudtshoorn. Also on the older mission stations,—communities where large numbers of mixed race of poor physique have collected, mostly under bad hygienic conditions,—there can be little doubt this disease has existed and spread for many years, as well as have leprosy and some other communicable diseases.

Factors responsible for its prevalence at the present day.

But the great bulk of the tuberculosis which at the present day we find distributed in various degrees throughout South Africa, among the native and coloured races, there can be not the least doubt, is a product of recent times, and has resulted from a number of factors which had not come into existence a couple of generations ago. Some of them may be briefly stated in the order of their occurrence.

The Immigration of Tuberculous Persons.

83. The earliest among them was the reputation which South Africa acquired for the climatic cure of the disease. During the last quarter of the nineteenth century many thousands of phthisical persons must have streamed into the country in the hope of regaining health. Of these only the severe and obvious cases would attract attention, but to every one such case there would be many who would pass unnoticed. In the course of gathering evidence we were much struck by the number of witnesses who had originally come to South Africa on account of the disease and had recovered.

The following figures may serve to indicate the extent to which in cases of tuberculosis occurring among Europeans, the disease has been acquired before coming to South Africa.

The Medical Officer of Health for Johannesburg, in his report on the Public Health for the municipal year 1912-13, gives particulars of the results on special enquiries made during a period of six years ending on the 30th June, 1913, into the origin of the disease in the case of 549 deaths from tuberculosis among whites in the municipality in that time.

Of this number 185 were South African born, 296 British born, and 68 foreign born. Of the British born the time of infection was unknown in 32, leaving 264, of whom 96 or 36·4 per cent., had been infected before arrival in South Africa: and 168, or 63·6 per cent. who developed the disease after arrival. Of the 68 foreign born, in 14 the history was unknown, and of the remaining 54 there were 10, or 18·5 per cent. who had been infected before arrival, and 44, or 81·5 per cent. after arrival.

Dr. Tomory in his annual reports on the public health of Bloemfontein gives the following particulars of imported cases:—Of 14 deaths of tuberculosis among Europeans in 1908, 9 were known to have come to South Africa suffering from the disease. In 1909 of 16 deaths, 12 were so reported. In 1911 of 23 deaths of tuberculosis among Europeans, 12 came to Bloemfontein from the United Kingdom

with the disease, 1 from Russia, 1 from New Zealand, 7 from other parts of South Africa, and 2 were local cases. In 1912 of 15 deaths 6 came from the United Kingdom, 2 from Russia, 5 from elsewhere in South Africa and 2 were of local origin.

In the case of Cape Town, of 202 deaths of Europeans during the years 1906 and 1907, from the disease, the Medical Officer of Health found that 39, or nearly 20 per cent., had been in South Africa less than a year.

With reference to all of the above figures, it is necessary to point out that the information upon which are based statements as to the original place of infection are not always to be relied upon.

Also, as showing the extent to which persons suffering from tuberculosis have been distributed about the country at those places believed to be favourable to the tuberculous, the following list, taken from the report for 1904-5 of the Medical Officer of Health for the Cape Colony, of persons suffering from phthisis and employed on the Cape Government Railways, may be of interest:—

Kimberley, 5 cases, all European males.

Bulawayo, 9 cases, all Europeans, 7 being males and 2 females; all said to have commenced in the British Isles.

East London system, 39 cases, all Europeans, except 3 Kaffirs. Of the 36 European cases, 28 were males (13 being clerks) and 8 females. The disease was reported to have been acquired in the Colony in 13 of the cases; one being the wife of one of the male cases, from whom she is said to have contracted it. In 15 cases it was acquired abroad, and in 8 the origin was unstated.

Cradock, 3 European males.

Graaff-Reinet, 2 European males.

Naauwpoort, 10 European males, one said to have contracted the disease in South Africa. It was the duty of one who was suffering from laryngeal phthisis, to attend to the telephones.

Laingsburg, 4 European males.

Grootfontein, 1 European male.

Matjesfontein, 3 European males—all employed in the refreshment department—and 1 coloured female.

Prince Albert Road, 6 Europeans, 2 being males and 4 females, one being the wife of one of the affected Europeans.

Fraserburg Road, 5 Europeans; 3 males and 2 females.

Beaufort West, 10 cases, 9 being male Europeans and 1 coloured. Of the Europeans 5 were stated to have contracted the disease in Cape Colony, 2 in Rhodesia, 2 in England and 1 not stated. One of them was a coffee stall attendant.

84. There is evidence that the aggregation of consumptives in these Karoo villages formed foci from which the disease has spread. Such a result is only in accord with experience elsewhere. The spreading of the disease to the inhabitants of Funchal by tuberculous visitors was long ago noted. The same has been observed in the case of phthisis resorts in Switzerland. In 1892 it was reported that "since Biarritz has been frequented by English consumptives in winter, the adjacent town of St. Jean de Lux has been at different times ravaged with phthisis."*

As far back as 1882 the increasing extent of phthisis in Melbourne was attributed to tuberculous immigrants.

It is a notable fact that it is particularly in those towns which were the first to be opened up by the railway, and which for some time remained termini, that the disease has prevailed longest and to the greatest extent. Thus the rail was opened at Grahamstown in 1879; to Graaff-Reinet and Beaufort West in 1880; Cradock in 1881; Kimberley in 1885; Bloemfontein in 1890 and Ladysmith (Natal) in 1886.

In those days very little of any precautions were taken to prevent the spread of infection. The Chairman of this Commission remembers seeing at Beaufort West some twenty or more years ago, the consumptives at the chief hotel, and of whom there were a number, sitting all day on the stoep, expectorating into the adjacent open water-furrow which was the only source of water supply of many dwellings and of the extensive coloured location just below. At Cradock he saw equal carelessness in regard to the disease.

* *British Medical Journal, 1892*, Vol. 1, page 256.

The advent of Industrialism.

85. The next factor to affect the spread was the opening up of freer communication within the Continent. This may be said to have begun with the discovery of diamonds at Kimberley in 1870, but the chief stimulus was the development of the gold industry in the Transvaal. There are probably not many who pause to remember that the first rail connection with Johannesburg was so late as 1892. Since then, however, the railway system has extended its network over the greater part of the Union.

Coincident with the opening up of the country has been the creation of labour centres and the aggregation of the native and coloured population in town locations and in compounds, where the conditions of housing and general health have been bad in the extreme. Thirty years ago few natives left their kraals for any distant destination; but now, in ever increasing numbers, they are crowding into urban centres in search of work economic conditions and expanding wants are forcing them to undertake.

Naturally with these changes have come changes in habits, in clothing and in diet, the adoption of European vices, and exposure to unhealthy conditions of labour in mines and elsewhere, all until then practically unknown to them. Of these we shall have occasion to speak more fully lafer on.

Thus while there are good grounds for believing that until recent years tuberculosis was comparatively rare in South Africa, it is also evident that during recent years exactly those conditions have arisen which will most adequately account for its present prevalence and spread.

CHAPTER V.

CENSUS ENUMERATION: RECOMMENDATION.

THE REGISTRATION OF BIRTHS AND DEATHS: RECOMMENDATIONS.

THE NOTIFICATION OF TUBERCULOSIS: RECOMMENDATIONS.

THE COLLECTION AND COMPILATION OF STATISTICS: RECOMMENDATIONS.

86. Before attempting to define the extent of the present prevalence of tuberculosis among the different communities and races in the Union, it is necessary to take stock of the statistics available for our guidance in this enquiry. We have already in a previous paragraph (7) remarked on the difficulties caused by the paucity of existing statistical data; it is necessary to amplify that statement and to show what actually is available, in what way it is deficient, and what improvements in the present arrangements are necessary in order to secure the collection and issue in an available form of proper statistical information.

The necessity for reliable Statistics.

87. It need scarcely be said that before effective measures for dealing with tuberculosis, or, indeed, any preventable disease, can be profitably considered certain numerical data are necessary. Nor can such measures be controlled and their efficacy maintained without a constant recourse to such data. We must know, for instance, exactly where, when and to what extent the disease prevails; whether it is increasing or diminishing; who are affected, and their race, age, sex and occupation, and other information of a like kind.

In South Africa, however, in the past, statistics generally have been neglected, and much of those available, are either in great part unreliable, or are collected on wrong lines.

The Registration of Births and Deaths.

88. In all questions such as that before this Commission, the most important class of statistics is a proper and accurate system of National Registration of Births* and Deaths, with the causes of death and other essential particulars; but such a system does not yet exist in any completeness in any Province of the Union.

* Apart from other uses, the number of births is required in connection with deaths, as the number of births registered in any year represents, for practical purposes, the population during that year of infants under one year of age.

Census enumerations of the Population.

89. Also, in order to make any use at all of births and deaths registration returns, it is essential to possess frequent and accurate census enumerations of the population. This also is far from being the case.

The last census was taken on the night of Sunday, the 7th May, 1911. This was a census of the population of the entire Union. Prior to this a census was taken by each of the four Colonies on Sunday, the 17th April, 1904. This enumeration was postponed from 1901 to 1904 on account of the disturbance to the population caused by the late war. The censuses before these were taken in 1891, and, in the Cape also in 1875.

As the population for any year after a census has to be estimated upon the increase or decrease which was found to have occurred between the last two censuses, it is evident that a ten years interval is far too long in a country such as South Africa, where we have so many different races, and where such sudden and violent fluctuations of the population are liable to occur, owing to waves of immigration during prosperous times, and to rapid migrations in periods of depression, or on the opening up of new centres of industry or the abandoning of existing ones. Even in the older, settled countries, the decennial interval between censuses is found to be too long to afford in every case accurate data, and in some, such as Prussia, quinquennial enumerations are carried out.

So far as the statistics at our disposal are concerned, we find ourselves unable to make effective use of any except those for the census years 1904 and 1911, in respect of which we have reliable returns of the population.

Under section 34 (ii) of the South Africa Act it is provided that in 1911, and every five years thereafter, a census of the European population of the Union shall be taken.

The Census Act, 1910, is a general Act, and under section 3, empowers the Governor-General to appoint *any* year for the taking of a census, and to prescribe the particulars which shall be taken thereat.

Recommendation.

90. Your Commissioners therefore strongly recommend that a census of all races within the Union be taken quinquennially, and that it include at least particulars of sex and age.

The Statistical value of existing Death Registration.

91. In order to ascertain the degree of reliance to be placed upon such statistics as we shall be able to present, it is desirable to consider briefly the efficacy of the systems of registration at present in operation in each of the Provinces, under which they were collected.

In an Addendum (B) to this Report will be found a memorandum, prepared by Your Commissioners, describing the laws and procedure now in force. From the information set out in this and from other evidence we obtained, we are of opinion with regard to the registration of deaths in the several Provinces, that that of the Europeans is fairly accurate in the *urban* areas, but less so in the rural areas, especially in the outlying parts. But in Natal, where no distinction in procedure is made between urban and rural areas, the Registrar-General considers that there are sure to be some omissions from the registers. [H. Miller, question 23879.]

As to the registration of deaths of coloured persons and natives in the Cape, this is probably fairly complete in the urban areas, but in the rural areas there must be many omissions.

In Natal the registration for natives is scarcely of any value even as to the extent of the mere numbers born or dying, while that of coloured persons and Indians is, except that of indentured and free Indians, which is carried out by the Protector of Immigrants, of not only no value as such, but their presence invalidates those of the Europeans, as the only means of telling the race is by the name of the deceased; whether it is apparently European, Indian or native.

In the Orange Free State the registration of coloured and native deaths might be at least as effective as in the Cape, if the law were but applied to them. In his evidence before the Commission, Dr. D. M. Tomory, District Surgeon and Medical Officer of Health for Bloemfontein, strongly urged the necessity for the introduction of a proper death registration of natives and coloured persons in

Bloemfontein, and indicated most conclusively the dangers and the difficulties entailed by its absence. [Questions 97187—220.]

In the Transvaal the registration of coloured persons and natives in the urban areas appears to be fairly complete, most of the deaths being medically certified. But outside the urban areas, except as far as natives in mining areas are concerned, registration does not exist.

92. As regards the registration of births and deaths of natives in the more purely native areas, locations and reserves, it is most unsatisfactory. Only in the Cape Province and in Natal, excluding Zululand, is such registration even attempted and there it would appear to be not now carried out as actively as formerly, so that not even the bare numbers of births and deaths occurring can be relied upon.

Your Commissioners have been informed that whereas formerly in the Transkeian Territories a fee of one shilling was paid to headmen for every event notified by them, this has been discontinued for some years, and with the withdrawal of the inducement, registration has become very incomplete.*

While it is evident that for many years to come the registration of births and deaths of natives in native areas must be incomplete and unreliable, it is only by making a beginning and with persistent effort that proper registration can ever be arrived at. It is not one of those matters which improve by waiting, but is one to which the native mind must be gradually habituated, and this can only be done by degrees, and after long official effort.

On this point we had the evidence of a number of Native Commissioners and other competent witnesses in the several Provinces, who were in agreement in recommending the adoption of registration of native births and deaths throughout the Union, and in thinking that it presented little real difficulty so far as actual numbers and sex are concerned, together with information (in the case of deaths) as to whether it was of an infant, a child, a young adult, or a middle aged or old person. [H. Miller, Questions 23935—6 and A. J. Shepstone, Questions 27421—29.]

One great difficulty in dealing with natives, and to some extent with coloured persons, is that of ascertaining their correct age. This is, however, considerably lessened if we deal with large age groups.

Registered Causes of Death.

93. The accuracy of the assigned causes of death is throughout more problematical than the other registered particulars concerning a death, as this depends upon the extent to which such causes are based upon a medical certificate or are mere lay surmises. In the urban centres of the Cape there is still a noticeable proportion of uncertified, and therefore unreliable, causes of death registered. The proportion could be much reduced if an enquiry were insisted upon, and a post-mortem examination made in every case where no medical certificate is forthcoming. Unfortunately, however, this practice is not always followed, indeed of recent years it has not been encouraged by Government, owing to the expense it entails. The matter, however, is one which is largely within the discretion of the resident magistrate; hence while some insist upon this course being followed in most uncertified cases, there are others who are less impressed with the statistical importance of correct registration, and, who, therefore, so long as they are satisfied that the death is due to natural causes, permit the issue of a burial order without a medical certificate. Formerly there was a direct inducement to magistrates to hold inquests and enquiries in these cases, as fees were attached to the service. [W. H. Smit. Questions 2966-76-77.]

Owing to the better provisions in the law of the Transvaal and the Orange Free State, there is a much smaller proportion of unreliable causes recorded in the urban areas of these Provinces.

In Natal, owing to the defects in the law, it is impossible to surmise to what extent the assigned causes have been medically furnished or not. Indeed the main intention of the Natal law is rather to provide a register for purposes of Civil record, such as legitimacy and succession, than to secure the safety of the public or the collection of vital statistics.

In the rural areas of all the Provinces the conditions are such that it must of necessity happen that a very large proportion of all deaths, even among Euro-

* On the other hand Dr. Hill, the late Medical Officer of Health for the Colony of Natal in his Annual Health Report for 1909, says of the accuracy of the native registration, "seeing that the official witness receives the liberal fee of one shilling, which is fixed by the Statute, for each birth and death registered, there is little chance of the facts being understated in the registers."

peans, are uncertified, but many more would be certified if the law required the production of a certificate whenever a medical man has been in attendance during the last illness.

Recommendations.

94. Having regard to the necessity for a proper registration of births and deaths in public health administration (embracing the prevention of tuberculosis), and to the defects disclosed in the present systems in the several Provinces, Your Commissioners desire to make the following recommendations on the subject so far as it affects questions covered by their enquiry:—*

(1) One law and one administrative system should as soon as possible be introduced for the entire Union.
(2) Such a law should provide for the prompt notification of all births and deaths equally among all races and classes of the community.
(3) The particulars to be recorded should in the case of deaths, at least, always include those of age, sex, race (and in case of natives, the tribe), birth place, occupation, (and in case of women the husband's occupation), cause or causes of death, and duration of last illness.
(4) In urban areas deaths should be notified within twenty-four hours, and in rural and purely native areas within one month of occurrence, and births in all areas within one month.†
(5) The term "Urban Area" should include all towns and villages, and should not be confined to those under some form of local government, and should also include all areas or zones immediately surrounding towns and villages, and all fairly populous communities, and all mining or industrial areas.
(6) In all urban areas a medical certificate of the cause of death should be required to be produced, and failing such production, an investigation by the District Surgeon or other medical practitioner should be made, before authority for burial is issued.
(7) Whenever a medical practitioner was in attendance during the last illness, whether within or outside an urban area, he should be required to give a certificate of the cause of death, and, if unable to do so, to report his inability to grant it.
(8) No interment or other disposal of the body of any person dying within an urban area should be permitted without a burial order, and in every case the person responsible for the burial should be required to endorse the particulars concerning the burial, when completed, on such order, and to return it to the officer by whom it was issued.
(9) In urban areas and, as far as possible, in rural areas, no burial should be allowed except in an authorised burial ground.
(10) In the Native Territories, and in more purely native districts and areas, the headmen of the location or kraal should be made responsible for the notification of all events occurring in his location or kraal, and a suitable fee or reward should be paid to him for the performance of this duty, subject to the institution of safeguards against fraud.
(11) In conjunction with a proper registration, there should be prepared from the records of registration and issued to the public as soon after each calender year as possible, full and carefully compiled statistical tables, of all deaths and their causes, together with ratios of mortality, arranged according to races, sex, ages and occupation, separately for the four Provinces and for the more important defined areas therein. Similar information should also be made available at shorter intervals to local authorities and their medical officers in respect of their particular areas of jurisdiction. [W. Miller. Questions 23812-14.]

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* Your Commissioners have not suggested details as to the registration of births and still-births, as being beyond the scope of their reference.

† This of course is quite apart from the operation of any special law requiring the notification of every birth to the local authority of the district in which it has occurred, in order to enable the authority to institute measures for securing the health of mother and child. Such special powers in respect of Pretoria and Johannesburg will be found provided in Section 189 of the Transvaal Local Government Ordinance, 1912.

The Notification of Tuberculosis.

95. But something more than a mere record of those who have actually succumbed to tuberculosis is necessary, mortality records, however valuable for future guidance, are no guide to immediate action. For this it is essential that those authorities, whose business it is to deal with the disease and prevent its spread, be promptly informed of the occurrence of every case within the area under their charge; and this can only be attained by an efficient notification of every case as soon as its nature is recognised.

Every such system of notification, to be effective, requires to be made compulsory. Voluntary notification is not only incomplete and therefore ineffective, but, by leaving the matter to his discretion, places an onus of a delicate and invidious nature on the person notifying, as notification almost always entails some amount of inconvenience on the patient or his friends.

Under most systems the duty of notifying is made dual: Firstly, the duty is imposed on every person in charge of the patient, and on the householder, hotel-keeper, lodginghouse-keeper, or school-keeper on whose premises the patient is, to give immediate notice thereof to the local authority of the district, and secondly, the duty is imposed on any medical practitioner in attendance upon the patient, (*a*) to inform those in charge of the patient, or the householder, hotel-keeper, schoolkeeper, on whose premises the patient is, of the nature of the disease, and (*b*) to forward as early as possible to the local authority a written certificate specifying the nature of the disease with other particulars, for which certificate he receives a small fee.

In practice, however, it is usually only the medical attendant who makes the notification, the others usually neglecting the duty, which in spite of the penalty the law provides, is rarely punishable, owing to the difficulty of proving that the person in default was aware of the real nature of the disease.

What forms of the Disease should be notified.

96. With notification of tuberculosis the question arises as to what forms of the disease and in which stages it should be notified. Some authorities think that only the pulmonary form need be the subject of notification. Your Commissioners are of the opinion that *all* cases of tuberculosis, in whatever stage or degree, should be notified, for these reasons:

When placing a statutory duty upon any person it is always well that such duty shall be one clearly and easily defined. If an option be left to the performer, it, on the one hand, may impose an unreasonable degree of responsibility upon him, or, on the other, may furnish an opportunity for evading altogether the performance of the duty. If only pulmonary tuberculosis be notifiable a person might reasonably decline to notify a laryngeal case of the disease, which, on all grounds, should be as notifiable as the pulmonary form.*

It is true that a patient is only dangerous to others when actually discharging living tubercle bacilli, and that the extent to which he is a danger depends, other things being the same, upon the quantity and the manner of the discharge, but while, according to these criteria, the pulmonary form of the disease with much tuberculous expectoration, is the most dangerous to others, it by no means follows that other forms of the disease may not under suitable conditions, be discharging infective material and be dangerous to associates, as, for instance, the dejecta in a case of tuberculous disease of the bowels.

There is, of course, the alternative of ignoring the particular form of the disease and deciding the question on the basis of its particular state; that is to say whether it is in the condition of discharging infective material—the so-called "open tuberculosis," or is not in an infective condition—the so-called "closed tuberculosis." It is, however, by no means easy to decide exactly when the condition of a patient is not infective, and in any case it is both unreasonable and inadvisable to place the onus of such a decision upon the notifying medical man; and as no such responsibility could be placed upon a layman, dual notification would have to be discarded.

But even in the case of medical men the difficulty of enforcing notification on such a basis would be fatal, as there are always some who decline to believe in the infectivity of the disease. This difficulty has been a constant source of admini-

* Under the "Short list of causes of death" adopted by the Registrar-General and the Local Government Board of England and Wales, "Phthisis (pulmonary tuberculosis)" includes not only laryngea tuberculosis, but also "acute miliary tuberculosis."

strative trouble in the analagous case of the certification of leprosy in the Cape Province where the law requires the medical practitioner to certify that the leper is a danger to the public.

It is, therefore, preferable to require *every* case of clinically recognisable tuberculosis to be notified, leaving it to the medical officer of health to decide in each case, upon a consideration of all the attendant circumstances, the degree of danger existing for others. By "clinically recognisable" we mean displaying some other signs or symptoms than the mere reaction to the tuberculin tests.

Another important reason for notifying all cases is that the notification of some minor form of the disease may lead, by the investigation that should follow every notification, to the discovery of some other affected member of the household, who otherwise might have escaped detection. Besides which it is, for obvious reasons, as important for the medical officer of health to be made aware of a case of abdominal tuberculosis in an infant as it is of a case of pulmonary tuberculosis in an adult.

Present extent of notification. In the Cape Province.

97. Notification of tuberculosis is at present in operation within the Union to only a limited extent.

In the Cape Province tuberculosis in all its forms was proclaimed on the 5th March, 1904, to be a compulsory notifiable disease under sections 28 and 29 of the Public Health Amendment Act, No. 23 of 1897; the system of notification being that just described. Also, under the provisions of this law every local authority is required to transmit to the Medical Officer of Health for the Union, at the end of each week, copies of all notifications made to it during the week, which requirement keeps the central authority in touch with the subject.

The information which the notifying medical practitioner is required by the Cape law to include in his certificate comprises (*a*) the nature of the complaint, to the best of his knowledge and belief, and (*b*) the name, sex, age and location of the patient.

In the subjoined Table 3 is a return giving the number of notifications in the Cape Province during the seven and a half years, from the 1st July, 1905, to the 31st December, 1912, made to the different local authorities within that Province. During this time there were 16,506 notifications; 12668 being within urban areas, or 2,577 of Europeans and 10,091 of coloured persons and natives; and 3,838 in rural areas, of which 434 were Europeans and 3,404 coloured and native.

There were 290 local authorities on this list, but 80 of them never received a notification during the whole of this period, while a still larger number only received two or three during the time. This was not due to the fact that there were no cases, for many districts in which the registration of deaths shows a considerable incidence of the disease have received only a few or no notifications at all. For example, in Graaff-Reinet where there were registered in 1911, 5 Europeans, 17 coloured and 10 native deaths from tuberculosis, there were no notifications, and in the town of Cradock with 5 Europeans, 24 coloured and 14 native deaths from the disease, there was only one coloured case notified during the same year. Of course, notification and death would not necesarily coincide in the same year, but such discrepancies cannot be due to this cause. As a matter of fact notification is only carried out in those districts in which the local authority or some member of it is more or less alive to the importance of looking after the disease. Thus, as will be seen by reference to the above mentioned Table, 12639 of the total of 16,506 notifications were made to only 25 local authorities (counting the Cape Peninsula as one body). Taking these districts as a whole and separately, it will be observed that there has been an increase in the numbers of notifications, both of Europeans and coloured, but whether this is due to more complete notification or to an increasing number of cases it is impossible to say.

Some of these notifications are re-notifications of the same case. In a disease of such long duration in the course of which the patient may change his place of abode or his doctor many times, this is bound to occur, but, judging from the experience of Cape Town, where it is perhaps more likely to occur than elsewhere, multiple notification is not made to a very great extent. In this city the Medical Officer of Health found that in the municipal year, ending on the 30th June, 1913, out of 151 actual cases of Europeans notified, eleven had been notified in the previous year and thirteen were notified more than once in the year under review; and of 386 cases of coloured persons thirty-five had been notified already in a previous year, and forty-three were notified more than once in the year, one of them being notified three times.

TABLE 3.—Shewing the number of Notifications in the Cape Province during each of the years 1905–1912, of Tuberculosis in European and Coloured persons, respectively.

AREA.	1905 July-Dec.		1906		1907		1908		1909		1910		1911		1912		Total.		
	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Eur.	Col.	Total.
All Urban Areas	105	391	279	935	352	1,174	356	1,356	321	1,456	364	1,497	379	1,555	421	1,727	2,577	10,091	12,668
All Rural Areas	7	96	51	326	42	427	73	405	65	461	66	545	66	542	64	602	434	3,404	3,838
Total of Province	112	487	330	1,261	394	1,601	429	1,761	386	1,917	430	2,042	445	2,097	485	2,329	3,011	13,495	16,506
Cape Peninsula (including Rural Council Area)	75	221	131	421	211	596	163	586	134	644	186	681	180	630	213	729	1,293	4,508	5,801
Malmesbury Municipality	..	..	3	4	..	2	2	6	4	8	4	6	4	5	3	7	20	38	58
Malmesbury Divisional Council	..	3	3	17	2	18	7	20	7	24	7	50	10	31	6	45	42	208	250
Stellenbosch Municipality	..	3	2	4	1	9	2	7	..	9	1	13	1	13	1	12	8	70	78
Grahamstown Municipality	3	9	23	76	15	87	17	73	18	84	12	100	14	85	6	90	108	604	712
Albany Divisional Council	..	1	1	4	..	6	..	7	..	3	..	6	1	6	..	7	2	40	42
Beaufort West Municipality	..	..	..	..	7	3	23	17	13	24	8	20	14	30	13	16	78	110	188
Cradock Municipality	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	10	..	11	11
Queenstown Municipality	..	..	10	8	12	11	7	13	5	16	3	23	4	13	..	14	41	98	139
Laingsburg Municipality	..	..	8	4	8	5	10	10	5	4	5	3	2	1	5	9	43	36	79
Kimberley Board of Health	..	..	..	..	14	40	24	52	15	26	21	60	12	67	6	89	92	334	426
Port Elizabeth Municipality	14	58	54	143	32	134	65	191	44	116	45	156	61	199	72	193	387	1,240	1,627
Port Elizabeth Divisional Council	4	62	..	37	1	56	..	51	4	62	2	60	..	58	1	74	12	460	472
Korsten Village Management Board	..	..	..	56	..	69	2	73	1	75	..	74	1	88	..	72	4	507	511
Uitenhage Municipality	..	..	..	..	..	..	..	2	13	46	8	33	6	25	11	37	38	143	181
East London Municipality	4	10	16	21	13	30	7	18	5	29	13	54	7	40	13	38	78	240	318
George Municipality	..	9	3	18	3	19	1	5	3	24	1	13	2	10	4	13	17	111	128
George Divisional Council	1	5	2	13	..	17	2	4	1	12	3	2	..	11	3	8	12	72	84
Oudtshoorn Municipality	3	5	6	25	3	15	14	82	18	50	9	43	6	33	15	48	74	301	375
Oudtshoorn Divisional Council	1	4	5	12	2	14	11	14	8	16	1	18	4	10	5	13	37	101	138
Kingwilliam's Town Municipality	..	..	..	..	1	15	1	11	1	11	..	15	4	7	2	9	9	68	77
Kingwilliam's Town Divisional Council	..	..	1	33	..	61	..	27	..	32	1	31	..	36	..	54	2	274	276
Alice Municipality	2	70	..	23	..	8	..	3	..	..	..	1	..	..	..	..	2	105	107
Victoria East Divisional Council	..	..	..	38	..	19	..	8	1	1	..	3	..	37	..	34	1	140	141
Somerset East Municipality	..	..	4	26	..	28	..	18	2	14	..	5	..	9	1	28	7	128	135
Namaqualand Divisional Council	..	..	3	21	2	49	8	85	1	17	..	49	2	31	1	27	17	279	296
	107	460	275	1,004	327	1,311	366	1,383	303	1,397	330	1,519	335	1,476	381	1,676	2,424	10,226	12,650

In Natal.

98. In Natal the notification of pulmonary tuberculosis was made towards the close of the year 1904, under the Act No. 44 of 1901, compulsorily notifiable throughout the Colony, with the exception of the borough of Pietermaritzburg, where owing to the opposition of the Council it did not come into operation until 1907. This Act, however, lapsed on the 31st December, 1911, since which date compulsory notification under it ceased, but a certain amount of voluntary notification has since continued. The Boroughs of Pietermaritzburg and Durban are, however, not affected by this lapsing, as the disease in their case was made notifiable under the provisions of Section 45 of Act No. 22 of 1894. It would appear that when the law was in force it was very imperfectly carried out. [Questions 16712-714.]

We have not been able to obtain detailed information of notifications made in this Province, but the following figures, which are given for what they may be worth, have been extracted up to the year 1909 from the Annual Health Reports of the Medical Officer of Health for the late Colony, and for the years 1910 and 1911 from that of the Assistant Medical Officer of Health for the Union, stationed in Natal.

TABLE 4.—Shewing the Notifications of Pulmonary Tuberculosis in Natal,

	1904.		1905.		1906.		1907.		1908.		1909.		1910.		1911.	
	Europeans.	Indians.	Europeans.	Indians.	Europeans.	Indians.	Europeans.	Indians.	Europeans	Indians.	Europeans.	Indians.	Europeans.	Indians.	Europeans.	Indians.
Durban	43	..	42	..	30	..	33	..	25	..	25	..	..	..	90	..
Maritzburg	5	..	..	..	..	..	1	..	4	..	5	..	..	..	..	..
Other Towns ..	8	..	4	..	6	..	3	..	7	..	10	..	..	..	..	..
Rural Areas ..	34	..	29	..	27	..	19	..	13	..	11	..	..	..	..	..
Ex Shipping ..	..	..	..	..	..	..	..	..	2	2	13	5	..	..	..	..
TOTAL	90	147	75	225	63	224	56	280	51	186	64	196	74	282	185	275

The Orange Free State.

99. In the Province of the Orange Free State, by the Public Health Ordinance, No. 31 of 1907, under Part III., provision is made for the compulsory notification of tuberculosis, but the adoption of this provision is optional on the local authority, and so far notification of this disease has only been brought into operation in the case of fourteen municipalities, one Villiage Management Board and one Settlement.*

In Bloemfontein, the largest of these areas, the annual number of notifications is small, namely:—

	1907	1908	1909	1911-12
Europeans	14	11	6	10
Natives	30	45	30	31

100. In the Transvaal tuberculosis is not a notifiable disease under the general law. Municipalities may, however, under their own bye-laws and without reference to the Union Government, make any disease notifiable within their areas of jurisdiction. No returns of such notifications would be required to be transmitted to the Central Authority. So far as we have been able to ascertain no municipality has made tuberculosis notifiable by bye-law. Your Commissioners were informed in evidence by the Medical Officer of Health for Pretoria that that municipality had referred the question of the introduction of notification to the Transvaal Municipal Association for advice, and that body had advised against it. [Questions 14188-99.]

* Namely in Bloemfontein (P. 68 of 1908), Bethlehem (P. 40 of 1908), Kroonstad and Baltfontein (V.M.B.), Harrismith (P. 141 of 1911), Parijs (P. 137 of 1911), Ladybrand (P. 78 of 1911), Dewetsdorp, (1911), Clocolan (P. 87 of 1912), Heilbron and Senekal (P. 229 of 1912), Trompsburg (P. 4 of 1913) Koffyfontein (P. 171 of 1913) Hoopstad (P. 175 of 1913), Rouxville (P. 265 of 1913), Hagenstadt Settlement (P. 63 of 1913).

In July, 1907, voluntary notification was commenced in Johannesburg, the Council having circularised the medical men practising within the municipality, inviting them to notify cases coming under their care.

The following table, showing the number of notifications in Johannesburg under the voluntary system, is supplied by the Medical Officer of Health to the Municipality.

TABLE 5.—Shewing the number of Notifications (voluntary) of, and deaths from Tuberculosis in the Municipality of Johannesburg during the six municipal years, July, 1907, to June, 1913,

	1907–8.		1908–9.		1909–10.		1910–11.		1911–12.		1912–13.		Total.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Whites ..	90	61	26	66	68	60	104	79	62	78	44	64	394	408
Coloured ..	166	280	44	258	97	326	226	385	249	481	243	469	1,025	2,199
Asiatics ..	7	12	1	12	..	9	5	6	5	40	2	9	20	88
Totals ..	263	353	71	336	165	395	335	470	316	599	289	542	1,439	2,695

Recommendations Regarding Notification.

101. Your Commissioners, believing that the efficient notification of all cases of tuberculosis is a measure of primary importance upon which the effectiveness of all action for the control of the disease must largely depend, have to recommend:—

(*a*) That a system of compulsory notification of all forms of tuberculosis be introduced throughout the Union, based on the provision (modified as below indicated) of the Sections 28 and 29 of "The Public Health Amendment Act, 1897," of the Cape Province.

(*b*) That by "all forms of tuberculosis" is to be understood tuberculosis manifesting its presence by some other signs or symptoms than the mere reaction to a tuberculin test.

(*c*) That the form of certificate prescribed for the use of the certifying medical practitioner should provide for the rendering by him of the following particulars:—

(1) The form, stage, and approximate date of onset of the disease.
(2) The name, race, sex and age of the patient.
(3) The place of residence of the patient.
(4) The occupation and place of occupation of the patient.
(5) Is there any known connection between this and any other case of the disease?
(6) Have the other members of the family or household, or intimate associates been medically examined, and with what result as regards tuberculosis?
(7) Can the patient be satisfactorily dealt with at his own abode.
(8) Will the medical attendant undertake the supervision of necessary precautionary measures. (Vide paragraph 442.)
(9) The measures the local authority is recommended to take.
(10) Is the patient, or those in charge of or dependent upon him, in need of assistance, if so, of what kind?
(11) Has the case been notified at any other time to this or any other local authority. If so, when and where?

It should be made compulsory upon the medical practitioner in attendance on the patient to answer, to the best of his knowledge and belief, the questions numbered 1 to 5 of the above; the remaining questions being left in his option to reply to. Your Commissioners, however, wish to emphasize the point that the co-operation of the medical attendant in the taking of measures of precaution and aid should be sought whenever possible.

(*d*) That the fee for each such certificate be that now payable under the Cape law, namely two-shillings-and-sixpence; provided that it shall be competent for any local authority to increase this amount in respect of advice furnished under any of the questions numbered 6 to 11.

(*e*) That returns of all notifications received by local authorities be rendered periodically to the Central Government, together with such information relating thereto as the Government may require.

(*f*) That the Central Government be empowered to require local authorities to enforce in their respective districts the carrying out of the law relating to the notification of tuberculosis.

(*g*) That in any area in which there is no local authority charged with the care and preservation of the Public Health, the notification of tuberculosis should be made, in like manner and with like effect as to a local authority, to that Government official who is appointed to deal with the disease in such area.

The Compilation and Publication of Vital Statistics: Recommendations.

102. Your Commissioners would like to point out, in connection with the collection of statistics, that it is necessary that some Central Department should be made responsible for their collection, classification and compilation, so as to render them available in respect of suitable areas and periods for use and comparison by those requiring to consult them.

The continuous and systematic collection and issue of Vital Statistics by the Government is in other countries of the world so fully recognised as being a matter of national concern, that it would seem unnecessary to labour the point, were it not the fact that no system of collection and collation of such statistics on an uniform basis for the entire Union has been as yet inaugurated. Each Province is run by a separate Births and Deaths Registry on the varying enactments in force in the Province at the date of Union on the 31st May, 1910.*

Also in many cases the collection and preparation of such vital statistics as were undertaken in each Colony before Union, appear not to have been kept up, and statistical publications which at that time it was the established custom for the several Governments to issue annually, have been discontinued without being replaced; thus, for example, in the Cape Province, the Annual Report of the Registrar of Births and Deaths, the Annual Report of the Medical Officer of Health for the Colony, and the very valuable "Cape Statistical Register"; also in Natal the Annual Reports of the Medical Officer of Health for the Colony, the "Annual Statistical Year Book" of the Government Statistician, and the Annual Report of the Protector of Indian Immigrants, and in the Orange Free State the Annual Reports of the Medical Officer of Health for the Colony, have ceased to be issued.† [H. Millar, Questions 23778-79-86-91; -801-3, 6, 9-11; 850-57; -929, -990. W. H. Smit, Question 3015.]

CHAPTER VI.

The Present Extent of the Prevalence of Tuberculosis.

Preliminary observations.

103. As already explained it is very difficult to obtain reliable statistical evidence as to the extent to which tuberculosis at present prevails among the different races and in different places of the Union. Your Commissioners have examined a large amount of statistical material, but have found very little upon which, taken by itself, decided opinions as to the exact extent of the prevalence of this disease can be based. In the subjoined tables they submit the most reliable of the figures they have been able to prepare. After we have discussed these we will submit the conclusions we have arrived at on the subject from a consideration of all sources of information at our disposal.

* We understand, however, that the Central Registry of the Orange Free State is now merged in that of the Transvaal. The International Classification of Causes of Sickness and Death, was adopted for the Union, with effect from the 1st January, 1912, by Government Notice No. 401, dated the 2nd April, 1912 (J. J. Erlank, Questions 15736-37-40.)

† We note the following passage in the Report of the Director of the 1911 Census, dated 14th September, 1912: "At present it is proposed that, in addition to carrying out the quinquennial census provided for by the Act of Union, this office is to co-ordinate and publish annually statistics relating to the activities of the several public departments, which will arrange for the collection of such statistics."

We shall deal separately with each Province, in view of the fact that the statistics relating to each are somewhat different in character. This arrangement is the most convenient, as many of the conditions affecting the matter vary in the different Provinces.

We shall also consider separately urban and rural areas.

In this connection the particulars as regards methods of death registration given in Addendum "B" may advantageously be kept in mind.

104. Before considering the tables, it is necessary to refer to the following points:—

There are only two years in which the actual populations of the different areas are known with sufficient accuracy—the census years of 1904 and 1911. Hence attention must mainly centre upon these years. At the previous census of 1891, registration of births and deaths for practical purposes did not exist.

Registration in rural areas is generally so imperfect as to render the figures for these areas nearly valueless.

In the case of the Cape Province, statistics are only available in respect of that portion known as the Province Proper, that is the Province excluding Bechuanaland and the Native Territories. For the Province Proper there are returns for both urban and rural areas.

Regarding the Transvaal, figures are available in respect of urban areas, and to a limited extent of rural areas; but for the Orange Free State there are no data of any value concerning rural areas.

In the case of Natal no figures are procurable, except some very limited ones extracted from the Annual Health Reports of the Medical Officer of Health for the Colony prior to Union. There are none at all for Zululand.

Proportion of uncertified to medically certified deaths.

105. In the Cape, a not inconsiderable proportion of the deaths in the urban areas, and a major portion of those in the rural areas are medically uncertified. The same is the case in the Transvaal in respect of rural areas. This seriously invalidates the returns.

In the case of the urban areas in the Cape, the proportion of uncertified deaths has varied in different years from three to seven and a half per cent. for Europeans, and from eighteen to thirty per cent. for Other than Europeans. The proportion is least in the larger towns.

In the rural areas, the proportion of uncertified deaths is about seventy-five per cent. for Europeans, and over ninety per cent. for Other than Europeans.

The proportion of uncertified deaths is different for the different causes of death, owing to some "causes" being more popular with the lay diagnostician—such as "Fever," "Diarrhoea" and "Bronchitis."

The following return illustrates the foregoing. It gives the average proportion per cent. of medically uncertified deaths to all the deaths registered from certain causes, during the years 1904-1911, in the urban and rural areas of the Cape Province.

TABLE 6.—Shewing for the Cape Province, in respect of each of certain diseases, the percentage of uncertified deaths to all the deaths registered as from each such cause, during the years 1904–1911.

Registered Cause of Death.	Urban Areas.			Rural Areas.		
	Europeans.	Bantu Races.	Mixed and Other Coloured Races.	Europeans.	Bantu Races.	Mixed and Other Coloured Races.
Tuberculosis	3·76	30·56	19·74	70·34	95·30	83·38
Pneumonia	3·85	24·50	16·24	29·16	91·27	70·22
Bronchitis	7·23	39·75	26·39	69·63	95·72	81·78
Other respiratory diseases	14·28	71 46	56 06	91·87	98·82	96·92
		Other than Europeans. 26·91			Other than Europeans. 89·67	
All Causes	5·89			75·57		

In the course of evidence led before the Commission, it was asserted that owing to the prominence given to the subject of tuberculosis, there was a tendency

for an exaggerated number of the uncertified deaths to be put down to that disease. This would not appear to be borne out by the above figures, as the proportion which the uncertified deaths from tuberculosis bear to the deaths certified as having been due to tuberculosis, although greater than the corresponding proportion in pneumonia, is less than is the case in other chest diseases and in All Causes. The number of uncertified deaths from tuberculosis is therefore likely to be understated. The same holds good in the Transvaal.

Sources of error.

106. The accuracy of the figures, both as regards numbers and causes of death, may be deemed to diminish in the following order:—Both numbers and assigned causes may be taken as being practically accurate in the case of Europeans in urban areas, less so in rural areas; less for coloured and mixed, and still less for natives, the figures for both these races being of very little use in respect of rural areas.

Apart, however, from errors of registration, there is good reason to doubt the accuracy of the tabulation of the returns furnished to the Commission by the Cape Registry, especially those for the year 1911.

Also distinctions between coloured and native are not reliable. We have satisfied ourselves that that which one person classified as a native, another considers to be a bastard of coloured or mixed race. Therefore while we have given whenever possible the race distinction of "native" and "coloured," we have also at the same time given the combined figures for "All Other than Europeans."

It must not be forgotten that in a large number of instances the numbers are too small to be of any real significance. In a small population, one death more or less from tuberculosis makes a very great difference in the rate of mortality.

THE CAPE PROVINCE.

Comparison between the years 1904 *and* 1911.

107. In Table 7 are shown for the whole of the urban areas of the Cape Province Proper, the proportion of deaths respectively from tuberculosis and from All Causes, per hundred thousand of males, females and persons, living at each certain age groups, during the two census years, 1904 and 1911. The figures are given separately for Europeans and Other than Europeans, and the Other than Europeans are also divided into those of the Bantu race and the Mixed and Other Coloured races. Unfortunately the deaths from All Causes at each age group for the year 1911 have not been made available to the Commission.

In order that the statistical value of these figures may be gauged, a footnote is appended to the table, from which it will be seen that they relate to a total population of 601,624 in 1904, and of 593,098 in 1911; and that in the first mentioned year there were 2,680 deaths from tuberculosis and 16,647 deaths from All Causes, while in the latter year there were 2,126 and 14,290 deaths respectively. The decrease in the urban population has been entirely due to a decrease of 31,257 in the number of European males, and of 8,384 in the number of Bantu males. The urban population of females of all these races, and of male coloured, has in each case slightly increased.

It will be noticed that the proportion of uncertified cases among Europeans was from three to five per cent., and among coloured from twenty to twenty-five per cent.

TABLE 7.—Shewing, in respect of the census years 1904 and 1911, for the *Urban* Areas of the Cape Province (excluding Bechuanaland and the Native Territories), the proportion of deaths from Tuberculosis and from All Causes respectively, per hundred thousand of Males, Females and Persons living in each age period; separately for Europeans, Other than Europeans, Bantu and Mixed and Other Coloured Races.

Age Period.	Tuberculosis (All Forms).						All Causes.					
	1904.			1911.			1904.			1911.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
Europeans.												
All Ages	165	124	147	120	94	107	1,542	1,434	1,495	1,468	1,118	1,294
Under 1 year		*		275	206	242		*		15,075	11,232	13,220
1 year and under 5 years				51	60	56				1,110	1,099	1,109
Under 5 years	167	155	161	99	89	94				4,056	3,160	3,614
5 years	13	36	25	22	32	27				209	229	219
15 years	50	75	62	61	91	77				430	215	320
20 years	200	181	193	133	123	128		*		615	516	565
35 years	269	167	226	209	143	178				959	826	899
45 years	302	123	223	217	68	143				1,647	1,002	1,327
55 years and upwards..	186	129	157	197	132	164				5,411	3,976	4,694
Other than Europeans.												
All Ages	723	780	750	557	605	581	4,024	4,108	4,063	3,543	3,251	3,396
Under 1 year		*		983	826	904		*		34,979	32,315	33,625
1 year and under 5 years				680	577	629				6,431	6,635	6,534
Under 5 years	946	983	963	755	640	697				13,471	13,078	13,273
5 years	353	375	364	208	252	230				855	786	820
15 years	461	769	615	510	583	550				1,245	1,129	1,181
20 years	699	976	815	579	807	693		*		1,581	1,432	1,506
35 years	998	1,076	1,002	769	718	745				2,074	1,596	1,854
45 years	1,201	853	1,041	698	715	706				2,747	2,070	2,424
55 years and upwards..	1,028	571	798	749	632	688				6,820	6,401	6,316
Bantu Races.												
All Ages	778	807	789	607	572	591	4,136	4,609	4,325	3,649	3,490	3,575
Under 1 year		*		995	726	854		*		36,254	32,756	34,413
1 year and under 5 years				496	639	559				8,382	8,818	8,603
Under 5 years	681	743	713	628	664	638				15,794	15,589	15,690
5 years	250	387	319	199	257	229				943	949	946
15 years	648	888	752	457	476	467				1,465	952	1,195
20 years	768	1,046	860	649	722	680		*		2,111	1,356	1,790
35 years	1,087	885	1,023	829	790	814				2,326	1,581	2,035
45 years	1,155	1,047	1,114	809	505	682				2,405	1,862	2,179
55 years and upwards..	1,258	680	9,870	879	688	758				5,807	5,722	5,765
Mixed and Other Coloured.												
All Ages	687	769	728	529	618	576	3,949	3,885	3,917	3,485	3,148	3,309
Under 1 year		*		972	873	927		*		34,435	32,107	33,271
1 year and under 5 years				748	562	655				5,711	5,816	5,764
Under 5 years	1,048	1,083	1,066	803	636	720				12,581	12,071	12,329
5 years	393	370	382	172	250	231				822	723	772
15 years	339	719	547	538	633	592				1,128	1,212	1,175
20 years	636	942	873	528	845	701		*		1,192	1,466	1,341
35 years	914	1,066	986	724	683	704				1,885	1,604	1,743
45 years	1,234	767	998	627	806	719				2,965	2,159	2,564
55 years and upwards..	896	521	709	674	631	651				7,402	5,920	6,605

* The figures are not available to the Commission.

NOTE.—In order that the statistical value of the rates contained in the above Table may be gauged, the following particulars are given of the gross numbers upon which they are based :—

		Numbers of the Population.			Number of Deaths from Tuberculosis.				Number of Deaths from All Causes.			
		M.	F.	P.	M.	F.	P.	No. of uncertified deaths.	M.	F.	P.	No. of uncertified deaths.
Europeans ..	1904	170,151	133,400	303,551	280	165	445	11	2,624	1,913	4,537	270
	1911	138,894	138,564	278,458	168	130	298	15	2,054	1,550	3,604	239
Bantu Races ..	1904	63,884	42,523	106,407	497	343	840	248	2,642	1,960	4,602	*
	1911	55,500	47,883	103,383	337	274	611	187	2,025	1,671	3,696	1,421
Mixed & Other Coloured Races ..	1904	95,921	95,745	191,666	659	736	1,395	210	3,788	3,720	7,508	*
	1911	100,511	110,746	211,257	532	685	1,217	211	3,503	3,487	6,990	1,450
Totals	1904	329,956	271,668	601,624	1,436	1,244	2,680	469	9,054	7,593	16,647	3,617
	1911	294,805	297,193	593,098	1,037	1,089	2,126	413	7,582	6,708	14,290	3,110

* 3347 uncertified Bantu and Mixed combined.

In Urban Areas. Mortality from Tuberculosis among Europeans.

108. The annual mortality from all forms of tuberculosis during 1911 among Europeans living in the urban areas of the Cape Province Proper, was 107 per 100,000 of the population, or 120 per 100,000 of males and 94 of females.

These rates represent a very substantial decrease as compared with those for the year 1904, which were, for all European persons, 147, and for males and females 165 and 124 respectively, or a reduction of 27·3 per cent. for males; 24·2 per cent. for females and 27·2 per cent. for persons.

There is always some danger of error in comparing isolated years, because the mortality from tuberculosis may vary from year to year, owing to a variety of fortuitous circumstances, and without indicating any permanent alteration in the occurrence of the disease, but the above reduction is greater than could be ordinarily accounted for by the operation of chance factors, and moreover, as will appear from the consideration of the limited information we possess concerning other years, there is reason to attribute to it an actual decline in the occurrence of the disease.

109. It will also be observed that the fall in the rate of mortality appears to have taken place fairly consistently at all age periods, except between the ages five to twenty years for males, and fifteen to twenty years for females, and over fifty-five for both sexes. At these ages a well marked increase has occurred. The greatest decrease has taken place in the ages under five years. At the same time, too much stress must not be laid on these figures, as the numbers upon which they are based are small.

110. It is of importance to consider these rates with the general mortality from All Causes; as many of the circumstances which tend to reduce the general death-rate also tend to reduce the mortality from tuberculosis. We have no information concerning the mortality at different age groups during 1904, but, comparing the general mortality at all ages, we find that it has declined from 1,495 per 100,000 of persons in 1904, to 1,294 in 1911: a reduction of nearly 13½ per cent. This fall in the general mortality has been greatest among females, in whom it amounted to 22 per cent., while among males it was only 4·8 per cent.

Comparison with England and Wales.

111. It is also of interest to compare the extent of the mortality from tuberculosis among Europeans during 1911 with the mortality in England and Wales in the corresponding year. For this purpose it is necessary to make corrections for the differences in age and sex composition of the respective populations. We thus find that had the population of England and Wales enumerated at the census of 1911, died, at each age group, of tuberculosis at the same rate as occurred among Europeans in the urban areas of the Cape Province, the total mortality at all ages from this disease would have been 125 per 100,000 for males and 97 for females, or 112 per 100,000 of all persons.

The actual death-rates from All Forms of tuberculosis per 100,000 of males, females and persons at all ages which occurred in England and Wales in that year were respectively 167, 128 and 147. Hence we see that the mortality from the disease was, in the urban areas of the Cape Province, really about 25 per cent. less in the case of males than it was in England and Wales; and 24 per cent. less in the case of females.

If we compare the general death-rate from All Causes with that of England and Wales, we do not find the same great difference in favour of the European living in the urban areas of the Cape Province.

	Males.	Females.	Persons.
General death-rates from All Causes per 100,000 of Europeans, in 1911, living in urban areas of the Cape Province; corrected for age composition	1,563	1,219	1,397
General death-rates in England and Wales in 1911	1,558	1,367	1,456

Other than Europeans.

112. Taking now the Other than Europeans, it is seen from the above mentioned Table 7 that the mortality from tuberculosis in 1911 in the urban areas of the Province, was for males 557, for females 605, and for persons 581, per 100,000 of the respective populations. It was therefore from four to six times as great as among Europeans. This statement is true for nearly all the age periods.

In the case of the Other than Europeans, there has also been a very considerable fall in the rates in 1911 as compared with those in the year 1904, and, with the single exception of males at the age period 15 to 20 years, at which there was a slight increase, this fall has occurred consistently at all ages and for both sexes. The actual percentage decreases are 23.0, 22.4 and 22.5 for males, females and persons respectively.

113. It will also be observed that the general mortality from All Causes is also about three times as great as among Europeans, having been in 1911, for males 3,543, for females 3,251, and for all persons 3,396. These rates, however, showed a marked improvement on those of the year 1904, especially in the case of females; the percentage reduction being 12·0 for males and 20·9 for females.

Separating the Bantu races from those of the Mixed and Other Coloured, it is seen that the decline in the tuberculosis death-rates has been fairly consistent for both natives and coloured, except that the fall has been much greater for native females; the percentage reductions being:

Bantu	...	...	Males 22; females 29·1
Coloured	...	...	Males 23; females 19·6

We have no explanation to offer of this difference in the case of native females.

In both of these races the general mortality has also fallen between 1904 and 1911, namely by 17 per cent. in the case of Bantus, and 15·5 per cent. in that of coloured. In both races the extent of the fall has been greatest in the female population.

It would therefore seem that between the years 1904 and 1911, there has occurred a considerable and consistent fall of the tuberculosis and general death-rates among all races.

114. In order to investigate this question somewhat further, we would direct attention to the following Table 8, in which are given for each year from 1904 to 1911 the number of deaths of Europeans and of Other than Europeans registered in the urban and rural areas of the Cape Province Proper, from tuberculosis, together with the percentage proportion which such deaths bore to all deaths from All Causes.

As already explained, we do not know the correct numbers of the population in these years, but it would appear from this return that between 1904 and 1911 the proportion which the deaths from tuberculosis bore to all deaths was remarkably steady from year to year, both for Europeans and for Other than Europeans: so that the mortality from tuberculosis seems to have varied simultaneously with the general mortality from All Causes. It is therefore probable that the reduction in the tuberculosis death-rate which we have seen occurred in the year 1911 as compared with 1904, had been also occurring in the years intermediate to these two.

TABLE 8.—Giving a comparison of the number of Deaths from Tuberculosis and from All Causes in each of the years 1904 to 1911 in the Cape Province.

YEAR.	EUROPEANS.						OTHER THAN EUROPEANS.					
	Urban Areas.			Rural Areas.			Urban Areas.			Rural Areas.		
	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to deaths from All Causes.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to deaths from All Causes.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to deaths from All Causes.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to deaths from All Causes.
1904	445	4,537	9·81	119	2,443	4·87	2,235	12,110	18·45	1,522	11,694	13·01
1905	389	4,029	9·65	126	1,964	6·42	2,053	11,608	17·69	1,339	10,550	12·69
1906	407	4,004	10·16	137	2,248	6·09	2,104	11,836	17·78	1,481	10,164	14·57
1907	381	3,677	10·36	128	2,283	5·61	1,902	10,856	17·52	1,534	11,312	13·56
1908	337	3,528	9·55	145	2,146	6·76	1,915	10,080	19·00	1,468	11,209	13·10
1909	356	3,598	9·89	127	2,245	5·66	1,872	10,081	18·57	1,523	10,944	13·92
1910	347	3,620	9·59	121	2,307	5·24	1,826	11,075	16·48	1,544	11,580	13·13
1911	298	3,604	8·27	114	2,313	4·93	1,827	10,686	17·10	1,445	10,822	13·35
Total 1904–11 ..	2,960	30,597	9·67	1,017	17,949	5·67	15,734	88,332	17·81	11,856	88,275	13·43

In the chief towns of the Cape Province.

115. In the following Table 9 are given figures, as far as such are available, in respect of certain chief towns in the Cape Province, for the years 1896, 1904 and 1911. From this it will be seen that in the case of Europeans, both the death-rate from tuberculosis and the General death-rate from All Causes have fallen steadily since 1896; the following being the rates per 100,000:—

	1896.	1904.	1911.
Mortality from tuberculosis	196	155	105
General mortality from All Causes ...	2,067	1,425	1,287

In the case of Other than Europeans, although the General death-rate has steadily dropped, the mortality from tuberculosis increased in 1904, as compared with 1896; and although it fell again in 1911, it was still higher than in 1896. The rates per 100,000 for the three years being:—

	1896,	1904.	1911.
Mortality from tuberculosis	556	663	572
General mortality from All Causes ...	4,404	3,860	3,234

TABLE 9.—Comparison between the rates of mortality from Tuberculosis (All Forms) and from All Causes per hundred thousand of the European and Other than European populations of the chief towns combined, of the Cape Province, during the years 1896, 1904 and 1911, respectively.

	1896.*					1904.*					1911.*				
	Population.	Number of deaths from :—		Mortality per 100,000 from :—		Population.	Number of deaths from :—		Mortality per 100,000 from :—		Population.	Number of deaths from :—		Mortality per 100,000 from :—	
		Tuberculosis.	All Causes.	Tuberculosis.	All Causes.		Tuberculosis.	All Causes.	Tuberculosis.	All Causes.		Tuberculosis.	All Causes.	Tuberculosis.	All Causes.
Europeans															
Males	†	†	†	†	†	144,964	257	2,169	177	1,496	114,881	147	1,659	128	1,444
Females	†	†	†	†	†	112,808	143	1,505	127	1,334	112,901	93	1,273	82	1,128
Persons	132,916	260	2,747	196	2,067	257,772	400	3,674	155	1,425	227,782	240	2,932	105	1,287
Other than Europeans															
Males	†	†	†	†	†	125,960	818	4,843	649	3,845	115,261	634	3,968	550	3,443
Females	†	†	†	†	†	106,577	724	4,132	679	3,877	115,116	684	3,483	594	3,026
Persons	132,325	736	5,828	556	4,404	232,537	1,542	8,975	663	3,860	230,377	1,318	7,451	572	3,234
Bantu Races															
Males	†	†	†	†	†	48,570	341	1,981	702	4,079	36,327	219	1,339	603	3,686
Females	†	†	†	†	†	30,151	194	1,335	643	4,428	27,316	177	978	648	3,580
Persons	†	†	†	†	†	78,721	535	3,316	680	4,212	63,643	396	2,317	622	3,641
Mixed and Other Coloured															
Males	†	†	†	†	†	77,390	477	2,862	616	3,698	78,934	415	2,629	526	3,331
Females	†	†	†	†	†	76,426	487	2,797	637	3,660	87,800	507	2,505	577	2,853
Persons	†	†	†	†	†	153,816	964	5,659	627	3,679	166,734	922	5,134	553	3,079

* The figures for 1896 are in respect of twenty-one chief towns, and those for the years 1904 and 1911 are for fifty chief towns (including the twenty-one towns dealt with in 1896. In both cases Cape Town and the Cape Peninsula Municipalities are reckoned as one town, and Kimberley and Beaconsfield as one.

† Information not available.

Note.—For the years 1896 and 1904 the numbers of the deaths of Europeans and Other than Europeans have been corrected for those of persons occurring away from their ordinary place of residence.

116. In order to ascertain how far these conclusions hold good in the case of the individual towns, we have prepared Table 10, giving in respect of each of the 21 chief cities and towns of the Cape (Cape Town and the Peninsula municipalities being taken as one area, and Kimberley and Beaconsfield as one), the mortality per 100,000 of Europeans and Other than Europeans, from tuberculosis and from All Causes in each of the years 1896, 1904 and 1911. These figures have been carefully compiled, and those for the years 1896 and 1904, at least, may be taken as being reasonably reliable. The explanatory notes to this table should be perused.

TABLE 10.—Showing in respect of the 21 chief towns of the Cape Province, the mortality per hundred thousand of the European and Other than European populations, respectively, from Tuberculosis (All Forms) and from All Causes, during the years 1896, 1904 and 1911.

Name of Town.	EUROPEANS.						OTHER THAN EUROPEANS.						Numbers of the Bantu and of the Mixed and Other Coloured Races in the population at the 1911 census	
	1896.		1904.		1911.		1896.		1904.		1911.			
	Tuberculosis.	All Causes.	Tuberculosis.	All Causes.	Tuberculosis	All Causes.	Tuberculosis.	All Causes.	Tuberculosis.	All Causes.	Tuberculosis.	All Causes.	Bantu.	Mixed and other Coloured.
Cape Town and Suburbs ..	228	1,964	161	1,217	114	*	515	3,342	610	3,220	510	*	1,559	75,965
Port Elizabeth† ..	170	2,300	118	1,346	119	1,146‡	1,243	6,361	520	3,126	702	2,952‡	1,644	10,891
East London ..	109	1,323	82	1,213	72	1,174	171	2,729	417	2,039	479	2,737	6,851	1,919
Kimberley (including Beaconsfield)§	170	1,756	232	1,664	137	*	523	4,308	757	3,841	598	*	17,435	9,491
Stellenbosch ..	348	2,696	40	1,442	74	1,022	405	4,412	1,011	5,178	522	2,784	29	3,419
Malmesbury ..	81	2,271	102	916	57	*	136	1,897	1,138	3,631	760	*	4	1,574
Paarl	149	2,616	60	1,686	102	*	316	3,934	688	4,015	491	*	38	6,068
Worcester ..	253	1,814	111	1,616	30	*	513	4,024	884	5,143	871	*	71	4,520
Robertson	59	2,298	98	1,178	171	*	536	7,181	1,078	5,638	432	*	5	1,383
Swellendam ..	0	2,222	0	966	0	3,346	206	3,289	395	2,605	554	5,146	2	1,261
Mossel Bay ..	312	1,663	60	1,388	52	1,242	701	2,313	942	3,688	979	3,563	9	2,545
Oudtshoorn ..	280	3,084	217	1,592	108	1,353	703	7,028	1,063	4,719	311	4,781	178	5,281
Graaff-Reinet ..	237	3,016	123	1,776	128	*	646	7,243	796	5,740	639	*	1,387	2,838
Beaufort West ..	786	3,866	634	2,717	145	1,371	872	9,918	1,437	5,749	965	5,227	361	2,126
Cradock	624	2,765	327	2,423	161	*	106	4,813	701	4,673	1,136	*	1,369	1,975
Grahamstown ..	226	2,319	123	1,386	123	1,789	343	5,198	757	3,437	584	4,165	4,317	2,190
Queenstown ..	233	2,606	313	1,491	106	*	169	5,577	348	3,554	474	*	4,071	1,198
Aliwal North ..	621	2,751	228	1,763	35	1,486	153	4,354	210	3,860	492	3,253	1,761	883
Somerset East ..	0	1,747	108	1,841	59	*	298	4,819	890	4,838	634	*	1,440	1,873
Kingwilliam's Town	117	1,712	119	1,594	36	1,472	487	2,369	582	3,242	578	3,008	2,627	831
Uitenhage ..	78	1,690	150	1,377	64	*	1,375	9,184	925	5,297	785	*	2,378	2,971
Total ..	196	2,067	157	1,362	107	*	556	4,404	639	3,689	577	*	47,536	141,202
Populations ..	132,916		222,870		195,480		132,325		184,879		188,738			

* No information regarding the number of deaths from All Causes available to the Commission.

† There are a large number of natives employed in Port Elizabeth, but in 1902 they were compelled to reside in the New Brighton Government Location, outside the limits of the municipality; they do not appear therefore in the figures for 1904 and 1911.

‡ This is an understatement, as the person who prepared the return of deaths for All Causes in this municipal area omitted all deaths of persons who had not been resident in Port Elizabeth for three months prior to death, on the ground that such persons could not be said to belong to Port Elizabeth.

§ In Kimberley about two-thirds of the Bantu population are employed on the mines and reside in the mine native compounds.

Note.—The figures for the years 1896 and 1904 are taken from the Annual Health Reports of the late Medical Officer of Health for Cape Colony, and have been adjusted for the deaths of persons not dying at their ordinary place of residence.

The populations for 1896 are calculated in the usual way on the populations enumerated at the censuses of 1891 and 1904. Those for the years 1904 and 1911 are the actual census populations as at April. They are therefore not quite the true population at the mid-year, 30th June.

On the whole a fairly consistent fall has taken place in most of these towns in the mortality, both from tuberculosis and from All Causes, in the case of Europeans, but in respect of Other than Europeans there has not been any very decided reduction, while in a number of instances there has been a marked increase, and in most there has been considerable fluctuation.

It will be noted that the mortality from tuberculosis and the General death-rate among the Other than European are, in some of these towns, correlated to a heavy mortality from All Causes, as for instance, in Cradock a death-rate from tuberculosis of 1,136 per 100,000; in Beaufort West of 965; in Mossel Bay of 979; in Worcester of 871; in Uitenhage of 785; and in Port Elizabeth of 702; (much understated).

Broadly speaking, it may be said that an increase or decrease in the tuberculosis mortality has synchronised with an increase or decrease in the General mortality, but there have been more marked exceptions to this.

Immigrant Consumptives and Tuberculosis Mortality.

117. There is no evidence that in any town a rise or fall in the mortality rates for one race coincides with a rise or fall, as the case may be, in the rates for the other race. Nevertheless it is a noteworthy circumstance that the large labour centres, and the towns which have been in the past the bourn of European consumptives, are among those which display the greatest increase in the mortality from the disease among its Other than European inhabitants; such as Cape Town, Port Elizabeth and Kimberley, and the towns of Graaff-Reinet, Beaufort West, Cradock, Grahamstown, Queenstown and Aliwal North.

118. In this connection it is interesting to note that the decrease of the disease among Europeans in these towns has been largely due to a decrease in the number of deaths of European *males*; owing, we believe, to a lessened number of consumptives of late years immigrating into South Africa on account of the climate, For example:—

	1896.		1904.		1911.	
	Males.	Females.	Males.	Females.	Males.	Females.
Cape Town ..	46	27	100	37	60	40
Port Elizabeth ..	15	9	18	11	13	9
Kimberley ..	14	5	24	14	15	9
Oudtshoorn ..	6	2	6	3	3	3
Graaff-Reinet ..	5	2	2	3	4	1
Beaufort West ..	9	3	12	2	2	1
Cradock	12	2	9	1	3	2
Grahamstown ..	10	5	6	3	5	9
Queenstown ..	4	2	10	3	3	1
Aliwal North ..	7	0	3	1	0	1
	128	57	190	78	108	76

It is significant also that 45 per cent. of all the deaths from tuberculosis among Europeans in the urban areas occur between the age of 20 and 25 years. In the Other than Europeans 35 per cent. of all cases occur at those ages.

All Other Forms of Tuberculosis than Pulmonary.

119. In all of the foregoing figures all forms of the disease have been included in the term tuberculosis. It is of moment to ascertain the extent to which Other Forms of tuberculosis than the pulmonary occur. For the reason that the other forms of the disease are most common in children, and it is probable are due to the ingestion of tuberculous material, and, in a proportion of the cases, to the consumption of tuberculous food. There is little doubt but that the registration and record of such cases are defective. This is indicated by the fact that there are very few uncertified deaths registered from these causes; thus in 1904 there were altogether only six uncertified deaths therefrom (all Other than European) registered, as compared with 463 uncertified cases of pulmonary phthisis.

Indeed, as regards the figures for the year 1911, we believe them to be quite valueless, and we have therefore decided to discard them altogether.

Taking the year 1904, we have the following rates of mortality per 100,000 from all other forms of tuberculosis than pulmonary.

TABLE 11.—Showing the Death-rate per 100,000 in the Urban Areas of the Cape Province proper from All Other forms of Tuberculosis than pulmonary, during the year 1904.

	Males.	Females.	Persons.
Europeans :			
Under 5 years ..	111	93	102
Over 5 years	8	7	8
All Ages	18	17	18
Other than Europeans :			
Under 5 years	274	234	254
Over 5 years	36	29	33
All Ages	63	56	60
Bantu Races :			
Under 5 years	120	130	125
Over 5 years	39	24	33
All Ages	45	38	42
Mixed and Other Colovred Races :			
Under 5 years	334	276	305
Over 5 years	34	31	33
All Ages	74	65	69

120. In England and Wales in 1911 the mortality per 100,000 at all ages from all other forms of tuberculosis than Phthisis, was as follows:—

	Males.	Females.	Persons.
Under 5 years	210	175	193
Over 5 years	20	20	20
All Ages	41	36	38

The registered mortality from these forms of tuberculosis among Europeans in the urban areas of the Cape is therefore less than half of the amount occurring in England and Wales. Comparing the ratio which Other Forms bear to All Forms of the disease, we find it is only 1 in 6 in the Cape as compared with 1 in 4 in England and Wales.

How far this difference may be due to defective registration, how far to there being fewer sources of infection, or how far to the existence of a smaller amount of bovine tuberculosis, or to the greater use of tinned milk, it is impossible even to surmise.

In the Rural Areas of the Cape Province.

121. With regard to the occurrence of tuberculosis among the inhabitants of the rural areas of the Cape Province, the figures are incomplete and more or less unreliable for all races, more so in the case of natives and less so in the case of Europeans.

In Table 12 is given the same information regarding the rural areas of the Cape Province Proper as has been given in Table 7 in respect of urban areas.

TABLE 12.—Showing, in respect of the years 1904 and 1911, for the *Rural* Areas of the Cape Province (excluding Bechuanaland and the Native Territories), the proportion of deaths from Tuberculosis and from All Causes, respectively, per hundred thousand of Males, Females and Persons living at each age period; separately for Europeans, Other than Europeans, Bantu, and Mixed and Other Coloured Races.

Age Period.	Tuberculosis (All Forms).						All Causes.					
	1904.			1911			1904.			1911.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
Europeans.												
All ages	48	47	48	42	43	43	991	962	978	878	848	864
Under 1 year	*	*	*	112	122	117	*	*	*	8,794	7,948	8,389
1 year and under 5 years	*	*	*	24	19	21	*	*	*	1,017	953	986
Under 5 years	78	43	61	43	40	41	*	*	*	2,659	2,382	2,524
5 years	3	21	12	3	12	7	*	*	*	156	200	177
15 years	30	48	39	7	30	18	*	*	*	217	241	229
20 years	50	55	52	46	62	54	*	*	*	283	340	310
35 years	63	60	106	46	40	43	*	*	*	475	488	481
45 years	64	130	92	75	61	69	*	*	*	490	721	591
55 and upwards ..	146	74	115	170	111	144	*	*	*	3,529	3,342	3,448
Other than Europeans.												
All ages	220	259	239	187	231	209	1,841	1,824	1,832	1,604	1,519	1,562
Under 1 year	*	*	*	214	191	202	*	*	*	13,966	11,326	12,620
1 year and under 5 years	*	*	*	114	121	118	*	*	*	2,713	2,460	2,585
Under 5 years	150	150	150	136	137	137	*	*	*	5,258	4,484	4,865
5 years	80	110	95	62	85	73	*	*	*	423	451	437
15 years	173	301	236	125	182	154	*	*	*	491	562	526
20 years	312	381	347	237	357	300	*	*	*	672	835	757
35 years	277	382	326	229	339	281	*	*	*	805	959	878
45 years	376	476	422	333	374	351	*	*	*	1,160	1,116	1,140
55 years and upwards	467	292	383	466	396	434	*	*	*	3,321	2,939	3,143
Bantu Races.												
All ages	174	175	175	140	153	146	1,713	1,630	1,672	1,402	1,235	1,318
Under 1 year	*	*	*	111	63	87	*	*	*	10,235	8,100	9,139
1 year and under 5 years	*	*	*	63	76	70	*	*	*	2,460	2,160	2,307
Under 5 years	82	61	71	74	73	73	*	*	*	4,240	3,533	3,879
5 years	48	65	56	33	40	36	*	*	*	363	361	362
15 years	139	164	151	61	64	62	*	*	*	439	412	425
20 years	245	299	272	205	227	217	*	*	*	641	695	671
35 years	261	263	262	219	242	230	*	*	*	820	786	804
45 years	345	389	336	257	290	273	*	*	*	163	143	154
55 years and upwards	424	211	218	377	416	396	*	*	*	3,036	2,537	2,795
Mixed and Other Coloured Races.												
All ages	321	458	386	275	404	336	2,117	2,286	2,197	1,987	2,142	2,060
Under 1 year	*	*	*	438	482	460	*	*	*	22,120	18,694	20,399
1 year and under 5 years	*	*	*	220	220	220	*	*	*	3,238	3,110	3,174
Under 5 years	301	365	334	268	278	273	*	*	*	7,401	6,566	6,983
5 years	160	221	189	120	183	150	*	*	*	541	639	588
15 years	252	643	438	249	468	350	*	*	*	590	926	744
20 years	461	575	525	293	654	466	*	*	*	726	1,155	931
35 years	309	650	463	248	541	380	*	*	*	776	1,318	1,020
45 years	432	662	532	470	540	500	*	*	*	1,163	1,232	1,193
55 years and upwards	584	551	570	628	349	511	*	*	*	3,836	3,872	3,851

* The figures are not available to the Commission.

Note.—In order that the statistical value of the rates contained in the above Table may be gauged, the following particulars are given of the gross numbers upon which they are based.

		Numbers of the Population.			Number of Deaths from Tuberculosis.				Number of Deaths from all Causes.			
		M.	F.	P.	M.	F.	P.	No. of uncertified deaths.	M.	F.	P.	No. of uncertified deaths.
Europeans ..	1904	133,682	116,219	249,901	65	68	133	92	1,325	1,118	2,443	1,933
	1911	141,485	126,219	267,704	60	54	114	87	1,242	1,071	2,313	1,728
Bantu Races	1904	222,798	220,368	443,166	388	388	776	709	3,817	3,592	7,409	*
	1911	229,906	234,963	464,869	322	359	681	660	3,224	2,992	6,126	5,856
Mixed & Other Coloured Races ..	1904	102,571	92,429	195,000	333	425	758	566	2,172	2,113	4,285	*
	1911	120,934	107,025	227,959	333	432	765	589	2,403	2,293	4,696	3,777
	1904	463,009	431,803	894,812	786	881	1,667	1,367	7,314	6,823	14,137	12,279

From this it is seen that for Europeans the death-rate from tuberculosis was in 1911, 43 per 100,000 of persons. This is much less than half the rate obtaining in urban areas, and, unlike the urban mortality, it is practically the same for males as for females. Also there has been no marked reduction as compared with the year 1904.

122. The General death-rate for Europeans in rural areas was, in 1911, 864 per 100,000, being a decrease of about 11·7 per cent. on 1904.

If we compare the rural rates of mortality of Europeans in Table 12, from All Causes at the different age groups with those given in Table 7 for urban areas, we find that at every age period the rates are higher from 30 to 50 per cent. or even more, in the urban areas than in the rural.

This rate of mortality is obviously much too low for a settled rural community not greatly affected by migration. Corrected for differences of age composition, as compared with England and Wales this would represent a General death-rate of only 926 per 100,000. We have already seen that the death-rate in England and Wales, which may be taken as a type of a settled population living under healthy conditions, was, in 1911, 1,459 per 100,000.

It is evident that this rate is understated, for if we compare the total European death-rate in rural areas with the birth-rate for the year 1904, we find that these were respectively 8·64 and 28·76 per thousand of the population. These rates give a natural increment of 20·15 per thousand, or of over 5,000 per annum of the population. This would represent a total natural increment of births over deaths, between the intercensal period of seven years (1904-1911), of roughly 36,000. Whereas the actual increase in the European rural population in this period, as shown by the respective censuses, was only 17,800.

It is therefore fairly safe to infer from these considerations that not more than from two-thirds to three-quarters of the European deaths in rural areas are being recorded.

We have also seen that a very large proportion of those recorded are medically uncertified. In the face of these facts we are unable to believe that the figures given for tuberculosis indicate the true extent to which the disease prevails in the rural areas.

If this be the case regarding European deaths, the understatement must be very much greater in respect of those of Other than European. Nevertheless, in spite of this understatement the tuberculosis mortality rates are high, being for the Mixed and Coloured races, who probably report deaths more fully than the native, 336 per 100,000 of coloured persons. The figures show a slight drop in 1911 on those for the year 1904.

For natives the rural tuberculosis death-rate in 1911 was 146 per 100,000. Statistically it is of no value.

The Orange Free State.

123. In the Orange Free State registration of the deaths of Europeans only is carried out. It is probably fairly complete in the urban areas, but is manifestly defective in the rural areas, the General death-rate from All Causes per 100,000 in the latter areas in the year 1911, being males, 525; females, 605; persons, 562; which, of course, is an absurdity.

During 1904, out of a rural European population of 94,573, there were only sixteen deaths from tuberculosis recorded; and in the year 1911 only fifteen out of a population of 119,844. We therefore do not think it worth while to attempt to come to any conclusion on these figures.

In the urban areas practically all deaths registered are medically certified, there having been only seven uncertified in 1904, and none in 1911. Such uncertified deaths are treated by the registrar as though the cause of death were unknown.

124. In the following Table 13 is given the number of deaths from tuberculosis (All Forms) and from All Causes among Europeans in the urban areas of

the Free State during each of the years from 1904 to 1911, and the percentage proportion of deaths from tuberculosis to all deaths:—

TABLE 13.

Year ended 31st Dec.	All forms of Tuberculosis.			All Causes.			Proportion per cent. of deaths from Tuberculosis to deaths from All Causes.		
	Males.	Females.	Persons.	Males.	Females.	Persons.	Males.	Females.	Persons.
1904	50	13	63	431	309	740	11·60	4·19	8·51
1905	43	15	58	366	250	616	11·75	6·00	9·42
1906	37	14	51	375	257	632	9·87	5·45	8·07
1907	24	10	34	323	235	558	7·43	4·26	6·09
1908	24	5	29	290	201	491	8·28	2·49	5·91
1909	29	18	47	311	223	534	9·32	8·07	8·80
1910	27	8	35	332	274	606	8·13	2·92	5·78
1911	32	12	44	361	315	676	8·86	3·81	6·51
Total ..	266	95	361	2,789	2,064	4,853	9·54	4·60	7·45

These figures indicate that there has been a slight reduction in the proportion which the deaths from tuberculosis bear to deaths from All Causes, but this is not sufficient to warrant the belief that there has been any noteworthy reduction in the extent of the disease during during these eight years, except that probably fewer male consumptives from overseas have been coming to the Province.

It will be observed that for males the proportion which the mortality from tuberculosis bears to that from All Causes is about the same as obtains in the Cape Province (see Table 8), while that for females is only about half. This is due to the large proportion of deaths from tuberculosis of males as compared with females; and is also another indication of immigration of overseas cases. (See paragraph 83, Chapter 4.)

125. In Table 14 will be found the numbers and the rates per 100,000 of European deaths from Tuberculosis and from All Causes, respectively, at each age group, for the two years 1904 and 1911.

The actual numbers are small and therefore any deductions must be made with caution. A decrease in the tuberculosis death-rate would appear to have taken place between 1904 and 1911; and to a lesser extent there has been a decline in the General death-rate; the figures being:—

	Tuberculosis death-rate per 100,000.		General death-rate per 100,000.	
	Males.	Females.	Males.	Females.
1904	167	73	1,438	1,725
1911	106	48	1,197	1,270
Percentage reduction ..	36·4	33·3	16·7	26·4

The Commission is not in possession of detailed statistics relating to particular areas in this Province.

TABLE 14.—Showing the numbers of deaths from Tuberculosis and from All Causes, with the rate per 100,000, among Europeans in the urban areas of the Province of the Orange Free State, in the years 1904 and 1911.

Age Period.	Population.			Deaths from Tuberculosis (all forms).						Deaths from all Causes.					
				Numbers.			Rate per 100,000.			Numbers.			Rate per 100,000.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
1904.															
All ages ..	29,976	17,910	47,886	50	13	63	167	73	131	431	309	740	1,438	1,725	1,545
Under 1 year ..	687	627	1,314	2	1	3	291	159	228	148	122	270	21,543	19,458	20,548
1 year and under 5 years ..	1,327	1,337	2,664	3	1	4	226	75	150	32	32	64	2,411	2,393	2,402
Under 5 years ..	2,014	1,964	3,978	5	2	7	248	102	176	180	154	334	8,937	7,841	8,396
5 years	4,740	4,946	9,686	1	..	1	21	..	10	12	22	34	253	445	351
15 years ..	10,192	3,948	14,140	10	..	10	98	..	71	41	18	59	402	456	417
25 years ..	7,350	3,141	10,491	18	5	23	245	159	219	63	38	101	857	1,210	963
35 years ..	2,989	1,898	4,887	11	4	15	368	211	307	35	25	60	1,171	1,317	1,228
45 years ..	1,563	1,078	2,641	2	1	3	128	93	114	32	13	45	2,047	1,206	1,704
55 years and upwards ..	1,115	930	2,045	2	1	3	179	107	147	63	38	101	5,650	4,086	4,939
Unspecified ..	13	5	18	1	..	1	..	..	..	5	1	6	..	..	..
1911.															
All ages ..	30,170	24,809	54,979	32	12	44	106	48	80	361	315	676	1,197	1,270	1,230
Under 1 year ..	830	720	1,550	2	..	2	241	..	129	127	119	246	15,301	16,528	15,871
1 year and under 5 years ..	3,018	2,997	6,015	1	..	1	33	..	17	33	57	90	1,093	1,902	1,496
Under 5 years ..	3,848	3,717	7,565	3	..	3	78	..	40	160	176	336	4,158	4,735	4,441
5 years	5,436	5,650	11,086	..	2	2	..	35	18	12	18	30	221	319	271
15 years ..	7,487	5,456	12,943	3	1	4	40	18	31	21	13	34	280	238	263
25 years ..	5,987	4,131	10,118	13	1	14	217	24	138	36	19	55	601	460	544
35 years ..	3,597	2,768	6,365	4	3	7	111	108	110	25	25	50	695	903	786
45 years ..	2,031	1,619	3,650	5	2	7	246	123	192	32	17	49	1,576	1,050	1,336
55 years and upwards ..	1,779	1,464	3,243	4	3	7	225	205	216	45	47	122	4,216	3,210	3,762
Unspecified ..	5	4	9	..	..	..	..	..	..	..	..	..	..	..	..

The Transvaal.

Preliminary Remarks.

126. The death-registration statistics relating to the Transvaal are not very informing on the subject of tuberculosis. Only those relating to the Urban Areas are reliable, and in their case many of their populations are so small that ratios based on the individual figures have to be received with caution.

In the Rural Areas registration of Natives is not compulsory by law, except in proclaimed mining areas. This fact necessarily renders the figures for rural areas misleading, as they really only apply to small portions of the districts to which they nominally relate. Thus of the 2,223 deaths from tuberculosis registered in all the rural areas of the Transvaal between the years 1902-3 to 1911, 497 occurred in the Middelburg rural district in which are the coal mines, 402 in the Pretoria, in which is the Premier Diamond Mine, 120 in the Barberton, and 166 in the Boksburg-Germiston rural districts, both of the latter being gold mining areas; or over one half of the total number supposed to be recorded for the entire rural portion of the Province.

Owing, as already stated, to the absence of knowledge of the numbers of the population in other years than 1903-4 and 1911, the figures given mainly refer to those two years. In the case of the first mentioned year they relate to what was then the administrative year, July 1903 to June 1904, whereas the census population on which we have calculated our rates of mortality, was taken in April, 1904, instead of at the middle of the administrative year, *i.e.*, 31st December. The figures for 1911 apply to the calendar year, and the census population was taken in April of that year instead of June. The results, however, are sufficiently accurate, although, judging by the movements of the population at these periods, it is possible that both these populations are slightly understated in respect of

urban areas. It is regrettable that we are not able to furnish rates of mortality for age groups higher than thirty-five years, all occurrences at and over that age having to be lumped together.

In the Transvaal the population of "Other than European" consists almost entirely of Natives, the proportion of Mixed and Other Coloured races including Asiatics being very small. The two groups have, however, been distinguished by us when possible.

In dealing with mortality statistics for the Transvaal, the fact must be ever kept prominently in view that the mining industry, with its preponderating community subjected to special conditions affecting sickness and mortality, obscures the statistics relating to the general population of which that community forms a part. Also the constant exchange of native labourers with outside areas must disturb the mortality rates calculated for the general population of natives.

Deaths registered during the period 1902-1911.

127. In the subjoined Table 15 is given the number of deaths among the several races from tuberculosis, pneumonia and bronchitis, with the percentage proportion they formed of all deaths from All Causes, during the period of nine and a half years, from July, 1902, to December, 1911.

TABLE 15.—Giving the total number of deaths registered in the Urban and Rural Areas of the Transvaal during the period July, 1902, to December, 1911, from Tuberculosis and certain other Causes, and the proportion they bear to the deaths from All Causes.

	European.				Asiatic.				Coloured.				Native.			
	Certified.	Uncertified.	Total.	Percentage proportion of all deaths.	Certified.	Uncertified.	Total.	Percentage proportion of all deaths.	Certified.	Uncertified.	Total.	Percentage proportion of all deaths.	Certified.	Uncertified.	Total.	Percentage proportion of all deaths.
Urban.																
Tuberculosis	2,175	5	2,180	8·41	416	..	416	9·62	357	3	360	9·21	9,332	55	9,387	15·47
Pneumonia ..	2,547	21	2,568	9·90	401	3	404	9·34	609	17	626	1·60	18,571	306	18,877	31·11
Bronchitis ..	740	11	760	2·93	124	1	125	2·89	230	9	239	6·11	1,448	124	1,572	2·49
All Causes ..	25,608	324	25,932	..	434	12	4,326	..	3,762	147	3,909	..	59,092	1,576	60,668	..
Rural.																
Tuberculosis	291	74	365	2·92	23	1	24	7·36	37	24	61	6·92	1,527	696	2,223	9·48
Pneumonia ..	631	664	1,295	10·37	17	4	21	6·44	42	71	113	12·82	3,364	2,293	5,657	24·12
Bronchitis ..	199	199	398	3·19	3	..	3	0·92	13	23	36	4·08	421	596	1,017	4·34
All Causes ..	6,194	6,293	12,487	..	308	18	326	..	386	495	881	..	12,550	10,904	23,454	..

It will be observed from this table that the proportion of uncertified deaths is small in the urban areas, being only four per cent. among the Coloured class, which has the largest proportion. That the proportion of uncertified deaths among natives is so small is due to the fact that so many of them are employed industrially and are provided with medical attendance, in connection with their employment.

In the rural areas over a half of the deaths are uncertified. Here also the proportion of certified deaths among natives is higher than would have been expected, but, as already pointed out, a large proportion of these deaths are of labourers on mines, most of which employ medical officers.

In this table particulars regarding pneumonia and bronchitis have been given, because the former of these diseases is very prevalent among natives on the mines, and may have some connection with the occurrence of tuberculosis, as a predisposing cause.

It will be noted that for Europeans, while the proportion which tuberculosis bears to the total deaths from All Causes is reduced in the rural areas to a third of what it is in the towns, the proportion in the case of pneumonia and bronchitis remain about the same.

In the case of natives it is seen what an enormous proportion of the deaths are due in the urban areas to tuberculosis and pneumonia, and that although much reduced in the rural areas—(the proportion of tuberculosis more so than that of pneumonia)—these two diseases still remain responsible for over a third of the deaths. This, however, owing to the inclusion of mining and purely rural events

in the one figure is an understatement as far as the mining areas are concerned, but is an overstatement if applied to the entire rural areas. This is demonstrated by an examination of the Middelburg and Pretoria rural areas, in which we know are respectively situated the Coal mining and Diamond mining industries. We here find the following native deaths during the period of 1902-1911

	Middelburg.	Pretoria.
Deaths from tuberculosis	497	402
Deaths from pneumonia	571	1,562
Deaths from all causes	2,432	3,939
Percentage of tuberculosis to all deaths	20.5	10.2
Percentage of pneumonia to all deaths... ...	23.5	39.7

128. In the urban areas both Asiatics and Coloured display a large proportion of deaths from tuberculosis, but of pneumonia the proportion is somewhat high (9·34) amongst the Asiatics and small among the Coloured, for whom on the other hand the rate for bronchitis is exceptionally high. We are not in a position to explain this.

In the rural areas the numbers are too small to admit of deductions.

The proportion of deaths from Tuberculosis to all deaths from All Causes.

129. In the following Table 16 is given the number of deaths from Tuberculosis and from All Causes, with the percentage which the former bears to the latter, for each of the years 1902-3 to 1911. These figures are given separately in respect of Europeans and Other than Europeans, and of urban and rural areas.

TABLE 16.—Giving for each year of the period 1902-1911, the number of deaths from Tuberculosis and from All Causes registered in the Urban and Rural Areas of the Transvaal, and the percentage proportion which the deaths from Tuberculosis bore to All Causes.

	Europeans.						Other than Europeans.					
	Urban Areas.			Rural Areas.			Urban Areas.			Rural Areas.		
	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to All Causes.	Number of Deaths from Tuberculosis.	Number of deaths from All Causes	Percentage of deaths from Tuberculosis to All Causes.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to All Causes.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Percentage of deaths from Tuberculosis to All Causes.
1902–3 ..	179	2,334	7·7	13	821	1·6	419	5,362	7·8	52	1,046	5·0
1903–4 ..	209	2,994	7·0	35	1,203	2·9	515	6,899	7·5	204	2,368	8·6
1904–5 ..	220	2,450	9·0	43	1,276	3·4	703	6,231	11·3	233	2,675	8·7
1905–6 ..	202	2,851	7·1	49	1,490	3·3	1,005	6,808	14·8	334	3,520	9·5
1906–7 ..	226	2,534	8·9	39	1,420	2·7	944	6,428	14·7	340	3,453	9·8
1907–8 ..	221	2,377	9·3	47	1,329	3·5	1,039	6,641	15·6	284	3,057	9·3
1908–9 ..	217	2,765	7·8	31	1,539	2·0	1,507	8,391	17·9	237	2,473	9·6
1909–10 ..	246	2,645	9·3	37	1,224	3·0	1,488	8,085	18·4	237	2,335	10·1
1910 (July to December ..	128	1,748	7·3	22	709	3·0	847	4,849	17·5	121	1,106	10·9
1911	332	3,234	10·3	49	1,476	3·1	1,696	9,209	18·4	266	2,628	10·1
Total ..	2,180	25,932	8·4	365	12,487	2·9	10,163	68,903	14·7	2,308	24,661	9·4

The year 1902-3 is hardly likely to be accurate as it was too soon after the war for registration to have become normal. Apart from this year, however, it will be noted that the figures for the individual years are remarkably consistent thoughout the period, and that, except in the case of other than Europeans in urban areas, there has been no great variation from year to year. Thus in urban areas an average of about 8·5 per cent. of the total number of deaths has been due to tuberculosis, and in rural areas about three per cent.

Also as regards other than Europeans in the rural areas the proportion has remained fairly steadily in the neighbourhood of 10 per cent. But in the urban areas, there has been a nearly steady rise throughout the period, culminating in a percentage of 18·4 of tuberculosis to all deaths. This has been due to the preponderating influence of the mining industry on the Rand with its heavy mortality.

Indeed this area is responsible for almost the whole of the deaths from tuberculosis, as is seen below:—

	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8	1908–9	1909–10
Johannesburg	188	189	264	406	369	399	488	410
Germiston ..	93	100	110	115	92	153	247	230
Boksburg ..	37	49	116	246	201	170	257	286
Benoni ..	..	..	..	..	65	85	130	154
Springs ..	18	5	12	18	19	14	26	53
Roodepoort-Maraisburg	12	45	64	79	73	78	136	142
Krugersdorp..	15	29	49	69	52	69	99	101
Total	363	417	615	933	871	968	1,383	1,376

These figures serve to illustrate the extent to which the mine statistics overshadow those for the rest of the country.

Mortality of Europeans at different age groups from Tuberculosis.

103. In the Table 17 are given figures showing for Europeans, the incidence at the main age group of the mortality from tuberculosis (excluding Miner's Phthisis), pneumonia and all causes in the principal urban areas of the Transvaal, in the two years 1903-4 and 1911.

TABLE 17.—Showing the rates of mortality per 100,000 of Europeans at different age periods from Tuberculosis (excluding Miners' Phthisis), Pneumonia and All Causes in Urban centres of the Transvaal,* during the years 1903-4 and 1911.

Age Period.	1903-4.			1911.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
Tuberculosis (All Forms).						
All ages	137	44	101	132	48	97
Under 1 year	223	47	137	59	183	120
1 year and under 5 years	18	76	47	58	26	42
5 years	15	22	18	5	10	7
15 years	67	18	43	31	34	33
20 years	148	54	117	114	78	10
35 years and upwards ..	215	51	159	258	43	179
Pneumonia.						
All ages	268	125	213	119	111	115
Under 1 year	1,247	987	1,121	1,246	1,222	1,234
1 year and under 5 years	209	114	178	174	224	198
5 years	15	15	15	24	24	24
15 years	50	71	61	42	45	44
20 years	210	83	169	73	34	60
35 years and upwards ..	459	188	367	127	98	112
All Causes.						
All ages	2,010	1,556	1,834	1,422	1,146	1,306
Under 1 year	22,004	18,806	20,448	15,044	13,203	14,137
1 year and under 5 years	2,326	1,709	2,022	1,407	1,334	1,371
5 years	411	338	375	350	196	273
15 years	925	697	814	294	330	311
20 years	1,261	776	1,102	724	536	678
35 years and upwards ..	2,490	1,540	2,168	1,866	1,265	1,644

* Namely, Barberton, Ermelo, Heidelberg, Klerksdorp, Middelburg, Volksrust, Standerton, Pretoria, Pretoria Suburbs, Potchefstroom, Johannesburg, Germiston, Springs, Benoni, Boksburg, Pietersburg, Roodepoort—Maraisburg, Krugersdorp.

It is seen that on the whole the European mortality from tuberculosis has not greatly altered between 1903-4 and 1911; but if anything there has been some reduction.

On comparison with the figures given for the Cape (Table 7) it is found that the rates generally are for males somewhat less, and for females less than half of those respectively obtaining in that Province.

With regard to the general death-rate, a marked fall took place in 1911, as compared with 1903-4. The rate in 1903-4 considerably exceeded that of the Cape Province, but in 1911 it was practically the same.

The following is a comparison of the Transvaal Urban European death-rate from tuberculosis (excluding Miner's Phthisis), and from all causes, with those for England and Wales in 1911, after correction for differences in age composition.

	Tuberculosis.			All Causes.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
Transvaal	126	46	99	1,415	1,040	1,250
England and Wales ..	167	128	147	1,558	1,367	1,459

Assuming that the registration is complete, the Transvaal European mortality is markedly less than that in England and Wales.

As regards the rural areas of the Transvaal, the proportion of tuberculosis among Europeans in each of these years appears to be very small and occurs chiefly among males. The figures may be an understatement of the actual amount, but even allowing liberally for this, the rates of mortality would still be small. The following are the actual rates per 100,000:—

	Tuberculosis.			All Causes.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
1903-4	42	11	28	1,007	906	963
1911	42	13	29	908	839	876

Mortality from other forms of Tuberculosis than Pulmonary.

131. The figures for tuberculosis in Table 17 include, as elsewhere throughout this Transvaal section, unless otherwise stated, all deaths registered from all forms of tuberculosis. The number of deaths recorded from other forms of the disease than phthisis is very small, and the rates in urban areas per 100,000 of the population at all ages were for 1903-4 and 1911 as follows:—

	1903-4.			1911.		
	Males.	Females.	Persons.	Males.	Females.	Persons.
Europeans	9	10	9	4	9	7
Other than Europeans..	(Figures not available for this year.)			32	9	30

We may be sure that these rates are understated.

The figures for pneumonia are given in the above table for the reason already mentioned. The large mortality due to this cause at ages under one year is noteworthy. It will be observed that the mortality at adult age was considerably less in 1911 as compared with 1903-4.

Mortality from Tuberculosis in the towns.

132. In Table 18 we give in respect of Europeans, natives, and mixed and coloured persons, the rates of mortality per 100,000 from tuberculosis and from all causes, for the two years 1902-3 and 1911 in certain groups of towns.

In the first group are comprised the municipalities of the Witwatersrand, and it therefore includes a large portion of the gold mining industry.

In the second group are the larger towns, of generally over two thousand inhabitants, including Pretoria and its suburbs.

In the third group are contained the smaller towns and villages. The numbers in this group are too small, however, to produce reliable rates.

Making allowances for possible errors consequent upon dealing with small numbers of events, and assuming that the death registration has been equally complete in each group, this table is interesting as showing the generally diminishing mortality, both from tuberculosis and from all causes, as we descend from the larger industrial towns to the smaller towns and villages. This is particularly marked in the case of Europeans.

Comparing the year 1911 with 1903-4, it is seen in this Table 18 that as regards Europeans, the mortality from tuberculosis (including such cases of miner's phthisis as were registered), has remained practically stationary on the Witwatersrand, but that the mortality from this cause and the general death-rate from all causes markedly diminished in every other instance in the year 1911.

With regard, however, to these tuberculosis death-rates on the Witwatersrand, it is to be remembered that they include all deaths from Miner's Phthisis, and that this cause of death among males has enormously increased between the years 1903-4 and 1911, as is shown in the next paragraph. If these deaths be deducted then a decrease in the tuberculosis death-rate of male Europeans has occurred, namely, from 156 in 1903-4, to 119 in 1911. But it is probable some deaths from Miner's Phthisis in 1903-4 were registered as tuberculosis.

As regards natives, the mortality from tuberculosis had considerably increased in both Groups I. and II., during 1911, although the general death-rate had in every case, except of females in Group I., decreased to a surprising extent.

The mortality from tuberculosis on the Witwatersrand during 1911 reached among natives the following very high rates per 100,000:—

Males 599; females 376; persons 588.

As regards mixed and coloured persons their numbers are so small in Group III., that no attention can be paid to rates of mortality worked out on them. In the Rand municipalities the death-rate from tuberculosis was higher in 1911 for males, but for females it showed considerable reduction, as also did the general death-rate for both sexes.

In other chief towns the coloured mortality, both from tuberculosis and from all causes, was about the same in 1911 as in 1903-4.

TABLE 18.—Giving the mortality from Tuberculosis and from All Causes among Europeans, Natives, and Mixed and Coloured persons, in certain Groups of Towns in the Transvaal, during the years 1903-4 and 1911.

Race and Sex.	1903–4.					1911.				
	Population.	Number of deaths from Tuberculosis.	Number of deaths from All Causes.	Mortality per 100,000 from tuberculosis.	Mortality per 100,000 from All Causes.	Population.	Number of deaths from tuberculosis.	Number of deaths from All Causes.	Mortality per 100,000 from tuberculosis.	Mortality per 100,000 from All Causes.
***Witwatersrand Municipalities**										
Europeans:										
Males	68,748	143	1,362	208	1,981	103,180	261	1,533	209	1,486
Females	41,245	15	646	36	1,566	74,814	41	900	55	1,203
Persons	109,993	158	2,008	144	1,825	177,994	302	2,433	170	1,367
Bantu:										
Males	111,013	361	4,951	325	4,460	247,360	1,483	7,433	599	3,005
Females	7,865	22	210	280	2,670	13,043	49	441	376	3,381
Persons	118,878	383	5,161	322	4,341	260,403	1,532	7,874	588	3,024
Mixed and Coloured:										
Males	11,697	24	309	205	2,642	14,721	36	287	244	1,949
Females	4,600	11	158	239	3,435	8,138	16	221	197	2,716
Persons	16,297	35	467	215	2,865	22,859	52	508	227	2,222
†Other Chief Towns.										
Europeans:										
Males	25,332	29	558	114	2,203	33,512	19	416	57	1,241
Females	17,637	11	309	62	1,752	25,244	10	254	40	1,006
Persons	42,969	40	867	93	2,018	58,756	29	670	49	1,140
Bantu:										
Males	20,408	50	673	245	3,121	24,339	74	411	304	1,689
Females	5,200	27	296	519	5,692	8,304	17	158	205	1,903
Persons	25,608	77	969	301	3,784	32,643	91	569	279	1,743
Mixed and Coloured:										
Males	4,971	7	97	141	1,951	4,274	6	76	140	1,778
Females	2,553	4	58	156	2,272	2,671	10	69	374	2,583
Persons	7,524	11	155	146	2,060	6,945	16	145	230	2,088
‡Smaller Towns.										
Europeans:										
Males	4,119	4	68	97	1,651	4,738	0	57	..	1,203
Females	3,118	3	51	96	1,636	4,258	1	43	23	1,009
Persons	7,237	7	119	97	1,644	8,996	1	100	11	1,112
Bantu:										
Males	3,458	6	74	172	2,140	4,479	..	57	..	1,273
Females	1,991	2	48	100	2,411	2,473	2	35	81	1,415
Persons	5,449	8	122	147	2,239	6,952	2	92	29	1,323
Mixed and Coloured:										
Males	353	..	10	..	2,833	623	2	5	321	802
Females	211	2	14	948	6,635	349	..	3	..	859
Persons	564	2	24	355	4,255	972	2	8	206	823

* Johannesburg, Germiston, Boksburg, Springs, Roodepoort, Maraisburg and Krugersdorp in 1904 and the same towns with Benoni in 1911; the latter being a rural area in 1904.

† Pretoria, Barberton, Christiana, Ermelo, Heidelberg, Vereeniging, Klerksdorp, Middelburg, Potchefstroom, Standerton, Volksrust and Pietersburg in 1904; and these with Pretoria Suburbs in 1911.

‡ Bethal, Schweizer-Reneke, Carolina, Lichtenburg, Lydenburg, Belfast, Zeerust, Piet Retief, Ventersdorp, Rustenburg, Wakkerstroom, Nylstroom and Wolmaransstad in 1904; and these with Amersfoort and Potgietersrust in 1911.

In Table 19 the particulars given in the last preceding table are furnished in detail in respect of each of the towns included in Groups I. and II.

TABLE 19.—Giving the rates of mortality per 100,000 from Tuberculosis and from All Causes, during the years 1903–4 and 1911, in certain Towns of the Transvaal.

A. EUROPEANS.

Name of Town.	Death-rate from Tuberculosis.						General Death-rate all Causes.					
	1903–4.			1911.			1903–4.			1911.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
Barberton	134	213	165	181	196	188	2,554	1,064	1,977	2,355	392	1412
Christiana	236	..	131	181	..	90	1,296	1,632	1,445	1,630	1,431	1,530
Ermelo	..	..	..	..	..	..	840	2,076	1,307	1,333	476	928
Heidelberg	280	131	218	..	..	..	1,492	1,307	1,415	894	812	854
Vereeniging	..	..	..	..	..	..	1,929	2,963	2,242	1,099	1,304	1,178
Klerksdorp	435	92	269	..	..	..	2,437	1,389	1,929	1,970	1,203	1,582
Middelburg	63	..	37	..	244	115	3,109	1,388	2,382	985	1,096	1,037
Potchefstroom	..	..	..	..	..	..	2,322	1,423	1,912	856	844	851
Standerton	151	123	140	..	..	..	3,933	2,703	3,464	1,733	1,340	1,548
Volksrust	..	..	..	123	..	63	2,138	2,011	2,086	1,348	1,842	1,586
Pietersburg	99	..	61	245	..	133	1,193	1,140	1,173	1,471	733	1,135
Pretoria	110	84	99	74	50	64	2,100	1,951	2,041	1,291	1,079	1,266
*Pretoria Suburbs	..	..	..	30	34	32	..	..	..	949	711	838
Johannesburg	213	44	149	202	48	135	2,254	1,654	1,906	1,449	1,221	1,350
Germiston	295	..	197	357	99	257	2,624	1,355	2,203	1,577	1,319	1,476
*Benoni	..	..	..	221	62	162	..	..	..	1,398	1,061	1,273
Boksburg	142	..	96	483	111	338	1,567	1,243	1,461	1,918	1,069	1,587
Springs	139	..	89	220	..	133	558	1,241	804	990	335	731
Roodepoort-Maraisb rg	89	53	76	263	..	157	1,040	1,316	1,139	1,161	1,164	1,162
Krugersdorp	169	..	101	378	58	251	1,331	1,172	1,267	1,611	1,214	1,454

B. BANTU RACES.

Barberton	100	..	83	313	..	294	2,309	..	2,220	2,188	..	2,055
Christiana	..	..	..	548	605	576	3,846	2,193	3,180	4,391	3,632	4,035
Ermelo	..	..	..	463	..	328	891	581	805	2,469	2,632	2,516
Heidelberg	284	..	203	..	..	..	2,702	1,779	2,439	1,058	1,083	1,066
Vereeniging	741	909	789	116	376	178	16,666	8,182	14,210	581	1,128	710
Klerksdorp	358	1,548	929	1,558	549	1,140	6,921	12,258	9,485	4,675	4,396	4,559
Middelburg	102	704	143	309	..	253	2,103	4,225	2,248	618	699	633
Potchefstroom	850	851	850	195	189	192	6,421	8,369	7,199	1,709	1,259	1,513
Standerton	63	264	102	..	..	..	2,776	4,348	3,056	1,485	2,008	1,637
Volksrust	..	..	..	..	258	118	2,621	3,247	2,649	3,030	1,546	2,353
Pietersburg	243	..	211	398	93	282	4,058	2,116	3,800	967	93	635
Pretoria	264	296	269	318	216	298	2,911	4,492	3,098	1,935	2,509	2,052
*Pretoria Suburbs	..	..	..	47	309	82	..	..	..	284	1,235	410
Johannesburg	256	391	265	545	321	535	3,739	3,750	3,740	2,923	3,557	2,950
Germiston	535	108	514	620	406	611	5,745	2,263	5,574	2,815	3,248	2,833
*Benoni	..	..	..	548	88	525	..	..	..	2,732	1,502	2,670
Boksburg	516	198	500	726	851	737	6,690	1,389	6,417	3,400	3,793	3,434
Springs	137	..	125	2,283	..	2,061	5,419	2,023	5,124	6,079	3,209	5,801
Roodepoort-Maraisburg	317	209	307	700	289	683	3,205	1,113	3,000	3,594	4,816	3,647
Krugersdorp	242	247	242	432	146	417	5,135	1,854	5,081	2,606	2,928	2,612

C. MIXED AND OTHER RACES.

Barberton	833	..	546	..	..	..	1,667	..	1,093	1,235	..	662
Christiana	..	..	..	1,163	..	641	2,459	3,158	2,765	2,326	2,857	2,564
Ermelo	..	..	..	..	..	..	2,703	..	1,695	1,099	1,613	1,307
Heidelberg	..	..	..	552	..	366	2,409	3,333	2,757	1,657	3,261	2,198
Vereeniging	2,000	..	1,316	..	..	..	6,000	3,846	5,263	2,256	1,613	2,051
Klerksdorp	766	2,255	1,152	..	..	..	2,682	6,358	4,147	1,224	2,061	1,595
Middelburg	521	..	377	..	..	..	3,646	1,370	3,019	1,613	1,886	1,695
Potchefstroom	..	..	..	..	..	..	2,144	2,485	2,293	1,811	2,841	2,247
Standerton	..	..	..	..	..	..	1,534	1,219	1,428	..	4,545	1,623
Volksrust	..	..	..	..	..	..	2,062	..	1,492	2,197	..	1,600
Pietersburg	..	..	..	..	..	..	..	..	..	1,205	2,000	1,389
Pretoria	82	98	87	202	821	438	1,720	1,765	1,733	2,220	2,874	2,469
*Pretoria Suburbs	..	..	..	..	..	..	..	..	..	..	781	306
Johannesburg	236	265	244	269	221	250	3,000	3,550	3,164	1,891	2,792	2,240
Germiston	80	400	133	69	196	102	1,521	2,800	1,734	1,999	2,152	2,037
*Benoni	..	..	..	255	..	183	..	..	..	1,911	973	1,665
Boksburg	341	..	256	381	..	272	1,192	2,072	1,410	2,515	3,409	2,772
Springs	..	..	..	..	..	..	..	..	..	1,212	5,333	2,500
Roodepoort-Maraisb rg	..	..	..	147	..	96	..	..	..	2,203	833	1,729
Krugersdorp	..	..	..	196	404	264	1,905	2,812	2,155	1,667	3,636	2,310

*Rural areas in 1904.

Note that the population of some of the races (especially the Mixed and Other Coloured) in certain of these towns is too small to furnish significant ratios of mortality, more especially in respect of tuberculosis.

Silicosis or Miner's Phthisis.

133. In all the above tables, all cases of miner's phthisis have been included under tuberculosis, except in Table 17, in which they have been excluded. As far as the registration of deaths is concerned, it is very doubtful to what extent deaths recorded as miner's phthisis were really due to silicosis and not to tuberculosis. It is not infrequently assumed by the uninformed that any case of tuberculosis which has originated on the mines should be termed miner's phthisis. On the other hand, in the majority of advanced cases of this disease the tubercle bacillus is present in the lungs. On the whole, therefore, we have considered it best to include the deaths returned as miner's phthisis in all of the tables, except Table 17, in which a comparison of the mortality at different age periods is given.

The actual number of deaths registered from miner's phthisis is not great, as the following figures show; but relatively to the deaths from tuberculosis they represent an increasing proportion, being in 1911 greater than the number of deaths from the latter disease, whereas in 1903-4 they only constitute a third.

	1903–4.		1911.	
	Europeans.	Natives.	Europeans.	Natives.
Johannesburg	20	3	52	43*
Germiston..	10	4	17	13
Boksburg	1	..	25	3
Benoni	..	..	8	5
Springs	..	..	1	..
Roodepoort-Maraisburg ..	2	1	8	1
Krugersdorp	3	9	26	22
Barberton	..	..	1	..
Klerksdorp	..	..	..	1
Potchefstroom	..	..	..	1
Pietersburg	..	..	..	1
Ermelo	..	..	..	3
Total ..	36	17	138	93
Rural Areas	4	..	10	..
Total ..	40	17	148	93

* Including one Asiatic.

Conclusions.

134. The conclusions we come to from a consideration of the statistics for the Transvaal, is that tuberculosis does not prevail among Europeans to any serious extent except in the larger urban areas, and that even in these the extent is not great and occurs mainly among males. It is probable that could we differentiate between those employed on the mines and those otherwise engaged, it would be found that a large proportion of the disease among males is connected with that employment. It is certain that a large proportion have been imported cases from overseas.

As regards European females the amount of tuberculous disease is small, both in urban and rural areas, it being less than half what it is in the urban areas of the Cape Province, and barely a quarter of the amount obtaining in England and Wales.

If, however, the amount of tuberculosis is small, still it cannot be said that it is on the decrease.

Also the general death-rate from all causes of Europeans in the urban areas of the Transvaal, after correcting for difference of age composition, compares favourably with the Cape and with England and Wales. (Compare paragraphs 111 and 130). Moreover, it shows signs of decreasing.

As to Natives, so far as the statistics go, they indicate that a very severe mortality both from tuberculosis, from pneumonia, and from all causes is taking place in the urban and especially the mining centres, and that the mortality from tuberculosis is on the increase. Outside of these areas the death registration affords us no information.

Of coloured persons the mortality from tuberculosis and from all causes is high, but on the whole it compares favourably with the Cape, from whence this class is mainly recruited.

IN NATAL.

Preliminary Remarks.

135. Concerning Natal, very little statistical information is available. We have already alluded (Chapter V, paragraph 91) to the system of registration in operation in this Province, and that, except in respect of Europeans, the registration is non-effective. Also that the registration of Europeans are not distinguished from those of other races.

No returns compiled by the Registry are issued, but up to the commencement of Union in 1910, the Medical Officer of Health for Natal furnished certain statistical returns in his Annual Health Reports which were presented to Parliament, but since Union these have been discontinued.

Regarding Indentured and Free Indians, some statistics of a valuable kind have been prepared annually for a number of years by the Protector of Indian Immigrants, which were also, until the commencement of Union, published as Blue Books. The Department of the Interior has kindly placed at our disposal the manuscript copies of these Reports for the years 1910, 1911, and 1912, prepared since Union.

We have thus been compelled as regards Natal, to rely for statistical information of the prevalence of tuberculosis mainly on the above-mentioned reports.

With reference to the figures so obtained, it is necessary to observe that the mixed and coloured are included with the European, forming in the census year, 1904, about seven per cent. of the populations dealt with in the case of the Colony, Durban and Pietermaritzburg, respectively, and about eight per cent. in the census year, 1911.

Also it is to be remembered that Indentured and Free Indians comprise only those Indians who have entered Natal under the provisions of the Indentured Indian Immigration Acts, and their descendants. Of those Asiatics who have entered the Province in the ordinary way, and their descendants, we have no statistical information. Regarding the Indian population of the Province, we would refer to our observations contained in paragraphs 176 to 181 of the next succeeding chapter.

Of Europeans (Including Mixed).

136. In Table 20 are given, in respect of Europeans (including mixed), the number of deaths and rates of mortality, per 100,000, from phthisis, other forms of tuberculosis, pneumonia and all causes, in each year of the period 1904 to 1909, separately for urban and rural areas. But for 1910 and 1911 we have been able to obtain only the numbers of deaths from phthisis and all causes, and furthermore, as the number of the population is unknown for 1910, even these scanty figures are not of much use.

TABLE 20.—Showing for the Province of Natal, in respect of Europeans (including persons of mixed race), the number of deaths and the rates of mortality per 100,000 from Phthisis, Other Forms of Tuberculosis, Pneumonia and All Causes, in each year of the period 1904-1911. The figures for the years 1904-1909 have been compiled from the Annual Health Reports of the Medical Officer of Health for Natal.

Year.	Population.*	Number of Deaths.					Death-Rate per 100,000 of Population.				
		Phthisis.	Other Forms Tuberculosis.	All Forms Tuberculosis.	Pneumonia.	All Causes.	Phthisis.	Other Forms Tuberculosis.	All Forms Tuberculosis.	Pneumonia.	All Causes.
The Province.											
1904	101,183	82	15	97	55	1,102	81	13	94	54	1,089
1905	101,170	53	10	63	63	956	52	8	62	62	944
1906	101,314	80	9	89	67	1,054	78	7	85	66	1,040
1907	99,150	67	15	82	48	939	67	15	82	48	948
1908	99,745	46	9	55	64	885	46	9	55	64	887
1909	98,934	50	10	60	35	806	50	10	60	35	814
1910	†	54	†	†	†	840	†	†	†	†	†
1911	107,051	68	†	†	†	1,057	63	†	†	†	987
Urban Areas.											
1904	58,077	59	12	71	29	722	101	20	121	49	1,243
1905	58,980	35	8	43	36	606	59	13	72	60	1,025
1906	58,785	64	7	71	30	704	108	11	119	54	1,197
1907	54,541	50	10	60	32	591	91	16	107	58	1,038
1908	54,136	27	7	34	40	531	49	12	61	73	980
1909	52,189	31	6	37	20	434	60	10	70	38	832
Rural Areas.											
1904	43,106	23	3	26	26	380	53	6	60	60	881
1905	42,190	18	2	20	27	350	42	4	46	63	829
1906	42,529	16	2	18	37	350	37	4	41	86	822
1907	44,609	17	5	22	16	348	38	10	48	35	782
1908	45,609	19	2	21	24	354	41	4	45	52	776
1909	46,745	19	4	23	15	372	40	9	49	32	795

*The numbers of the population were estimated by the Medical Officer of Health, except those for the census years 1904 and 1911.

†Figures not available.

Assuming that registration is complete, and that the numbers of the population to which they are referred are correct, it would seem that the mortality from tuberculosis is comparatively small among Europeans in Natal. Moreover it would appear that the amount is diminishing in the urban areas. The mortality per 100,000, in 1909, was in urban areas: Phthisis 60, other forms 10; in the rural areas: Phthisis 40, other forms 9.

The general death rate in the same year was respectively only 832 and 795. The smallness of these last-mentioned rates makes us inclined to doubt the completeness of the figures. These rates show a reduction as compared with 1904; in urban areas from 1,243 in that year, and in rural from 881. It is difficult to see how such low general death-rates can be truly obtainable over a long period of years, unless the population is continuously receiving by immigration a very large accession of young unmarried adults, or is losing by emigration a large proportion of persons at the extremes of life.

137. In 1911 the following was the age composition of the European populations of the urban and rural areas of Natal as compared with that of England and Wales:—

	Natal.				England and Wales.	
	Urban.		Rural.			
	Males.	Females.	Males.	Females.	Males.	Females.
Under 5 years	1,108	1,188	1,227	1,359	1,110	1,030
5 to 45 years	7,367	7,283	6,969	7,121	6,833	6,760
Over 45 years	1,525	1,529	1,802	1,520	2,057	2,210
	10,000	10,000	9,998*	10,000	10,000	10,000

*In 2 age unspecified.

From these figures it is evident that the Natal European population does not differ very greatly in age composition from that of England and Wales. Both in urban and rural areas there are fewer old persons, but on the other hand, in the rural areas there are more young children. It is probable that the whole difference would be covered by a reduction of about one per thousand in any ordinary death-rate, say on the English death-rate of 14·59.

We can only conclude, therefore, that these general death-rates are greatly understated, and if this is the case with the death-rate from all causes, then it is only reasonable to assume that the same applies to those relating to the particular cause, tuberculosis.

We would not have referred to this point so persistently throughout these pages, were it not for the fact that such mortality rates have been accepted by the public in the past without question, and have been taken as evidence of the existence of superior health conditions of the population to which they refer, whereas they may have no such significance.

Durban, Pietermaritzburg and Other Towns.

138. In Table 21 similar particulars as those given in the preceding table are supplied separately in respect of Durban, Pietermaritzburg, and the other towns (grouped) of the Province. Practically the same features are displayed by this table. If the figures can be taken as correct, then tuberculosis in Europeans in these areas is practically an almost negligible quantity, as far as the carrying out of special measures are concerned.

TABLE 21.—Showing for the towns of the Province of Natal, in respect of Europeans (including persons of mixed race), the number of deaths and rates of mortality per 100,000 from Phthisis, Other Forms of Tuberculosis, Pneumonia and All Causes, in each year of the period 1904-1909; compiled from the Annual Health Reports of the Medical Officer of Health for Natal.

Year.	Population.*	Phthisis.	Other Forms Tuberculosis.	All Forms Tuberculosis.	Pneumonia.	All Causes.	Phthisis.	Other Forms Tuberculosis.	All Forms Tuberculosis.	Pneumonia.	All Causes.
Durban.											
1904	33,282	28	9	37	20	420	84	27	111	60	1,261
1905	34,669	22	6	28	16	353	63	16	79	46	1,018
1906	33,800	36	4	40	8	383	106	10	116	23	1,133
1907	30,156	28	5	33	20	310	92	15	107	66	1,034
1908	29,751	16	3	19	22	283	53	10	63	74	951
1909	29,287	15	2	17	11	218	51	6	57	37	744
Pietermaritzburg.											
1904	16,245	20	2	22	9	240	123	12	135	55	1,477
1905	15,900	10	1	11	17	178	64	6	70	107	1,119
1906	15,900	18	1	19	17	205	113	6	119	107	1,289
1907	15,300	14	3	17	8	189	91	19	110	52	1,228
1908	15,300	7	3	10	13	176	45	19	64	85	1,150
1909	13,853	7	1	8	7	136	50	7	57	50	981
Other Towns.											
1904	8,550	11	1	12	..	62	128	11	139	..	725
1905	8,411	3	1	4	3	75	35	11	46	35	891
1906	9,085	10	2	12	5	116	110	22	132	55	1,276
1907	9,085	8	2	10	4	92	88	22	110	44	1,002
1908	9,085	4	1	5	5	72	44	11	55	55	792
1909	9,049	9	3	12	2	80	99	33	132	22	884

*Estimated by the Medical Officer of Health, except for the census year 1904.

We are indebted to Dr. C. Ward, the Medical Officer of Health for Pietermaritzburg, for the following figures for that city, relating to the three years subsequent to those contained in the Table 21, viz., 1908-9 to 1910-11.

Year.	Mortality per 100,000.			
	Europeans.		Natives.	Indians.
	Tuberculosis.	All Causes.	Tuberculosis.	Tuberculosis.
1908-1909	65	1,068	157	239
1909-1910	41	852	181	256
1910-1911	88	1,162	199	290

Indentured and Free Indians.

139. In Table 22 are given particulars compiled from the Reports of the Protector of Indian Immigrants, of the mortality from tuberculosis, pneumonia, and all causes among indentured and free Indians taken together, for each year in the period 1904 to 1912.

TABLE 22.—Showing for Indentured and Free Indians in the Province of Natal, the number of deaths and the rates of mortality from Pulmonary Tuberculosis, Other Forms of Tuberculosis, Pneumonia and All Causes, in each year of the period 1904–1912. Compiled from the Annual Reports of the Protector of Indian Immigrants.

	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Approximate population at middle of year	88,000	91,239	98,049	101,078	104,120	103,906	106,265	110,943	113,731
Number of deaths:—									
All Causes	1,602	1,881	2,611	2,392	1,955	1,687	1,955	2,419	2,044
Tuberculosis, Pulmonary ..	269	205	195	204	226	164	189	254	253
,, Other Forms	17	18	39	27	50	51	62	79	57
,, All Forms ..	286	223	234	231	276	215	251	333	310
Pneumonia	175	215	240	239	256	222	283	340	111
Death-rate per 100,000:—									
All Causes	1,820	2,062	2,663	2,366	1,878	1,624	1,840	2,184	1,797
Tuberculosis, Pulmonary	306	204	199	202	217	158	178	229	223
,, Other Forms	19	20	40	26	48	49	69	71	50
,, All Forms ..	325	244	239	228	265	207	237	00	273
Pneumonia	199	236	245	236	246	214	266	306	98

These statistics are on a totally different footing to those just dealt with. All deaths of such Indians have to be reported to the Protector, who is in constant touch with everything affecting the community, and the figures may therefore be taken as being accurate. Some over or under-statement may occur, however, in the ratios, as the mean population for the middle of each year is only an approximation, although a fairly close one, being the mean of the numbers of the populations on the 31st December of the year under review and of the preceding year.

With regard to these figures it is, however, most important to remember that in each year a considerable number of indentured Indians are repatriated on account of chronic disabling diseases, especially tuberculosis, rendering them unfit for labour. The figures therefore do not represent the full mortality which would have occurred had this not been the practice. Thus the following numbers have been repatriated each year on account of disabling disease:—

Year ..	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.
Advanced Tuberculosis ..	75	62	63	42	133	64	123	98	*
All causes of unfitness ..	385	706	433	454	267	*	246	233	148

* Number not known to the Commission.

On the other hand, the general mortality is swollen by a large occurrence of deaths of women in the puerperal state, and from suicide and violence. Thus, to take the year 1912, there were 48 puerperal deaths, 153 from violence, and 36 suicides.

There are, however, a considerable number of deaths from meningitis, peritonitis, and chronic diarrhœa, some of which may well be the result of tuberculosis.

It will be observed from this table that the mortality from tuberculosis is extremely high, averaging about 300 per 100,000; that it is mainly due to pulmonary phthisis; and that there is no evidence that it is decreasing in extent.

Also that pneumonia is the cause of a very considerable mortality, of about 250 per 100,000, and that with the exception of the year 1912, when it was only 98 per 100,000, it has been fairly constant in amount.

140. It would appear that the occurrence of tuberculosis is greatest among those Indians who have newly arrived in Natal, and this in spite of the careful medical examination which was made of every immigrant before he was embarked in India.

The Protector has furnished us with some figures on this point relating to the year 1911, from which we are able to produce the following:—

Of 6,254 Indians who had been in Natal one year and under, there were 31 deaths from tuberculosis in the year (14 phthisis and 17 other forms), giving a death-rate of 4·96 per thousand. Out of this number also 21 (18 phthisis and 3 other forms), had to be repatriated, or a rate of 3·35 per thousand, or together an occurrence rate of 8·31 per thousand.

There were living in Natal in that year 22,013 Colonial-born Indians, and of this number there died in the year from tuberculosis, 84 (58 phthisis and 26 other forms), giving a death-rate of 3·81 per thousand.

We have seen (Table 22), that the tuberculosis death-rate for all indentured and free Indians, in 1911, was 3·33 per thousand.

The proportion of tuberculosis mortality tends rapidly to diminish with increasing length of residence in South Africa, which however, also means increasing age of the individuals.

Judging from the admissions to the Greyville Indian Hospital, it would seem that a large majority of the cases are between 20 and 30 years of age. Namely: under 20 years, 1; 20 to 30 years, 46; 30 to 40 years, 10; over 40 years, 2; total 59.

It should be pointed out that in addition to repatriations on account of tuberculosis, a certain number of rejects had to be returned at once, being found affected immediately on arrival. Thus out of 43,563 arrivals (30,836 men and 12,727 women), 16 were found affected (15 men and 1 woman), giving a rate of 0·37 per thousand.

TABLE 23.—Showing the number and the proportion per thousand of the population of deaths from Tuberculosis, Pneumonia, Bronchitis and All Causes, among Indentured Indians and Free Indians in Natal, and the number and proportion per thousand of Indentured Indians repatriated on account of Tuberculosis, in each year of the period 1904–1911.

Year.	Population.	Deaths from Tuberculosis.			Repatriations for Tuberculosis.			Death-rate per 1,000 from Tuberculosis.			Repatriation rate per 1,000 from Tuberculosis.			Total loss per 1,000 from	Pneumonia.		Bronchitis.		All Causes.	
		Phthisis.	Other Forms.	Total.	Phthisis.	Other Forms.	Total.	Phthisis.	Other Forms.	Total.	Phthisis.	Other Forms.	Total.	Tuberculosis.	Deaths.	Rate per 1,000.	Deaths.	Rate per 1,000.	Deaths.	Rate per 1,000.
								INDENTURED INDIANS.												
1904	30,567	115	11	126	73	2	75	3·8	0·4	4·1	2·4	0·1	2·5	6·6	41	1·3	6	0·2	566	18·5
1905	32,690	87	12	99	58	4	62	2·7	0·4	3·0	1·8	0·1	1·9	4·9	70	2·1	22	0·7	643	19·7
1906	37,598	79	20	99	55	8	63	2·1	0·5	2·6	1·5	0·2	1·7	4·3	113	3·0	27	0·7	974	25·9
1907	41,118	112	11	123	41	1	42	2·7	0·3	3·0	1·0	0·02	1·0	4·0	106	2·6	16	0·4	911	22·2
1908	42,422	103	30	133	129	4	133	2·4	0·7	3·1	3·0	0·1	3·1	6·3	73	1·7	17	0·4	618	14·6
1909	42,179	84	37	121	52	12	64	2·0	0·9	2·9	1·2	0·3	1·5	4·4	48	1·1	7	0·2	464	11·0
1910	41,854	98	39	137	110	13	123	2·3	0·9	3·3	2·6	0·3	2·9	6·2	56	1·3	11	0·3	498	11·8
1911	43,332	124	37	161	88	10	98	2·9	0·8	3·7	2·0	0·2	2·3	6·0	85	2·0	16	0·4	610	14·1
								FREE INDIANS.												
1904	54,117	154	6	160				2·8	0·1	3·0				3·0	136	2·5	68	1·3	1,036	19·1
1905	68,549	118	6	124				1·7	0·1	1·8				1·8	138	2·0	84	1·2	1,238	18·1
1906	60,633	122	19	141				2·0	0·3	2·3				2·3	125	2·1	73	1·2	1,637	27·0
1907	61,291	92	16	108	No repatriation			1·5	0·3	1·8	No repatriation			1·8	133	2·2	81	1·3	1,481	24·2
1908	60,586	123	20	143	of Free Indians.			2·0	0·3	2·4	of Free Indians.			2·4	183	3·0	98	1·6	1,337	22·1
1909	61,318	80	14	94				1·3	0·2	1·5				1·5	174	2·8	85	1·4	1,223	19·9
1910	64,411	91	23	114				1·4	0·4	1·8				1·8	227	3·5	122	1·9	1,457	22·6
1911	67,610	130	42	172				1·9	0·6	2·5				2·5	255	3·8	137	2·0	1,809	26·7

141. In Table 23 is given information regarding tuberculosis and certain other diseases separately for indentured and free Indians.

From this table it will be seen that as regards tuberculosis it is of very much greater occurrence among indentured than free Indians. Of course, the age composition of the free Indians is very different from that of the indentured, as it contains all the young children and the colonial-born Indians.

Allowing for this difference the working conditions of the indentured Indians is probably responsible for the greater incidence of tuberculosis among them.

In dealing with the Natal Coal Mines in a later portion of this report, we shall see the effect of that employment in leading to the development of tuberculosis among Indians engaged upon it.

It will be observed that the rates of pneumonia, of bronchitis and of all causes are greater among the free Indians; this is due to the number of young children in that group.

142. The general death-rate from All Causes is probably not greatly excessive, if tuberculosis be excluded, especially among indentured Indians, in whom it has shown a tendency to decline between the years 1904 and 1911.

It is worth while noting that taking the mortality from all causes among Indians over a series of years, the greater portion of it occurs in the last six months of each year. Almost exactly two-fifths takes place between January and June, and three-fifths between June and December; November and December being generally the worst months. There appears to be no difference in this seasonal variation in respect of Indians employed on the coal mines in the highlands, as compared with those employed along the coastal belt.

We have not the necessary data to enable us to further analyse this occurrence.

Mortality among indentured and free Indian children.

143. It is of interest to distinguish between persons under and over fifteen years of age. We have prepared the following figures on this basis in respect to the mortality occurring during the year 1912.

Disease.	Death-rates per 100,000.			
	Indentured.		Free.	
	Children.	Adults.	Children.	Adults.
Tuberculosis, Pulmonary	22	337	31	355
,, Other Forms	188	26	48	40
,, All Forms ..	210	363	79	395
Pneumonia	77	66	93	139
All Causes	2,255	1,216	2,203	1,846

Very little can with safety be deducted from these figures, as there are a number of circumstances affecting them which we cannot properly gauge. Thus the average age of the group of indentured children must be much higher than that of the free children, which contains all the infants and the very young, on which account, other things being equal, there should be a smaller mortality from all the above causes among the indentured; it would appear, therefore, that the indentured are much less healthy, allowing for differences of age, than are the free children. When we remember that there is no limit of age before which children may be put to work, we could hardly expect the result of indenturing to be otherwise than bad.*

That there is more pulmonary tuberculosis and a greater general death-rate among the non-indentured adults is also probably consistent, in as much as there would be little re-indenturing among the sick and feeble.

* We were informed in evidence that, as far as coal mines are concerned, boys are not allowed to work on them until they are sixteen years of age; but as regards other work—*i.e.*, on the sugar estates—there is no limit before which children, boys and girls, may be put to work.—(Mr. Polkinghorne, Questions 18,104 and 18,105.) It rests entirely with the parent at what age the child is indentured and put to work. The parent receives the wages. It is very seldom that children are forced to work at too young an age. Such cases may arise, but as much as possible that sort of thing is controlled. —(Mr. E. G. A. Sanders, Questions 25,937 to 25,941.)

CHAPTER VII.

The Extent of Prevalence of Tuberculosis among Natives.

144. All of the preceeding figures have related in the main to the urban areas of the Union; we have been able to obtain but little reliable statistical information concerning the present prevalence of tuberculosis among natives in rural areas, and still less in the Native Territories and Reserves. Such registration statistics of rural areas as are available we have already given in the preceding chapter for what they may be worth. As regards natives, therefore, we have been compelled to rely mainly upon individual expressions of opinion, based on more or less satisfactory experience, given to the Commission in evidence taken in the different areas concerned; upon such fragmentary statistics as local medical practitioners have been able to extract from the records of their private practice; and to some extent upon what we have ourselves observed.

In this last connection we may mention that we visited many places and kraals in outlying native areas in order to examine for ourselves any discoverable sick natives thereat, with the view to the detection of cases of tuberculosis among the people, but although every effort was made on such occasions by the magistrate and other officials having direct control of natives, to secure their attendance, the result was almost invariably disappointing owing to the invincible distrust of the natives that our enquiry was merely the forerunner to the taking of some distasteful action by the Government, either in the shape of the forcible removal of sick persons, or of some kind of penalisation of the sick or healthy. Indeed so suspicious are natives of official interference that medical men practising among them found it detrimental to their practices and to the confidence which the native placed in them, to associate themselves publicly with the proceedings of the Commission.

General views as to extent of prevalence.

145. Speaking generally these sources of evidence enable us with some assurance to make the following statements.

In the rural districts of the Union, although there is very little tuberculosis among Europeans, the disease is extensive and tending to increase among the coloured, mixed and native races on farms, on mission stations and in locations. But it is more particularly concerning the raw natives in the Native Territories, areas and districts in which these collect, that the opinion is almost universally expressed by witnesses of all classes—medical men, missionaries, magistrates, traders and leading natives,—that the disease is increasing, and according to many, rapidly so. These witnesses all believed this increase to be mainly due to the following causes:—

(*a*) The return of native labourers with pulmonary or other forms of tuberculosis;
(*b*) the increasing adoption and misapplication by the native of European clothing and habits, and
(*c*) their incurable propensity to promiscuous spitting and to excluding as far as possible all ventilation from their dwellings.

146. With regard to the first of these alleged causes, the views held by those having experience of the native under kraal life, are fully borne out by the information, statistical and other, in the possession of the Commission, as to the extent of the occurrence of tuberculosis on the mines, and the number of natives suffering with the disease who are continually leaving for their homes.

When, however, we try to arrive at an accurate judgment as to the actual amount of the disease existing among the raw natives in their kraals, we find ourselves at sea. All we can venture with confidence to assert is that in many areas, as for example, the native districts and portions of the Native Territories of the Cape Province, and in Basutoland, it is considerable, while in those areas more recently opened up to labour recruitment and to contact with civilization, such as the Northern Transvaal and Zululand, it is probably not great in amount, but even here the recognition of pulmonary tuberculosis in women, and the not infrequent occurrence of other forms of the disease, especially of tuberculous cervical glands and of spinal caries, would seem to indicate the presence of a greater amount of infection than would appear from the surface..

In support of the foregoing it may be well to refer to some of the figures given to us by medical men in practice in native areas.

Obviously this class of statistics is open to the fallacy that cases of tuberculosis, or that patients of one sex may not come under treatment to the same extent (greater or less) as do patients of the other sex or those suffering from diseases; but with this reservation the figures are of considerable value.

In Basutoland.

147. Although not within the Union, Basutoland affords one of the best fields of enquiry, as it is a very strictly preserved native reserve, and the natives are therefore not subject to much European contact, except those who go out of the Territory for periods of work on the gold and diamond mines and elsewhere. Also they are all of one tribe; and, owing to the system of Government hospitals and dispensaries, more is known as to their health than is the case in other native areas.

Dr. H. N. Macfarlane, Government Medical Officer at Leribe, a district having a population now of about 90,000 natives, (10 years ago about 60,000) informed the Commission that during the eighteen years he had been practising there he had treated in the Government hospitals and dispensary, 322 cases of tuberculosis in natives, of whom 272 were males and 50 were females. Of this number 22 were glandular (fifteen males and seven females); fourteen abdominal (eight males and six females); and thirty-two were fibroid phthisis, all in males.

It should be mentioned here that by fibroid phthisis Dr. Macfarlane does not mean necessarily silicosis. On the contrary he believes the fibroid condition to be caused in the majority of cases by antecedent syphilis. About seventy-five per cent. of the Basuto in Basutoland are stated to have been infected with syphilis at some time of their lives.

Of the 322 cases, the majority were lost sight of, but 19 he knew to have died. He had only met with two or three apparent recoveries.

The following is a statement, taken from the hospital registers, of the total number of patients seen by him each year, with particulars of the cases of tuberculosis among them. There are three points to be noted in regard to this statement. Firstly, that of the total number of all patients, the number of females predominates to the extent of about a third more than males. Secondly, that the disease for which about a sixth of all the patients were being treated was syphilis. and lastly, that it was only after the war, about 1902, that natives began going to any extent from his district to work on the mines, and that it was only after that time that cases of tuberculosis began to appear in any numbers; that such cases were chiefly in males who had been working on the mines, from which many of them had only just returned, mostly suffering from the pulmonary form of the disease.

Year.	Total number of patients treated.	Number of cases of Tuberculosis.			Remarks.
		Males.	Females.	Total.	
1895	2,710	4	3	7	1 pulmonary, the rest glandular.
1896	2,640	1	..	1	..
1897	2,430	2	..	2	..
1898	2,360	1	2	3	1 tubercular abscess (male).
1899	3,570	4	2	6	All pulmonary.
1900	3,065	2	3	5	,,
1901	3,980	1	2	3	,,
1902	3,935	2	1	3	1 fibroid (male).
1903	4,113	10	2	12	5 fibroid (males); 1 abdominal (male child).
1904	3,400	9	1	10	All pulmonary, 3 being fibroid (males).
1905	4,320	6	..	6	All pulmonary.
1906	4,810	13	1	14	,,
1907	5,278	17	5	22	2 fibroid (males); 1 abdominal (male child).
1908	6,120	21	5	26	1 fibroid (male); 3 joints (males); 2 glandular (female children).
1909	7,000	23	5	28	All pulmonary (1 female child).
1910	7,410	60	4	64	6 fibroid (males); 4 abdominal (3 males, 1 female); 4 glandular (3 males, 1 female); remaining were pulmonary, including 3 children (2 females, 1 male).
1911	9,463	48	6	54	8 fibroid (males); 7 joints and glands (2 males, 5 females); 3 abdominal (2 males, 1 female).
1912	11,130	48	8	56	6 fibroid (males); 5 glands (3 males, 2 females); 3 abdominal (children); remaining were pulmonary, including 3 female children.
Total ..	87,734	272	50	322	

Taking the rough estimate of Dr. Macfarlane as to the sex composition of all hospital patients, it would accordingly appear that about 7·7 per thousand of the male patients are treated for tuberculosis, and that only about one per thousand of the female patients suffer from that disease.

The above evidence and facts seem clearly to indicate that the bulk of the tuberculosis as found in Basutoland is of the pulmonary form occurring in males, and has been acquired on the mines or at labour centres. Also that it is increasing in amount, in as much as during the first half of the period, 1895-1903, the average percentage of cases of tuberculosis to all causes under treatment was only 0·15, while in the second half, 1904-1912, it was 0·48, that is, it had trebled.*

148. Dr. H. W. Dyke, a private Medical Practitioner at Butha Buthe, in the Leribe District, gave the Commission very similar evidence to the above. His native practice was chiefly among the blanket Kaffirs, not those who had come

* *Note by Dr. Porter.*—Dr. Porter regards this conclusion as correct, but incomplete in the most important respect that it does not mention a further fact which emerges from the same figures (whatever their value may be), namely, that during the mine-going years 1902-1913, the proportion of *females* infected remains roughly the same (namely, about one per 1,000 of the *persons* treated) as it was in the pre-mining years 1895-1902. This militates against the theory (however probable on other grounds) that infected boys spread Tuberculosis on return to their kraals.

much into contact with Europeans, and there were more females among them than males. The following were his figures:—

Year.	Number of individual patients—not attendances	Number of cases of Tuberculosis.	Remarks.
1908 (last half)	750	10	9 phthisis (all males); after history of only 3 traced, all of whom died, 1 Pott's disease (child).
1909	2,000	35	All phthisis (27 males, 7 females, 1 child); after history 5 males traced, all died.
1910	2,100	28	26 phthisis (16 males, 5 females, 5 children); 1 glandular; 1 hip joint (male) died; termination of other cases not traced.
1911	2,500	30	29 phthisis (17 males, 10 females, 2 children; 7 males traced, 5 died, 2 apparently arrested; 1 Pott's disease (female).
1912	3,300	39	37 phthisis (32 males, 2 females, 3 children); none traced.
	10,650	142	

The tuberculosis cases were therefore in the proportion of 1·3 per cent. of all patients; but of the total number of persons coming under treatment for all complaints the women were in the proportion of four females to three males; while the proportion among the tuberculosis patients was only one female to three males.

Dr. Dyke said the males usually acquired the disease on the mines, and returning, infected the women and children.* He instances the case of a man returning with the disease, from whom it spread to his father, sister, and two brothers; five out of the entire family of seven dying of the disease.

Many of the men returning from the mines have fibrosis. In his opinion, if they remain away from mining after that they may recover, but if they go back again, they usually return with lung breaking down. He did not attribute the fibrosis to syphilis. The women in all cases get a simple pulmonary form with breaking down of the lung.

149. Dr. G. Hertig, in practice at Morija and outlying districts, stated that fourteen years ago he saw very few cases; now not a week passes that he does not see fresh cases, mostly coming from the gold mines, some from Kimberley and a few from Port Elizabeth. He knows of such cases returning and infecting many members of their families, who had never been outside of Basutoland.

150. On the other hand Dr. H. C. Long, the Principal Medical Officer, Basutoland, does not think the increase is so rapid as is generally assumed. He, however, agrees that there is an increase, due to the infection partly contracted outside the Territory and partly in the kraals. He believes that there is a considerable amount of tubercular gland disease, he does not believe that syphilis plays any part in its production nor in fibroid phthisis.

In a summary he gave of all cases of tuberculosis treated at the various Government hospitals and dispensaries, during the year 1905 to 1912, 876 cases were pulmonary; 839 cases, glandular; 169 tubercular joints; and 84 abdominal, including acute miliary; making a total of 1,986 cases.

It is unnecessary to multiply references to the evidence we obtained regarding tuberculosis in this Territory. We are satisfied that the disease is of common occurrence and is on the increase.

In the Native Territories of the Cape Province.

151. In the Native Territories of the Cape Province, evidence of a similar kind regarding the extensive and increasing prevalence of tuberculosis was obtained by the Commission.

* *Note by Drs. Porter and Turner.*—This may be true, but is not indicated by the figures on pp. 79 and 80.

Dr. W. F. Nicol, District Surgeon of Mount Ayliff, in the Native Territories, informed us that out of about 850 separate native patients seen in his private practice during the year 1910, 31 were cases of tuberculosis; and in 1911, out of about the same number, 33 were tuberculosis, or a trifle under four per cent. of all cases. These cases were only those of which he had no doubt as to the tubercular nature of the disease. He kindly furnished us with a list of the individuals and particulars of their disease, from which it appeared that of the 64 cases, 52 were suffering from pulmonary tuberculosis, 10 were glandular (of which one was associated with lupus), one bone and one larynx.

152. At Butterworth, one of the districts of the Native Territories which has had the largest contact with Europeans, Dr. C. P. Bligh-Wall, the District Surgeon there, kindly give us the following return of native cases of tuberculosis (individual cases seen for the first time) in his practice during the year 1908 to 1912. Most of them are "gqoboka," or dressed natives.

	Total No. of individual native patients.	No. of cases of Tuberculosis.			Percentage of all patients.
		Pulmonary.	Other Forms.	Total.	
1908 ..	2,661	256	34	290	10·8
1909 ..	2,443	395	58	453	18·5
1910 ..	3,746	509	61	570	15·1
1911 ..	3,916	605	53	658	16·8
1912 (first 7 months)	5,253*	525	23	548	10·4

* Increase in numbers due to being joined by a partner in June, 1911.

Of the 2,519 cases, 91 per cent. were pulmonary.

Dr. Wall is of opinion that a large proportion of the natives of this district either have or have had tuberculosis, and that this condition has arisen from the fact that the district is one of the oldest to come into contact with civilization.

153. Dr. K. McMurtrie, Medical Officer to the St. Lucy's Hospital, Ncolosi (St. Cuthbert's Mission), in the district of Tsolo, informed the Commission that of 2,000 consecutive patients coming under treatment, from July 1911, he found 306 cases, or 15·3 per cent., in which he was able to make a definite diagnosis of tuberculosis, and 118, or 5·9 per cent., in which the symptoms were such as to make him suspect the presence of the disease, but could not make a definite diagnosis. The great majority of the cases were pulmonary, and next to these came glandular, then bone and last abdominal. He believed that persons suffering from tuberculosis came to the hospital for treatment less readily than did those suffering from other complaints. He considered that the disease is increasing.

154. Dr. R. H. Welsh, for the past twenty years District Surgeon of Umtata, stated that during the time he had practised there the disease had increased, so that now pretty well half the native patients he saw were suffering from it. He gave a number of instances in which three, four or more members of a native family had succumbed to the disease. He considered it to be more common among dressed natives than among the "reds." About half the cases he saw were glandular, and these mostly in children.

He had not prepared any statistics from the records of this practice, but hearing on the 17th July that the Commission would visit Umtata to take evidence on the 2nd August, he noted, for the information of the Commission, particulars of each native case of tuberculosis as it presented itself for treatment during this fortnight. As this constitutes a random sample of cases, it is valuable as an indication of the actual conditions regarding tuberculosis, and we therefore venture to give a summary of the particulars. It should be stated that he sees in his native private practice annually about 1,500 new patients.

17th July. Woman suffering for five years from phthisis, brought her son aged 17 years, suffering with acute tuberculosis. Only ill a few months and now dying. Also another son aged 14, with probable pulmonary tuberculosis.

18th July. Woman with chronic tubercular abscess of neck (discharging), brought two daughters for treatment; one having distinct tuberculosis, left apex, and the other indefinite signs of pulmonary tuberculosis, with long-standing cough.

20th July. A young native girl of 20 years, whom he had seen on 3rd May, preceding, then suffering from anaemia and doubtful signs of pulmonary tuberculosis, returned now with distinct phthisis.

Also a young woman whom he had previously seen in November, with cough, but no definite physical signs, now returned with marked consolidation of whole of right lung with commencing breaking down. History of father and four sisters affected. Learned from this patient that a woman living in adjoining hut, whom he had seen last year with commencing tuberculosis, had since died.

23rd July. A young woman of about 20 years, suffering with apical pulmonary tuberculosis. Gave history of her mother having had cough for some years, and that her seven sisters had died from chest complaint.

On same day saw a young man of 20 years suffering from rapid consumption. His father had died of the same disease six months before.

30th July. Saw child with large tubercular glands of neck and commencing tubercle of lung.

On same day a woman came to hospital for treatment with her two children. All three with definite tuberculosis. Mother had been affected for two years.

155. Dr. David Melville stated, regarding his native practice in the district of Tsolo, that about ten per cent. of all the cases he saw were tuberculosis, and of the latter about seventy per cent. were pulmonary. There were a good many glandular and bone cases. He was of opinion that the disease was steadily increasing, and that most of the infection was brought down from the mines. Whereas formerly the disease was unusual in the red Kaffirs, it is now fairly prevalent.

156. Dr. F. H. Walker, District Surgeon of Nqanduli for the past seventeen years, said that he had taken from his register of native private patients the number of new patients he had seen for all complaints during the preceding three months. In this period he had seen 882, out of which sixteen were phthisis, four tubercle of bone, including spinal caries, and nine tubercular glands; in all 29 or 3.3 per cent. But the number that came to him varied very greatly for no apparent reason. He does not see a tithe of the tuberculosis, because only acute cases of illness come for treatment. The more chronic cases of disease like tuberculosis treat themselves with patent medicines.

157. Dr. C. A. Lumley, District Surgeon of Idutywa for the past nineteen years, stated that during the previous two years he had treated some 2,000 native patients, all new cases, and that out of this number there were 66 cases of tuberculosis, or about three per cent.; 42 of these being pulmonary, 13 tubercular glands, eight general tuberculosis, and one each of tuberculosis of the larynx, skin and testes. The larger number of cases occur in children, next to whom come men. He believes the disease to be increasing, especially among raw natives.

158. It would hardly seem necessary to go on multiplying these statements; the evidence which we took was much the same throughout these Terrtitories, and it is certain that tuberculosis is decidedly prevalent in most, if not all portions of them. Most so in those districts which have been longest under European influence, least so in those in which the raw native preponderates, as in Pondoland. There is also no reasonable doubt that it is increasing in extent. When we remember how disinclined the native is to seek European medical treatment, the large number of cases coming under the notice of medical practitioners must connote a very considerable amount of the disease in the general population, with a pretty widespread infection.

We regret that we have no evidence whatever regarding the amount of tuberculosis in British Bechuanaland, but we understand that it prevails among the Bechuanas, along with syphilis, to a great extent.

In Natal and Zululand.

159. Also in the case of Natal and Zululand we have been able to obtain but little statistical evidence as to the prevalence of tuberculosis among the native races.

Dr. A. Bonfa, who is District Surgeon and District Health Officer, Umzinto, told us that from his records he found that out of his native practice, comprising about 3,000 new patients annually, he sees about fifty cases of tuberculosis. His general patients came often from long distances, and were chiefly made up of women and children and equally divided between raw and "Amakolwa," or clothed natives, but the cases of tuberculosis were more numerous in the latter. The cases of tuberculosis are about equally divided between males and females. In his experience he found the disease to be as prevalent among natives in the highlands as in the coastal belt.

160. Dr. Wildish, who as District Surgeon successively of Ngotshe and of Eshowe in Zululand, has had a long experience, stated that as regards hospital patients at Eshowe, 20 per cent. of such patients were treated for forms of tuberculosis other than phthisis. The chief form he treated was glandular, mostly of the cervical glands, but also the femoral and axillary. Next to this in number are tubercular joints. There were also many cases of tubercular affection of the skin and subcutaneous tissue, more extensive than ordinary lupus—deep undermining ulcers, leaving bridges of healthy skin. Abdominal cases also occurred, chiefly in children. Pulmonary cases were in a minority, but as a rule natives do not come up for the treatment of the pulmonary form, as their own native doctors treat this by "shlanzering," that is by inducing severe vomiting. They mostly seek the advice of European doctors for those forms capable of operative treatment. He believes phthisis to be much more common than his hospital figures indicate.

In some cases secondary infection has followed surgical interference with the glandular form. When not treated the glands break down and by their discharge form a source of infection, he believes, which may be taken up and spread by the great number of cockroaches and bugs infesting native huts.

At the request of the Commission, in view of the exceeding prevalence of large glandular masses, Dr. Wildish sent specimens of such glands to Dr. Park Ross, the Government Bacteriologist, Natal, who kindly examined them for us, and has reported the presence of the tubercle bacillus in them.

In Ngotshe in the highlands of Natal, Dr. Wildish saw comparatively little tuberculosis, and this was mostly phthisis brought in from the mines. But the natives in that district did not seek European medical advice to the extent that they do in the Eshowe district. In Umbelini's Kraal just above the Wonder Mine, the disease was very rife. There were five men there that he knew of suffering with various forms of tuberculosis.

161. In spite of the paucity of definite evidence, we believe that tuberculosis must be fairly prevalent among the Natal natives in the coastal belt, and to a lesser extent in the highlands and in Zululand.

We find that the glandular form is very common, and we cannot believe that this would exist to such an extent without other and more infectious forms being prevalent.

In the Northern Transvaal.

162. With regard to the large native population of the Northern Transvaal we found it difficult to secure statistical evidence of any kind. But the general impression of witnesses was that a considerable amount of tuberculosis occurs, but varying in different tribes; most in the Basuto, less in the Shangaan and least in the Bavenda. Also that it is on the increase, and that the source of its introduction is the native mine labourer.

These views were certainly confirmed by our own limited observation. (See note to paragraph 210, Chapter IX).

At the Pietersburg general hospital, a small institution, which between 1903 and 1913 admitted 1,785 native patients, there were treated out of this number 88 natives suffering from tuberculosis, of whom 53 died; most of the remainder being sent out but little improved. Nearly all the cases were pulmonary. Only six were women.

At the same period there were 1,258 European admissions, of which 20 were phthisis, with nine deaths. Nearly all of these were imported cases from overseas.

With regard, however, to the native cases of tuberculosis, it is to be pointed out that a considerable number were native labourers returning to their homes from the Witwatersrand mines, and who were found already far advanced with pulmonary tuberculosis on arrival at Pietersburg.*

163. At the Elim Swiss Mission Station in Spelonken, in the Louis Trichardt district of the Northern Transvaal, there is a small hospital, providing fifteen beds for Europeans and thirty for natives. This hospital is kept distinct from the Mission Station, and receives an annual grant from the Government. The institution is in the care of Dr. M. A. J. des Ligneris. The chief disease for which natives are treated is syphilis. Out of 610 native patients treated during two years (1911-'12 and 1912-'13), 421 were for syphilis, and 28 for tuberculosis. Many of the cases of tuberculosis had come in for anti-syphilitic treatment and were found to be also suffering from tuberculosis. Out of 18 cases of tuberculosis treated in the year 1912-'13, 8 died in hospital. Pulmonary tuberculosis is the chief form, but there are many cases of glands, mostly in children and young people.

The tribes in the neighbourhood of the station are the Shangaan and the Bavenda, but neither of these readily seek medical treatment, and the cases treated are chiefly among the Transvaal Basuto, which, as we have mentioned elsewhere, is an offshoot of the Basuto of Basutoland. The experience of the medical officer concerning them is of particular interest in connection with the medical evidence tendered to the Commission in Basutoland, to which we have already referred (paragraphs 147 to 150). It will be remembered that in Basutoland 75 per cent. of the Basuto are stated to be syphilitic and that great difference of medical opinion exists as to the nature of the large amount of glandular disease existing there; some maintaining that it is of syphilitic origin, while others, among them is the principal medical officer, are convinced that the enlarged glands are merely a tubercular manifestation.

Dr. des Ligneris finds that the Transvaal Basuto is also heavily infected with syphilis, it being with them a commensal disease, and in no sense a venereal one, that the primary sore is never recognised, and that as many women are affected by it as are men. But in contrast to this, tuberculosis is much more common among the men, which he attributes to the fact that a very large proportion of the males go to work on the mines.

Conversely the Shangaans have little syphilis among them, but there is a good deal of tuberculosis, and of this there is most seen among the women and children. The men of this tribe used at one time to go to the mines, but of late years they chiefly go to work as house and store boys in the towns.

Of the cases of syphilis among the Basuto coming to the hospital for treatment, Dr. des Ligneris, finds ten to fifteen per cent. to be also suffering from tuberculosis, frequently of the cervical glands. He gave the following history of a typical case:—A man aged 30 years had been treated at the hospital for syphilis, and discharged apparently cured. He returned soon after with enlarged glands on the right side of the neck, which the patient believed to be syphilitic. Dr. des Ligneris operated and removed them. They proved to be typical tubercular glands. At this time no other tuberculous lesion was discoverable. There was nothing in the lung. No dissemination of infection occurred during the operation. He made a good and quick recovery and was discharged cured a fortnight later. Less than a year after he returned with well marked pulmonary tuberculosis on the right side.

*The following particulars of natives who, in the course of eleven months, had reached Pietersburg from the mines in a dying state, was furnished to the Commission by the Resident Magistrate:—

Date of death.	Cause of death.	Passport Number	Tribe.	Residence.	Name of Mine discharged.
20th Oct., 1911..	Phthisis ..	35,564	Kalange ..	Rhodesia ..	Randfontein Central.
—Dec., 1911 ..	?	?	Bavenda..	?	Name not recorded.
5th Feb., 1912 ..	Phthisis ..	?	Bavenda ..	Zoutpansberg	New Goch.
30th Jan., 1912..	Phthisis ..	40,929	Bavenda..	Zoutpansberg	Jumpers Deep.
5th March, 1912	Dropsy ..	85,846	?	?	Comet.
6th March, 1912	Dysentery..	C.90,922	Portuguese	Portuguese East Africa.	East Rand Proprietary Mines.
28th June, 1912	Tuberculosis	?	Portuguese	Portuguese East Africa.	New Kleinfontein.
12th July, 1912..	Phthisis ..	18,086	?	?	Premier Mine.
17th July, 1912..	Tuberculosis	100,261	?	Rhodesia ..	East Rand Prop. Mines.

On the other hand many cases of pulmonary tuberculosis start as such on the mines. He instanced such a case. A man had been working at Johannesburg for two years, but had never been under treatment there. He said his illness started with a little stitching pain in the chest, but nothing much. But he was easily tired after work, so he went home. For four months he coughed and expectorated blood. He then came to the hospital with tuberculosis of both lungs. He died the next day. At the post-mortem, one lobe showed a simple pneumonia, but the rest of the lungs were full of tubercular nodules.

He found that among the Shangaans living near the station whom he got in an early stage and could keep under supervision and treat with tuberculin, he got apparent cures. Of this he instanced cases.

Instance of the spread of tuberculosis in the Kraal.

164. Dr. des Ligneris also gave examples of kraal infection. The following instance was partly under his observation and partly under his predecessor's, Dr. Borle, who confirmed the facts to the Commission.

The natives on this station live in native huts, round and square, settled in little family groups, or villages, the dwellings being closely aggregated. In one such group which we visited there had been thirteen huts, all of the square kind but two, some of them being of superior type. Three of them had been vacated and destroyed on account of the occurrence of tuberculosis. In this group the following cases of tuberculosis occurred. In one dwelling a little girl, her mother, another woman and two children died; in another dwelling three girls and the mother died; in another, one woman had tuberculosis and recovered, but her little boy died later on; in another one woman died; and in yet another, although the parents have always been healthy, one daughter died, about six months before our visit, of typical tuberculosis, another daughter had tubercle of the eye, and a third two years before our visit had come under treatment for tubercular glands of the left axilla which were removed. Later on the lower cervical glands were twice operated on. It was then found that her left lung was affected, and she was put under tuberculin treatment. At the time of our visit she had so far improved that she was fat and felt quite well, but physical signs still remained in the lung.

We have detailed this very extensive outbreak, because, having taken place under skilled medical observation, it appears to be beyond dispute, and is therefore a good instance of the spread of tuberculosis in the native kraal. It is to be mentioned that these natives are not of the usual mission type, but differ little from the raw Shangaan.

CHAPTER VIII.

Some Racial and Social Features of the Population which affect Considerations Regarding Tuberculosis.

165. In view of the great effect that differences of race, sex, age, occupation and conditions of living have in determining the relative incidence of tuberculosis, it is necessary before proceeding further, to consider the general characters of the population of the Union, its races and their distribution, and the more important of the social conditions that may affect the occurence of tuberculosis. In this matter of tuberculosis, as with most other questions, the position of South Africa is unique as compared with any other country, by reason of the number of races that have to be dealt with, and especially the great preponderance in the population of the uncivilised native races.

Distribution of the main Races in the Population.

166. At the last census, taken in April, 1911, there were within the Union a total population of 5,973,394 persons. This number included some 5,293 travellers in transit by rail or camping out on the night of the census.

The distribution of the main races in the four Provinces are as follows:—

	Europeans.	Bantu.	Mixed and other Coloured.	Total.
Cape of Good Hope ..	582,377	1,519,939	462,649	2,564,965
Natal	98,114	953,398	142,531	1,194,043
Transvaal	420,562	1,219,845	45,805	1,686,212
O.F. State	175,189	325,824	27,161	528,174
Total	1,276,242	4,019,006	678,146	5,973,394

The European.

167. Of the European portion of the population, speaking generally, it may be said that it consists of two elements, the older portion South African born, mainly of Dutch and French extraction and settled on the land or in the smaller up-country towns, and the newer or immigrant portion, chiefly congregated in the coastal and larger towns and in the industrial centres.

In connection with the question of tuberculous infection in early life, and the resulting acquired immunity, it is desirable to obtain some idea of the relative numbers of the European population born respectively in and outside of South Africa. The figures are given in the following Table 24.

TABLE 24.—Showing the numbers and percentage proportions of Europeans born in and outside South Africa, respectively.

	Urban.				Rural.				Urban and Rural.			
	Born in South Africa.		Born outside South Africa.		Born in South Africa.		Born outside South Africa.		Born in South Africa.		Born outside South Africa.	
	Number.	Proportion per cent.	Number.	Proportion per cent.	Number.	Proportion per cent.	Number.	Proportion per cent.	Number.	Proportion per cent.	Number.	Proportion per cent.
Males ..	210,194	59·48	143,186	40·52	304,106	92·30	25,374	7·70	514,300	75·32	168,560	24·68
Females ..	227,526	74·62	77,380	25·38	275,114	96·35	10,434	3·65	502,640	85·13	87,814	14·87
Persons ..	437,720	66·49	220,566	33·51	579,220	94·18	35,808	5·82	1,016,940	79·86	256,374	20·14

Thus of the European population in the rural areas nearly the whole, or 94·18 per cent. is South African born, while in the towns the percentage is only 66·49.

But in the urban areas the great majority of the foreign-born will be found concentrated in the port towns, Kimberley, on the Rand and in other centres of industry. It will also be seen that a large majority of the foreign-born are males; the percentages being in urban areas 40·52 for males and only 25·38 for females, and in the rural areas 7·70 and 3·65 per cent. respectively. Of the South African-born it will be observed that there is a tendency for the females to collect in the towns.*

168. There is some difference in the character of the urban population in the Cape as compared with the other Provinces. In the Cape Province there is a considerable urban population settled in old established small towns and villages of under 5,000 and mostly of about 2,000 inhabitants. These towns are in nearly

* *Note by Dr. Gregory.*—In view of this small proportion of foreign-born among the rural population, and of the fact that comparatively few immigrant consumptives now repair to the rural areas, while female immigrant consumptives practically never did so, we may take it for certain that nearly all the deaths from Tuberculosis among Europeans in the rural areas are among South African born persons. This is important as there is a tenedncy on the part of some to assume that all European cases of Tuberculosis in South Africa have been imported.

every case the business centre of the rural district in which they are situated, and consist generally of about equal numbers of Europeans and of coloured or mixed races. Few industries are carried on, and the Europeans are mostly in easy circumstances and are comfortably housed. The coloured classes, on the contrary, are usually in extremely poor circumstances and are crowded into a location, generally at the lower end of the town, occupying very wretched huts and hovels destitute of sanitation or easy access to a pure supply of water.

In the Transvaal the urban population is nearly all contained in the large mining centres along the Reef, although there are also a few old country towns of the kind found in the Cape.

In the Orange Free State, if Bloemfontein be excluded, only a very small proportion of the population is urban.

Also in Natal the great bulk of the urban population is contained in Durban with its suburbs, and in Pietermaritzburg and Ladysmith.

The only towns in the Union which can really claim to have any of the characters of industrial centres are Cape Town, Port Elizabeth, East London and Kimberley in the Cape Province, Bloemfontein in the Orange Free State, Johannesburg and the adjoining Reef towns, Pretoria, and the mining areas in the Transvaal, and Durban in Natal.

169. The following Table 25 shews for each Province the percentage proportions of European males and females living in (*a*) towns of over 5,000 total inhabitants, (*b*) towns of less than 5,000 total inhabitants, and (*c*) in rural areas.

TABLE 25.—Shewing for each Province the percentage proportions of European Males and Females living (*a*) in towns of over 5,000 total inhabitants, (*b*) in towns of less than 5,000 total inhabitants, and (*c*) in Rural Areas.

	Cape Province.			Natal.			Transvaal.			Orange Free State.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
Towns of over 5,000 inhabitants	31·62	33·35	32·45	54·40	54·02	54·22	55·04	51·08	53·31	14·69	11·17	13·07
Towns of under 5,000 inhabitants	16·86	17·82	17·33	10·05	11·97	10·95	6·18	7·10	6·58	17·34	19·62	18·38
Total *Urban*	48·48	51·17	49·78	64·45	65·99	65·17	61·22	58·18	59·89	32·03	30·77	31·45
Total *Rural*	51·52	48·83	50·22	35·55	34·01	34·83	38·78	41·82	40·11	67·97	69·23	68·55

From the above it is seen that in the Cape one half of the European population live in towns, in the Free State less than a third, in Natal over three-fifths and in the Transvaal exactly three-fifths.

170. The influence of immigration, with its effect of concentrating in the larger towns and industrial centres a preponderance of European young adult males, cannot be ignored when dealing with the relative incidence of phthisis. We have seen that in other countries the mortality from pulmonary tuberculosis is greatest between the years of age 20 and 55, and that the incidence is greater on males than on females. Therefore, other things being equal, a population containing a preponderance of young males over twenty years of age would display a larger proportion of pulmonary tuberculosis than would a community of normal age and sex composition. On the other hand a population containing an excess of young children will tend to shew a high occurrence of all other forms of tuberculosis, the incidence of which is greatest on very young children.

The extent of the error which would result from a comparison of the *crude* rates of mortality occurring in different parts of the Union, if difference of age and sex composition be not allowed for, will be evident from a consideration of the following Table 26, which gives in respect of each Province the age and sex distribution of the European population in urban and rural areas respectively. Thus, for example, to compare the Cape and the Transvaal, in the Cape Province 44·7 and 45·7 per cent. of the male and female populations, respectively, were under 20 years of age, whereas in the Transvaal the percentages were 34·1 and 45·0 respectively. Also in the Cape urban areas there were to every hundred males 98·7 women, while in the Transvaal the proportion was only 73·8.

TABLE 26.—Shewing for each Province, the numbers and percentages at each age period of the European population, male and female, in Urban and Rural areas, and the proportion of females to males.

Ages.	Urban.					Rural.				
	Numbers.		Percentage at each age period.		Proportion of females to 100 males.	Numbers.		Percentage at each age period.		Proportion of females to 100 males.
	M.	F.	M.	F.		M.	F.	M.	F.	
Cape Province.										
Under 5 years	17,949	17,489	12·34	12·17	97·44	22,988	21,986	14·87	16·04	95·64
5 years	31,926	32,343	21·94	22·52	101·31	38,138	36,409	24·67	26·56	95·47
15 years	15,163	15,871	10·42	11·05	104·67	15,513	14,393	10·04	10·59	92·78
20 years	36,160	36,169	24·86	25·18	100·02	38,055	33,223	24·61	24·23	87·30
35 years	19,801	17,296	13·61	12·04	87·35	16,697	13,581	10·80	9·91	81·34
45 years	12,446	12,136	8·55	8·45	97·51	11,633	8,835	7·53	6·44	75·95
55 years and upwards..	12,009	12,322	8·27	8·59	102·61	11,543	8,652	7·47	6·32	74·95
Unspecified	21	6	0·01	..	..	12	6	0·01	..	..
Total	145,475	143,632	100·00	100·00	98·73	154,579	137,085	100·00	100·00	88·68
Natal.										
Under 5 years	3,663	3,527	11·08	11·88	96·29	2,359	2,159	12·27	13·59	91·52
5 years	5,999	6,485	18·15	21·85	108·10	3,826	3,504	19·89	22·06	91·58
15 years	2,676	2,802	8·10	9·44	104·71	1,591	1,447	8·27	9·11	90·95
20 years	10,035	8,038	30·36	27·09	80·10	5,151	4,293	26·79	27·02	83·34
35 years	5,638	4,288	17·06	14·45	76·06	2,834	2,068	14·74	13·02	72·97
45 years	2,865	2,392	8·67	8·06	83·49	1,834	1,309	9·53	8·24	71·37
55 years and upwards..	2,174	2,149	6·58	7·23	98·85	1,632	1,104	8·49	6·96	67·65
Unspecified	1	..	..	..	..	3	..	0·02	..	..
Total	33,051	29,681	100·00	100·00	89·80	19,230	15,884	100·00	100·00	82·60
Transvaal.										
Under 5 years	16,812	16,428	11·62	15·38	97·72	15,950	15,521	17·40	20·22	97·31
5 years	22,329	22,134	15·43	20·73	99·13	19,774	18,705	21·58	24·37	94·59
15 years	10,251	9,493	7·09	8·89	92·61	9,127	8,508	9·96	11·09	93·22
20 years	49,106	31,683	33·94	29·67	64·52	22,894	18,477	24·97	24·07	80·71
35 years	27,637	15,335	19·10	14·36	55·49	11,467	7,523	12·51	9·80	65·61
45 years	12,390	7,158	8·57	6·70	57·77	6,765	4,301	7·38	5·61	63·58
55 years and upwards..	6,155	4,552	4·25	4·27	73·96	5,659	3,710	6·18	4·83	65·56
Unspecified	4	1	..	..	..	20	5	0·02	0·01	..
Total	144,684	106,784	100·00	100·00	73·80	91,656	76,750	100·00	100·00	83·74
Orange Free State.										
Under 5 years	3,848	3,717	12·75	14·99	96·60	10,562	10,423	16·50	18·67	98·68
5 years	5,436	5,650	18·02	22·77	103·94	13,957	13,108	21·80	23·48	93·92
15 years	2,898	2,984	9·61	12·03	102·97	6,639	6,171	10·37	11·05	92·95
20 years	10,576	6,603	35·05	26·61	62·43	16,654	14,265	26·02	25·55	85·66
35 years	3,597	2,768	11·92	11·15	76·95	7,413	5,587	11·58	10·01	75·37
45 years	2,031	1,619	6·73	6·52	79·71	4,514	3,276	7·05	5·87	72·57
55 years and upwards..	1,779	1,464	5·90	5·91	82·29	4,253	2,990	6·64	5·35	70·30
Unspecified	5	4	0·02	0·02	..	23	9	0·04	0·02	..
Total	30,170	24,809	100·00	100·00	82·23	64,015	55,829	100·00	100·00	87·21

In connection with this table, and as we have had occasion to compare the rates of mortality occurring in the Union with these obtaining in England and Wales, we subjoin the proportions per 10,000 of males and females living at each of the same age periods in England and Wales, at the Census of 1911.

	Males.	Females.	Persons.
Under 5 years	1,110	1,030	1,069
5 years	2,061	1,934	1,995
15 years	949	903	925
20 years	2,484	2,576	2,532
35 years	1,339	1,347	1,343
45 years	971	985	978
55 years and upwards	1,086	1,225	1,158
	10,000	10,000	10,000

171. Regarding the conditions of life of the European population of the Union, it may be said that there is an almost complete absence of those conditions which favour the occurrence of tuberculosis and are such prominent factors in this respect in European countries. Thus there is, with the exception of the limited class known as poor whites, remarkably little acute poverty, and as far as actual deprivation of food is concerned this is rarely present.

Speaking generally, the class of European dwelling is good, although with some of the older Africanders the desire to secure coolness in their dwellings during the heat of the day, results in the exclusion of sunlight and fresh air. Also domestic and personal hygiene are frequently very faulty, which is possibly owing to the scarcity of efficient domestic service, to inadequate water supplies, and in some parts to the enervating effect of the climate. Also in the majority of towns, systems of conservancy are badly carried out and in many places not carried out at all. Furthermore in the poorer class of house in the country districts earth floors are common, with the practice of smearing the living rooms with cowdung, or with blood, by which means a surface consisting of organic material easily converted into dust is produced, and one probably suitable as a nidus for pathogenic organism; to say nothing of the possibility of the dung itself having been derived from a tuberculous animal, it being a fact that the excrement of tuberculous cattle is frequently heavily infected with the tubercle bacillus.

But, except in the larger towns, where rents are high, there is little inducement to overcrowding among the Europeans. Among poor whites and the bijwoner class, however, the dwellings are often very poor and insanitary, and overcrowding exists. The poor whites are mainly to be found in certain districts, as for example, Knysna.

On the other hand, with the magnificent climate generally found throughout the Union, outdoor life is always possible. Also the hardships arising from extremes of cold, so common in Europe, do not exist at all.

Again, with the exception of the mining industry, there are very few Europeans following unhealthy occupations of a character predisposing to phthisis, such as are so frequent in Europe.

Also taken as a whole there is less alcoholism among Europeans in the country.

The Coloured or Mixed Races.

172. The coloured or mixed section of the population of the Union, as dealt with in the last census report, consists of a number of different elements which unfortunately have not been treated separately in detail. There were in the Union a total of 678,146 persons of coloured or mixed race, composed as follows:—

	Males.	Females.	Persons.
Cape Coloured	217,451	217,837	435,288
Malay	10,288	11,085	21,373
Griqua	3,970	3,789	7,759
Hottentot, Bushman, Koranna and Namaqua	30,022	26,014	56,036
Indians	93,886	55,905	149,791
Chinese	1,870	35	1,905
Others	3,792	2,202	5,994
Total	361,279	316,867	678,146

The Cape coloured range from the nearly pure native to the nearly pure European. In intelligence they are greatly in advance of the native races from which they have sprung, many of them possessing capacity of a high order. In physique, however, they do not appear to possess the constitution either of the European or of the native,* and speaking generally it would seem that they posssess less moral stamina than either of these races. They appear to be easily affected by tuberculosis, and according to the majority of the observers who gave evidence before the Commission, the disease usually runs a rapid and hopeless course. They constitute one of the most important factors in the consideration of tuberculosis.

* To take one obvious character. The European usually has fair and the native nearly always very fine teeth, but in the average Cape Coloured person they decay early, rapidly and almost completely.

In the towns they are largely employed in the smaller trades and industries, or as labourers and many of the females are in domestic service of the whites. In most of the towns the majority reside in the native or coloured location belonging to the municipal authorities.

The better class, of whom there are many, usually live on the same lines as the European, but the greater proportion live in a very insanitary manner, their dwellings are generally of very inferior description and are overcrowded. They work very intermittently, and as they are unlike the native in having any crops or cultivated ground to rely upon, they often are ill-nourished and dependent upon such food as their number who are in domestic service can bring away from the houses where they are working. They are apt to spend their earnings injudiciously and many are inclined to intemperance.

The great bulk of them, 391,327, are in the Cape Province, where they form the chief inhabitants of the older mission stations, such as Saron, Genadendal, Hankey, Enon, Mamre, etc. They are to be found throughout the Province, and in numbers in most of the towns, but their main areas are the Western Province and the South Western districts, such as the Cape, Paarl, Malmesbury, Stellenbosch, Oudtshoorn and Port Elizabeth. Except in the district of Mount Currie, very few are in the Native Territories.

On the date of the census there were only 22,655 in the Transvaal (mostly in the towns), 15,112 in the Orange Free State and 6,194 in Natal.

The Malay.

173. Of the 21,373 Cape Malays, 19,763 reside in the Cape Province, mostly in the Cape, Stellenbosch and Paarl districts. The Cape Malay was formerly a descendant of the Malay slaves originally introduced by the early Dutch settlers from their East Indian possessions, but they long ago became mixed with European, coloured, and, later, with Bantu blood, and the term is now more or less synonymous with coloured persons professing the Moslem faith. A few years back they were a fairly well-to-do community having, in the districts in which they congregate, a monopoly of certain trades, notably those of livery stables, green grocery, laundry work, fishing, painting, carpentry and masonry. Now, however, they have become a dwindling race and have been largely displaced from most of these trades, and except for their religion there is not much to distinguish them from the ordinary Cape coloured.

The Griqua.

174. The Griquas, by some authorities believed to be allied to the Hottentots, are of mixed race. With the exception of a few in the Orange Free State, practically all the 7,759 are in the Cape Province in its northern districts of Griqualand West and in the natives territories, chiefly in Mount Currie. As a race they possess in marked degree all the constitutional weakness of the Hottentot and coloured races. They are heavily infected with tuberculosis.

The Hottentot.

175. Of the Hottentots it may be said that a good deal of difficulty exists in determining between a Hottentot and a Cape coloured boy, for it is a rapidly disappearing race, and the majority of those classed as Hottentots are of mixed native and European blood. It is doubtful if many pure specimens still exist For this reason the number enumerated at the different censuses are inconsistent. Of the 56,036 at the last census nearly all are in the Cape Province, fairly evenly distributed, except that the larger numbers are to be found in the Oudtshoorn district and in Namaqualand, both these places being the original habitat of the Hottentot and Bushmen races. In physique, as a race, they are hopeless. They are much addicted to drunkenness and to dagga smoking.

Indians and Asiatics.

176. There were, at the date of the census, 149,791 Indians within the Union. This race has health and social problems that are entirely of its own, and which require special consideration as far as Natal is concerned. It is, therefore, unfortunate that they are lumped together with the "Coloured and Mixed Races," of the total of which they constitute nearly one fourth.

The following Table 27, prepared from the Report of the Director of the Census, 1911, shows that 133,031 were in Natal; 10,048 in the Transvaal; 6,606 in the Cape Province; and only 106 in the Orange Free State.

Of this number 63,776 (32,408 males and 31,368 females) were born within the Union, of whom 59,277 (29,946 males and 29,331 females) were born in Natal.

TABLE 27.—Showing the distribution, with age and sex composition, of the Indians within the Union.

Ages.	Cape of Good Hope.			Natal.			Transvaal.			Orange Free State.		
	M.	F.	P.	M.	F.	P.	M.	F.	P.	M.	F.	P.
Under 20 years	929	550	1,479	29,683	27,851	57,534	2,062	1,121	3,183	12	15	27
20–39 years ..	3,543	312	3,855	36,761	19,571	56,332	4,297	657	4,954	49	3	52
40–59 years ..	1,007	123	1,130	11,566	4,552	16,118	1,521	180	1,701	20	2	22
60 years and over	111	31	142	2,136	887	3,023	170	40	210	5	..	5
Unspecified ..	..	..	..	14	10	24	..	..	..	..	..	..
Total ..	5,590	1,016	6,606	80,160	52,871	133,031	8,050	1,998	10,048	86	20	106

Two classes of Indians have to be distinguished. In each Province there is the ordinary Indian or Asiatic, who has entered the country of his own initiative, merely conforming to the immigration restriction laws at the time being in force in the particular Province. In this class is included also his descendants born within the Union. It numbered in the year of the census, approximately, 30,000 to 35,000. They are mostly small traders, many being of Arab extraction and Mohammedans by religion.

Indentured Indians.

177. The other class is peculiar to Natal, and consists of Indians imported into that Province under the Indian Immigration Laws, and of the descendants of such Indians. Importation—which, however, has ceased since July, 1911—was conducted by the Indian Immigration Board, under Government supervision, represented by the *Protector of Indian Immigrants*, and was subject to indenture signed in India. The coolies on arrival were allotted to the different employers, who refunded to the Board by annual instalments the cost of the importation.

The indenture was for a term of five years, and applied alike to men, women and minors of ten years and upwards, and was independent of whether the person was married or single. The Government, however, stipulated that the number of indentured women should be not less than forty per cent. of the whole number of immigrants imported. With those born in the Province the proportion is now between 50 and 60 per cent. The Protector is of opinion that the proportion of women is insufficient, and in consequence sex troubles arise. (Question 17874-87.)

Males under 16 years and females under 13 years of age are deemed to be children.

At the conclusion of the original indentures the immigrant has the option either of re-indenturing, or of remaining in the Province as a "Free Indian," subject to the payment to the Government, under Act 17 of 1895, of an annual licence fee of three pounds sterling; or of being repatriated to India at the expense of the Board.

The term "Free Indian" also includes the children of indentured and free Indians, but these are entirely free, and are not liable to the payment of any annual fee.

Indentures are automatically terminated by permanent disablement—as, for example, by tuberculosis, and the sufferer may be repatriated by the Board, but there are no powers to enforce this if the immigrant refuses to leave. Marriage does not affect the indenture, but for two months before and three months after child-birth a woman cannot be required to work.

According to the Protector of Indian Immigrants, there were on the 31st December, 1912, 114,271 Indians in Natal, under the Indian Immigration Laws, classified as follows:—

	Men.	Women.	Children.	Total.
Free Indians	22,479	12,206	36,002	70,687
Indentured Indians ..	9,451	3,676	2,437	15,564
Re-indentured Indians ..	14,888	6,244	6,888	28,020
	46,818	22,126	45,327	114,271

Of the Free Indians a total of 15,295 (10,206 men and 5,089 women) were in December, 1912, liable to pay the annual licence fee.* The natural increase (excess of births over deaths and repatriations), since the stoppage of immigration has been about a thousand per annum.

The wage for males is a minimum of ten, increasing to a maximum of fourteen shillings per month, and for females a minimum of five, increasing to a maximum of seven shillings per month. Re-indentured and free Indians, however, command higher rates of pay up to thirty shillings per month for agricultural work, and fifty shillings for underground coal mining.

Indentured Indians and their families are required to be provided with quarters, rations and fuel and medical treatment by the employer.

The official scale of rations is: 7 lbs. of meal, 6 lbs. of brown rice, 4 lbs. of dhall and 1 lb. of ghee (in this case mustard seed oil or cotton seed oil) per week, and 1½ lbs. of salt per month. Re-indentured Indians claim an increased ration of 3½ lbs. of meal and 3 lbs. of rice per week.

The chief form of employment is as labourers on the sugar estates, where they are engaged in planting, weeding, cutting, trashing and tramming cane, and in and about the sugar mills.

Next to this comes work on the Natal Coal Mines, both on the surface and underground. Between 3,000 and 4,000 male Indians are so employed. Owing to the nature of the work, and possibly to the difference of temperature underground and on the surface, with the severe cold in winter, due to the altitude, the sickness and mortality among them are severe, especially from Pneumonia and Phthisis. The death-rate during 1912 from the latter disease, being 5·30 per annum per 1,000 as compared with 2·21 for all immigrant Indians. During the four years 1908-1911 the following average annual rates per thousand in the case of *male* indentured Indians employed on the coal mines:—Death-rate from Phthisis, 6·14; from other forms of tuberculosis, 1·22; repatriated on account of tuberculosis, 15·79. Total annual wastage from this disease, 23·15 per thousand.

There are also a considerable number employed in Durban by the municipality, there being about 2,400 men, women and children in the Corporation Indian Barracks; and by the South African Railways, including the Harbour Department—their barracks at Pietermaritzburg and at Durban at the Point and at Greytown containing between 2,000 and 3,000 Indians. Also large numbers are employed at the wharves by stevedoring companies, and many free Indians are engaged in domestic and other capacities.

Hours of Labour.

178. The officially recognised hours of labour for indentured are nine per diem, but it would appear that on some sugar estates it is not infrequent for them to start for work at day-break, and with intervals for meals, to continue until dark. On some estates they have set tasks to perform and can knock off when these are finished. Cases of ill-treatment and overwork have been known to occur. On one estate this matter was made the subject of a Commission of Enquiry, with the result that the mortality was at once reduced from a rate of 39 per thousand, at which it had persisted for some years, to one of only 15 per 1,000. The Authorities state that the extent of the sickness and death-rate has proved a most reliable index of the conditions of treatment of Coolies by different employers. Overwork is promptly reflected by an increase in the rates of sickness and mortality.

Your Commissioners are inclined to think that the hours of labour are in some instances too long. The great majority of these people are of very inferior physique and possess but little power of resistance to overstrain. Tuberculosis and pneumonia are exceedingly rife among them, and according to the Protector of Indians the first mentioned disease is increasing. It appears to run a rapid course and to be but little amenable to treatment. In spite of the medical examination in India before departure, cases of the disease were occasionally found among immigrants on arrival at Durban, which appeared to have developed on the voyage.

We also believe that the indenturing of young children is detrimental to their health and that this question deserves the consideration of the Government.

On the other hand, Mr. Polkinghorne states that the physique and general appearance of the immigrants progressively improve during the period of their original indentures, and that those re-indenturing after their five years in Natal,

* Only 1,594 men and 41 women had done so. As regards the payment of this fee, the law has not been enforced in the case of women.

are all round better than when entering the Province. Part of this improvement may, however, be due to a selective action by deaths and repatriations. Also the Protector of Indians is of opinion that the offspring born in Natal are of much better physique than those born in India.

Medical Attendance.

179. Indentured Indians are entitled to medical attendance, medical comforts and medicine, both for themselves and their families at the expense of their employer. For this purpose the Province is divided into "Circles," each having its Indian Medical Officer appointed by the Board. The more important circles, in which lie the large sugar estates and the collieries, have hospitals established by the Board to which severe cases of illness are removed. The cost is defrayed from a capitation of ninepence per head payable by employers. The hospitals are fair in construction and equipment, but the nursing is primitive; the entire institution being run by male Indians under a European male superintendent. The nursing of the females appears to be carried out by males.

Housing and Accommodation: Conclusions regarding.

180. As a rule the coolies are accommodated by large employers either in barracks or in open compounds consisting of blocks of rooms, or in villages composed of huts of either grass or wattle-and-daub. The Natal Government Health Department has laid down types to which different classes of huts must conform, namely, the ordinary grass hut, the wattle-and-daub hut, the all-iron building, and the brick building.* Also the sanction of the Health Officer is required when huts are erected.

We were informed that of recent years great improvement had taken place in the standard of accommodation, with a resulting improvement in the health of the occupiers; nevertheless we found much of it, both on the sugar estates and the coal mines to be unsatisfactory. Many employers, however, had erected blocks of substantial brick-built rooms, but frequently these lacked sufficient lighting and ventilation, and many of them were overcrowded. In nearly all cases the general standard of sanitation was low and the surroundings of the dwellings extremely dirty. A proper water supply within reasonable distance was not always provided. In many instances the latrine accommodation was deficient; although we are informed that of recent years the authorities had given special attention to enforcing the provision of proper latrines, in connection with the prevention of hook-worm disease; about 80 to 90 per cent. of all Indians being found by Dr. Burton Nicol to be infected with it on arrival at Natal.†

Among the most unsatisfactory quarters seen by the Commission was the barrack accommodation belonging to the Railway Department in Durban, both at the Point and at Greytown. These quarters were most insanitary, many of the dwellings being back-to-back and quite unfit for habitation.

We reproduce the following rates showing the excessive incidence of tuberculosis on the inmates of these barracks, which should have spoken for itself:—

The population was 2,160 in 1910 (men 1,138, women 408, children 614), and 2,221 in 1911 (men 1,198, women 410, children 613). In 1910 there were 4 deaths and 5 repatriations from phthisis: and in 1911, 10 deaths and 7 repatriations, of which all were phthisis, except two which were on account of other forms of tuberculosis. These give the following rates per thousand for tuberculosis:—

	Death-rate.	Repatriation-rate.	Total Wastage.
1910	1·85	2·31	4·16
1911	4·50	3·15	7·65

We were informed that repeated official representations had been made to the Railway Department on the subject.

Certain of the large Indian barracks situated at the Point and belonging to stevedoring companies were also unhealthy in many respects. In the opinion of your Commissioners the practice of crowding a man, his wife, and a large family of young children into single rooms of small dimensions is bad, and should be severely discouraged by the responsible authorities.

*A reprint of these useful regulations will be found in Annexure C.

†Dr. Nicol found in the majority of his cases the parasite present to be the *Necator Americanus.*

System of Control.

181. While the supervision of the general well-being and the medical care of Indians is a function of the Indian Immigration Trust Board, and is controlled by the Protector of Indian Immigrants, who is *ex officio* a member of the Board, the control of the general sanitary conditions under which Indians are maintained, the suitability of their dwellings, the provision of latrines, the ensuring of proper water supplies, and the prevention of infectious disease are matters falling under the Health Administration of the Union. Although, owing to the personal efforts of the several officers concerned the two authorities appear always to have attempted to co-operate in these matters, we are of opinion that these two aspects should not be separated but should be combined under one general control. While in many cases the same person holds the two offices of Government Health Officer and Indian Medical Officer, this is not always so, and when it is the officer is responsible for, and has to report to different authorities regarding the two sides of his work.*

Also the main power of coercion of recalcitrant employees lies in the hands of the Indian Immigration Trust Board, which consists of members elected by the employers of indentured Indians, with two members nominated by the Government, one of whom is the Protector of Indians. Its revenue is derived from the annual capitation payments made by employers of indentured labour. The Protector of Indian Immigrants and his staff are maintained and paid by the Government, but the Indian Medical Officers are employees of the Board. As a matter of *arrangement*, however, the Board requires them to take instructions from the Protector.

Mixed and other Coloured Races: Sex and Age distribution.

182. The attached Table 28 furnishes for each Province the numbers and percentages of males and females at each age period of the mixed and other coloured races, and the proportion of females to males. As we have seen, the title "Mixed and Other Coloured Races" includes a number of totally different races, but roughly it may be taken that the figures for the Cape and Orange River Provinces apply practically to Eurafricans, and those for Natal to Indians, while those for the Transvaal are so mixed as not to be of much use racially.

A particular feature in this return is the preponderating proportion of children under 15 years of age and of females to males at all ages in the Cape Province, due to the Cape coloured male seeking work outside the Province, and to the coloured female collecting in the urban areas, either as domestic servants or in municipal locations.

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* *Note by Dr. te Water and Dr. Porter.*—We dissent from this expression of opinion, believing that "the general well-being and the medical care of Indians" dovetail with their general sanitary circumstances; that *all* these matters concern *both* Authorities to some extent, and that it is, therefore, undesirable that either Authority be entirely divorced therefrom.

TABLE 28.—Showing for each Province, the numbers and percentages at each age period of the Mixed and Other Coloured Races, male and female, in Urban and Rural areas, and the proportion of females to males.

Ages.	Urban.					Rural.				
	Numbers.		Percentage at each age period.		Proportion of females to 100 males.	Numbers.		Percentage at each age period.		Proportion of females to 100 males.
	M.	F.	M.	F.		M.	F.	M.	F.	
Cape of Good Hope.										
Under 5 years	16,225	16,332	15·71	14·32	100·66	20,074	20,046	15·50	17·34	99·86
5 years	26,289	27,178	25·45	23·83	103·38	34,125	31,138	26·36	26·95	91·25
15 years	10,132	13,059	9·81	11·45	128·89	12,907	11,200	9·97	9·69	86·77
20 years	25,633	30,824	24·83	27·03	120·25	28,019	26,092	21·64	22·57	93·12
35 years	11,028	11,258	10·67	9 87	102·09	13,687	11,366	10·57	9·84	83·04
45 years	7,193	7,520	6·96	6·59	104·55	9,950	7,756	7·68	6·71	77·95
55 years and upwards..	6,751	7,866	6·54	6·90	116·52	10,494	7,713	8·11	6·68	73·50
Unspecified	29	10	0·03	0·01	..	219	259	0·17	0·22	..
Total	103,280	114,047	100·00	100·00	110·43	129,475	115,570	100·00	100·00	89·26
Natal.										
Under 5 years	4,041	4,234	12·51	19·25	104·78	6,809	7,079	12·91	19·97	103·97
5 years	6,376	5,817	19·74	26·46	91·23	9,525	8,514	18·06	24·03	89·39
15 years	2,405	2,030	7·45	9·23	84·41	2,961	2,706	5·61	7·64	91·39
20 years	10,583	6,036	32·76	27·45	57·03	20,578	12,002	39·02	33·86	58·32
35 years	5,134	2,039	15·90	9·27	39·72	7,754	3,214	14·70	9·07	41·45
45 years	2,230	1,047	6·90	4·76	46·95	3,251	1,163	6·17	3·29	35·77
55 years and upwards ..	1,524	785	4·72	3·57	51·51	1,840	751	3·49	2·11	40·82
Unspecified	6	2	0·02	0·01	..	20	10	0·04	0·03	..
Total	32,299	21,990	100·00	100·00	68·08	52,738	35,439	100·00	100·00	67·20
Transvaal.										
Under 5 years	1,744	1,794	8·70	15·84	102·87	1,042	1,059	11·97	18·59	101·63
5 years	2,632	2,418	13·14	21·36	91·87	1,900	1,463	21·82	25·69	77·00
15 years	1,808	1,153	9·03	10·18	63·77	951	621	10·92	10·91	65·30
20 years	8,336	3,716	41·62	32·82	44·58	2,363	1,315	27·15	23·09	55·65
35 years	3,469	1,288	17·31	11·38	37·13	1,142	566	13·12	9·94	49·56
45 years	1,384	561	6·91	4·96	40·53	697	346	8·00	6·08	49·64
55 years and upwards..	658	390	3·28	3·44	59·27	602	323	6·92	5·66	53·65
Unspecified	2	2	0·01	0·02	..	9	2	0·10	0·04	..
Total	20,033	11,322	100·00	100·00	56· 2	8,706	5,695	100·00	100·00	65·41
Orange Free State.										
Under 5 years	543	567	12·52	13·73	104·42	1,496	1,525	14·82	17·78	101·94
5 years	836	884	19·27	21·39	105·74	2,450	2,210	24·26	25·77	90·20
15 years	502	573	11·57	13·87	114·14	1,234	953	12·22	11·11	77·23
20 years	1,347	1,146	31·05	27·74	85·08	2,151	1,896	21·30	22·10	88·15
35 years	446	364	10·28	8·81	81·61	1,021	823	10·11	9·60	80·61
45 years	310	271	7·15	6·56	87·42	661	519	6·55	6·05	78·52
55 years and upwards ..	347	322	8·00	7·80	92·80	1,075	644	10·64	7·51	59·91
Unspecified	7	4	0·16	0·10	..	10	7	0·10	0·08	..
Total	4,338	4,131	100·00	100·00	95·23	10,098	8,577	100·00	100·00	84·94

The Bantu Race.

183. We pass next to the great Bantu race, the numbers of which amounted in the Union at the 1911 census to 4,019,006, and which comprises practically the whole of the pure native population. The term Bantu, however, includes many different tribes, which although belonging to the Bantu family, are nevertheless widely separated as regards racial characteristics, habits, customs and language. Between many of them there exists great tribal animosity, and until very recent years severe tribal wars were frequent. Indeed, the history of the native races in South Africa has been mainly a succession of migrations of weaker tribes under pressure of the more war-like, among the latter the Zulu being paramount.

The different tribes also vary considerably in physique and constitution, in intelligence, general capacity, size, build, skin pigmentation and hair growth, and in the extent to which they are affected by certain diseases, among which must be mentioned tuberculosis.

The chief tribes indigenous to the Union are, in the order of their greatest numbers, the Zulu, the Amaxosa, the Fingo, the Tembu, the Bechuana, the Pondo, the Tonga, the Swazi and the Bavenda.

The following Table 29 shows the distribution of the different tribes in the four Provinces.

The numbers given for the individual tribes must not, however, be taken as beyond dispute, as the average census enumerator has some difficulty in distinguishing between them.

TABLE 29.—Showing the distribution of the chief Bantu Tribes of the Union at the census of 1911.

	Cape.	Natal.	Transvaal.	Orange Free State.	Total.
Zulu	23,527	877,264	88,650	48,005	1,037,446
Basuto	93,310	5,524	455,801*	190,813	745,448
Xosa	353,261	456	39,715	6,509	399,941
Fingo	316,881	84	17,817	12,967	347,749
Tembu	267,088	199	1,412	8,706	277,405
Bechuana	112,320	18	106,500	50,276	269,114
Pondo	209,375	13,771	12,721	389	236,256
Tonga	888	10,970	171,848	672	184,378
Swazi	467	30,342	89,462	4,736	125,007
Bavenda	286	6	88,710	17	89,019
Ndebele..	184	92	58,551	755	59,582
Pondomise	54,188	9	1,986	140	56,323
Baca	43,266	7,367	4,706	192	55,531
Other smaller tribes ..	43,617	7,234	2,409	716	56,323
Portuguese, Rhodesian and Central African Natives	1,281	62	79,557	931	81,831
Total	1,519,939	953,398	1,219,845	325,824	4,019,006

In the Cape Province.

184. The general bulk of the Xosa, Fingo, Tembu and Pondo tribes inhabit the Cape Province, the numbers of these tribes in the other Provinces being comparatively insignificant. Thus there were only about 40,000 Amaxosa in the Transvaal, mostly temporarily working on the mines. A few Fingoes are also found in the Transvaal and the Orange Free State, and a few Pondos in the Transvaal and Natal. But for the rest the numbers are negligible. Together these four tribes constitute 75·4 per cent. of the entire Bantu population of the Cape Province; the Bechuana, Basuto and Pondomise, together amounting to 17·1, while the remaining 7·5 per cent. is made up of small numbers of unimportant tribes.

The Xosa is probably the most distributed tribe throughout the Province. It is usually known as the Kaffir and was the earliest of the Bantu races occupying Kaffraria and was our opponent in the old Kaffir wars. The Xosa is mainly to be found in the area comprising the districts of Albany, Bedford, Fort Beaufort, Victoria East, Stockenstrom, King William's Town, East London, Bathurst, Alexandria and Uitenhage, where taken as a whole it constitutes the great bulk of the native population. The tribe is also in large numbers in the native Territories, chiefly in the Transkei and Tembuland. It is one of the most advanced in civilization of the native tribes of the Union.

* According to the figures of the Director of Native Labour, there were employed in the Transvaal labour districts 8,992 Basutos from Basutoland who are included in the above number.

The Fingoes are descendants of tribes driven south by the Zulu under Tshaka. Meeting with the Kaffirs they became enslaved by them, from which bondage they were emancipated by the English at the close of the Kaffir war in 1834. They are one of the most intelligent and docile of the African races, and are rapidly advancing in civilization. They are in considerable numbers in almost every district of the Province, especially those of King William's Town, Peddie and Herschel; but chiefly in the Native Territories, where they predominate in the area formed by the contiguous districts of Nqamakwe, Tsomo, Butterworth and Idutywa.

The Tembus who are also forward in civilization, are also widely spread throughout the Province, but their main habitat is in Tembuland in the Native Territories, next to this they congregate in the area formed by the contiguous districts of Queenstown, Cathcart, Tarka, Cradock, Molteno, Glen Grey and Wodehouse, where they form the great majority of the native population. They are also in considerable numbers in Herschel.

Of Pondos there are few to be found outside the Native Territories where a fair number exist throughout, but the great bulk are in Pondoland. This area was only annexed to the Cape in 1895 and the tribe, which is of a lower order than those just mentioned, has scarcely emerged from barbarism, and are thus far behind the other tribes in general progress.

Most of the Bechuanas are to be found in Bechuanaland and the districts immediately south of it, namely, Barkly West, Hay, Herbert, and Kimberley. For years they have constituted a large part of the labour complement of the Kimberley mines and the River Diggings. They are more degenerate than others of the Bantu race, and are extensively affected with syphilis.

The Basuto is not, strictly speaking, a tribe of the Cape Province, although there are over 90,000 of them settled in the districts adjoining, or near to the Basutoland border, namely, Matatiele, Mount Currie, Mount Fletcher, Herschel, Aliwal North and Wodehouse. Also considerable numbers are always to be found temporarily in Kimberley employed on the Diamond Mines.

There are few Pondomise to be found anywhere but in the Qumbu, Engcobo and Umtata districts in the Native Territories.

The Bacas are nearly all located in the Native Territories in the districts of Mount Frere and Umzimkulu.

Also in Umzimkulu, which district adjoins Natal, are to be found the majority of the few Zulus in the Cape Province.

Of the Cape Bantu population, 879,126 were at the census in the Native Territories, which is entirely a native reserve, while of the 568,252, in the Colony proper, 322,537 were in the more purely native districts such as Glen Grey, Herschel, Peddie, King William's Town, Victoria East, where native reserves or locations exist and the life is communal.

In Natal.

185. In the Province of Natal almost the entire native population consists of Zulus, the Zulu as now understood being nearly confined to that Province. Of the total number 738,429 were in Natal proper, and 214,969 in Zululand. The Zulu is physically one of the finest and hardiest of the native races. He suffers less from disease than any of the other uncivilized tribes employed on the mines. He is intelligent, temperate and clean, although perhaps not so adaptable as some of the Cape Province natives. Generally speaking, he has not made much progress in civilization, but lives in the manner of his forefathers. The proportion of amakolwa among them is small.

Such other tribes as are to be found in Natal are mostly extensions from neighbouring territories near the borders of which they are to be found, such as the Swazis from Swaziland, the Pondo from Eastern Pondoland, and the Tonga from Portuguese East Africa.

In the Transvaal.

186. In the Transvaal, excluding the floating population of about 275,000 natives employed on the Transvaal mines, and on the Rand as house-boys, store-boys, etc., the settled tribes are distributed more or less throughout the Province, but the principal are aggregated in particular areas, the great bulk of them, amounting to 326,023, being domiciled in the Zoutpansberg.

The Transvaal Basuto, or M'sutu, is the most extensive tribe, constituting 40 per cent. of the entire native population. It is an offshoot of the Baralong

and itself includes a number of subsidiary tribes, of which the Bapedi is the most important. It is to a large extent domiciled in the Northern and Eastern sections of the Province, namely in the Lydenburg, Zoutpansberg, Waterberg, Rustenburg and Pretoria areas.

The Tonga tribes, commonly known as the Shangaans, and sometimes as the "Knobneuzen,"* form the next largest section of the settled tribes of the Transvaal, or about 15 per cent. of the whole. They originally came from the East Coast, now Portuguese Territory. They are said to have been tribes conquered by the Zulu, from whose power they fled. They inhabit generally the Zoutpansberg and the north-east portion of the Province. They are of good physique, docile and adaptable, and proceed freely to the large labour centres of the Transvaal.

The next largest tribe are the Bechuanas, another offshoot of the Baralongs. They are found mostly in the western and south-western districts, *i.e.*, Marico Lichtenberg, Rustenburg, Wolmaransstad and Potchefstroom.

The Bavenda, a very distinct tribe, occupy the extreme northern part of the Transvaal in the Louis Trichardt district of the Zoutpansberg area. They originally came from the Congo Basin, some two hundred years ago, and settled in the Njelele Valley. Until a few years ago they were constantly engaged in internecine strife, and only comparatively recently have been brought under European administrative control.

There are a considerable number of Zulus in the Province, mostly in the south-eastern portion, and chiefly in the Wakkersstroom district. They are emigrants from Zululand, partly descendants of fugitives from the despotism of Tshaka.

Also a large number of Swazis are to be found in the Barberton, Wakkersstroom, Ermelo and Carolina districts adjoining Swaziland, whence they have come partly as fugitives and partly as overflow.

In the Orange Free State.

187. In the Orange Free State the predominant native tribe is the Basuto, and next to this in about equal proportions, come the Bechuanas, consisting mainly of Baralongs, and the Zulu.

The Basuto is distributed in numbers in all parts of the Province, but mainly in the districts of Harrismith, Ladybrand, Bethlehem and Ficksburg, adjoining Basutoland.

The Bechuanas and Zulus are also distributed in every district of the Province, but the former are chiefly to be found in Bloemfontein and Thaba 'Nchu districts, while the latter are mainly domiciled in the Harrismith, Vrede and Bethlehem districts on the Natal border.

Movement of Natives.

188. It has to be remembered that a very considerable number of the natives found at any one time within the Union are not in a strict sense inhabitants of the Union, as they are merely a temporary floating population from adjoining native areas, whence they have come for the purpose of earning money to take back to their homes. Thus on the date of the census there were 81,831 Portuguese East African, Southern and Northern Rhodesian and Central African natives, most of whom were employed on the Rand mines. Also the Union is the only outlet for the large native population of Basutoland and Swaziland. It is therefore impracticable to deal with the health of the native population of the Union without at the same time taking into consideration the condition of the native population of these areas. Certainly so far as Basutoland, Swaziland, the Bechuanaland Protectorate and the Portuguese East Coast are concerned, conditions affecting the health of the natives of these areas must affect in varying measure the health of natives within the Union, especially at the large labour centres.

* From the old tribal custom of tatooing by cutting pieces of skin on their faces, and especially their noses, which they rolled into little knobs.

The extent to which this movement of native races occurs is indicated by a consideration of the birth places of natives, obtainable from the census, there having been 228,254 born outside the Union, of which number 186,886 were males and only 41,368 females, the component figures are as follow: —

	Persons.	Males.	Females.
Basutoland	75,132	48,798	26,334
Bechuanaland	5,020	3,826	1,194
Nyasaland	4,573	4,571	2
Rhodesia	4,684	4,412	272
Swaziland	21,662	12,573	9,089
German South-West Africa	2,207	1,239	968
Portuguese East Africa	114,976	111,467	35,909
Total	228,254	186,886	41,368

It is also prominently displayed by the preponderance of males to females in the urban areas at the working years of life, from 15 to 45 years, while the reverse holds good in the rural areas. Thus at the age period from 20 to 35 years the number of females to every hundred native males of the same age period in the urban and rural areas respectively, was for each Province as follows: —

	Cape Province.	Natal.	Transvaal.	Orange Free State.
Urban	74·4	12·2	5·2	44·6
Rural	150·7	171·5	146·9	107·0

And it is also seen in the ages of the native populations in urban areas as compared with rural, as is shown by the following Table 30 giving the ages of males and females of the Bantu population in the several Provinces.

As has already been emphasized, these differences are of paramount importance in the consideration of tuberculosis.

TABLE 30.—Showing for each Province the numbers and percentages at each age period of the Bantu Races, male and female, in Urban and Rural Areas, and the proportion of females to males.

Ages	Urban.					Rural.				
	Numbers.		Percentage at each age period.		Proportion of females to 100 males.	Numbers.		Percentage at each age period.		Proportion of females to 100 males.
	M.	F.	M.	F.		M.	F.	M.	F.	
Cape of Good Hope.										
Under 5 years	6,547	6,865	10·75	13·14	104·86	118,929	126,347	18·02	16·93	106·24
5 years	10,443	10,897	17·15	20·86	104·35	199,144	191,669	30·17	25·69	96·25
15 years	6,087	6,438	10·00	12·32	105·77	66,265	75,219	10·04	10·08	113·51
20 years	20,283	15,089	33·30	28·88	74·39	123,356	185,848	18·69	24·91	150·66
35 years	8,732	5,654	14·34	10·82	64·75	60,813	69,765	9·21	9·35	114·72
45 years	4,782	3,426	7·85	6·56	71·64	44,810	46,843	6·80	6·28	104·54
55 years and upwards..	3,976	3,864	6·53	7·39	97·18	46,655	50,447	7·06	6·76	108·13
Unspecified	47	13	0·08	0·03	..	101	29	0·01	..	..
Total	60,897	52,246	100·00	100·00	85·79	660,073	746,167	100·00	100·00	113·19
Natal.										
Under 5 years	345	386	1·10	8·49	111·88	58,016	63,815	14·68	12·23	110·00
5 years	4,047	850	12·88	18·70	21·00	136,799	137,363	34·61	26·33	100·41
15 years	6,903	792	21·97	17·43	11·47	38,971	59,044	9·85	11·32	151·70
20 years	14,324	1,752	45·59	38·54	12·23	72,254	123,943	18·28	23·75	171·54
35 years	4,231	429	13·46	9·44	10·14	36,327	53,963	9·19	10·34	148·55
45 years	1,228	203	3·90	4·47	16·53	25,447	35,208	6·44	6·75	138·36
55 years and upwards..	335	133	1·07	2·93	39·70	27,391	48,391	6·92	9·28	176·67
Unspecified	9	..	0·03	..	..	102	27	0·03	..	..
Total	31,422	4,545	100·00	100·00	14·46	395,257	521,754	100·00	100·00	132·00
Transvaal.										
Under 5 years	3,220	3,370	1·10	13·73	104·66	78,530	85,918	19·00	17·55	109·41
5 years	7,901	3,936	2·71	16·03	49·82	125,227	118,657	30·30	24·25	94·75
15 years	35,494	3,137	12·15	12·78	8·84	35,880	46,166	8·68	9·43	128·67
20 years	189,419	9,899	64·85	40·31	5·23	79,202	116,363	19·17	23·78	146·92
35 years	45,068	2,495	15·43	10·16	5·54	42,742	53,575	10·34	10·95	125·35
45 years	9,207	1,010	3·15	4·11	10·97	25,788	31,444	6·24	6·42	121·93
55 years and upwards..	1,782	702	0·60	2·86	39·39	25,862	37,239	6·25	7·61	143·99
Unspecified	42	4	0·01	0·02	..	84	42	0·02	0·01	..
Total	292,133	24,553	100·00	100·00	8·40	413,315	489,404	100·00	100·00	118·41
Orange Free State.										
Under 5 years	1,982	2,133	7·71	12·82	107·62	24,012	25,027	16·87	17·80	104·23
5 years	3,038	3,563	11·82	21·42	117·28	40,252	36,751	28·27	26·15	91·30
15 years	2,960	2,359	11·51	14·18	79·70	15,925	15,075	11·19	10·72	94·66
20 years	11,261	5,026	43·81	30·21	44·63	29,870	31,962	20·99	22·73	107·00
35 years	3,596	1,591	13·99	9·57	44·24	13,734	13,274	9·64	9·44	96·65
45 years	1,586	918	6·16	5·52	57·88	8,014	7,861	5·62	5·60	98·09
55 years and upwards ..	1,252	1,031	4·87	6·18	82·35	10,482	10,577	7·37	7·52	100·90
Unspecified	34	16	0·13	0·10	..	69	52	0·05	0·04	..
Total	25,709	16,637	100·00	100·00	64·71	142,358	140,579	100·00	100·00	98·75

Conditions of Native Life. Effect of visiting Labour Centres.

189. The great majority of the aboriginal natives are settled on the land, mainly in reserves or in locations under tribal or communal tenure. A large proportion, however, are on private lands either farming on the shares system or as farm labourers, in both cases living in native huts erected by themselves. Also a considerable number reside with their families in town locations, especially in the Cape Province. In any case, the native does not readily shift his kraal, his home usually remaining permanently at the place of its first location. This is partly owing to his own strong tribal instinct, partly to his property consisting in cattle and to his local right of grazing and of cultivation and partly to the general trend of the native laws which prohibit squatting and make it difficult for him to migrate, or to remain in any place not specially reserved for

him or not his master's premises. It follows, therefore, that as increasing numbers tend to overcrowd the reserves, and as advancing civilization leads to increasing wants, larger and larger numbers of the young men are either forced or attracted to the various labour centres in search of work. As, however, the requirements which they seek to satisfy are limited or temporary, chief of which is to earn sufficient for lobolo, and as they rarely relinquish their local tribal and family ties, their stay at the labour centres is usually of very limited duration, being from three to twelve months, and generally only six.

This practice is a salient feature which must be always kept in mind when dealing with the health of the native, for in the first place it means that the native industrial population consists mainly of young male adults in the prime of life, and who are to a certain extent selected lives, as the tendency is for the weak and the ailing to remain at the kraals. Also it is a continuously changing population. A large proportion of its units not being under observation during the whole of any period under review.

In the next place as soon as a native is stricken with any illness his one desire is to clear off back to his kraal. Thus the whole of the sickness and mortality arising at the place of occupation, and possibly due to the occupation or to local conditions, is not ascertainable, while on the other hand disease is being constantly introduced into the kraals.

Lastly, owing to the shortness of the period of exposure to the adverse conditions of labour centres, and to the recuperative effect of a return to the free and lazy life of the kraal, any evil effect of such conditions is very much mitigated in the case of the native. On the other hand there must be set against this the adverse effect of the frequent readjustment required by the changes from the kraal life to the severer conditions of the labour centre. In many cases also there is added to these the effect of change of altitude and climate, as for example, in coming in winter time from the coastal belt to work on the Witwatersrand. It seems to be well established in the case of natives employed on the mines that it is during the first few weeks after joining the greatest hazard occurs. This is particularly so with regard to the occurrence of pneumonia.

All of these effects apply with particular force in the case of tuberculosis.

190. There appear to be good grounds for believing that, quite apart from the particular effects incidental to the particular kind of labour undertaken—as, for instance, those attendant upon underground mining—the mere change from kraal life to the environment of the labour centre adversely affects the health of the average raw native. How much this is due to change of climate conditions, aggregation, often in overcrowded compounds, alterations in dress and diet, restriction of freedom, unaccustomed physical strain, or exposure to organisms harmless to ordinary individuals, but pathogenic to the uninured raw native, it is difficult to say. As extreme instances of this effect we may mention the case of tropical natives recruited for the mines. These boys suffered in health and succumbed in large numbers to pneumonia, even during the three weeks they were detained in the Witwatersrand Native Labour Compound for acclimatisation prior to being drafted on to the mines, although every care as regards housing, warming, feeding and treatment was exercised.

And the case of raw natives under detention in the gaols of the Cape Colony —usually having high-walled, sun-less yards—for crimes such as stock theft or assault with violence, implying a fair amount of physical fitness for accomplishment, it was no uncommon experience for such natives, 25 to 35 years of age, to pine and die without any obvious disease being diagnosed by the Medical Officer, either during life or at the autopsy.

Condition of Kraal life which affects his Health.

191. It is here necessary to take account of some of the conditions under which the native ordinarily lives at his kraal, so far as these affect his health and especially the occurrence of tuberculosis.

Labour.

The raw native in his kraal lives in the main an easy, healthy open-air life. Much time is passed idling in the sun. The hut is usually occupied only at night and when shelter from the weather is required. Such work as is carried on is simple and intermittent, and is mostly performed by the women and children. The women certainly have to do hard work, which is often performed with a baby on the back. It consists in such offices as collecting firewood, carrying water, crushing

grain by grinding between stones or in a stamp block, cooking, making kaffir beer, tilling small patches, with the harvesting and carrying of the produce, and usually hut building and repairing. Hunting, formerly the men's occupation, is a thing of the past. A fair amount of voluntary exercise is taken in visiting at kraals and in violent dances.

Personal Habits.

192. The native is moderately clean, seeing the small amount of water available for washing. If living near a river, and in compounds where baths and showers are provided, he is fond of washing, but this trait varies in different tribes. He is fairly clean in the disposal of his excrement, usually depositing it at a distance from his dwelling. He has, however, one bad and invincible habit, that of incessant spitting promiscuously about, which is important from the point of view of tuberculosis. All natives are in fact most careless and filthy in regard to their nasal and buccal secretions. He will foul his fingers with it and after "cleaning" them on his own bare leg, on the floor or the neighbouring wall of the hut, or anything else convenient, he may dip into the common eating utensil. He always eats with his fingers; and pipes, drinking and other utensils are used in common. Spitting about outside the hut is possibly not a great danger with the intense sunlight of South Africa, but as children are always crawling about and fowls and pigs are foraging around some danger may occur. Advancement in civilisation does not seem to effect the least improvement in the natives' habit of spitting; and the lower class coloured person is not much better in this respect. In most cases when he spits on the floor of the hut he either smudges it out with his foot, or sweeps it into the fire with a small besom provided for the purpose. It would appear, however, that some raw natives, when in the hut habitually spit into the fire or into a receptacle containing earth or ashes, and that invalids having copious expectoration may use such a receptacle both inside and outside of the hut, but such cases are rare, although certainly on some occasions the Commission saw it being done; not, however, on account of infection but in order to prevent a mess. It must be mentioned that until the last stages are reached, a native suffering from consumption usually passes his day outside the hut.

Another custom which is conducive to disease is the sleeping on the ground of the hut, and also using it as a table. In this way he comes into contact with any dirt and infection that may be on the floor. Also as his blanket has no right or wrong side, and he never washes it, he collects in it whatever dirt is on the floor. It is true that in most huts there are a few reed mats or skins on the floor, but no particular care is taken as to how they are used.

Attitude towards Consumption.

193. Natives have not the slightest fear of associating with a consumptive, and if told that to do so may convey the disease, they treat the statement with evident incredulity. The possibility of educating the native in this matter appears to be somewhat remote. He is intensely superstitious and attributes nearly all that he cannot understand to the influence of witchcraft or to spirits. Although very imitative, he is also very conservative and has but little individual initiative. Although he is sociable and kindhearted, freely sharing what he has with others, and assisting and attending upon the sick, he looks upon any person chronically disabled as a nuisance and a burden.*

In European medical treatment the average raw native has no great faith, and he shuns a hospital as a place in which if he does not die, it is not due to the authorities that he escaped with his life. This attitude is, however, rapidly changing. Although the native is difficult to convince, when once convinced he accepts without reserve. Thus when once a medical man or an institution gains their confidence they will travel long distances for treatment. They are also reliable pay masters. A good example is found in their attitude to vaccination. They have recognised that it prevents small-pox, with the result that they will at considerable trouble present themselves for re-vaccination time after time within short periods.

* See the late Mr. Shepstone's evidence referred to in Chapter IV, paragraph 78. As regards leprosy, most tribes have come to recognise its contagious nature, and, therefore frequently force the sufferer to leave the kraal and live in the bush.

Objection to Ventilation.

194. There is another apparently ineradicable habit of the native to which we must allude, which is his dislike to ventilation in his dwelling. Windows, and ventilation openings he persistently blocks up. If possible he will always have a fire in his sleeping place. The hotter and stuffier the air the better he likes it. Added to this he invariably sleeps with his head wrapped up in the blanket. If the blanket were clean there would be no great harm in this, on the contrary it would act to some degree as a filter both to himself of the air he inhales, and to others of the breath he exhales. But as a rule the blanket or other covering is filthy. Also after sleeping in such confined air he will go outside naked for the purpose of relieving himself, thus often contracting a severe chill.

Clothing.

195. As regards clothing very little is worn in the warmer parts of the Union. The blanket and to a less extent sun-cured skins are the chief covering. The blanket is usually of cotton to which greater substance is given by rubbing red clay into it. His own skin is also well protected by a coating of grease to which is sometimes added ochre or some other earth. Many tribes also dress their hair elaborately with grease and red clay. When so dressed it is not "undone" for long periods, and becomes very foul. This is especially the case with the Pondos and Zulus. Some tribes partially shave their heads.

In the case of those tribes which have been longest in touch with European civilisation, as the Cape coloured native, the blanket is rapidly giving way to European clothing. This is especially the case with the men, and in most parts of the Union it is not unusual to find men in shirt, jacket and trousers.

There seems to be a consensus of opinion among those well-informed on native matters, that the adoption of European clothing is having a detrimental effect upon the native's health. Many such persons consider it to be at least one factor in the extension of tuberculosis among them. Whereas with the blanket he throws it off and on as he feels the need, with European clothing he wears it day in and day out without change and without respect to whether he is hot or cold. As a rule he wears second hand clothing, imported for kaffir truck, which is much too heavy and is unsuitable to the climate or his particular needs. Thus he may constantly be seen tramping along under a sweltering sun in a cast-off heavy military coat. When it rains his clothing gets wet, and at the end of his journey, instead of removing it, he will sit about until it dries. The blanket kaffir takes his blanket off when it rains and folds it up so as to keep it dry, and the rain falls from his greasy skin like water from a duck's back. On reaching shelter he is soon dry and he then has a dry blanket to cover him at the moment when it is most needed.

Conversely the woman instead of a warm blanket, cloths herself in thin cotton blouses which afford but little protection, and as they do not often possess a change, it is no uncommon thing for them after washing their linen to put it on their backs again moist.

Another objection to European clothing is the filthy condition into which it gets after long wearing, no attempt being made to cleanse it. As has already been said, in his aboriginal condition the average native is not uncleanly in his person, but when he takes to European clothing there is a tendency to neglect his skin.

Character of Huts.

196. The native hut although differing considerably according to the tribe and the exigencies of the particular locality, is nearly always the same in its main features, and in the case of the same tribe there is practically no variety. They are usually round and of respectable size, with a diameter of fifteen, twenty or more feet. In some cases they are square, and the square hut is commonly looked upon by missionaries and the authorities as a satisfactory sign of advancement in civilisation. Missionaries try to induce their adherents to build square dwellings, and the late Natal Government in fixing the hut tax, went so far as to exempt from the tax square huts containing a modicum of European furniture, such as tables and chairs, and in which the occupants live on European lines.

It is true that the ordinary round hut is not susceptible of very great improvement. Also the square hut has this to recommend it that is usually more stably built, more lofty, has a larger door, is more likely to possess windows and may also have a chimney which acts as a ventilator. Above all it is capable of extension by more than one room. But on the other hand it is liable to certain grave abuses

from the health point of view, unless the occupant's manner of living has advanced equally with his dwelling. For the square hut is generally much dirtier, its corners do not get cleaned out, its windows are frequently closed up, the materials of which it is constructed are less pervious to natural ventilation, and European furniture more often than not means the collecting of all sorts of rubbish of not the slightest utility, which is never shifted and is the harbourer of dirt. Also far from it possessing several rooms and giving greater space and privacy to the individual occupants, it usually tends to be overcrowded, for whereas the ordinary hut costs little to build and is therefore reduplicated to suit requirements, the square hut is expensive and therefore has to suffice, whatever the size of the family. Further, the native round hut is easily repaired, and is of so little value that it is readily abandoned if it become unfit, or, as was the usual practice, on a death taking place in it. But the square hut is often allowed to fall into great disrepair and to be inhabited after it has become unfit for habitation.

The native round hut may be entirely constructed of withes and grass, as in the case of the bee-hive hut of the Zulu, which has the shape of half an orange; but it usually has perpendicular walls surmounted by a conical roof of thatch, supported in the centre on one or more upright poles. The walls are generally of interlaced wattle, thickly and smoothly plastered inside and out with mud, over which is sometimes added a coating of paint made of red or white earth. In some places where brush wood is scarce and stones are plentiful the walls are made of dry rubble with flat stones. Sometimes the walls are made of sun-dried mud bricks. The roof nearly always rests flush on the walls, with projecting eaves. In some tribes, as the Bavenda and Bapedi, the eave is carried outwards and supported on posts, thus forming a low verandah encircling the hut. Such huts are quite dark and without ventilation. In some of these cases, as at Mphthalela's location in the Pietersburg district, the roof instead of resting on the walls, is raised on posts a foot or eighteen inches high, so that some ventilation is thus secured, but we were informed that this was only done on account of the white ant.

In most cases the door is very small and often has to be entered on the hands and knees. This is especially the case in the Zulu hut. With the Cape Province native and the Basuto it is larger, and the tendency is to increase its size. The door may be merely a piece of basket work, sometimes clayed over, placed in front of the opening, as with the Zulu, or may be of wood with a European lock and key, as with the Cape native. In the case of the Bavenda the doors are small and often elaborately carved.

There are rarely any windows, but sometimes there are small port-holes, but when they exist they are usually stopped up. Larger windows are becoming common with the Cape native. The raw native objects to windows, as he fears that while asleep he may be looked upon and bewitched. Thus nearly without exception the native hut is dark and almost without ventilation.

In most cases the floor is not at all, or only slightly raised above the ground, but with the Bavenda and Bapedi the hut is built on a solid platform a couple of feet high. The floor is generally of hard clay, often smeared with cowdung, and is hard and well polished. In the centre is a small depression in which the fire is made. There is no chimney, and the smoke has to find its way through the interstices in the roof. When the fire is burning the pungent smoke is such that it is impossible to stand upright in the hut. But near the floor where the native lies, there is a clear stratum. The fact that the smoke finds egress in this way demonstrates that there is a certain amount of ventilation in the hut—a fact otherwise imperceptible. The roof and upper part of the walls are usually saturated with the condensed products of combustion, many of which must be germicidal, they are in fact "smoke-cured," nevertheless the huts harbour much vermin, including cockroaches, lice, bugs and ticks, among the latter, in Zululand and along the East Coast, is the *Ornithodorus Moubatta*, the carrier of African Relapsing Fever.

The floor is nearly always clean swept, and there are spread a few grass mats or skins on which the inmates lie. Beyond a few calabashes or earthen pots, and perhaps a tin trunk brought back from the labour centre, there are surprisingly few articles kept in the hut. It is with the more civilised native, when the gourd and the native pot is replaced by the old kerosene tin and a sewing machine is required, that the hut becomes filled with useless lumber and refuse.

Disposition of the Kraal.

197. In the kraal of the raw native there is usually the owner's hut and one for each of his wives, and their respective children. The young men also have their own hut. There is generally a cooking hut or kitchen, although cooking is

often done in the open, and a store hut. Sometimes there are enclosed courts to the huts, as with the Bapedi, the floor of this being rammed and cowdunged like the floor of the huts. The whole is usually surrounded by a rubble stone wall, a thorn hedge, a ring of aloes, or a stake, cane or reed stockade. Within the fence or adjoining it is the cattle or goat kraal. The fence is really a survival of the old warlike times and was primarily designed as a means of defence. Thus it is much more perfect among those tribes, as the Bavenda, Bapedi and Tonga in the Northern Transvaal (who have been the more recently brought into touch with civilisation), where it is of the nature of a high stockade with narrow winding approaches. While among those tribes advancing in civilisation as some of the Cape natives, it is often altogether absent, except as a fence round the cattle kraal.

Inside these walls, except, of course, in the cattle kraal, the ground is usually clean. The enclosure is in fact, the living place of the family, for by the raw native the hut is primarily only a sleeping place. In some tribes, as among the Basuto in Basutoland, there is often a small separately reed-enclosed court in which they gather.

The immediate surroundings of all kraals are filthy with garbage and excrement, although every kraal possesses numbers of pigs which act as natural scavengers

The native village may consist of one or more of such family units, or of considerable aggregations. In the Cape Native Territories, in Natal and in Basutoland small kraals are seen dotted on the hill sides all over the landscape, but among the Bavenda, and Transvaal tribes they are commonly collected in large villages. Also in the Cape Province, where Government locations exist, the kraals are fairly aggregated. In Bechuanaland they are also closely aggregated in large villages known as Stadts.

Among the Bavenda the main kraals have been built for strategic reasons under the krantzes of the mountains, as for example Sibasa's kraal. And the same practice has been adopted by the Malaboch tribe, while other weak tribes may place them in thick bush. But most tribes build their kraals in the open, generally on the slopes of hills. As this practice necessitates being some little distance from water, supplies have to be carried on the heads of the women.

Diet.

198. The food of the raw native is extremely simple, consisting mostly of grain; mealies and kaffir corn being the staple. Some of the Northern tribes grow beans and the ground-nut. Soured milk (Amaas) is an important item among the cattle owing tribes, as the Cape Province natives and the Basuto. Although he is extremely fond of it, meat is comparatively rarely consumed. With the native, cattle represents his wealth, and he is therefore loath to destroy it by slaughter, except for feasts and on important occasions, but he eats any beasts that die a natural death (with the not infrequent result of becoming infected with anthrax). Green vegetables are not grown by him, but most tribes grow pumpkins largely, between the rows of mealies, and wild spinach and some wild roots and fruits may be consumed where they exist.

Kaffir Beer.

199. One great article of diet with the majority of the natives of the Union is kaffir beer (Juala) made by the fermentation of kaffir-corn meal. The beer before consumption is coarsely filtered through a conical bag of plaited grass, and is therefore thick and contains a large amount of solid material, partaking largely of the character of a food as well as a drink. Ordinary kaffir-beer contains only from two to four per cent. of spirit; it is therefore only very mildly alcoholic. It is partaken of in large quantities, and is probably a valuable article of diet.

From the evidence laid before us, however, it would appear that in the Native Territories of the Cape, beer-drinks are rapidly becoming a serious menace to the health of the Cape native. For these functions large quantities of a stronger brew are prepared, and many natives spend a great part of their time visiting from kraal to kraal at which beer-drinks have been arranged. The function sometimes lasts for four or five days at a stretch, during which time the beer is consumed to great excess, and very little other food is taken. The participants crowd into huts, where dancing and drinking is kept up through the night. Whereas formerly only the men drank in this way, the women are now as bad as the men, and we were told by trustworthy persons, that it is not uncommon to see the children drunk. During such a bout the native, with impaired vitality

after excess of drinking and violent dancing exercise, will leave the overcrowded huts and expose himseld to the cold night air, illness often resulting. At the end of such a debauch he experiences an insistent craving for animal food, and may commit stock theft to satisfy it.

While, however, beer-drinks are undesirable from health and all points of view, and should be prevented by the authorities as far as is possible, we consider that under existing conditions properly brewed kaffir-beer of low alcoholic strength is a valuable article of native diet, and that as such its use should not be discouraged. Moreover, from what we have learned regarding its use on the Rand mines and its supply by the Durban Corporation, we believe that it is entirely advantageous to provide for the regulated supply to the native at labour centres, under proper safeguards as regards its alcoholic strength and the quantity consumed, of a well-brewed kaffir-beer. Whether such beer is a true antiscorbutic, as many maintain it to be, we have not sufficient evidence to determine, but there seems no doubt that it is a valuable article of diet to the native away from his kraal and subjected to the unusual strain of continuous labour. It is probably also of use as a mild stimulant in preventing recourse to strong liquor, which is so detrimental to the native from all point of view.

At Durban the Corporation, under special statutory powers, has established a brewery where large quantities of an excellent beer of an alcoholic strength of about two per cent. are brewed. This is sold to the native at the municipal native eating-house, to be drunk only on the premises and under adequate restrictions as regards quantity consumed. The authorities and all who are acquainted with the system agree that the effect of the measure has been in all respects excellent. The annual profits from the undertaking are very considerable and are strictly devoted to the carrying out of measures for the betterment of the native, among which have been the erection of improved quarters for togt boys (*i.e.*, casual hire labour) and a hostel for native females. In Annexure D will be found a copy of an account of the process of brewing prepared for the Commission by the Durban municipal authorities.

We are of opinion that similar schemes could be advantageously extended to most centres of labour in the Union.*

Changing of Diet with Civilization.

200. With increasing civilisation the native tends to depart from this simplicity of diet, and to approximate to the habits of the coloured man. He prefers when he can obtain it, the comparatively innutritious white bread, he consumes so-called coffee instead of his soured milk, and he spends his money on various tinned luxuries from the trading store. Also in spite of the stringent liquor laws, he takes to the pernicious alcoholic drinks specially manufactured by the European for his consumption. These changes are particularly seen in the case of natives living in the vicinity of urban areas in the Cape Province.

General Effect of Civilization on Conditions of Health.

201. In the Native Territories, Reserves and Locations the native is subjected to the restraints of tribal law and custom, and to the authority of his chiefs and headmen. Justice is administered by the authorities according to the Native Code (Natal and the Cape) and in its absence to a large extent in accordance with native custom. But as he advances in civilisation these checks and restraints tend to become weakened, without being replaced by other conventions or adequate means of control. This is especially the case with the natives who detach themselves from their tribe and permanently resort to industrial centres.

In this connection it should be remarked that the raw native woman comparatively rarely leaves the kraal for outside employment, and those that do lose caste, and often drift into immorality and usually do not return to their tribe.

* It would appear that some other municipalities have tried to obtain similar powers to those of Durban, but have not been successful in their application. Thus the Mayor of East London informed the Commission that that Council had applied to the Cape Provincial Administration and had been refused, on the ground that that Administration was opposed to the principle. (Question 71,402.) Also the same difficulty appears to have occurred at Bloemfontein. (Question 97,916.) The subject came before the Eighth Annual Meeting of the United Municipal Associations of South Africa, held at Bloemfontein on the 17th November, 1913, and was referred to a sub-committee to report on, which it did in the following terms :—" That the United Municipal Associations of South Africa affirms the principle that the manufacture and supply of native beer to natives within urban areas should be municipalised, conditionally upon the profits being devoted entirely to the benefit of the natives in those areas." It was decided to refer this report to the Provincial Association for consideration and report.

If means could be devised by which native women could resort to the labour centres in proportionate numbers to the men, and when there live without deterioration, as native families and under native conditions, it would be an advantage, as well on health grounds as for other reasons, but there seem insurmountable difficulties in such a proposal.

While on the other hand, by contact with Europeans and by close aggregation with large numbers of his fellows in compounds and the like at labour centres, the native is subjected to an enormously increased risk of exposure to the infection of tuberculosis and other diseases, on the other hand the effect of many of the changes above described as taking place in his home life, is to reduce his general powers of resistence to infectious disease and to assist its spread when once introduced into his home.

It will be gathered from this account that from the point of view of the health of the native the change which is taking place from barbarism to a condition of semi-civilisation is detrimental, and that an increased amount of tuberculosis must be looked for as the process continues. In the past the civilising of the native has been largely the fruit of missionary teaching, but when he began going out in numbers to labour centres he also began to work out his own emancipation from barbarism, by the simple process of imitation and assimilation of European ways. This change is now proceeding with ever accelerating pace, and all that we can hope to do is to direct it, and to see that it is accompanied with such effective knowledge, as may enable him to avoid, as far as may be possible, attendant evils, of which disease and deterioration are not likely to be the least.

It would seem from the information we were able to obtain in the native areas of the Union, that under the conditions under which the raw native lives the tendency of introduced cases of tuberculosis to spread infection is apparently slight. Although numbers of males suffering from this disease are constantly returning to the kraals from labour centres, and especially from the mines, yet we were not able to gather very definite evidence of spread; therefore not many women and children appear to be affected—at least with pulmonary tuberculosis, although there would seem to be a noticeable number suffering from tuberculous glands. The amount of tuberculosis in women and children, however, is greater in proportion to the length of time and the extent to which the resort to labour centres have been taking place, and to the degree of advancement of the tribe from barbarism to civilization. So that the number of affected women and children is smallest among the Northern Transvaal tribes, greater among the Basutoland Basutos and greatest among the Cape natives, and of these last greatest among the natives in the districts of the Cape Province proper.

There is one point connected with the question of the spread of infection from returning tuberculous natives which should be mentioned, namely that from the evidence before us it would appear that such cases, at least those sufficiently advanced to be obvious, usually soon die. It was the almost universal opinion of medical men practising in native areas that in nearly all cases of phthisis in a native its course is rapid, and a fatal ending assured. We shall have occasion to refer to this later on. (Paragraphs 208 to 211).

CHAPTER IX.

Observations on the Type and Course of Tuberculosis in South African Races.

202. It is necessary to refer briefly to some clinical aspects of tuberculosis as it is met with in South Africa. Our remarks on this important subject have to be incomplete and sometimes to consist of hardly more than surmises, as we have had no opportunity of undertaking any investigation by proper laboratory methods. Some of the points raised we believe to be of such importance that they should be the subject of further systematic research.

Relative incidence of Tuberculosis on South African and Foreign-born persons.

203. The relative incidence and effect of tuberculosis on the South African-born, as compared with the foreign-born European,* is one of these matters. From the evidence given by medical practitioners, it would appear that, in the experience of many, the disease tends to run a more rapid course in the South African-born than is the case in the foreign-born. But this treatment makes no distinction

* "Foreign-born" means born anywhere outside of South Africa.

between those foreign-born who came out with the disease and those who acquired the infection after arrival in South Africa.

If the opportunities of infection are much less wide-spread in South Africa, as we believe to be the case, and if infection in early life, by creating in the individual an acquired immunity, protect him against a manifest or lethal attack of tuberculosis arising from a re-infection in later life, then it would be a reasonable assumption to make that on the average the South African-born person, coming into contact with infection in later life, would suffer from the disease in a more virulent and rapid form.

On this question we have no facts to go upon and it is one which can only be settled by an analysis of the origin, duration and course of a large number of cases of the disease, by the performance of a sufficient number of tuberculin and opsonic tests, and a consideration of post-mortem examinations made with a view to the discovery of old tubercular lesions.

As bearing on the question, we may allude to the comparatively small mortality from all forms of tuberculosis in European infants and children under five years in this country, as compared with England and Wales, it being only about half of the English rates.

We would also point out that no just comparison can be made between South African-born cases and imported foreign-born cases, as the latter, as met with here, are really a group of selected cases of the disease, in as much as few persons—at any rate now-a-days—immigrate to South Africa suffering from the disease in a severe and rapid form. It is usually the slow chronic case which comes out.*

We have attempted to throw some light on the matter by means of certain figures given by the Medical Officer of Health for Johannesburg, in his Annual Report. During the six years, July, 1907, to June, 1913, he has instituted enquiries in respect of the 549 deaths from tuberculosis of Europeans occurring in that time. Of this number there were born outside South Africa 364, and 185 in South Africa. Taking now the birth places of the population of Johannesburg as enumerated at the 1911 census, we obtain, for the entire period, a death-rate from tuberculosis per 1,000 of—

South African-born	3·01
Foreign-born	6·20

Of the 364 foreign-born, 106 are recorded as having been infected before arrival in South Africa, and of 212, it is stated that the infection first manifested itself after arrival. In 44 of the cases this point was unknown, but assuming that these would, if known, have been infected before and after arrival in like proportion, then we obtain the following rates per thousand:—

Foreign-born infected before arrival ...	2·06
Foreign-born infected after arrival ...	4·14

Thus foreign-born die of infection acquired in South Africa at the rate of 4·14 as compared with 3·0 in the case of South African-born. The comparison, however, proves little, as there are more foreign-born than South African-born persons working underground on the mines. It indicates, however, that in Johannesburg imported cases of tuberculosis do not form quite so large a part of the tubercular mortality as is commonly believed.

In Natal the Medical Officer of Health found that out of 256 deaths of Europeans from tuberculosis, 208 occurred in foreign-born, and 48 in Natal-born persons, representing, supposing the population to be composed equally of foreign-born and Natal-born persons, about four deaths from tuberculosis in the former to one in the latter.

Type and course of the disease in Natives.

204. Another point of the very greatest importance is the question of the type of the disease occurring among natives, for if the causes responsible for this type were properly understood, it would no doubt supply the key to a number of unsettled questions connected with the causation of tuberculosis. We have to remem-

* It is surprising the length of time many of these imported cases appear to survive. Thus in his *Report for the Year, July, 1912-June, 1913*, the Medical Officer of Health for Johannesburg gives, as the result of his enquiries into ninety-six deaths of *imported* cases, thirty which had resided in South Africa for periods between ten and twenty years, and eight for over twenty years.

ber that in the raw native and in his relations to tuberculous infection we have a very different set of circumstances from those that we are accustomed to among Europeans. The difference in the disease in natives is shown in its clinical and pathological manifestations, in the extreme rapidity of its course, and in the frequency with which it has a fatal ending.

In dealing with this matter we regret that we are not in a position to do more than to indicate some of the salient features, and to suggest some possibilities in the way of explanation. The subject is one necessitating a prolonged and systematic investigation, such as we have had neither the opportunity nor the means to carry out. It is one which requires for its pursuit a properly equipped research laboratory, and we suggest that it might well be undertaken by the South African Institute of Medical Research.

Clinical and Pathological Characters.

205. In its clinical and pathological characters the disease in the native differs markedly from that in the European. Post-mortem the infection is found usually to be more diffuse and to partake more of the nature of an acute general systemic infection. The tendency to limitation of the lesion caused by the infection by the supervention of fibrotic and caseous and calcareous changes is not seen to any extent. If the lungs are the seat of infection, instead of it being confined to one or more circumscribed patches, and mainly to the apex, it is generally more or less diffused throughout one or more lobes or the whole of one or both lungs. The base of the lung is very frequently affected rather than the apex; possibly due to the disease following on an attack of pneumonia. There is often a considerable amount of surrounding infiltration. Cavities may result from the rapid breaking down and destruction of lung tissue, but the slowly progressing cavity, and still less the healing contracting cavity, with extensive fibroid change, is comparatively rare.

Also the lungs are more often than otherwise not the only or chief seat of infection, the spleen, liver, intestines, peritoneum and other abdominal organs being frequently affected. Of the abdominal organs probably the spleen is most frequently attacked, and, indeed, it is no uncommon thing in rapidly fatal cases of tuberculous infection to find the spleen the only organ visibly infected. In such cases the organ has a plum-pudding appearance, the tubercular nodules varying in size from a pea to a walnut. The organ also is generally greatly enlarged, often weighing over 1,000 grams, the normal weight (in East Coast natives) being about 300 grams.

206. We submit the following summary of the results of autopsies performed on East Coast and Tropical natives at the compound hospital of the Witwatersrand Native Labour Association, by its Medical Officer, Dr. G. A. Turner. It is to be noted, however, that according to experience in the case of mine native labourers, the East Coast and Tropical native is relatively more prone to tuberculous infection than is the average native of the Union, and therefore these results probably display the extreme of the pathological type as found in the raw natives.

Out of 308 autopsies, the following was the predominant lesion:—pulmonary tuberculosis, 140; general tuberculosis, 92; tubercular peritonitis, 33; tubercular spleen, 31; tubercular liver, 7; tubercular meningitis, 3; tubercular kidney, 1; spinal caries, 1.

There were also 88 autopsies in which the cause of death was silicosis, and of this number 59 had also tuberculosis. In all, out of 601 autopsies no less than 367 (including the tubercular silicosis) was for tuberculosis, or 61 per cent.

According to Dr. Maynard, in 164 autopsies of natives dying of tuberculosis, the lungs were not affected at all in 23 cases, or 14 per cent.; and in the 141 cases in which the lungs were affected, in 113 cases, or in 80 per cent. some abdominal organ was also found to be affected. In the 164 cases the abdominal organs were by themselves or in conjunction with the lungs or other organs, affected in the following percentage proportions:—The mesenteric glands, 66; spleen, 49; liver, 38; peritoneum, 23 and kidney, 7.

Dr. Frew, in giving evidence before the Commission, referred to the large amount of abdominal tuberculosis he found post-mortem in mine natives dying of the disease. Dr. D. Macaulay, M.L.A., Medical Officer to the Geldenhuis Group of Mines and the New Heriot Mine stated to the Commission that he found in at least ten per cent. of his post-mortems on natives dying of tuberculosis, that the spleen was extensively affected. Also Dr. H. E. Miller, Medical Officer to the East Rand Group of Mines, said that in his post-mortems, he found tubercle everywhere—in the lungs, intestines and spleen. The infection was very often generalised through the lungs, from base to apex.

207. The clincal and external physical signs are in accord with these pathological characters; that is they are such as usually result from a rapid consolidation and breaking down of the lung tissue.

A voluminous purulent sputum, such as is so often seen in European chronic cases with mixed infection, is comparatively rare, except in the more slowly progressing, advanced cases. A constant short pneumonic cough is more usual than the periodic clearing cough of the advanced case in Europeans. With the absence of slow ulcerative processes opening up blood vessels, profuse haemorrhage is comparatively rare, but the expectoration of blood-stained sputum occurs. The usual account given by the native is that he suffers much from cough and spitting of blood.

Rapid course of the disease.

208. The onset and development of the disease is often very rapid, and it sometimes happens that a native who is far advanced in it shows little sign in his general appearance of being affected. He may still be plump and well nourished. Indeed this is a not uncommon experience on the mines. The boy, who has been working regularly, making no complaint and continuing, apparently, in his usual health, suddenly declares sick. The history then obtained is that for some little while he has been suffering with malaise, has tired easily at his work and been feverish. An examination then discloses the fact that he is suffering from acute tuberculosis. He is admitted to the mine hospital, and in a very short time, (if he cannot be repatriated before) he is dead.

It is necessary to remember these facts when we come to consider the health administration of the Mines. In that section of our Report we shall show that from a consideration of the deaths of 524 natives from tuberculosis occurring on twenty-two of the Rand Mines taken at random, 18·9 per cent. died within a week of their first admission to the mine hospital, while the average duration of treatment in hospital before death supervened was only thirty-three days. In that place we shall also discuss the import of these figures, it is here only necessary to allude to them in connection with the particular matter of the rapidity of the disease, both in its onset and its course. We may mention, however, that all natives before being drafted on to the Witwatersrand Mines undergo medical inspection, either by a Government medical officer or by the medical officials of the Witwatersrand Native Labour Association, according to their place of entry; and as far as Tropicals and East Coast are concerned, these have been submitted to one or more medical examinations before leaving Portuguese Territory. It may be presumed therefore that they have no obvious tuberculosis at the time of joining.

Recommendations for earlier detection of cases on the mines.

209. As a raised temperature usually exists, probably the best means of securing the more early detection of such cases would be by arranging for a routine taking, at suitable intervals, of the afternoon or evening temperatures of mine boys as they come from work, and the setting aside for medical examination those found to have temperatures exceeding 100° Fahrenheit. This practice would have the great advantage of detecting a certain proportion of early cases of other illnesses, especially pneumonia. Although this procedure at first sight may seem formidable, in practice it is not really so, as with a suitable system and with properly trained orderlies, the temperatures of a large number of boys, lined up, can be very expeditiously taken and recorded. Of course it would only be carried out at intervals and only a proportion of all the boys working would be taken on any one day. At the present time some mines carry out an inspection, by means of a hospital orderly, of the mine boys, as they enter the compound after coming off shift, for the purpose of detecting cuts and abrasions on the feet and legs, and applying an antiseptic dressing, so as to prevent subsequent suppuration and consequent disablement from work.

210. The medical evidence given to the Commission everywhere in the Union was practically unanimous as to the extreme rapidity of the course and the usually fatal ending of a pulmonary or general infection of tuberculosis in the native.* This is practically the universal experience of medical practitioners

* Thus at Ramagoeph's Location, in the Pietersburg District of the Transvaal, that Chief, after consulting with a number of his headmen, whom he had called in to meet the Commission, said that they could recollect the names of 28 men who during the preceding three years had returned from the mines and died of chest complaint, similar to a case shown by him to the Commission, which was a clear case of advanced phthisis. In this time they could only recollect two women who had died from the disease. The inhabitants of this location numbered between 7,000 and 8,000 persons.

everywhere. Six months or even less was the limit usually assigned, while two years was considered to be unusual, although, of course, much more chronic cases than this sometimes occur. As to recovery, few practitioners were able to instance such cases within their knowledge, and all, almost without exception, held the view that, under the conditions usually obtaining in regard to the treatment of natives, if once the disease in these forms is well established, recovery never occurs.

This statement, however, requires qualifying by two considerations; one of these being that as a rule medical practitioners do not see cases in natives until they are fairly advanced, and that they do not often have an opportunity of following them throughout the course of the disease. At the same time they obtain a knowledge of the issue of the case in a sufficient number of instances to enable them to come to general conclusions on this point, and their experience and that to be obtained by hospital statistics is that recovery must be, to say the least, of extremely rare occurrence.

The other consideration is that in no case does a native receive the continuous care and treatment which a European usually obtains, and in this connection some few medical practitioners have given it as their opinion that if the disease be taken early and suitable food, care and treatment could be continued under proper conditions, a proportion, although a very small one, of the cases might be expected to become arrested.

Nevertheless, taking the experience of the De Beers Convict Station, to which we have referred in paragraph 295, it is clear that, however early the case is seen and whatever, may be done for it, in most instances the event is rapid death when once the disease is established.

Influence of kraal life on the course of the disease.

211. This matter of the rapidity and fatality of the disease has an important bearing upon the question of the spread of tuberculosis in the kraals. It has been frequently asked why,—if such a large number of boys are being continuously returned from the mining and other industrial centres to their kraals, suffering from pulmonary and acute tuberculosis,—we do not find many more cases in the kraals, and see it spreading more than appears to be happening. But obviously if cases rapidly succumb there would never be at any one time many cases to be seen or to spread infection.

Some optimists connected with the mines have assured us that they are not to be found, because they recover as soon as they get away from the mines and revert to the natural conditions of kraal life; but while no doubt such a change of environment should benefit their condition, we do not believe, with the facts before us, that such change would in any notable proportion of cases be capable of arresting the well established disease, or in the stages so often reached when they leave for their kraals.

But while this is probably true of the established case of the disease, it must not be forgotten that for every case which has become established and has developed to the extent of producing marked lesions and symptoms of tuberculosis, there must be many others, who having become infected, are still maintaining a successful resistance to the invasion, and for these return to the open life of the kraal is their salvation. But these are not the cases which ever become known and appear in the records.* They are the cases which end by merely yielding a reaction to the tuberculin test. But they are also the cases which would, if they were known, furnish a powerful argument in favour of the system of short contracts and frequent return to kraal life for all native labourers on the mines and at labour centres.

212. The influence of the open life of the kraal suggests an explanation of the circumstance, so frequently referred to in the course of this report, that in the kraals, of those suffering from tuberculosis, so few women and children appear to be affected with the pulmonary or generalised forms of the disease, but that tubercular glands seem to be the common manifestation. It is possible that the early limitation of the infection to the glands is because of the power of resistance not having been depressed by over-strain and unhealthy environment, to which the men are exposed at labour centres. But as to why in these cases the cervical glands are usually, and the axillary glands are frequently affected, especially in children, the possibility arises that it is due to the portal of entry of the infection, inasmuch as all infected sputum and material is cast on the ground and floor of the hut, which serves as table, chair and bed.

* Dr. Turner, from his experience of native-rejects at the W.N.L.A. compound, dissents from this statement.

Views explaining the type of the disease.

213. In the characteristics above described, we believe that we are witnessing the effect of a tuberculous infection, in more or less massive dose, in persons who, compared with Europeans, possess a greatly inferior power of resistance to attack by the tubercle bacillus, which want of resistance is probably due to two if not three causes.

The first, and possibly the most important cause, is the absence of an acquired immunity, induced in early childhood by a minimal infection with the bacillus, to which the subject of it has reacted, and which he has reduced to the condition of a latent focus in some part of his body, as for example, a tuberculous gland.

The second factor is exposure to an unaccustomed and adverse environment, which reduces such normal powers of resistance as the native naturally possesses. In this category come all those influences of diet, unsuitable clothing, overcrowding, especially in unhygienic buildings, continuous and excessive labour, and fundamentally changed habits; to all of which he is subjected in greater or less degree during his stay at labour centres, and most if not all of which reach their greatest effect in the case of the underground workers on the gold and diamond mines, where among many other detrimental effects, we also have that most potent factor, the inhalation of an irritating dust, which by the tissue irritation it sets up, depresses the powers of resistance to invasion by the tubercle bacillus, whether directly inhaled or brought to the lungs by an internal route.

In the portion of this report dealing with tuberculosis and mining, we shall have occasion to detail some of the more important of the predisposing conditions found on the mines, and it will be seen how marked and how constant is the effect of adverse conditions of environment and excessive physical strain in at once increasing the incidence of and mortality from, not only of tuberculosis, but also of pneumonia and other diseases, in the native subjected to them.

The third possible factor is a genuine tribal or racial proclivity to the disease.

214. With regard to the theory of the absence of an acquired immunity being a prominent factor in the causation of tuberculosis in the native, there are a number of considerations which support this view, and on the other hand there are some others which, while not opposed to it, may be taken as indicating that in his proclivity to tuberculosis, the native is in reality displaying a hereditary tribal characteristic.

We may briefly refer to some of these considerations.

215. The characters of the disease in the raw native, such as those we have above described, approximate to that which we may call the infantile type, that is of the type of tuberculosis we see resulting from a massive infection in a young child not previously rendered immune by a minimal infection. Thus we get in extreme cases the rapid, fulminating, general, or more or less diffuse infection, destroying the patient by a pure tubercle bacillus intoxication without any adequate effort at a systematic reaction being made.

216. The raw native seems to be less frequently infected in early life than is the European. We see evidence of this in the comparatively small proportion of the Other Forms of tuberculosis occurring among raw natives; while on the other hand when glandular tuberculosis takes place, it seems to run much the same course as it does in Europeans, except perhaps that the glandular lesion may be more extensive and there may be a greater liability to diffusion of the infection.

Some further evidence is afforded by the recorded results of the Calmette tuberculin conjunctival test on raw natives. Calmette's conjunctival test has usually been employed on natives on account of the difficulty of recognising a reaction in a black skin by Von Pirquet's method, except by its raised character as compared with the control. In estimating the conjunctival test, however, it is necessary to have a very clear standard as to method of performance and as to what constitutes a reaction, before the statistics obtained by different operators can be compared with safety.

Dr. Long, Principal Medical Officer of Basutoland, kindly furnished us with the following results of 519 tuberculin tests performed by Government medical officers by the Calmette method on natives in Basutoland, in none of whom it is stated there was any apparent tuberculosis:—

	Positive.	Negative.	Percentage of reactors.
222 Adult males who had been out of Basutoland, and believed to have worked on the mines..	81	141	36·0
181 Adult males who had never been out of Basutoland	28	153	15·5
24 Male children under 16 years	4	20	16·7
58 Adult females	10	48	17·2
34 Female children under 16 years	7	27	20·5
519	130	389	25·0

Thus among these Basuto from 15 to 20 per cent. of those who had not been out of the country reacted to tuberculin. In Europe Calmette himself gave the proportion of reactors as 18 per cent. out of 20,000 tests performed by him on apparently healthy persons. This would seem to indicate a very considerable proportion of latent tuberculosis among the generality of natives in Basutoland, if the two sets of results be comparable. We do not, however, believe them to be comparable, and therefore notwithstanding these figures we do not believe that the actual amount of tuberculosis in this population is so great as they would seem to denote.

But what is of more importance in these results is the fact that of those who at some time have left Basutoland and come into contact with civilisation and infection, mostly in the course of work on the mines, no less than 36 per cent. react. Whatever may be said against a comparison of the results with European statistics, it would not apply to this comparison; except perhaps that there may have been some difference in the relative degree of selection in the two groups of natives under consideration. We may therefore accept it as being a clear indication that tuberculosis, active or latent, is at least twice as common among those who have been at labour centres as among those who have not.

Similarly, Dr. N. M. Macfarlane, Government Medical Officer at Leribe, in Basutoland, gave the following particulars of tests made by him on Basutoland natives by Calmette's method: Of 27 convicts tested, six reacted, of whom five had been to the mines (one having manifest phthisis), and one was a Lovedale boy.* Of the twenty-one who did not react only one had been to the mines.

Of seventy-one Government native employees (clerks, policemen, hospital attendants , etc.), ten reacted, of whom three had been to the mines, and one was a native interpreter who had just recovered from pneumonia, and one was the son of this interpreter, who had come from Lovedale. Of the sixty-one non-reactors some only had been to the mines.

Of fifty hospital patients, none of whom were in for, or suspected of having tuberculosis, twenty-four were males, of whom four reacted, three of whom had been to the mines and one had pleurisy. Twenty-six were females, of whom two reacted, one being under treatment for pneumonia and the other for gonorrhoeal endometritis.

In regard to Tropical natives, Dr. Maynard furnished the Commission with the results of certain Calmette tests on such natives passing through the Witwatersrand Native Labour Compound to and from the mines.

In the case of new boys going to work on the mines for the first time:—

	Tested.	Reacted.	Percentage of Reactors.
Nyasa	129	6	4·0
Mozambiques ...	415	7	1·7
Total ...	544	13	2·4

* Lovedale is a large missionary native college, in regard to which the evidence is very formidable as to the frequency with which tuberculosis occurs among its native pupils.

For old boys arriving at the Compound for re-employment on the mines he gave:—

	Tested.	Reacted.	Percentage of Reactors.
Nyasa	52	10	19·0
Mozambiques ...	63	11	17·5
Total ...	115	21	18·0

And for boys returning home after one term of employment on the mines:—

Tested.	Reacted.	Percentage of Reactors.
131	26	19·8

Dr. A. Frew, Medical Officer to the Wit. Deep and Knight Central Mines, has for several years applied the Calmette test to mine labourers entering the mine hospital with symptoms which were *suspicious of being tubercular*. The following were his results.

	Tested.	Reacted.	Percentage of reactors.
Central African tribes	180	110	61·1
Other tribes	261	184	70·5

217. Also there is the important fact that in autopsies made on natives dying from other causes than tuberculosis, we do not find evidence of the healed pulmonary lesions, such as we find in Europeans in Europe to the extent of seventy or eighty per cent.

On this point nearly every district surgeon is in agreement, that it is of the greatest rarity to find such lesions in the case of autopsies made for medico-legal purposes on natives. We may here allude to the great frequency with which simple pleuritic adhesions are found in the chest-cavity post-mortem, it being rare not to find them to a greater or less extent. The consensus of opinion is that this condition is not of tubercular origin, and that it does not coexist with tubercular manifestations. The exact significance of these adhesions, however, is uncertain, although a number of explanations of their origin suggest themselves, such as the result of a pleuritic extension of pneumonia, a disease of some frequency in the native; the effect of a rheumatic infection; the result of a simple pleurisy, if such occur; or the result of traumatism.

218. It is also significant that the amount of tuberculosis increases and the general character of its manifestations are less in the infantile type of the disease, and that glandular and local infections become more common, according to the extent or degree to which the particular tribe has come into contact with Europeans and civilization.

In the section of this Report dealing with the occurrence of tuberculosis on the mines, we have been able to show from the records kept in connection with that industry, that there is a well marked and constant difference in the proportion of tuberculosis taking place, both in respect of deaths and of repatriations, in native mine labourers of different tribes, and it is seen that this difference coincides to a great extent with the length of time and degree to which the several tribes have come into contact with civilisation, being greater in Tropical natives and least in those of the Cape Province, the other main territorial tribes following in the order of East Coast, Basuto, Transvaal and Natal.

There is also one very important fact that this enhanced proclivity to tuberculosis does not stand alone, but is always associated in much the same degree with an enhanced proclivity to pneumonia and to disease and mortality generally. Thus the East Coast native not only gets more tuberculosis than the Transvaal native, but he also gets more pneumonia,* and more disease generally; and in the same way the Transvaal native not only has more tuberculosis than the Cape

* *Note by Dr. Porter.*—While it is true that the East Coast native gets more pneumonia than the Transvaal native, it is also, on the other hand, noteworthy that the East Coasters average pneumonia rate for the five years 1908-1912 was considerably lower than that of the Basuto for the same period. (*Vide* Memoir on Pneumonia amongst Tropical Natives on Rand." Chart V. G. D. Maynard, 1913.)

native, but also more pneumonia and other disease. It is difficult in face of this fact to assert that the difference displayed by these tribes in respect of tuberculosis indicates a hereditary specific proclivity to that particular disease.

219. But although this may be suggestive of differences in a degree of acquired immunity being responsible for differences in the tribal incidence of tuberculosis, it must be pointed out that there are doubtless other factors determining these differences, such as the relatively greater change in environment, which work on the mines entails on some tribes as compared with others, as for example in the Tropical native as compared with the Cape native.

Also different tribes treat themselves very differently when working on the mines. Some feed themselves more generously and also take greater care of themselves. In these respects there are marked differences between the Basuto and the Cape native, in favour of the latter. Again, some work very much more strenuously and some more often select certain kinds of detrimental work, such as drilling, as compared with others. Furthermore, some tribes continue on the mines without going back to their kraals, for longer periods than do others. Apart from the fact that Tropical were, and East Coast boys are recruited for a twelve month term, while the Union native generally only contracts for a four or six months period, the East Coast native frequently continues on at the expiration of his contract for an indefinite time; on an average amounting to seventeen and a half months, and in exceptional cases running into ten years or more. Also he returns again and again to the mines, the percentage of "old boys" among East Coast recruits amounting to from 65 to 70 per cent. This, it need hardly be pointed out, is a potent factor in the production of silicosis, which is more common in the East Coast than in any other tribe, and is a powerful predisposing cause of pulmonary tuberculosis.

But apart from all of these facts, which may be summed up in the term "differences of environment," there is another very important fact which must be remembered, which is that different tribes have very different average types of physical development. Anyone looking, say, at a Zulu and comparing him with a Bechuana, would not for a moment expect the latter to be capable of the same amount of work and physical strain that the Zulu should be able to undertake. That which would overload the one would be ease to the other.

Syphilis in relation to tuberculosis.

220. In fixing the order of the relative tribal incidence of tuberculosis, both the Basuto and the Bechuana appear to have a somewhat high incidence in comparison with their position in the scale of native civilization and contact with Europeans. Of course, in constructing a scale of the relative tribal incidence, and of the relative degree of tribal civilization we are only stating a broad approximation, and therefore too much stress must not be put on the relative position assigned to individual tribes. The true value of the comparison lies not so much in individual cases as in the general rule which is seen to exist, that liability to contract tuberculous disease at the mines and labour centres is in inverse ratio to the degree to which the tribe has previously come into contact with European civilization.

But in the case of both the Basuto and the Bechuana there is a suggestion of a possible explanation of their relatively increased tribal proclivity to tuberculosis which must not be overlooked.

Among the Bechuanas of Bechuanaland syphilis is extraordinarily rife, reliable estimates putting the proportion of the entire population affected at from 60 to 80 per cent. For many years past the Government has had to institute special medical services for the wholesale treatment of the population.

We have already alluded in Chapter VII, paragraphs 147 to 150 and 163, to the extensive prevalence of syphilis among the Basuto, both of Basutoland and of the Transvaal, and to the opinion held by some of the medical men, practising among them in the districts in which they live, that there may be some connection between this disease and the occurrence of tuberculosis among them; that syphilis may be responsible for a pulmonary fibrosis on which tuberculosis supervenes.

Dr. B. G. Brock, who was formerly in practice in Basutoland, and later for some years Medical Officer to the Government Native Labour Compound at Driehoek, Germiston, and who, in this last mentioned capacity, was responsible for the Government medical examination of natives recruited for employment on the mines, both on joining and on leaving, holds very pronounced views as to the extent of the prevalence of syphilis among natives employed on the Reef, and its effect in "preparing the way for tuberculosis and in probably being the chief

cause for the great prevalence of, and high mortality from this disease in natives engaged in mine work on the Rand." He states that he has found that thirty-five per cent. of all natives (East Coast and Tropicals not included, as these tribes do not pass through the Driehoek Compound) have a fibroid condition of the lungs, and that a very much larger proportion, about eighty per cent., have had syphilis.*

While the Commissioners, after an examination of some of the cases of simple syphilitic pulmonary fibrosis presented to it by Dr. Brock, were unable to satisfy themselves of the existence of this condition in these particular cases, or of any other syphilitic manifestation, in these particular cases, they feel that the opinion of a careful earnest worker, of such long experience as is Dr. Brock, cannot lightly be set aside.

It is no doubt true that syphilis may produce a fibrotic condition of the lungs, and that this condition may predispose to a subsequent tuberculous infection, just as any other injury to the lung tissue may do, as, for example, happens (in an acute form) from an attack of pneumonia, or (in a chronic form) from the fibrosis resulting from irritating dust inhalation in silicosis or miner's phthisis. Virchow, Vidal, Dittrich, Pankritius and others, attribute a chronic fibroid condition of the lung to syphilis, "analagous with the chronic syphilitic inflammation of the liver, testicles, etc.," and Cornet has observed that "taking the standpoint that any injury facilitates the entrance of the tubercle bacillus into the tissues, one may also regard syphilis as a factor favouring tubercular infection." Potain also declares syphilis to be a predisposing cause of tuberculosis.

But the question is to what extent does this predisposition actually occur. Is pulmonary fibrosis a frequent result of syphilis in the native? To this question we have not the requisite data to reply, and we retain an entirely open mind on the subject. We would indicate that if syphilis does have this effect in only a small proportion of cases, then with the extensive syphilisation said to exist among the Bechuana and Basuto, this fact would be sufficient to account for the very much greater incidence of tuberculosis on these tribes on the mines.†

221. It may be argued that the differences in susceptibility to tuberculosis displayed by different tribes is really due to a true racial difference, and that it is exhibited not only with tuberculosis, but appears in connection with other of the infectious diseases, and notably with pneumonia.

While it is more than probable that between the European and the native races a definite racial difference exists, resulting in a greater susceptibility in the latter to tuberculosis, it is difficult to believe that any marked hereditary racial differences specific to tuberculosis exist between individual tribes.‡ After all the Bantu tribes are all descended from one stock and in most cases are very closely related. Even as between European and native, if great differences are displayed in proclivity to the disease and in its effects, there are also enormous differences as regards the degree of acquired immunity and the effects of environment and predisposing conditions, which, if they could be fully discounted, would probably not leave so much difference between the two races to be accounted for by true racial difference.

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* "An Inquiry into the Prevalence of Syphilis in the Native of South Africa, and its influence in aiding the spread of Tuberculosis."—*Lancet*, May 11th, 1912.

† There is one point to which we would refer, although it is not one falling within the scope of our reference, or only very indirectly so, as a possible predisposing cause of tuberculosis. This is the very great prevalence of syphilis among the natives in some parts of the Union, as for instance in the Northern Transvaal and in Bechuanaland, and the evidence constantly brought to the notice of the Commission, during the course of conducting its enquiry in different parts of the Union, to the effect that the disease is spreading generally to a menacing extent among other portions of the native population.

In connection with the widespread occurrence of this disease, and the remarks made above regarding its possible effect on the occurrence of tuberculosis as a predisposing factor, we would allude to the possibility of the disease known as Yaws or Frambœsia existing among natives, as well as syphilis. The grounds for making this suggestion may be briefly indicated.

(*a*) That many of the common effects of syphilis as seen among natives, closely approximate to those of Yaws; chief among these being the absence of primary chancre and of many of the usual primary and secondary manifestations of syphilis; the extreme rarity of any of the common syphilitic nervous diseases, especially tabes dorsalis; the frequent occurrence of ulceration, with enormous loss of tissue, especially of the palate, fauces and nose; and the occurrence of mild cases, with the tendency to recovery without antisyphilitic treatment.

(*b*) That syphilis and Yaws are so nearly allied that some authorities consider them to be the same disease. John Hutchinson, believed Yaws to be a modified form of syphilis. The causal organism in both cases is a spirochete, and salvarsan (606) acts alike on both.

(*c*) That mid Africa is the original habitat of Yaws, whence it was spread by negro slaves to the West Indies and elsewhere. It is therefore strange if it has not been brought South during the migration of races. The prevalence of what has always been described as syphilis has been noted by travellers among natives in South and Central Africa very many years ago.

‡ Drs. Porter and Turner dissent from this expression of opinion.

That there are purely racial differences in resistance to disease between different human stocks may be taken for granted, just as we know them to exist in the case of plants and animals, but what we wish to emphasize is that it is necessary, before we definitely attribute such differences to purely racial distinctions, for us to exclude all other possible causes.*

In the case of pneumonia, while its incidence is overwhelmingly great on the Tropical native on the Rand Mines, a study of the question goes to show that while those statistics which are advanced in support of the view of there being a true inherited difference between tribes are not in any way conclusive of such a contention, nor inimical to other views, there are other statistics which on the contrary indicate the great importance of the factors of immunisation, environment and predisposing conditions in the production of the observed tribal difference.

222. In connection with this question we may refer to the mortality from tuberculosis among negroes in the United States of America.

In the year 1911, in the registration area of the United States, the death-rate per hundred thousand from tuberculosis of the white and coloured populations, respectively, were:—

	White.	Coloured.
Tuberculosis of the lungs	126·2	405·3
Tubercular meningitis	8·5	15·4
Other Forms of tuberculosis	11·3	30·1
Total	146·0	450·8

It will be observed that these rates rival those of our own natives.

Dr. T. D. Coleman, who has had a prolonged medical experience of the American negro, writing of tuberculosis among them,† says that the medical profession of the South is unanimous in the opinion that in the negro's condition of slavery, tuberculosis was comparatively unknown. That when they were slaves they lived for the most part in the open, tilling the soil, well housed, well clothed, well fed, and when sick were attended by a competent physician. They were free from care, with all their material wants supplied. They now forsake the plantation for the town, are shiftless, have to do labour for which they are unfitted, are unsober, given over to dissipation and sexual excesses. Venereal disease exists among them to an extent scarcely to be comprehended by one who has not lived among them, it being claimed that fifty to seventy-five per cent. have either hereditary or acquired syphilis. The average negro is ignorant of the fundamental laws of hygiene, and when he develops tuberculosis it rarely leaves its victim alive.

Conclusions.

223. This question is not one of mere academic interest, but is one which intimately affects our judgment as to the future of the South African native in his relation to tuberculosis, and our decision as to appropriate measures for his protection. If the foregoing observations be correct—and they are in accord both with our experience and with the present day theories as to the principles of infection and immunisation—then it necessarily follows that we must expect an increasing amount of tuberculosis to occur among the native races as their contact with European civilisation and industrialism extends; and as we cannot possibly hope to abolish all sources of tuberculous infection, it results that our efforts at limitation and control must be in the direction of (*a*) reducing the opportunities of massive infection, and (*b*) improving the native's environment and removing predisposing causes.

* In the case of animals it is almost impossible to overrate the effect of immunisation. Take for example the two diseases known as Redwater and Heartwater, both due to infection conveyed by ticks. Animals coming from a clean district into an area infected with either of these diseases, are pretty well certain to die, yet the animals brought up on a redwater or heartwater veld suffer comparatively little; simply owing to their having acquired an immunity to the disease. In the case of the owner of one of the biggest farms in the country, which had at one time been one of the worst redwater and heartwater farms, but on which the ticks had been exterminated for the past eight years, he sent a hundred head of cattle off his farm, and fifty per cent. of them promptly died of these diseases.

In the case of malaria the effect of a naturally acquired immunity is very clearly demonstrated in the inhabitants brought up in a malarial district. Such an example is found in the natives of certain districts of Mozambique.

† "Tuberculosis: A Treatise by American Authors." Ed. by Arnold C. Klebs, M.D. (Lond.). 1909.

It is necessary for us to clearly remember that while throughout this Report we have been demonstrating that the going to mining and industrial centres results in a heavy incidence and death-rate of tuberculosis on the native worker, in this demonstration we have taken account of a part only of the whole result. This is we have only taken into account the cases of massive infection, in which tuberculosis becomes manifest by symptoms and effects constituting an obvious attack of the disease. But coincident with such cases there are many more in which the infection has been acquired in minimal and possibly repeated doses, and under such conditions as has enabled the recipient to deal successfully with it and thereby to acquire a degree of immunity.

The object of measures should be to limit the effect of civilisation and industrialism on the native to this desirable result.

CHAPTER X.

The Infectiousness of Tuberculosis.

224. In the course of evidence tendered to the Commission by Dr. G. D. Maynard (at the time Assistant Medical Officer to the Witwatersrand Native Labour Association, and now Assistant Director to the South African Institute of Medical Research), he dealt at some length with the question of the infectiousness of tuberculosis; embodying his views on this subject in a memorandum which he laid before the Commission. The views which he therein advocated are those held by the biometrical school of investigators, and are those which are largely identified with the name of Karl Pearson, F.R.S., Professor of Eugenics at the London University; having been advocated by him (alone or in collaboration with others), in a series of able monographs. These views assert that infection has little to do with the occurrence of tuberculosis, as evidenced by the mortality occurring from this disease, but that it depends mainly on heredity.

Dr. Maynard subsequently issued his memorandum as an address to the Johannesburg Branch of the British Medical Association, and it was afterwards published in the South African medical journals. It will be found reproduced *in extenso* in Annexure "E" hereto.

Dr. Maynard's evidence and his expressed views were also at the time given a good deal of prominence in the lay-press, leading to some controversy, and possibly to some confusion in the public mind as to the value of anti-tuberculous measures.

The Commission therefore felt it incumbent upon it to take the question of infectiousness into consideration, whereupon it was found that the Commissioners themselves differed in opinion as to the extent to which infection is actually responsible for the spread of tuberculosis, but it was also found that these differences of opinion did not materially affect the character of the measures which they have decided to recommend for combating the disease within the Union. They therefore agreed to exclude from the body of this Report discussion of the subject of the infectiousness of tuberculosis, leaving to individual members the option of separately expressing their views upon the question in an Addendum to this Report; and accordingly there will be found in Addendum "A" a memorandum on the subject by Drs. Porter and Turner.

For the benefit of the general reader, however, the Commission has thought it desirable that individual members should supply in this place a short résumé of their views on the question.

By the Chairman.

225. In this statement only the broad factors influencing the occurrence of tuberculosis are taken into account. No argument or proof is attempted, but this Report itself contains much in support of the doctrine of infection and the influence of environment.

1. Tuberculosis is caused by infection with the tubercle bacillus, and by nothing else.
2. This infection (speaking generally and ignoring unusual sources of infection), must be derived either

   (*a*) from a previous human case, or
   (*b*) from tuberculous meat or milk.

3. Both of these sources are controllable. Therefore no matter how widespread or extensive the sources may be, it should be possible to limit them to a great extent by suitable sanitary measures:—

   (*a*) directed specifically to the particular source of infection, and
   (*b*) generally to the improvement of bad hygienic conditions favouring the spread of infections in general.

4. Judging by the fact that in European countries about eighty to ninety per cent. of all persons have been found to have been infected with tuberculosis by the time they reach early adult age, infection in those countries must be very widespread. Also the bulk of the infection in individuals must occur in very early childhood.

5. Manifestations of the disease in the adult are therefore usually due to either:—

   (*a*) the breaking down of an old localised, latent lesion and the diffusion of infection through the body, or
   (*b*) a re-infection from outside the body.
   Evidence points to the former being of not infrequent occurrence.

6. The manifestations of the disease in the adult are usually different in type to those occurring in early childhood, being modified in the former by a previously acquired partial immunity.

7. In considering tuberculous infection we must be careful to determine what we mean by tuberculosis as a disease. As a disease it means active manifestations of tuberculosis, recognisable during life. But short of this there must occur every degree of infection, from the minute and transient infection which causes no symptoms up to a fatal attack of the disease.

8. The chief factors responsible for determining whether the infection will or will not result in active tuberculous manifestations, and in determining the severity of the symptoms, are:—

   (*a*) The virulence, quantity and frequency of the dose of infection.
   (*b*) The portal of entry into the body.
   (*c*) The presence of an acquired immunity, the result of a previous infection (with or without manifestations), and the degree of that immunity.
   (*d*) The conditions of environment of the individual, affecting his state of health and consequently his normal natural powers of resistance to infection at the time being.

9. By conditions of environment are meant all those conditions which adversely affect the normal health of the individual. They include climatic conditions; exposure; hardship; overstrain, physical or mental; insufficient rest or relaxation; bad housing; overcrowding; dirt; improper clothing; insufficient or improper food; insufficient fresh air and sunlight; the effect of toxines, such as alcohol, dagga, blasting fumes, and of infective diseases.

10. A study of the effect of the abnormal conditions of life and work at the mines and on the native races of South Africa affords an unique opportunity of demonstrating the influence of environment in leading to the production of tuberculosis and to other disease in those subjected to them.
    This demonstration is among the findings of this Commission.

11. There are doubtless hereditary differences in the degree of natural resistance to the tubercle bacillus. These differences may be either of racial or of individual origin. In the former case they may appear more or less marked, as for example, as between Europeans and aboriginal natives. In the latter case the difference is probably only slight. In neither case are we justified in assuming an observed difference to be due to heredity until we have determined the relative effect of the factors mentioned under (*a*), (*b*), (*c*) and (*d*) of section 8 in causing the observed difference.

[U.G. 34—'14.]

12. There is no evidence solely supporting the belief in the hereditary transmission of a special "tuberculous diathesis." There is a good deal of evidence directly contrary to the theory. Still less is there any warrant for the contention that the possession of this diathesis is the main determining cause of phthisis.

13. It is also reasonable to believe that "natural selection"—that is the survival of the more resistent members of a community—will be likely, when acting over a long period of time, to result in a generally more resistent race; but this is not a factor of practical importance in the consideration of measures for controlling the spread of tuberculosis.

14. Nor is there any valid evidence in support of the assertion made by Professor Pearson and by Dr. Maynard that the decreasing death-rate from phthisis taking place in England during the last fifty or sixty years, is due to natural selection, and "is not due to sanitary and hygienic improvements, or to more efficient public health control."

15. It is also possible that the natural passage of many generations of the tubercle bacillus through a series of more resistent hosts may result in the production of an organism of a type of permanently lowered pathogenic virulence, but there is no evidence upon which we can base the supposition that by this means tuberculosis has become, or will become, a milder and less lethal disease. The investigations of the British Royal Commission on human and animal tuberculosis are opposed to this as a working hypothesis.

16. The natural corollary to the above is that the measures to be relied on to prevent the occurrence of tuberculosis, are:—

(*a*) To control and limit the conveyance of infection from the affected to the healthy.
(*b*) To prevent the consumption of tuberculous food.
(*c*) To remove all conditions which favour the continued vitality of tuberculous infection outside the body.
(*d*) To improve the conditions of environment of the individual, especially those involving his housing, feeding, clothing and work.

17. It may be said that another proposition emerges from the above statement, namely, that, failing the complete suppression of all sources of infection, then a mild infection in early life is a safeguard which should be aimed at rather than prevented. Our knowledge and our powers of control, however, are at present much too limited to enable practical consideration to be given to such a proposition. Either we must endeavour by every available means to prevent the occurrence of all infection, or we must blindly leave the suppression of tuberculosis entirely to the operation of natural forces, which undoubtedly are capable of evolving the remedy, but in their own time and at great cost of life.

By Dr. Te Water.

226. I concur with the summary of conclusions arrived at by the Chairman. Close contact with the sick so materially increases the risk of the healthy contracting the disease, that it should by all possible means be avoided. It appears from our evidence that the spread from the diseased to the healthy person does occur sufficiently frequently, that it justifies and makes immediate legislative interference, with the view of restricting its further progress, incumbent. Measures based on our knowledge of the nature of the tubercle bacillus and its propagation, will materially influence the course of the disease in South Africa.

As regards heredity, so far as the Union is concerned, the evidence we have been able to procure shows that it has not played any important part in the etiology of tuberculosis, except perhaps in preparing a specially favourable soil for the growth and development of the bacillus. The history of such cases of tuberculosis will show whether the seriousness of the disease is due to the tissues being extra vulnerable and extra liable to attacks of the tubercle bacillus; or whether it is owing to unusual virulence of the causal agent, the tubercle bacillus; or whether the environment gives exceptionally favourable conditions for rapid development, diminishing the resistance to the tubercle bacillus.

By Dr. Porter and Dr. Turner.

227. 1. We accept the assumption that amongst the inhabitants of Europe all adults have been exposed to frequent infections with the bacillus tuberculosis.

We believe:—

2. (*a*) That amongst *inhabitants of Europe* the degree of infection of tuberculosis from person to person is a factor which has been materially exaggerated;

(*b*) That amongst South African natives and coloured, and to less degree amongst European-Africanders, tuberculosis is, under certain conditions, a distinctly infectious disease.

3. (*a*) That the existence of heredity, in the sense that everyone is born with, *i.e.*, inherits, a certain degree (high or low) of natural resistence to tuberculosis (and other diseases) cannot be denied;

(*b*) That "heredity" in the sense of transmission of a positive "predisposition" or "taint" as an acquired characteristic from an infected stock, can have obviously little to do with the incidence of the disease amongst natives immediately descended from practically uninfected stock.

(*c*) That as regards Europeans and persons of mixed race, the effect of heredity in this sense is a speculative question upon which, in the present state of our knowledge, we do not propose to dogmatize.

4. That the phenomenon of "natural selection" or gradual elimination of the unfit, as well as "increased well being" and improved conditions of housing and feeding, which raise the natural resistance of the individual, have contributed, in degrees which we are not prepared to define, to the fall of the tuberculosis death-rate in England.

5. That it is undoubtedly desirable that further research be made into the factors which produce the fall in this death-rate, and that reasonable and well-considered expenditure with the object of improving conditions of housing, feeding and well-being of the community, is both justifiable and necessary.

CHAPTER XI.

Summary of the Facts regarding the Prevalence of Tuberculosis.

228. In the previous chapters we have had of necessity to deal at tedious length with the question of the extent of the prevalence of tuberculosis, and on the general factors influencing its spread, for on a correct appreciation of this the nature of our recommendations must depend. Had sufficient statistics been available the subject would still have been difficult, owing to the large area of the Union and the variety of the races to be considered. Without proper statistics it has only been possible to arrive at a conclusion after the exercise of a careful discrimination and the weighing of a great deal of evidence, which although separately not of great value, when taken in the mass becomes fairly conclusive.

And here we may remark that in the course of our survey we have been struck with the general consistency of the evidence, the several parts being in most cases in accord with the facts deducible from the whole.

We now find ourselves able to make with some assurance the following summary:—

As regards Europeans.

229. (1) Active tuberculosis is not very prevalent, and although the degree of prevalence varies, the amount, except in some of those places especially frequented by overseas cases, is considerably less than it was in England and Wales in the year 1911.

(2) It is much more frequent among the foreign-born as compared with the colonial-born European. A large proportion of the deaths are in imported cases; that is in persons who come to South Africa already actively suffering with the disease.

(3) There is no means of ascertaining whether active tuberculosis *originates* in South Africa relatively more frequently in the foreign-born than in the South African born, but it is probable that it does, having regard to the fact that the great majority of the foreign-born live in the towns.

(4) We have had little opportunity of investigating the question as to whether there is a larger proportion of latent tuberculosis among foreign-born than South African-born, but the information (Chapter IX, paragraph 203) points

to this being the case. It can only be decided by extensive tuberculin tests and by post-mortem records.

(5) The disease is from a third to three times more frequent in males than in females. Probably mainly due to the greater immigration of males, many of whom are tuberculous.

(6) The relative extent of its prevalence among Europeans in the four Provinces, so far as registration figures can be relied upon, is in the following order: the Cape, the Transvaal, Natal, and the Orange Free State.

(7) It is on the whole about three times as prevalent in the towns as in the rural areas.

(8) It is most prevalent in the large coastal and industrial towns, on the mines, and in those places which have been the resort of consumptives on account of climate and altitude.

(9) The mortality is mainly from pulmonary tuberculosis. According to the statistics, the mortality from the other forms of the disease, relatively to the entire tubercular mortality, is one-third less than it is in England and Wales.

(10) In most parts of the Union the disease in Europeans, according to the registration statistics, is diminishing in amount, this probably being due to

(*a*) decreasing immigration of consumptives;
(*b*) better hygienic conditions of living.

(11) This diminution is coincident with a reduction in the general death-rate from all causes.

(12) On the whole the amount of tuberculosis among Europeans is satisfactorily low, and should be easily reducible by simple measures, assuming that sources of infection to the European are not multiplied either by the immigration of consumptives or by association with affected coloured persons and natives, or by tuberculous food.

As regards persons of Coloured and Mixed Race.

230. (1) Tuberculosis in persons of coloured and mixed race appears to have been of long standing in those parts of the Union first brought under European settlement.

(2) It is from four to six times as prevalent as among Europeans.

(3) It is very prevalent, and everywhere where these races are to be found, it is responsible for a large mortality, but chiefly in the towns and town locations and on the older Mission Stations of the Cape Province. It is most prevalent in the larger towns and industrial centres.

(4) It appears to be decreasing to some extent in the towns, the decrease being coincident with a diminishing general death-rate. The reduction is probably due mainly to there being less overcrowding consequent upon the arrest in recent years of the growth of urban populations, and to local authorities maintaining a better standard of hygiene.

(5) In the case of towns most frequented by overseas consumptives there seems to be some degree of correlation between the presence of such consumptives and the prevalence of the disease among the coloured inhabitants.

(6) It is more prevalent among some sections of the coloured classes than others, especially those having Hottentot blood, as for example the Griquas and the Namaquas.

(7) It displays no unusual discrimination between males, females and children.

(8) Phthisis and general tuberculosis are its most common manifestations, but all other forms are frequent. The mortality from all other forms is from three to four times as great as among Europeans.

(9) We are satisfied that tuberculosis prevails among the coloured and mixed races to a very serious extent; that it is responsible for a very large amount of sickness and mortality and of inefficiency in these races; and that it is imperative in the welfare of themselves and of the general community that energetic measures be taken to control the disease.

As regards Asiatics.

231. (1) Our information concerning the disease in Asiatics, apart from the mixed and coloured races, is very limited and is practically confined to the indentured Indian and his descendants in Natal.

(2) Among those constituting the general population the prevalence of the disease is probably less than among the coloured and mixed races, but is still excessive; but in view of the small proportion they form of the general population, we see no reason for considering them, in connection with preventive measures, apart from the coloured and mixed element.

(3) The indentured Indian being of the Coolie class, is, generally speaking, of inferior physique than the ordinary Asiatic of the Union. He is subject to entirely different conditions of life and labour.

(4) Tuberculosis is very prevalent among them, attacking both sexes and all ages.

(5) It is mostly of the pulmonary type.

(6) There is no evidence that it is decreasing.

(7) There is reason to believe that the indentured Indian does not suffer from the disease in this country to any greater extent than at his home in India. On the contrary the extent is probably much less.

(8) It is largely dependent upon the nature and arduousness (in some cases) of his employment, and upon his housing and manner of life. There is evidence that the absence of an age limit for putting young children to labour leads to a greatly increased prevalence of tuberculosis and pneumonia among them. (*Vide* paragraph 143). Improvements in these and in other directions should effect a gradual reduction in the prevalence of tuberculosis among this class.

As regards Natives.

232. (1) Tuberculosis is of comparatively recent introduction among the Bantu tribes.

(2) We are satisfied that it has now become a most serious menace to the future of the native races throughout the Union, that it is increasing, and that unless effective measures are taken it is likely to materially increase.

(3) The disease, however, prevails to a variable extent among the different native tribes and communities; from a comparatively small degree in the raw native who remains in his kraal, and who has come into but little contact with civilisation, up to a very large amount occurring among those brought under the influence of European industrialism, and living under conditions, to the native of exceptional stress. There are many gradations between these extremes. No single term, therefore, will define the extent of its prevalence among natives.

(4) The prevalence is in proportion to the degree and duration in which the following factors have operated:—

(*a*) The adoption of civilised habits and modes of life as practised by natives; including clothing, housing and diet.
(*b*) The change from the freedom and openness of kraal life to town locations, compounds, barracks, Kaffir lodging houses and other close aggregation.
(*c*) The change from a leisurely life to one of continued labour under more or less arduous conditions.
(*d*) The coming into contact with massive infection by association with the European and coloured races.
(*e*) The indulgence in deleterious kinds of alcoholic liquor.

(5) These factors lead also to an increased general death-rate from other diseases, and notably so from pneumonia and other respiratory complaints.

(6) Among raw natives tuberculosis predominates among adult males, owing to their going out to labour centres. As the more civilised tribes are approached the prevalency becomes more equalized between males and females.

(7) Pulmonary and acute general tuberculosis predominate, more especially among adult males. Among females and children there is a large proportion of glandular cases (mostly cervical), especially among the less civilised and raw natives.

(8) Speaking generally it is found to be least prevalent in Zululand and the Northern Transvaal, more so in Basutoland, still more in the Cape Native Territories, and most widespread among natives in the settled districts of the Cape Province.

(9) Tuberculosis is excessively prevalent among natives working in the large industrial centres and especially on the mines,—gold, diamond and mineral.

(10) Owing to the extent to which the disease occurs on the mines, and the large number of natives employed thereon, together with their frequently changing personnel, the mining industry is one of the most important of all the factors in the cause and diffusion of the disease among the native population.

(11) Tuberculosis once introduced is spread by the personal habits of the native, chief among which are:—

(*a*) His habit of promiscuous spitting, especially on the floor and walls of his hut.
(*b*) His love of dark ill-ventilated huts, and his objection to fresh air at night time.
(*c*) The use of the floor as bed and table.
(*d*) His personal uncleanliness.

(12) These practices must be an effective cause of the infection of children, whose habit it is to crawl and play about on the floor of the hut, and thus get infected material on their hands, which they convey to their mouths.

(13) They also go far to explain the large amount of cervical glandular tuberculosis occurring in the kraals, on the supposition of infection through the fauces not only of children but of adults.

(14) Over and above the effect of such factors in causing the disease, there may be to some extent a tribal susceptibility to it which would be one explanation of the greater proclivity that is shown by some tribes over others to the disease. (Chapter IX, paragraphs 218 and 219.)

(15) There are special factors in operation on the mines which predispose to tuberculosis among mine workers. These will be found discussed in the chapter dealing with the occurrence of tuberculosis in connection with that industry.

CHAPTER XII.

Conditions of Housing of Coloured Persons and Natives in Urban Areas and elsewhere.

233. The terms of reference to the Commission require it to take into consideration the effect of "occupation, housing and the concentration of persons in compounds, mission stations, and locations, and of conditions of life generally, in spreading the disease," and in fact no adequate consideration could be given to the subject of the causes and spread of tuberculosis without dealing with the conditions of housing and occupation, chiefly of that largest section of the population, the coloured and native races.

We have already dealt generally with the conditions under which the population of the Union live, and at some length with the uncivilised native at his kraal. It remains for us now to deal with the conditions under which coloured and native are housed, in urban areas and at labour centres. With regard to housing conditions on the mines, this will be considered later on when dealing with the subject of the health of native mine employees.

Urban Locations.

234. Speaking generally, in the towns the native is not allowed to live anywhere but in the town native location, except he reside on his master's premises. The law on the subject is usually contained in local bye-laws, but in some cases it is statute law. In the Cape Province natives who are registered parliamentary voters, and those who are the owners of property to the value of £75 in the urban area, are exempt from such restrictions. In the Orange Free State all natives and also all coloured persons living in urban areas must reside within the location maintained for them by the urban authority, and all over sixteen years of age must take out with the local authority, and pay for a monthly residential pass. In addition to this, those who are not in the service of a white master must obtain a certificate from the local authority, and pay for it five shillings a month.*

As regards coloured persons elsewhere than in the Free State, those of the better class reside in their own or in hire-houses in the town, and in the Cape Peninsula and some other places all do so, as these towns have no coloured loca-

* Law No. 8 of 1893. By section 8 "Coloured Person" includes all male and female persons above the estimated age of sixteen years, of any native tribe in South Africa, or, "who, in accordance with law or custom, are called coloured persons or are treated as such, of whatever race or nationality they may be."

tions. In many towns, as, for example, Kimberley, Mossel Bay or Worcester, property owners have been allowed on a somewhat extensive scale to erect hire-houses or tenement blocks for coloured people, for which in many cases a high rent is charged, while the accommodation is most objectionable from the sanitary standpoint, and considerable overcrowding occurs. In not a few such cases such buildings are of the back-to-back type.

But in most places in the Union all the natives and the bulk of the coloured people live in the town location. To a certain extent in some localities the same applies to Asiatics. Some municipalities, as for example East London, possess powers to compel Asiatics to reside in locations.

Generally bad condition of Municipal Locations.

235. In view, therefore, of the fact that residence in such locations is to a large extent compulsory by law, and in most cases is forced on the person by circumstances, it is clear that the local authority lies under a very grave responsibility to ensure that every location under its jurisdiction is maintained in a proper condition and is as well constructed and healthy as it is possible to attain. But far from this being the case, the majority of such locations are a menace to the health of their inhabitants, and indirectly to the health of those in the town. We have, indeed, no hesitation in saying that we know of no municipal location which is entirely satisfactory. We do not go so far as to say that there is none which is entirely satisfactory, but if there be we are unaware of its existence. Some of course, are much less objectionable than others, but all those which we have seen are bad in some feature or other.

As showing the almost universal extent to which this stricture applies, we may refer to the locations at such widely different places as Alice, Beaufort West, Bloemfontein, Cradock, East London, Graaff-Reinet, Grahamstown, George, Jagersfontein, Kimberley, Mossel Bay, Pretoria,* Queenstown, Uitenhage, Worcester, all of which among others, were inspected by the Commission.

It must be clearly understood, however, that in saying this we do not wish to cast any reflection upon any local body. On the contrary, we think that the majority are awakening to their responsibility in this matter and many are already effecting some improvement in the locations under their charge; but owing on the one hand to ignorance of the danger or to neglect in the past, and on the other to the character of the native and coloured population themselves, the problem is one of very great magnitude and difficulty.

236. In some places the municipal council is in a particularly difficult position, owing to a location within its area not being in the strict sense a municipal location, but one originally established on ground reserved by the Crown for the use of natives or coloured persons, who have been given certificates of occupation, or hold their plots on quit rent, or some other form of permanent tenure. In such cases the municipality is at a double disadvantage, for on the one hand it cannot exercise effective control, sanitary or other, as their location bye-laws cannot apply to such locations, while the ordinary bye-laws in force throughout the town are of little use for such a community, nor has the Council the power as landlords of forcing obedience to its requirements, and on the other hand it is unable to levy a reasonable revenue from the inhabitants, as they can only be rated in the ordinary way, and the rateable value of such property being in most cases very small, the yield from any rate is not worth consideration.

Examples of such locations are to be found in the Brownlee location at Kingwilliam's Town, the Government location at Grahamstown, and the old location at Worcester.

It will be seen, therefore, that the general condition of locations is a subject deserving the careful consideration both of the Government and of local authorities, especially as, in the opinion of your Commissioners, their radical improvement is imperative if efforts for the reduction of tuberculosis among their inhabitants are to succeed.

Principal Defects of Urban Locations.

237. In the following account of some of their salient defects, we have purposely refrained from mentioning specific examples, it is to be understood, however, that every location has not every one of the defects described, although very many are defective in a large number or in most of them.

* We shall allude later on to the improvements which the Pretoria Municipality is projecting.

The Site.

As regards situation, the location is usually placed on the outskirts of the town, which is a desirable arrangement, but the site is in many cases ill-chosen; generally on some donga, and in the vicinity of, or not far from the town sanitary tip, the refuse dump, and the slaughter poles, and at the same time away from the possibility of procuring any proper domestic water supply. The ground is frequently stoney and irregular and fit for no purpose, and is incapable of being kept in good order.

Rarely has any attempt been made to systematically lay out the site. Huts are dumped down anywhere; no proper streets are laid out, and little if any attempt made for surface drainage. The plots allotted to hut-holders are often irregular in size and not clearly marked off, while few are enclosed. Consequently sanitary control is difficult and the individual duty of plot holders with reference to their plots is hard to define or enforce. Nor is any garden ground provided, and considering the usual character of the site and the lack of water it would not be of much use to do so.

Sanitation and Sanitary Services.

Very few indeed of the dwellings are provided with sanitary accommodation of their own, and public latrines in the location are few and often entirely absent. Those that are provided are not often made proper use of.

Refuse is in most cases not collected and removed by the local authority, and when this is done it is usually very imperfectly carried out. As a rule a place is pointed out by the authority where the inhabitants themselves are expected to dispose of their refuse, generally a donga or sluit.

The absence of a proper water supply is usually one of the most pressing needs of such locations. In some cases the town water is laid on to one or two stand pipes in the location, but in most instances the inhabitants have to fetch their water from the irrigation furrow after it has run through the town, or from some neighbouring sluit. Public washing places are seldom if ever provided.

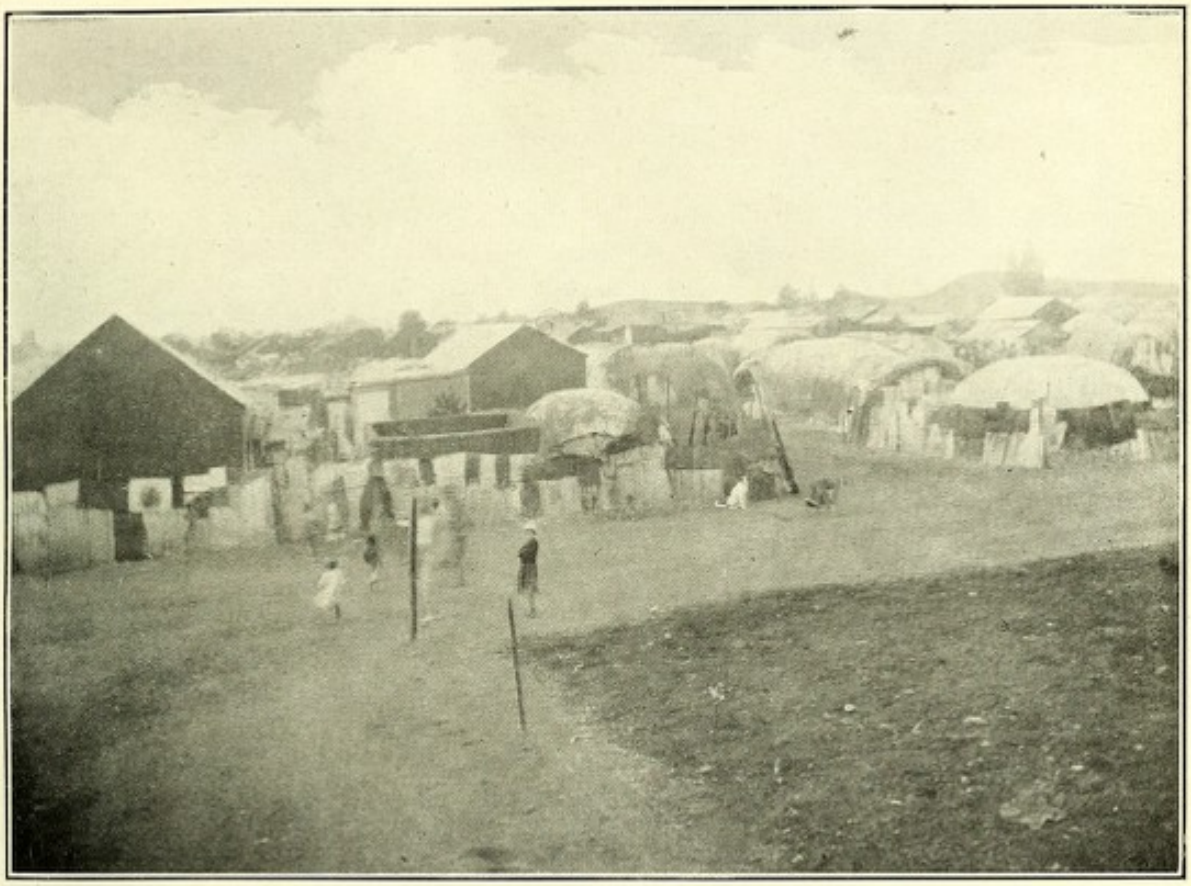
Although most municipal bye-laws relating to the location provide restrictions as to the keeping of animals, they are very rarely properly applied, with the consequence that sheep and goat kraals adjoin the dwelling; horses, cattle and other animals are kept in back yards, and pigs in numbers roam at will, scavenging through the location.

Character of Dwellings.

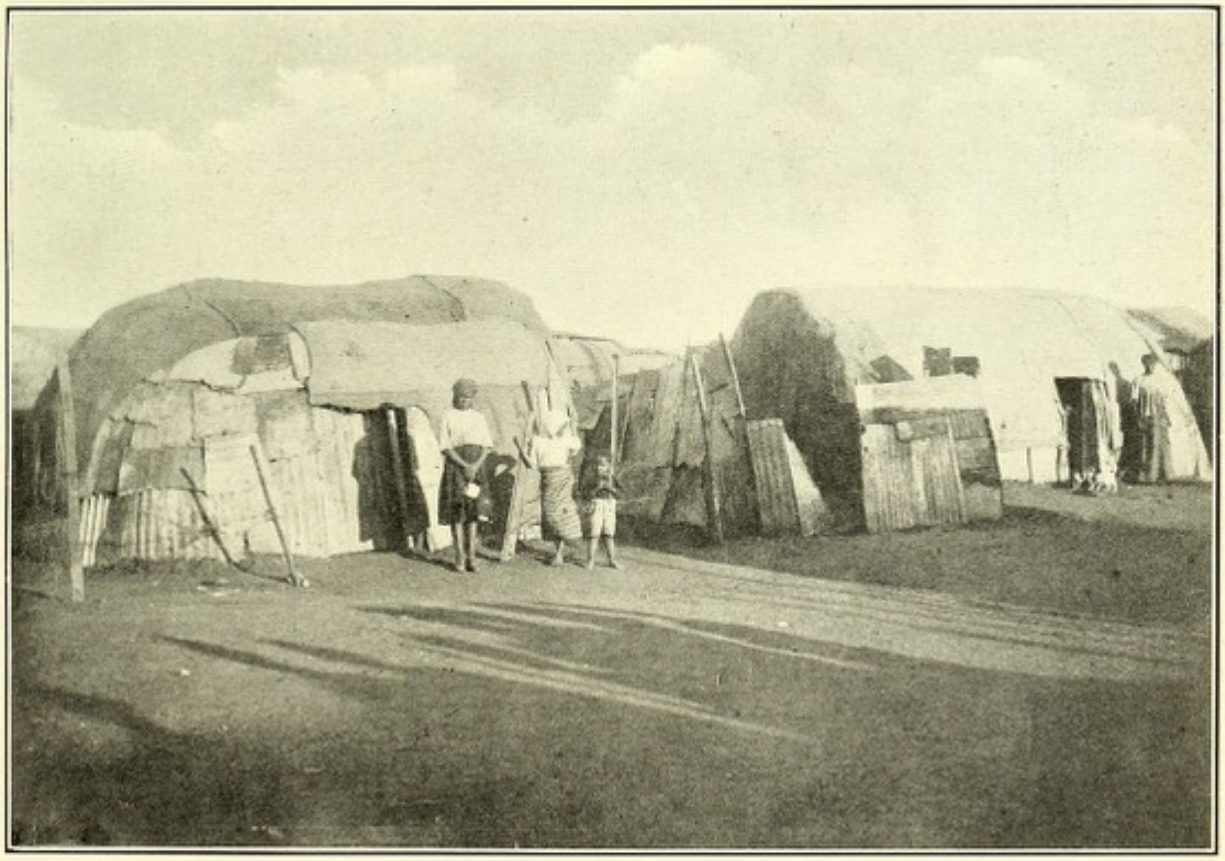
But it is with the character of the dwelling that the greatest fault must be found. With few exceptions they are a disgrace, and the majority are quite unfit for human habitation. Of course, in every location there are a certain number of better class inhabitants who have erected reasonably satisfactory dwellings, and in some cases the local authority has insisted upon, and in some instances has itself erected, dwellings of a better standard. In some locations, generally those inhabited by pure natives, a fair type of native round hut may prevail, but speaking generally the dwellings are mere shanties, often nothing more than hovels, constructed out of bits of old packing case lining, flattened kerosene tins, sacking and other scraps and odds and ends. They are put up on the bare ground, higgledy-piggledy, without any sort of order, often propped up one against another. Most municipal location bye-laws provide that a person renting a plot shall erect a dwelling to the satisfaction of the location superintendent, but in the majority of cases such requirement has remained, at any rate in the past, a dead-letter.

The dwellings are low, dark and dirty, generally encumbered with unclean and useless rubbish, mud floors are the rule, often below the ground level and consequently sometimes apt to be flooded in the wet weather. Overcrowding is frequent; and altogether one could hardly imagine more suitable conditions for the spread of tuberculosis.

In order to give some small idea of what we have tried in a few words to describe, we submit on the opposite page, two photographs of huts in the Greenpoint Location, Kimberley. In this location, which until recently belonged to the De Beers Consolidated Mines, but has now been taken over by the Kimberley Municipality, very many of the dwellings are constructed of bits of sacking stretched over an irregular framework of sticks or of flattened paraffin tins. Its only redeeming feature is that the sacking is fairly porous. The dwellings shown in the picture are, however, far from being as bad as many which are found in most locations.

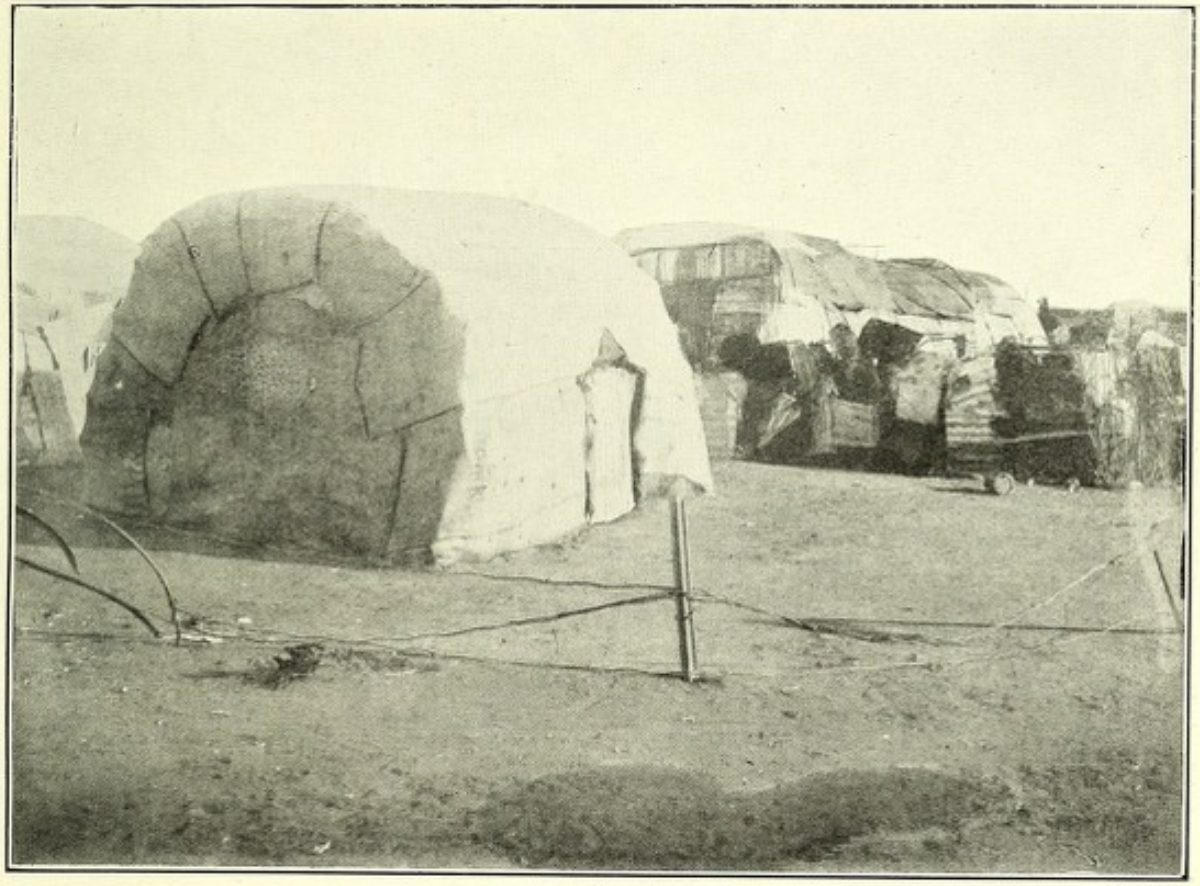


I.—General View of Location.



II.—View of Two typical Huts.

GREEN POINT NATIVE LOCATION, KIMBERLEY.



III.—View of Huts and Surroundings.

Conditions of tenure.

238. The conditions of tenure in municipal locations are hardly conducive to the erection by the inhabitant of a decent class of hut; the system being that of allotting a site of a given extent, for which the occupant is charged a monthly rental varying from about eighteen pence to five shillings, to which is added varying charges for water and sanitary services when these are supplied. On the allotted plot the person is supposed to erect a dwelling to the satisfaction of the location superintendent. Except in a few cases, this requirement is either ignored, or the standard required by the authority is so low as to be of no practical value. If any question arises, the plot-holder says he is too poor to erect a proper dwelling at once, and that the present structure is intended to be only a temporary one. Only one person or family is supposed to occupy the same plot, although lodgers may be taken by hut-holders, with the sanction of the local authority, and such lodgers usually have to pay a monthly tax to the authority. On leaving the location the owner generally has the option of disposing of his hut to a new comer, who, however, must be approved by the local superintendent. In a large number of cases he abandons it, and the Commission came across instances where such dwellings, quite unfit for habitation, had been taken over by the municipality and were being by it rented out to tenants.

According to most location bye-laws in force, the tenancy of the plot is a purely monthly one, and is held at the option of the local authority, and its continuance is subject to a number of contingencies, such as not falling into arrear with rent or licence or other fees; conforming to the municipal bye-laws; being of good reputation; being in satisfactory employment in the town; not having been convicted of any breach of the law, and so on: of all of which the local authority is the judge. By nature the occupants of locations are none too stable in character, and such reservations as these, although in themselves very necessary, are not calculated to give him any feeling of permanency, so that, even if the individual had the means at his disposal, there is very little inducement for him to erect a decent class of dwelling. In many other respects, also, the restrictions are often very severe.

It is only right to say, however, that we have no reason to believe that these powers are ever arbitrarily exercised by the local authority, on the contrary they generally err on the side of leniency. Indeed the tendency is to consider the occupant as having acquired vested interests of which he cannot be dispossessed without due compensation. It may be added that this factor of compensation has, in many cases, stood in the way of the municipality, shifting its location to a more suitable site, and requiring the provision of better dwellings. It has recently cost the Pretoria Municipality £6,600 in compensation to the residents of a portion of the old location which was required by the Council as a sewage disposal area in connection with its new sewage scheme.

Provision by Municipality of Dwellings in Locations.

239. In some cases the municipality with praiseworthy intentions, has erected within the location blocks of tenements, and the rentals from these have given a remunerative return on the outlay. But unfortunately in certain cases the local authority has been ill-advised in the class of dwelling which it has erected.

The Pretoria Municipality has recently projected a new location on a site of about 75 acres, on rising ground, distant about 2½ miles from the centre of the city, and enclosed by a belt of trees 100 feet wide. Open space for churches, schools, sanitary conveniences, wash and bath-houses, recreation grounds, etc., are provided. The dwelling plots are fifty feet by fifty feet, giving seventeen huts to the acre, intercepted by 40 and 20 feet roads. The location is divided into three blocks: (*a*) for better class married natives, (*b*) for poorer class married natives, (*c*) for single natives in barracks, and low-class native women, and general floating native population. A sum of £25,000 has been allocated to the scheme, of which £18,000 has so far been expended.

So far only (*a*) class of accommodation has been erected. This consists of fifty huts, facing east, each being a detached cottage of two rooms, each twelve feet square, and a kitchen eight feet square, with a small covered stoep. They are constructed of best kiln-burned bricks, tarred up to the sill height. The walls are not plastered inside, but are lime washed. The only woodwork employed is in the roof timbers. The roof is of galvanised iron, painted. The window frames

and doors are of iron. The floor is of granolithic.* Permanent means of ventilation is arranged for through the projecting eaves. One closet is provided for each three huts. The cost of erection was under £120 each, and the rent obtained is £1 per month, ten shillings of which is to cover stand rent, sanitary services and water supply, and ten shillings to provide interest and redemption on the capital outlay Some difficulty was experienced at first in getting tenants, but they have been now all taken up by families evicted from the old location. These huts appear to be of a satisfactory type for better class inhabitants or locations, and we therefore submit the subjoined plan, together with a photograph of one of them.

There is a window to the kitchen in the rear wall of the building, which is not shown on the plan. The design would be greatly improved by the provision of a window in the rear wall of each living room so as to provide for cross ventilation.

240. We are of opinion that a system under which the local authority erects suitable dwellings for hire is one which should be encouraged, as if it is carried out on proper lines, it should result in a material improvement in the present state of things. Such undertakings, after providing for maintenance, interest and redemption charges, should return a margin of profit, to be used for the general betterment of the location and its environment. For this purpose we are of opinion that local authorities should be assisted by means of Government loans at a reasonably low rate of interest, provided, however, that the period of redemption be not unduly extended.

At the same time we do not wish it to be inferred that persons should be debarred in any location from building their own dwellings. On the contrary this should be encouraged, provided always that they conform to a proper standard of construction. And to this end the carefully designed municipal dwelling will serve as a model, and is sure to be of educative value. But there are always numbers of persons who, owing to the temporary character of their stay, or to their not having the necessary means or skill, or to some other cause, are unable to build for themselves, and for these rented quarters of various grades are necessary.

When a dwelling has been erected and maintained by the owner to the satisfaction of the local authority, there should be, upon the owner having for a *bona fide* cause to relinquish it, some definite arrangement, by which the local authority will be prepared to take over the dwelling at its appraised value as a location dwelling at the time of surrender.

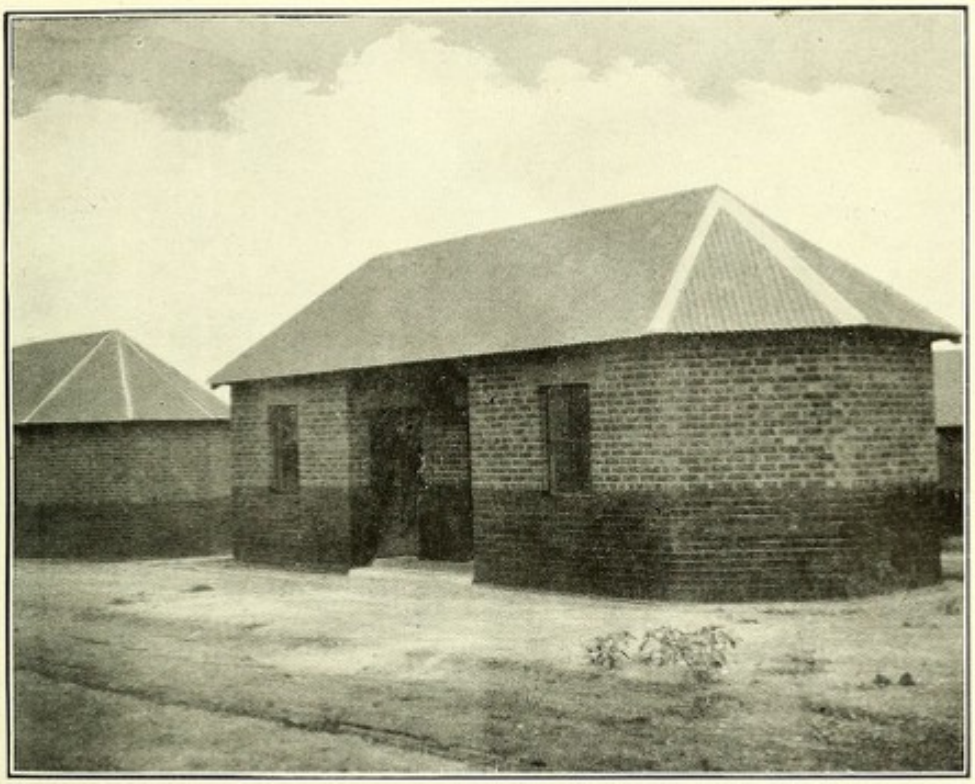
Re-establishment of locations on new sites.

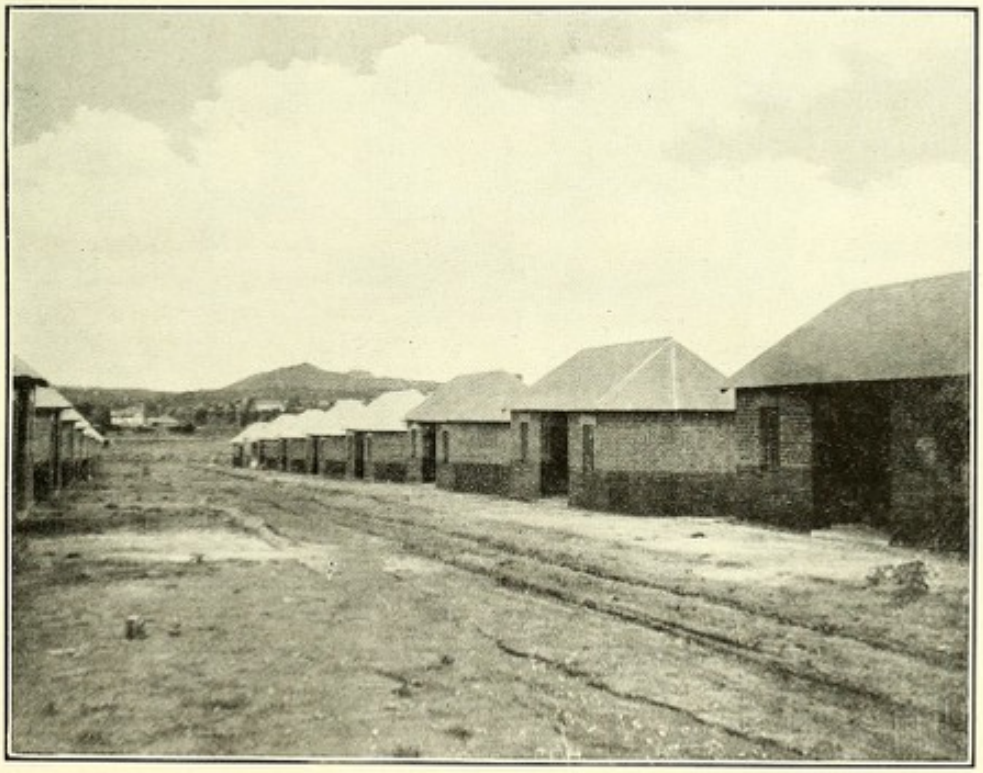
241. In the majority of cases, however, the mere provision of such municipal dwellings in the existing location would not provide the necessary remedy, inasmuch as the whole location requires re-laying out and in many instances an entirely new site ought to be chosen. In order to adequately deal with such cases it would seem that new statutory powers will be necessary to empower the local authority to effect the removal of locations to suitable sites, and to cause the demolition of unsuitable dwellings, without being faced with unreasonable, and in many cases paralysing, claims for compensation. At present it is held that the occupants have acquired vested rights, and as we have indicated, such claims have amounted to many thousands of pounds in the case of certain municipalities which have attempted improvements of the kind.

The majority of the dwellings in such cases have no commercial value, and even to the owner himself the value is trifling, and, while direct hardship should when possible be prevented, the offender and original cause of the trouble should be expected to bear a reasonable share of the consequences of his neglect. If the displaced hut-owner is unable or disinclined to build again, there will be the municipal huts which he can rent.

* It is proposed in the case of future huts to make the floors of "Pyrofyngont," a material which has been used with success in the dormitories, etc., of the Trappist Monastery at Pinetown, Natal. It is composed of a mixture of ground dolomite, 75 per cent.; mineral colouring matter and cement, 10 per cent.; and sawdust or vegetable fibre, 15 per cent. The cost laid at Pinetown was three shillings per square yard, seven-sixteenths of an inch thick. The Commission was struck with the cheapness, durability, quality and appearance of this material. It presents a hard, polished red surface, without cracks, and showing no signs of wear. The character which appeared to us to be particularly valuable was that it did not seem to be such a rapid conductor of heat as cement, granolithic and other purely mineral substances. The boys were said to sleep on it without any chill or discomfort. The required materials are obtainable from Messrs. Schleicher, Pyrofyngont Works, Clemenstrasse, 113-115, München, Bavaria. Most of them should be easily manufactured in the Union. We are indebted to the kindness of Brother Nivard, of the Trappist Monastery, Pinetown, for these particulars.

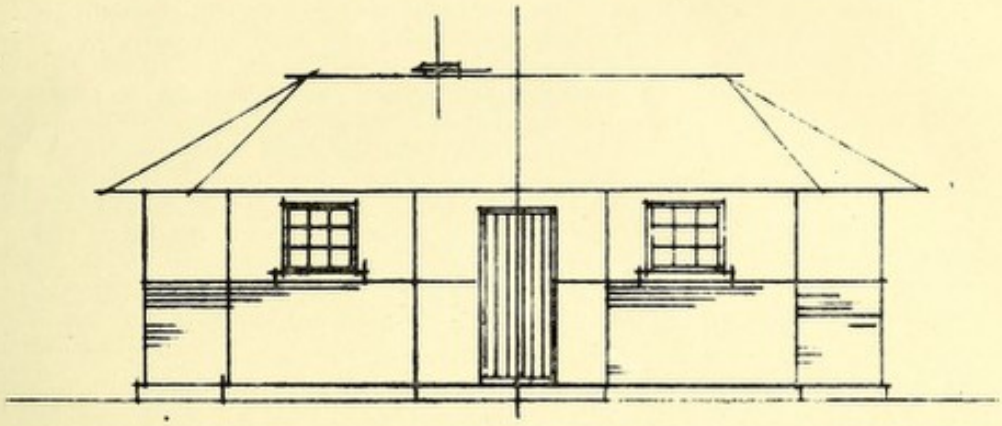
NATIVE HUTS ERECTED IN NEW LOCATION, PRETORIA MUNICIPALITY.



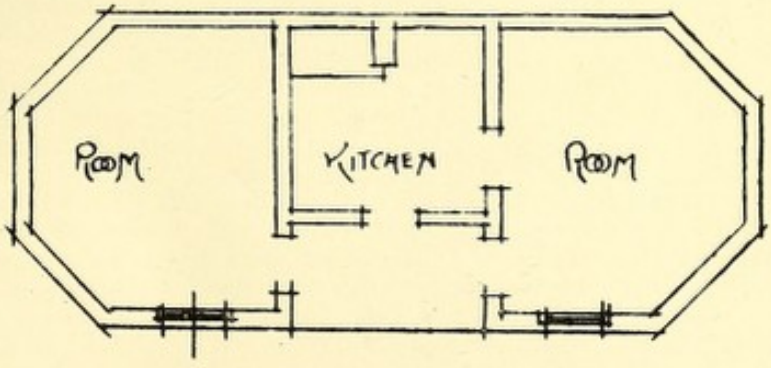


TYPE NATIVE HUT
Nº 3

SCALE ⅛ INCH = 1 FOOT



ELEVATION



PLAN

F. WALTON-JAMESON
TOWN ENGINEER
PRETORIA
15-11-1913

It may be added that this principle has already been conceded. At Port Elizabeth there were a number of large, particularly insanitary locations, some of which were on private ground, which the Town Council found itself powerless to deal with. During the occurrence of plague in the Colony the Cape Government promulgated regulations under the Public Health Act, closing these locations and ordering all natives out of the town to a site purchased for the purpose by the Government, and now known as the New Brighton Government Location. This action was subsequently embodied in general legislation under the "Native Reserve Location Act, 1902," as amended by Act No. 8 of 1905.

It may also be added that the immediate effect of this action was a very great improvement in the health of the said natives, as shown by the rates of mortality.

In the case of locations established not on town land.

242. Such statutory powers should also apply to cases where the location is not on town land, but has been originally established on ground granted on reserved by the Crown for the use of natives or coloured persons, whether under individual occupation, in community or through some missionary church—as described in paragraph 236. Cases have arisen—as that of the Brownlee Location at King-william's Town—where locations established on this basis have become a menace to the health of its own as well as of the town inhabitants, and the municipality is quite powerless either to shift it or to exercise control.

Such statutory provisions should also empower the local authority to apply and enforce its municipal location bye-laws within any such location. The fact that the inhabitants hold their allotments independently of the local authority should not be allowed to interfere with proper control by the local authority over the location.

The proclamation of certain areas to be locations.

243. Also the Central Authority should have the power to declare that any particular area is to be treated by the local authority as a location. At the present time there are on private ground what are to all intents and purposes locations, but which the local authority is powerless to deal with as such. As examples we may mention the area adjoining the Worcester municipal location, known as Mylnesdorp, which is crowded with coloured hire-dwellings of the most undesirable type, many being back-to-back. And the area known as Korsten Village, just outside Port Elizabeth, and near to the New Brighton Native Location, in the Divisional Council area. This is a shocking place from every point of view, and is the scene of much riotousness and illicit liquor making and selling.

Also over such proclaimed locations and areas the local authority should have special powers of taxation by means of a hut tax, instead of the ordinary rating on the value of the property, which, as has been explained, otherwise yields an inadequate return.

Poverty of inhabitants of locations.

244. There is one factor which strongly militates against the provision of proper dwellings and the adoption of a satisfactory standard of living by the inmates of locations, and that is their poverty. The ordinary wage is only from two shillings to two shillings and threepence a day. Coloured persons in domestic service generally save the food they are supplied with during the day, and take it home with them in the evening to share with their family. It would seem that the population of most locations is larger than is necessary for the needs of the European population of the town to which the location belongs. Also in many, if not in all, locations the presence of a considerable number of loafers is tolerated; generally in contravention of the municipal bye-laws, which prohibit the sojourning of persons in the location for more than twenty-four hours, or other specified period, without a permit from the superintendent. The result is that the wages earned are small, and many of those who should be working are merely loafing and living on the earnings and food of the workers, so that the location becomes the haunt of undesirables.*

* For example, in a report by a special committee appointed in July, 1912, by the Grahamstown Municipal Council, the following statement is made concerning the location :—"There are many healthy, able-bodied men residing in the location, who do not work. And when they do happen to find employment, leave their situation with the least provocation. The custom of schools and colleges and employers of domestic servants supplying baskets of food every day to bring home for consumption, however well meant, encourages these men in sloth and idleness, and leaves the women to do all the earning when it is possible."

So, too, at Worcester, one of the Town Councillors said to the Commission :—"We as a Council are determined to do our level best, but we are faced with this great handicap—the idleness and neglect of these people, resulting in their wretched conditions. Unfortunately, the Commission comes along, and says : 'Why don't you alter this state of affairs ?' I appeal to you : Why does not the Government come in and say to these people, 'Go out to work'—compel them to go out to work and earn money, and then there will be very much less sickness. It is this continual overcrowding among them, and we have no power over it. They bring upon themselves these wretched conditions, as a result of their idleness. Bad feeding, bad housing, bad clothing, all come from their poverty ; and yet they continue to loaf instead of going out and earning a decent living."

And the same applies to the population of every coloured location.

Provision of garden ground.

245. We would suggest that whenever possible, provisions should be made of sufficient garden ground, attached to or in the vicinity of the dwellings. On many occasions the Commission, in the course of inspecting coloured quarters have been struck with the admirable use which has been made of garden ground where such has been available. It is unreasonable to expect that improvements in dwellings and in the general standard of living is likely to result under conditions where almost every simple amenity is absent.

Administrative Control.

246. In the course of our enquiry we found that the Location Superintendent was not infrequently old and ignorant, and his post was looked upon as a sinecure. Moreover he was often not under supervision. Unless the Sanitary Inspector happens also to be Location Superintendent, the former rarely has jurisdiction within the location, municipal sanitation stopping at its boundary. We are of opinion that in every case the superintendent should be a competent, energetic man, who should be made responsible to the town clerk for the proper management of the location. He should not be allowed to permit any infringement of the location bye-laws, without the town clerk's or the Council's express permission. The sanitary department should at the same time exercise its ordinary jurisdiction over the location, as in other parts of the town.

The superintendent should be required to keep proper registers of all dwellings, their character, number of rooms, and the number of authorised inmates. Also of all inhabitants, with their race, sex and age, place and nature of occupation, and such other particulars as may be deemed useful.

In some cases such records are supposed to be kept, but as a general rule they are neglected.

Every adult resident should be provided with a residential ticket which he should be bound to produce when required by the police or any authorised municipal or Government officer. Every dwelling should have conspicuously attached to it its distinctive number, together with the number and description of its authorised inmates.

With these arrangements frequent inspection should be undertaken both by day and by night, for the prevention of overcrowding and the detection of undesirables.

Action by the Central Authority.

247. The Central Authority should be empowered, without imposing an undue financial burden on the local authority, to require that the local authority carry out and enforce within every location in its area, suitable bye-laws for securing the erection and maintenance of proper dwellings; for the provision of a proper water supply, of latrines, and the observance of sanitation, and the prevention of overcrowding; and for ensuring the proper management and control of the location. In the event of default on the part of a local authority, after due notice, the Central Authority should have power to step in and carry out the neglected duty on behalf of, and at the expense of the authority in default.*

The Central Authority should also have the power to proclaim suitable bye-laws to be in force, in the event of the local authority itself failing to frame such bye-laws. It should draft and issue for the guidance of local authorities series of model bye-laws on the above subjects.

Also the Central Authority should define and lay down standards to which dwellings and locations should conform, on similar lines to those mentioned in the case of indentured Indians in Natal. (See paragraph 180, Chapter VIII, and Annexure "C".)

The practice of Municipalities making a Profit out of Locations.†

248. There is one feature in connection with the municipal management of locations to which we desire to direct attention. We find in many instances in which we have made enquiry into the matter, that the local authority has been

* *Note, dissenting.*—Dr. te Water dissents from the proposals to grant powers to the Central Authority of interference with the Local Government, beyond those already given specifically by Acts of Parliament; he is of opinion that the Central Authority should act mainly in an advisory capacity, and not be empowered to force or impose expenditure on any Local Authority against their desire, without Parliamentary sanction.

† *Note by Dr. Porter.*—Paragraphs 248-250, pp. 131-9, were relegated to an Appendix by a Majority (Drs. teWater, Porter and Turner) of the Commissioners, but were nevertheless re-inserted by the Chairman in the Text. Owing to representation that their removal therefrom would occasion material delay, they have been permitted, under protest, to remain as printed. (See also p. 282.)

making a considerable profit out of the running of its locations, which profit has been placed to General Municipal Revenue, while at the same time the location has been badly in need of improvement in some of the directions we have above described.

We do not think we should be justified in making a statement of this kind without adducing specific instances in support of it.

Examples.

249. The following are some examples:—

Cradock.

(1) At Cradock the municipal location contains about 2,300 inhabitants—mostly natives, and there are four or five hundred natives and coloured persons living in the town. The plots are of all shapes and sizes, and are very close together. They are supposed to be 40 feet by 40 feet, but this is not adhered to. A rent of two shillings and sixpence to five shillings and sixpence per month is charged for each plot. There are 498 dwellings; they are mostly of bad type. The Mayor stated that the houses are not satisfactory; they are very often overcrowded, and the ventilation is not good. Formerly they were granted garden plots, but not now, as there is less room in the location. Night-soil is not removed from the location, except from certain dwellings belonging to the Council, but there are movable latrines placed over pits, round the location. They are said to be used. Water to a limited extent is supplied by standpipes in the location.

Some eleven years ago the Council put up a row of 32 back-to-back rooms. They are a most unsatisfactory type of dwelling. The rent is five shillings to seven shillings and sixpence a month. The Council is unable to secure a proper class of tenant. In 1910 these rooms produced £54, but in 1912 only £5 17s. 6d. Since then they have been taken up, and also a number are allowed to be occupied free by paupers. These rents do not appear in the following account of revenue and expenditure of the location for the three years 1910-12.

	Revenue.	Expenditure.	Surplus.
1910	£1,399 0 7	£270 18 8	£1,128 1 11
1911	1,022 10 8	228 0 7	794 10 1
1912	1,125 7 0	224 7 0	901 0 0

The expenditure includes wages, scavenging, disposal of night-soil, and all other outlay. But no charge is made for water supplied. The Mayor and Town Clerk considered that £150 to £200 a year would fully cover the value of what was supplied to them. But the total receipts from water rates from the town was in 1912 only £282 17s. 1d.; so it is clear that this estimate is liberal. The total municipal expenditure for 1912 was only £10,300 1s. 5d. which includes the Park loan of £1,000, and £1,991 12s. 0d., which the Town Treasurer reported to be extraordinary expenditure, *i.e.*, mostly capital expenditure. It will be seen therefore that the profit from the location covers a substantial proportion of the ordinary municipal expenditure; roughly about twelve per cent.

The Municipal Council, however, has shown itself anxious to promote the health of the inhabitants of its location. During the year 1913 it made a very important advance in the shape of the appointment of a native woman, a trained nurse from the Victoria Hospital, Lovedale, as a visiting nurse to nurse and look after cases of sickness in the location. It also erected and opened during this year four good two-roomed brick cottages, on rising ground on the outskirts of the location, at a cost of about £200, for the accommodation of persons in the location suffering from Phthisis. No compulsion is exercised in inducing such cases to go there, and at the time of our visit, four or five months after opening, only one had taken advantage of it. During the year there were 40 deaths of coloured persons from tuberculosis registered in the town. [Questions 82560-82847 and 83464-482.]

Pretoria.

(2) The Municipality of Pretoria states that the staff for the administration of the locations consists of a Superintendent and Assistant. For the financial year ending 30th June, 1913, the revenue from stand rents in respect of the old location amounted to £1,594 12s. 0d. and the expenditure to £764 16s. 8d. The surplus was therefore £829 15s. 4d., and was absorbed into the General Revenue of the City. A charge of four shillings per dwelling is made for water and sanitary services, which about balances the expenditure on those matters.

Bloemfontein.

(3) At Bloemfontein there are four locations containing, we are informed, 1,919 stands, of which 1,514 are occupied, carrying a population at the last census of 12,205 (6,212 males and 5,993 females), of which number 3,165 are children under fourteen years of age. 1,250 of the total number were sleeping on their master's premises. 4,200 residential tickets, at five shillings per month, were issued monthly. The size of the stands is mostly 50 feet by 50 feet, but a few are a little larger or smaller. The rent of the stands is one shilling and sixpence per month. The charge for water is one shilling, and for sanitary services, four shillings per month per dwelling.

Return furnished by the City Treasurer of income and expenditure in respect of Native Administration for the year ended 31st March, 1913.

Income.

Ground rent of stands (1s. 6d. per month) ...	£1,200	0	0	(Estimate, Actually received at date of return £1,137).
Sanitary fees. (4s. per month per dwelling) ...	3,000	0	0	do. £3,021.
Water (1s. per month per dwelling)	900	0	0	
Residential and domestic passes	2,305	0	0	
Special trading licences, etc.	158	15	0	
Sundries	50	5	0	
Total ...	£7,614	0	0	

Expenditure.

Salaries	£670	10	10	
Town Treasury for clerical work	120	0	0	
Sanitary Inspector's salary	138	0	0	
Maintenance of Labour Bureau, etc.... ...	409	4	8	
Value of water supplied at 5s. 6d. per thousand gallons	2,322	18	6	
Sanitary services (Night-soil, slops and refuse)	2,086	6	0	(Actual payments to contractor).
Proportion of destructor expenditure	300	0	0	
Cost of native conveniences in town. (Five latrines)	387	15	0	
Interest on, and redemption of loan	135	0	0	
Total ...	£6,569	15	0	
Surplus of Revenue over expenditure	£1,044	5	0	

But the actual profit was much more than this. The charge for water is for each dwelling one shilling per month. The inhabitants have to carry their water from standpipes in the location; much of the supply is wasted owing to taps leaking or being carelessly left running. It is measured through a meter, and it would appear that during the year under review 8,447,000 gallons were delivered to the locations. The ordinary ratepayer is charged five shillings and sixpence to ten shillings per month for the first thousand gallons, and thereafter two shillings per thousand. The average actual cost of water to the municipality is stated to be two shillings and twopence per thousand gallons, or to be exact

25·56 pence including all loan charges. At which price the supply to the locations cost the Council £915 and the cost was therefore practically covered by the amount of £900 in the receipts for water from the locations; whereas in the expenditure return it is charged at five shillings and sixpence per thousand, or a total of £2,322 18s. 6d. or a profit of about £1,400.

It would appear therefore, that after providing apparently liberally for all expenditure on the Native Administration, a profit was made in the municipal year 1912-13 of about £2,500. The entire estimated municipal expenditure for general purposes for the year, including £9,415 loan charges on the Bloemspruit improvement, and the £6,569 on Native Administration, was £71,937.

Bloemfontein is a sewered town, but in the locations the ordinary sanitary system is in operation. For the year 1912-13 the sanitary rate on property in the town was 1½d. in the £ which included sewerage and refuse removals, destructor, wash-house, street cleaning and watering, public baths, hospital and other small items.

The sanitary charge for the location was four shillings per hut per month, or forty-eight shillings per year, representing, on the basis of a sanitary rate of 1½d. in the £, a rateable value of £384. The City Treasurer considered that £30 would be a reasonable value to place on the location stands. The Town Clerk thought the average value of the dwellings in the location might be put at £50, but to Your Commissioners this seemed an excessive estimate. The average value does not therefore exceed £80.

In connection with these locations the municipal authorities stated that they had not made up the roads, had not provided proper drainage or considered a sewage scheme, or put up municipal hire-dwellings—because of the cost. [Questions 96267-545 and 97764-953.]

Grahamstown.

(4) At Grahamstown there are three locations; one known as the Government Location or erven, and on each side of this is one of the two municipal locations. They all adjoin, forming one area, and contain, we were informed in the Government and Municipal portion, respectively, about 2,000 and 5,000 inhabitants, Fingoes and Kaffirs.

In the Government portion the natives hold individual title to the erven and pay a quitrent of five shillings a year to the Government. These erven are also assessed for municipal rates according to the value of the property on them. The average valuation is said to be from £50 to £60.

In the municipal portion the rent of plots, 150 feet by 150 feet, is sixteen shillings per annum. The revenue from this source during 1912 was £414, and the actual expenditure on the location was £266, leaving a balance of £188 which was absorbed into the General Revenue. In addition to this there are the rates levied on the Government portion, amounting, we were informed, to £260 per annum.

For the year 1913 an increased expenditure was being incurred for a Location Inspector, in response to the agitation raised against the deplorable condition of these locations.

There is also a water-rate levied by the Council of ten shillings per annum per dwelling. The supply is given by means of several four-hundred gallon tanks placed at different spots in the locations. The taps on these tanks are locked, and are opened only twice a week, by order of the Council. The water enters the tanks very slowly, on the dribble. A responsible official of the Council told the Commission, in the course of evidence, "the tanks are no sooner opened than they are emptied, and they (the inhabitants) cannot get any more." "They pay ten shilings a year, and perhaps they get two paraffin tins full a week. Twice a week the tanks are opened; and they all crowd round these half inch taps with their tins, and they may have to wait for hours to get their turn at the tap, and they struggle and fight like Kilkenny cats to get it." [Question 78729.]

In a report by a Special Committee appointed by the Council on the 10th July, 1912, "to inquire into the working of the whole municipal staff and Administration, with a view to economy and reform" this recommendation occurs regarding the locations:—"That additional new taps of a larger size be fixed in the municipal tanks to enable drawers of water to get their supply more readily." Yet the above was the condition of things at the time of our visit in March, 1913.

The water-works account of the Town for the year 1912, showed a profit of £1,694. (Revenue £5,705; expenditure £4,011).

The above mentioned Committee also reported of the locations:—"There is no proper system of sanitation carried out in the locations. The use of pails and the removal of night-soil is optional. And where there are infectious diseases (when they happen to be found out), there appears to be no regular method of removing or burying the excreta, or of supplying and using disinfectants. The sick and dying crawl out and defecate as near as possible to the hut they live in, and when they get beyond the strength of that, they lie in their filthy clothes, or use rags which are then thrown out into the streets, or hidden in the aloes and prickly pear bush." "No places have been set aside for the deposit of filth, rubbish, litter, etc., as provided for in Clause 20 (of the municipal regulations). The consequence has been that the occupiers of the Government and municipal locations have regardlessly thrown all their rubbish into the streets."

In evidence given before the Commission the responsible official above referred to stated, regarding the filthy condition which the Commission found the locations to be in:—"Well, it (the removal of refuse) has not been done regularly. Occasionally the Council would vote the sum of £5 for the Location Inspector to arrange for a cart to go round and collect the tins and rubbish; but it is not done regularly. This slackness and neglect is not due to the officials of the town; it is the 'powers that be'; we point out what is required and ask for authority to do these things, and we are sat upon for our trouble. We cannot get anything done in the Locations." [Question 78716.]

And the Mayor in evidence admitted that the great occurrence of tuberculosis among the inmates of the locations had been attributed by reasonably reliable authorities to the fact that their dwellings and general conditions are insanitary and that overcrowding occurs. [Question 78102.] He was bound to admit that the locations are in a bad condition and that it had been so for many years past. [Question 78062 and 63.] The late Medical Officer of Health to the Municipality characterised the locations as "a disgrace to civilisation." [Question 78338.]

Graaff-Reinet.

(5) At Graaff-Reinet the Municipal Location contains about 2,500 inhabitants, and there are nearly another 2,000 living in the town, mostly in hire-houses. Two-thirds of the population are mixed and coloured, and one-third Bantu. The plots in the location are seventy-five feet by ninety feet; some a little smaller. There are 376 huts, five shillings per plot per month being charged. There are also a hundred hire-dwellings erected by the Council ten or eleven years ago. They are built in rows; seventy-four single rooms and twenty-six double rooms. They are said to have cost £5,000, which seems a high price for the class of building. The single rooms are let at six shillings, and the double, at seven and sixpence per month. Forty of the rooms are occupied by indigent persons without payment of rent. They are expected to assist in keeping the location clean. The only public water-supply is from a well and by baling out of the irrigation furrow. Night-soil is removed by the Town Contractor.

The receipts from the location during 1912 were, rent of plots £893 15s. 6d.; rent of municipal huts £263 2s. 3d.; total £1,156 17s. 9d.

Asked what the total expenditure on the location amounted to, the Mayor said that it would run to about £500 per annum if you took salaries, removal of night-soil, and included everything, and with interest and sinking fund on the Government loan of £5,000. Subsequently on discussing the amount of the profit that they were making, and which was being absorbed into the General Revenue, the Mayor thought that the expenditure might be £600 per annum. And the Town Clerk thought that £500 or £600 would cover every expenditure on the location.

The next day, however, a member of the Location Committee, with the Council's officer holding the dual posts of Sanitary Inspector and Location Superintendent, appeared before the Commission and presented a return of expenditure on the location, which we reproduce in full, as under:—

	£	s.	d.
60 pails, removed three times per week, at 6d. per pail per time	234	0	0
40 huts occupied free, for the purpose of cleaning W.C.s and Location	120	0	0
1 native foreman to see after same at 25s. per month	15	0	0
60 sanitary buckets, at 8s. per bucket	24	0	0
8 cart drivers taking away rubbish once a week at 4s. each ...	83	4	0
8 horses at 1s. 6d. per day for 52 days' forage	31	4	0
Location Inspector's salary	120	0	0
Assistant Inspector's salary	30	0	0
50 bags of lime for cleaning rooms, at 3s. per bag	7	10	0
Disinfectants for rooms; infectious diseases	6	0	0
Repairs for hire-rooms	15	0	0
Pass books, etc.	10	0	0
Expenditure on well and pump in location	10	0	0
Interest on loan of £5,000 at 4 per cent.	200	0	0
	£905	18	0

Further enquiry elicited the fact in regard to the first item of £234, that there was one municipal contractor who removed the night-soil pails both in the town and the location, and that the entire sum paid to him, according to the municipal audited accounts, during the year 1912, *for all removals in the town and location*, was only £207 5s. 8d. That he was paid at the rate of fourpence-halfpenny per pail, and that the sixpence per pail charged in the above statement included the sum of three-halfpence per pail for disinfectants supplied by the Council.

Regarding the second item of £120 for forty huts occupied rent free by indigent persons, this cannot figure in a statement of the actual cost to the Council of the location. The actual expenditure in respect of these rooms is already provided for under the item interest on the cost of their erection. Of course, from the accounting point of view, there would be no reason why it should not appear in a statement of Revenue and Expenditure, but in that case it would have to figure on the credit side as well as the debit side.

With regard to the other items in the return, we have not the means of checking them, but would refer to Questions 83977 to 84064 in the evidence.

Taking the Mayor's and Town Clerk's evidence that the profit on the location is about £600, then we may remark that the general municipal rate levied to cover all purposes was three-halfpence in the £, which yielded in 1912 the sum of £2,919 7s. 2d. Therefore the profit on the location represents an amount equal to one-fifth of the yield of the general rate, or is equal to about a third of a penny rate on the rateable value of the town.

Kimberley.

(6) At Kimberley there are three locations. One of these, known as Green Point Location, containing about 4,000 inhabitants, and one of the worst in the country, was established by the De Beers Mines Company, and was only taken over by the municipality in July, 1913, as a result of the amalgamation of Beasonsfield and Kimberley in one municipality on the 2nd December, 1912. The charge made to hut owners in this location was fifteen shillings per quarter, payable to De Beers.

Of the two Kimberley locations under the old municipality, a large one, known as "No. 2" contains about 8,000 natives, and the other only about 200 or 300. In addition to these there are some 15,000 natives living in the De Beers Mines compounds.

There are also about 8,000 coloured persons living in the town, mostly in hire-houses, but some on their own property, many of the dwellings being in very bad condition. Some natives are also allowed to live in this class of dwelling, and there are some living on their master's premises. There is no coloured location, nor any for Asiatics, although the Council has power to establish the latter.

The European inhabitants of the municipality number about 18,000.

There are 1,042 allotments in the location. The size of the plots is forty feet by sixty feet, but this is not always adhered to. The charge made by the Council is ten shillings per plot per quarter, and two shillings and sixpence for water and sanitary fees. The water supply is obtained from public wells in the

location. Plot-owners are allowed to erect sacking and paraffin-tin huts. Most inmates are said to be very poor, earning only twelve shillings and sixpence to fifteen shillings a week.

The following return of receipts and payments in respect of the Kimberley locations during the year 1912 was furnished by the Acting Town Clerk:—

Receipts.		Payments.	
Tax	£1,920 0 0	Salaries, Wages, Commission ..	£1,244 9 5
Wells	470 10 0	Cycle Upkeep	11 2 0
Fees	467 1 0	Smithwork, Farriery, Harness	8 12 6
Brick Licences ..	40 18 6	Lighting	7 6 1
Dog Licences ..	80 0 0	Cleaning	82 10 9
Church Sites ..	6 0 0	Maintenance, Building, &c. ..	249 11 9
		Produce for Horses	47 4 5
		Disinfectants	39 16 6
		Sundries	90 5 1
	£2,984 9 6		£1,780 18 6

Surplus £1,203 11s. 0d., absorbed into General Revenue.

It may be mentioned that in his evidence, the Superintendent of Locations was very emphatic that the clear profit in the locations was more than £1,200. That it was, in fact, about £1,600, after paying all expenses native constables, upkeep of office, etc. Apparently the difference arises from the circumstance that this officer is also Town Ranger and that he has made allowance in the expenditure for the upkeep of the Ranging Department. [Questions 92356-92363.] However, the difference is immaterial one way or the other, the important point being that the municipality is making a substantial profit out of the locations, amounting according to the Mayor, to about two-and-a-half per cent. of the total annual revenue, including that from the locations themselves.

A very large proportion of the dwellings in the locations are unsatisfactory. The Chief Sanitary Inspector stated that there was room for improvement, but that very little money had been spent upon improvement and that there is great difficulty in securing improvement now that they have been allowed to develop into their present condition. [Questions 93993-93996.]

The Mayor, on being asked whether, speaking generally, he thought the locations were not in a good condition, replied that he would not like to say that, but they are not in the condition he would like to see them in. He said with regard to the profit which was being made, "there I must say that I do feel it is always a wrong principle that any revenue we get should be spent otherwise than on the locations until such time as it is in decent and proper condition." He was, however, not in favour of putting up municipal dwellings in the location, as to do so would involve the raising of a loan for the purpose, and the policy of the Council was against incurring any municipal indebtedness, as the life of the town is uncertain owing to it being merely a mining community. [Questions 92163-92198.]

Beaufort West.

(7) At Beaufort West the municipal location contains a population of about 740 persons of the coloured class; very poor, generally earning about twelve shillings or fifteen shillings a month. Many will not work. There are 124 municipal hire-rooms, for which a rent of four shillings per month is charged, sixty are unlet, owing to absence of tenants, some of these are occupied by paupers. There are 250 allotments. The rent of plots is three shillings per month. There are 109 huts, put up by plot-holders, but some of these have lapsed to the Council, and they are let at four shillings and four shillings and sixpence per month. Water is laid on by pipe to the location. There are a few pail closets, but some of the inhabitants use the veld. The class of dwelling is unsatisfactory, but the Council has done away with most of the grass huts, leaving mainly stone ones.

The following is the return of Revenue and Expenditure for the year 1912, prepared by the Council. The expenditure includes all costs and charges for services rendered:—

Receipts.		Expenditure.	
Rent of hire-rooms ..	£201 12 0	Salaries	£132 0 0
Rent of Plots ..	196 11 6	House Allowance and Water for Location Overseer ..	40 0 0
		Repairs to Buildings, &c. ..	6 14 9
		Water (approximately) ..	45 0 0
		Sanitary Services	14 14 0
		Interest on outlay at 6% ..	15 10 0
	£398 3 6		£253 18 9

Surplus absorbed into General Revenue £144 4s. 9d.

Jagersfontein.

(8) At Jagersfontein the municipality is in a peculiar position. The town is established on the mining estate of the Jagersfontein Mine and Estate Company, Limited, which will not alienate any portion of the ground. All persons, including the municipality, hold their stands subject to a monthly rental and to certain conditions, contained in Government Notice No. 1236, of the Orange Free State Republic. The municipality consequently levies no property rate on householders. The municipality has no commonage and does not even own the ground on which the Town Hall is built.

The location is on the Company's ground, to whom the municipality pay £150 a year, receiving the right to control the location and to take the rents payable by the stand-holders. The population consists of some 2,300 natives. The plots are thirty feet by thirty feet, there are between three hundred and four hundred huts, and the plot rent is three shillings and sixpence per month. This includes water, which is supplied from the Company's tank, and a certain amount of night-soil removal, to the extent of thirty-six pails in the public latrines. The Council also levies a residential pass fee of sixpence per month on all females in the location above the age of sixteen years. Being a mining area, all the coloured males between the age of 16 and 70 years have to pay to the Government, monthly, a registration tax of one shilling and a hospital tax of sixpence.*

During the financial period from the 1st January, 1912, to the 31st March, 1913, the revenue from the location was £664 3s. 9d. and the total expenditure under all heads was £420 5s. 9d. giving a profit of £243 18s. 0d. which was expended upon general municipal matters.

The dwellings in the location are very unsatisfactory, but under such a system of tenure the Council is not anxious to expend money on the betterment of the location. At the same time there seems no reason why any surplus arising from its administration should not be devoted to its improvement.

Uitenhage.

(9) At Uitenhage there are five municipal locations containing about 750 dwellings and accommodating about 3,000 inhabitants. There are altogether some 5,300 natives and coloured inhabitants in the town, including the locations. The condition of all of these locations is bad. They have increased in size considerably during the last ten or twelve years, during which time much might have been done to insist upon an improved class of dwelling but nothing was undertaken by the Council. There are no municipal huts. When a plot falls in with a hut on it, the Council sells it, if it is not too dilapidated. A plot is allotted and the person is allowed to put up what kind of dwelling he things fit, without restriction. All that is attempted is to keep them in line if possible.

The size of the plot varies, and also the rent charged. At Oaklands location, which is for coloured, it is four shillings and sixpence per month. At Gubb's, a Kaffir location, it is three shillings and sixpence. The majority of the dwellings in this are native round huts. At Kabah location for coloured and Hottentots, it is four shillings and sixpence, but there are about sixty large

* Orange River Colony Law Book, Chapter LXX, sections 3, 4 and 9.

plots, seventy-five by a hundred and fifty, which have irrigation water, and vegetables are grown; these are let at six shillings per month. At Doornhoek (coloured), and at the Basuto (native) locations, the charge is three shillings and sixpence. Lodgers, male and female, over twenty years of age, in every case are charged two shillings and sixpence per month.

There is no system of night-soil removal, the inhabitants using the bush.

Of recent years refuse has been removed once a week, refuse bins being provided. It is stated that this has resulted in improved conditions.

Water is provided by means of stand-pipes in the locations. In some there are very few. In Gubb's well and river water is mostly used.

A certain number of destitute and infirm persons are allowed to occupy sites free.

Nearly all of the inhabitants are very poor, earning very small wages.

The revenue from the locations was in 1912, £2,010, and the total expenditure was about £900. No charge, however, appears to have been made for water. The profit is taken into General Revenue and spent upon the town. According to the evidence of the Mayor and Town Clerk the profit on the locations provides about one-tenth of the revenue of the town. The Mayor expressed the opinion that this was not a sound policy. He thought that the inhabitants of the locations should pay some share of the upkeep of the town, seeing that they are not rated, and some portion of the profits ought to go to the betterment of the locations. Personally he was not satisfied with the locations. He considered they should be kept cleaner, but while the Council should see to this he would also expect the people to do something towards it. Also he thought that the Council should assist them to better dwellings. Some years ago at the Kabah Location the Council had given the plot-holders trees to plant, and had given prizes of a few shillings at the end of the year to those who had kept their residences nice and their trees in good condition. Although some had neglected the trees, on the whole it was very satisfactory. He was in accord with the principle of a Council building improved dwellings and letting them at a rental sufficient to cover administraton, with interest and redemption of the outlay on their erection. [Questions 81802 to 81882, and 81915 to 81922.]

East London.

(10) In East London there are two native locations, the East Bank and the West Bank. There is also a small Asiatic location. They contain about 8,500 inhabitants. All are natives except about 1,500 of Cape coloured, Hottentot, and Asiatic race. A very large proportion are lodgers living with the owners of huts, who come into the town for a period of work. There are less than a thousand natives living in town, under permit to reside on their master's premises.

There are about a thousand huts, of which number some two hundred are round huts. Plots are forty feet by forty feet, and the rent is one shilling and sixpence for the site, sixpence for water and sixpence for sanitary service, or a total of two shillings and sixpence per month.

But owners taking in lodgers pay ten shillings a month; the plot rent being eight shillings and threepence, water a shilling and sanitary service ninepence.

The water supply is by means of standpipes. There are no latrines in the locations,but public latrines are erected round the outside of the location, the pails from which are said to be removed nightly. We were told there were 186 pails.

Refuse, at the time of our visit, was being removed three times a fortnight, but we were told that it is usually removed more frequently.

There are four municipal lodging houses in the locations, the monthly rent being four shillings for one, and eight shillings for two rooms.

The condition of the dwellings in both of the locations is very bad and insanitary. As a whole the locations are decidedly unsatisfactory. That on the West Bank is the worst. Many of the dwellings were in a shocking state of dilapidation.

The Council owns no huts, but when a dwelling is vacated and rent is owing on it to the Council, it is put up to auction and the Location Superintendent is authorised to buy it in, if the highest bid is less than the amount of the rent owing, when, if it be in his opinion unfit for habitation, he can report the fact to the Council, with a view to obtaining permission to destroy it. So far as we could ascertain, however, many unfit dwellings were allowed to change hands by sale from one to the other.

In the Mayor's Minute for the year 1911, the Annual Report of the Council's Medical Officer of Health contains the following passage:—"Tuberculosis among

natives is increasing as one would naturally expect, their huts being often damp and leaking, with no ventilation, and admit no sunlight to lessen the spread of this disease, the huts should be constructed with windows, ventilation, overcrowding should be prevented as much as possible, and isolation in cases of sickness. The damp and marshy ground in and about the Location requires draining."

The Mayor, in his evidence before the Commission, admitted the unsatisfactory character of the dwellings, and he stated that within the last few months, as the result of his own comments in the Council on the condition of the locations, very strict instructions with regard to any new structures had been issued.

According to the Mayor's Minute for 1911, the revenue and expenditure on the locations for the *ten* months ended on the 31st December, 1911, was as follows:—

Receipts.		Expenditure.	
Hut Tax	£2,978 11 6	General Maintenance	£1,516 11 11
Water	349 15 0	Transferred to Water A/c ..	682 10 3
Sanitary	332 15 3	Transferred to Sanitary A/c ..	377 6 8
Commonage	57 0 6	Commonage	33 3 7
Lodging Houses ..	266 4 0	Interest on Capital	164 9 4
Asiatic Location ..	82 6 0		
Native Cemetery ..	40 19 3		
Dog Tax	9 0 0	Balance	1,342 9 9
Total	£4,116 11 6		£4,116 11 6

The profit on the ten months would therefore appear to have been £1,342 or at the rate of £1,611 per annum. In evidence the Town Clerk attempted to minimise the amount of this profit, on the ground that there were other expenses, and that there was greater expenditure on the sanitary and water services. With regard to these contentions, we can only say that the accounts are those officially published by the Town Treasurer, and that in them the sum of £377 6s. 8d. is specifically transferred from the location account to the sanitary account, as representing the cost of (not the receipts from) the sanitary services; and the sum of £682 10s. 3d. to the water account. It is difficult to see why accounts greater than the actual receipts should have been transferred to these special accounts if the amounts so transferred did not represent the actual cost of the service.

According to the figures furnished by the Location Department, the profit for the year 1912 appears to have been about £1,700. We therefore seem justified in assessing the annual profits derived from the inhabitants of these locations at approximately fifteen hundred pounds. [Questions 70957 to 71157 and 71182 to 71266.]

250. We could give other instances of this practice of making a profit out of the locations, but the above examples will serve sufficiently to demonstrate the extent to which it obtains. Those we have presented have been selected from every class of town, big and little, and including country, seaport and industrial centres.

The principles which should govern Location Finance.

251. It will have been noticed that when the question of making a profit out of the location to the relief of the ordinary rates, has been brought to the notice of municipal authorities, a desire has been sometimes displayed by them to reduce as far as possible the apparent amount of such profit. We welcome this, because it is evidence that when brought to their notice they have at once recognised that it is not a desirable practice. We are inclined to think that in the majority of cases, indeed probably in all, the procedure of absorbing location surpluses into the General Municipal Revenue instead of applying them to the betterment of the locations, has resulted more from want of consideration of the true character of the policy involved than from its deliberate adoption as a sound principle.

The question, however, arises as to what charges may be equitably borne by the location account, other than those connected with its actual administration.

It is certainly fair that it should be required to bear an overhead or head office charge. In most cases, however, this would be very trifling, as the office and

administrative work is usually performed in the office of the Superintendent of the location.

It has also been contended that the native should be taxed for the general upkeep of the town, but this seems to us unreasonable. He is really there for the use and benefit of the town, and personally he derives very little, if any, advantage from any municipal improvements. Parks, baths, entertainments and such amenities do not benefit him in the least. He certainly uses the streets, but only as a pedestrian, and then to a very limited extent. His location is usually some distance from the town and in most cases, either on account of the curfew act or by force of circumstances, he repairs to his location as soon as his work is done. We, therefore, do not think that any charge against the location should be made on account of General Municipal Expenditure.

It may be contended that the municipality is entitled to a fair rental for the use of the ground included in the location stands, and in this we concur. But this will not amount to much when the nature of the ground is taken into consideration and a fair valuation based on its unimproved value is placed upon it. In this connection it may be pointed out that a charge of four shillings per month for a plot fifty feet by fifty feet represents an annual rental of over £38 per acre.

Séparate location accounts of Revenue and Expenditure.

252. We are of opinion that every local authority should be required to keep a separate account of all revenue and expenditure connected with its location and native administration, that such accounts should be subject to proper audit, and that any surplus of revenue over expenditure should be strictly devoted to the betterment of the location and the improvement of the condition of its native and coloured inhabitants.

253. We have entered in some detail into the administration of town locations, because we are impressed with the very insanitary and unhealthy conditions under which they at present are maintained, and because we are convinced that extensive improvement is imperative if hope is to be entertained of arresting the growth of tuberculosis among their inhabitants. Probably about half of the mixed and coloured urban population, and four-fifths of the urban native population in the Cape Province, lives in such locations .

Summary of Recommendations.

254. To summarise our recommendations regarding town locations:—

A. It should be incumbent upon Local Authorities:—

(i) To remedy, as far as possible, unhealthy and unsuitable sites.

(ii) To properly lay out sites so as to provide for sufficient roads and open spaces. Allotments to be properly enclosed or demarcated, and dwellings to be kept in alignment.

(iii) To cause dwellings to be suitably constructed, and to be maintained in a sanitary condition.

(iv) To prevent overcrowding, both of allotments and of dwellings.

(v) To provide and make available an adequate supply of water for domestic purposes.

(vi) To provide adequate and available latrine accommodation for the inhabitants.

(vii) To provide for the proper collection and disposal of nightsoil and refuse.

(viii) In suitable cases to provide municipal hire-rooms and dwellings of a model character for single persons and those unable to build for themselves.

(ix) To provide public washing places. Whenever possible these should include some shower baths.

(x) To regulate and restrict the keeping of animals within the location, especially swine (see paragraph 424, Chapter XIV.), and the construction and location of cattle and sheep and goat kraals.

(xi) To provide for the proper control and management of the location.

(xii) To require every adult inhabitant to take out a monthly residential ticket, and to produce the same for inspection when called upon to do so by any authorised officer.

(xiii) To keep proper registers of all huts, inmates (including lodgers) and stock. And to cause every hut to bear conspicuously its register number and the number of authorised inmates.

(xiv) To prevent the presence of loafers and undesirables in the location.
(xv) To give, as far as may be possible, security of tenure to those erecting suitable dwellings of a stated value, with equitable conditions of surrender.
(xvi) When possible, to arrange for the granting of garden plots to suitable holders of allotments.
(xvii) To frame, with the approval of the Central Authority, adequate bye-laws governing the above matters.

B. Statutory powers should be conferred upon Local Authorities to cause without incurring unreasonable liability for compensation:—

(i) The removal of any location on an unhealthy site to some other more suitable site.
(ii) The re-arrangement of any location on its existing site.
(iii) The demolition or re-construction of any unhealthy or unsuitable dwellings.

C. Local Authorities should also be empowered:—

(i) To exercise and carry out, *mutatis mutandis*, with the sanction of the Central Authority, any of the powers and duties mentioned under (A.) and (B.) in respect of any location within its area established on Crown or private land, other than a location under the Administration of the Department of Native Affairs.
(ii) To frame bye-laws applying to such locations.
(iii) To levy suitable taxes on the inhabitants of such locations.

D. (i) The Central Authority should be empowered to require every Local Authority to carry out in a proper manner its powers and duties relating to locations, with power to take action itself in the event of failure on the part of a Local Authority to do so; and to prescribe and lay down standards to which dwellings or any other matter or thing in any location shall conform, and to bring into force suitable bye-laws in the area of any Local Authority, for regulating any of the above-mentioned matters.
(ii) The Central Authority should also be empowered to declare, on the application of the Local Authority, any area, which, not being a location, has the characters of a location, to be for all purposes a location in which the Local Authority shall have and exercise all or any of the above-mentioned powers and duties. [Paragraph 243.]
(iii) The Central Authority should assist Local Authorities by granting Government loans at a reasonable rate of interest, and under suitable conditions as regards redemption, for the erection by the Local Authority of approved dwellings for hire to natives and coloured persons. [Paragraphs 239 and 240.]

Slum Property.

255. In the course of dealing with municipal locations we have had occasion to refer to the common occurrence in urban areas of slum property, hired to coloured, and, sometimes, native tenants. We have there recommended that in the case of any continuous area of such hire property, the local authority should be able to secure the proclaiming of such area to be a location, so as to deal with it under the same powers as we recommend should apply to native locations. As an example of such a slum area we may instance the large collection of native tenement dwellings adjacent to the municipal location at Worcester, which we have already described.

Apart, however, from such extensive areas, there are in nearly every town with which the Commission is acquainted, collections, large or small, of such unsatisfactory hire-houses. In many places the slum premises which the Commissioners inspected were of the very worst possible description, many of the dwellings being back-to-back, and the state of repair exceedingly bad. Much overcrowding occurs in them, and high rents are charged. Such property, therefore, proves a very remunerative investment. In a not inconsiderable number of instances the landlords exercise direct or indirect influence on the Council, and therefore little action is taken by the local authority to find a remedy.

At the same time we find that, taking a broad view over a number of years, local authorities generally throughout the Union are exercising greater care in this matter than they formerly did. And in the areas of those local authorities where records are available, there is satisfactory evidence that efforts to reduce overcrowding and to prevent the occupation of unhealthy dwellings has effected an improvement in the general health of the coloured and native population of the area, as is indicated by a lowered death-rate, including that from tuberculosis. We mention this, however, not with the intention of minimising what we have just said as to present conditions, but in order to show what would happen if local authorities properly exercised their powers in this direction.

We have to recommend, therefore, that the Central Authority should in all cases exercise the powers which it already possesses to require local authorities to deal effectively with slum property within their areas. We have little doubt that to a large extent councillors would welcome the support which this would give them in carrying out that which the majority of them recognise to be necessary measures.

Mission Stations.

256. Speaking generally, many of the conditions seen in municipal locations obtain on mission stations. This is more especially the case in the many old-established mission stations of the Cape Province.

As a rule the dwellings are square houses of one or more rooms, but they are badly constructed, and are dark and very badly ventilated, and often very dirty. The floors are nearly always of earth. The rooms are encumbered with much useless and uncleanly lumber, and are generally overcrowded. The beds of these coloured people are often particularly unhygienic, and when the family is large, are occupied by several persons.

The above is the general conditions of things, but there are of course exceptions on every station.

On the older mission stations of the Cape Province, and there are a considerable number of these, the inhabitants are of the Cape coloured class, and are largely of a degenerate type.

In the majority of cases the inhabitants have a vested right in the holding upon which their dwelling is erected, either by communal title or by individual right, the ground having been originally secured by Government or other grant.

The missionary authorities have as a rule no control or authority over the inhabitants, except a religious one, and consequently the manner of life is on very many decidedly unsatisfactory. As an example, Mamre Mission Station in the Malmesbury District may be quoted. [Questions 69453-54.]

The inhabitants go out to work on the surrounding farms, but are on the whole very poor.

The above remarks apply more particularly to the coloured mission stations of the Cape, such as Genadendal, Mamre, Elim, Enon, and the like. They do not apply so forcibly to the native missions, in some of which the natives live in native huts and practically under much the same conditions as do kraal natives.

The general health is on all these stations bad, and the amount of tuberculosis is great. We had it in evidence from the missionary authorities in charge of different stations that in many cases entire families had been exterminated by this disease. Unfortunately it is not possible to obtain definite figures, owing to the imperfection of the records, but to take as an example, the case of the Mamre Mission Station, with a population of under 2,000 coloured persons, it was stated that the number of deaths from pulmonary tuberculosis which came to light was ten or more a year.

In no case does any local authority exercise any control over these stations, although from the sanitary point of view they should be treated as urban areas. In some few instances in the Cape Colony a village management board, or even a municipality, has been created over their areas; but, owing to the class of persons who of necessity are elected as members, and to the small rateable value of the property affording no adequate revenue, such authorities have been little more than a farce, and probably have done more harm than good.

But the great majority are under no sanitary regulation whatever.

Recommendation.

257. In the opinion of your Commissioners it is imperative that, wherever possible, every mission station should be brought under effective sanitary control by the Divisional Council of the district where such exists, and in other cases by the Government.

The Government should be empowered to frame and bring into force a series of suitable bye-laws of general application, for controlling all sanitary matters within all mission stations, and for dealing with infectious disease, including tuberculosis, occurring among their inhabitants. The Rural Local Authority should be required to properly enforce such bye-laws, and in the case where there is no local authority, then they should be enforced by the Resident Magistrate, through the police and with the advice of the District Surgeon or other health officer.

Where an inefficient Village Management Board or other form of urban authority exists, this should not be allowed to block sanitary reform, and if it cannot be reorganised, it should be abolished. In any case the Government should exercise *effectual* control over the actions of such authorities.

Missionary Authorities have stated in evidence that owing to the overcrowding into sick rooms, and the entire absence of any precautions with regard to tuberculous persons, they consider it absolutely necessary that powers should exist, and be applied, for requiring the compulsory occupation by such persons of shelters, and failing their satisfactory observance of this requirement, then that they should be compulsorily removed and isolated. But they believe that if this last power existed, its deterrent effect would be such that it would rarely be necessary to make use of it. We concur in this suggestion.

Tuberculosis in New Brighton Government Native Location.

258. Setting aside the Mines, there are no statistics from which we can ascertain with any certainty the effect of aggregation and compound life on natives and coloured persons in the production of tuberculosis. For one thing all such records are so very incomplete, and for another there are so many varying factors to be taken into account, that but few reliable deductions can be made from them.

The New Brighton Native Location at Port Elizabeth, however, affords some indication of the effect on the native of proceeding to industrial centres for work. This is a Government location established about thirteen years ago, for the accommodation of natives, and their families, working at Port Elizabeth. Nearly all are aboriginal natives, and are employed mostly on the railway, in the harbour (many of them stevedoring) and in stores.

In many native districts and areas in the Cape Province visited by the Commission it was stated in evidence that it was a frequent occurrence for natives who went to Port Elizabeth for spells of work to return to their homes suffering from consumption.

With certain exceptions all natives employed in Port Elizabeth are required by law to live in this location. At the time of our visit it contained a population of 4,993 persons, all of whom were natives, with the exception of about 175 of coloured or mixed race. Of this number 3,628 (2,300 males and 1,328 females) were adults, and 1,365 were children.

This population is mostly a floating one, coming from the native districts to Port Elizabeth for periods of work; but the proportion of permanent residents is increasing. About one-sixth are raw Kaffirs and the rest are dressed natives. Many of the latter are not of the best type.

The dwellings, with the exception of twenty-six native round huts, are all of wood and iron. Many of them are of an unsatisfactory kind, being somewhat large common rooms, in rows under one roof. But many of the married quarters are comfortable little semi-detached cottages, each containing two rooms and a kitchen.

The population is in fairly good circumstances and is well fed. The work at the port is somewhat hard, and to some extent irregular. There is a considerable amount of illicit liquor.

The site of the location is rather exposed and bleak.

The location is under the care of a Superintendent, and it is supervised by the Resident Magistrate. There is a Medical Officer, and free medical attendance is given.

It is stated that a not inconsiderable number of sick natives come to the location on account of the free medical treatment provided.

In the following Table 31, are given the number of deaths and the rate of mortality per thousand of the population from tuberculosis. All respiratory diseases other than tuberculosis, and all causes, for each of the years from 1904 to 1912.

TABLE 31.—*New Brighton Location.*—Giving the number of deaths and annual rates of mortality per thousand of the average annual population from Tuberculosis, All Other Respiratory Diseases, and from All Causes, during each of the years 1904–1912.

Year.	Annual average Population.			Tuberculosis.				All other Respiratory Diseases.				All Causes.			
				Number of deaths.			Mortality per 1,000.	Number of deaths.			Mortality per 1,000.	Number of deaths.			Mortality per 1,000.
	M.	F.	P.	M.	F.	P.	P.	M.	F.	P.	P.	M.	F.	P.	P.
1904	1,663	669	2,332	7	6	13	5·5	8	9	17	7·3	31	17	48	20·6
1905	2,465	1,245	3,710	18	7	25	6·7	26	20	46	12·4	60	45	105	28·3
1906	3,011	1,464	4,475	11	7	18	4·0	24	18	42	9·4	54	19	73	16·3
1907	2,427	1,274	3,701	4	9	13	3·5	13	11	34	6·5	29	35	64	17·3
1908	2,090	1,240	3,330	13	13	26	7·8	8	4	12	3·6	41	43	84	25·2
1909	1,414	1,280	2,694	13	11	24	9·0	11	9	20	7·4	51	37	88	32·7
1910	1,461	1,658	3,119	16	9	25	8·0	20	17	37	11·8	74	61	135	43·2
1911	2,027	1,725	3,752	11	14	25	6·6	4	11	15	4·3	46	58	104	27·7
1912	2,822	1,951	4,773	10	9	19	4·0	15	21	36	7·5	63	52	115	24·1
Total	1,615	1,042	2,657	103	85	188	5·9	129	120	249	7·8	449	367	816	25·6

It is seen from this that the mean annual death-rates over the entire period of nine years were:—

	Males.	Females.	Persons.
Tuberculosis	5·3	6·8	5·9
All Respiratory Diseases other than Tuberculosis	6·7	9·6	7·8
All Causes	23·2	29·3	25·6

These are high rates of mortality from tuberculosis. It is to be noted that the rates for the separate years show a great range of fluctuation, varying from 3·5 to 9·0 per thousand. Within limits a rise or fall in the tuberculosis death-rate coincides with an increased or diminished death-rate from Other Causes.

When comparing these rates with those of other communities it must be remembered that there is a large proportion of children, among whom tuberculosis appears to be rife. Thus, out of 16 autopsies in which the cause of death was found to be tuberculosis, 10 were in children. Of this latter number 6 were pulmonary. It is a pity that the above figures were not furnished separately for adults and children. Of 107 cases of tuberculosis seen by the Medical Officer, 45 were children under fourteen years of age.

Also it must not be forgotten that five-sixths of the natives are dressed natives and of a bad type, that the conditions of work are arduous and the amount of alcoholism is heavy. And that a not inconsiderable number of persons suffering from tuberculosis are said to come to the location for the sake of getting free medical treatment.

Nevertheless, when every allowance is made the above rates are of an alarming character.

Mortality-rates among Native employees in certain Industrial undertakings.

259. In the Native Labour Area of the Witwatersrand there are certain industrial undertakings which are required to furnish to the Government Native Labour Bureau, returns of deaths among their native employees. From the figures supplied to the Commission by the Director of Native Labour we have prepared the following Table 32, giving in respect of the Modderfontein Dynamite Factory, and of a group of industrial undertakings, consisting of Lime and Brick Works, and Electric Power Stations, the numbers of deaths from disease and annual rates of mortality per 1,000 of the mean annual strength, from Tuberculosis, Pneumonia and All Other Causes, during the years 1910, 1911 and 1912.

TABLE 32.—Showing the number of deaths and the rates of mortality from Tuberculosis, Other Respiratory Diseases and All Other Causes per thousand of mean average strength of Natives employed at (*a*) the Modderfontein Dynamite Factory, and (*b*) certain industrial undertakings (Lime, Brick and Chemical Works, Electric Power Stations), during each of the years 1910, 1911 and 1912.

	Modderfontein Dynamite Factory.								Other Industrial Undertakings.							
	1910.		1911.		1912.		1910–12.		1910.		1911.		1912.		1910–12.	
Mean annual strength ..	660.		637.		663.		653.		1,019.		1,411.		1,692.		1,374.	
	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.
Tuberculosis ..	..	..	5	7·85	3	4·52	8	4·08	3	2·94	..	..	6	3·55	9	2·18
Pneumonia ..	3	4·55	2	3·14	1	1·51	6	3·06	7	6·87	8	5·67	4	2·36	19	4·61
All Other Causes	1	1·51	5	7·85	3	4·52	9	4·59	2	1·96	6	4·25	6	3·55	14	3·40
All Causes ..	4	6·06	12	18·84	7	10·55	23	11·73	12	11·78	14	9·92	16	9·46	42	10·19

Average tribal composition.

	East Coast.	Transvaal.	Others.	Total.
Dynamite Factory	197	397	59	653
Other Industrials	237	407	730	1,374

Regarding these figures we may remark:—

The numbers are too small on which to base entirely reliable conclusions.

The amount of tuberculosis at the Dynamite Factory is unexpectedly high.

This may be due to men who are unfit for work on the mines drifting over to these occupations, but we have no evidence that it is, but it is probable.

The amount of pneumonia is small, and should be noted in connection with the extent of its occurrence on the mines.

The East Coast native among these labourers exhibits a greater proportion of pneumonia, a fact which is noteworthy.

The mortality from Other Causes is satisfactorily low.

Ricksha pulling: Effect on Health.

260. In the course of its enquiry the Commission was asked by the Government to undertake some investigation into the effects of ricksha pulling on the health of natives following that occupation. Also when in Natal we found that the opinion was rather widely held that this occupation was a cause of tuberculosis. We accordingly attempted to obtain definite information on the subject. There was, however, but little decisive evidence, one way or the other, to be got. Statistics there were none, and personal experience was limited by the fact that whenever a ricksha boy falls ill, he follows the usual practice of all natives of promptly clearing off to his kraal; while, if at his home he should happen in sickness to come under European observation, the nature of his previous employment would seldom be ascertained or recorded. Thus, no amount of negative evidence would serve in any degree to settle the question, and of positive evidence there was not much.

In such a case as this, where it is impossible to trace the complete history of a sufficient number of ricksha boys, there remains only the other method of taking a large number of boys actually at the time being engaged on the work, and submitting them to a careful medical examination to ascertain if they show any departure from normal health, and if so, its nature and frequency, and whether it appears to have any relation to the work or the length of time the boy has been employed on it.

In this difficulty the Commission, after consultation with Dr. Bray, its President, applied to the Durban Medical Society, which on other occasions had undertaken enquiries in the interests of the public health, and asked if it would be prepared to make a clinical investigation into this matter; the Durban Corporation at the same time having promised the co-operation of their officials in producing for medical examination and enquiry, such of the boys as might be required.

The Society, however, expressed itself unable to undertake the investigation, and unanimously adopted the following resolution on the subject:—

> "That, whilst fully appreciating the honour conferred upon the Society we much regret nevertheless that for the reasons set out below we are unable to conduct the investigation as requested by the Tuberculosis Commission."

The following are the chief reasons for this decision:—

1. The natives engaged in the occupation of ricksha pulling are a constantly changing lot and it would be very difficult to obtain a truly representative number.
2. Those at present on the road would be found to be mostly all healthy "boys"—consequently a report confined to these would be entirely misleading.
3. It was strongly felt that any report to be thoroughly satisfactory and truly reflective of the position should include an examination of a large proportion of natives not at present in town, but who have been some time engaged in the business, and are now at home resting. This would involve an immense amount of trouble.
4. To conduct an investigation on these lines and also satisfy the suggestions thrown out in your communication—would involve the sacrifice of far more time and labour than any busy practitioner—of whom the Society is principally composed—is prepared to afford.

261. Practically the use of public rickshas is confined to Durban, Pietermaritzburg and Johannesburg. Roughly the boys at any one time under licence in each of these places is about 1,000, 280 and 400, respectively.

In Johannesburg they are almost exclusively employed by natives and coloured persons, and in carrying luggage and goods for Europeans.

In Durban and Pietermaritzburg they to a large extent take the place of cabs. In the former place there are about 100 licensed to carry natives.

In Durban, which may be taken as the chief source of our information, both the ricksha owner and the puller have to be licensed by the Corporation. The rickshas are entirely owned by one or two large companies. They pay an annual licence fee for each ricksha of one pound. They hire them to the native, nominally, at two shillings per diem, but actually the charge is ten shillings per week.

By a municipal bye-law there has to be provided with each ricksha a waterproof cape for the use of the boys in wet weather.

The above charge, however, included quarters for the native, in large barracks belonging to the companies. The boy feeds himself entirely. He pays two shillings per month to the Corporation for his licence. He is said to earn on an average about five shillings a day.

Before the licence is granted he is subjected to scrutiny by the Corporation licensing official, and if of inferior physique or obviously sick, his licence is refused. As there are more boys offering than are required, this examination can be fairly select. This point has to be remembered when considering the absence of visibly bad effects of the work.

The age of the boys ranges from about 20 to 45 years, but the average age is said to be about 25 years.

The period of employment is generally from two to three months, after which they return to their kraals for six or eight months. They are said to return to the work in many cases again and again.

Formerly most of the boys were Pondos, but more recently these have fallen out and Zulus have taken the work on.

262. The alleged danger from the work arises from two factors, which are very patent to anyone who has observed the boys engaged in the occupation.

The first is the great strain involved in pulling a passenger up even a slight gradient. In Durban some of the roads are excessively steep, but even on the level with a heavy load the strain is severe, especially, as often happens, when two passengers are carried.

Some idea of the extent of the strain involved is suggested by the evidence of Mr. Frank Hoare, a director of the Durban Ricksha Company, who stated that a difference of a few pounds in the weight of a ricksha meant that the native refused to pull it. Thus, while their older machines weighed from 250 to 300 lbs., and were found too heavy, their new machines are 235 lbs. gross weight.

Also, unless they are most carefully balanced on the axle, the increase of weight on the boy is too great.

Man is not anatomically constructed for draught work, and the effort of pulling puts a greater strain on him and on his thoracic organs than probably any other form of ordinary labour.

The other respect in which the work tells on him is that after getting very heated and in a profuse sweat, he sits down to cool while waiting for another fare. He may thus sit in the cold at night for hours.

Dr. D. Birtwell, District Surgeon for Durban, is very positive as to the injurious effects of ricksha pulling in inducing tuberculosis, due to the strain, sweating and chill. He had no doubt about it. He stated that he had actually seen a few of the boys break down, but there were numbers of them who, as soon as this happens, return to their homes. But he based his opinion chiefly on the result of post-mortem examinations, all of which in the district, as District Surgeon, he has to perform. He often noted that when he found tuberculosis, the boy had been a ricksha puller.

Dr. W. J. Hill, District Surgeon of the Inanda Division, believed that ricksha pulling is injurious. He cited one case where a ricksha boy was on his way home, sick, and died en route. Post-mortem he found miliary tuberculosis and a greatly dilated heart. He had been pulling a ricksha in Durban only ten days before.

Dr. W. A. Peverley, practising at Malvern, said that when medical officer to the Addington Hospital, Durban, he had observed in autopsies, very dilated hearts in ricksha pullers. He had observed the same effect clinically during life.

Many other medical men considered that the conditions of the work, as observed by them would lead them to expect it to predispose to tuberculosis and to cause cardiac disease, but they had not met with actual cases for the reason that the boys cleared off to their kraals as soon as they became ill.

The late Mr. A. J. Shepstone, who had been Secretary for Native Affairs for Natal, and was Acting Chief Native Commissioner, was most decided in his views as to the injurious effect on the native's health of this work.

It may also be mentioned in passing that he strongly animadverted on the bad effect it had on the native's character. That in the course of his work at night he came into close contact with the seamy side of European life, with drunkenness, and was sometimes employed as a tout by European prostitutes. He considered that the large number of boys engaged in the occupation (which, allowing for the time off at their kraals, must be some 7,000 or 8,000) would be much better employed on other work.

Mr. G. W. Adamson, Resident Magistrate of Newcastle, stated that one of his boys went to Maritzburg to pull a ricksha, contracted a serious chill, and returned with tuberculosis, dying a few months later. The disease was diagnosed by a medical man.

Mr. J. W. Cross, Magistrate of Dundee, who had had a wide experience in Natal and Zululand had had reports made to him of the effect of ricksha pulling in inducing tuberculosis.

Sergeant F. C. Mackay, who had been stationed for over seven years at Maritzburg, and had, in the course of his duties, to come much into contact with the ricksha pullers, stated that the rapidity with which they broke up by illness was a well recognised fact, that in the course of the work they got severe chills while waiting for fares after getting hot with pulling.

Dr. A. Bonfa, District Surgeon, Umzinto, said that he had seen several cases of tuberculosis among ricksha pullers. He considered the disease more common in them than in others. He gave particulars of cases. [Questions 28961-68.] On the other hand there were some witnesses: as Drs. Birt and Addison of Durban, who, on negative evidence, were of opinion that the occupation was not injurious, therefore, although on *a priori* ground, ricksha pulling may be expected to be injurious and that the liability to chill following on strain would predispose to pulmonary and cardiac disease, yet the evidence on the subject is not conclusive.

From other points of view it has nothing except perhaps its cheapness to recommend it.

Recommendation.

263. Your Commissioners advise that steps be taken by the Government and by municipalities to gradually bring about its abolition, and that the public be induced to co-operate in this object by public notification of its effect, both on

the health and on the character of the native. And that in the meanwhile Municipalities be advised to frame bye-laws:—

(*a*) For prohibiting any licensed ricksha puller from carrying more than one adult passenger, or one adult female and a child, or two children, in any ricksha, under a penalty of disobedience, and with the liability to cancellation of his licence.

For the purpose of this bye-law any person apparently over the age of twelve years to be deemed to be an adult.

(*b*) For prohibiting the plying for hire of any ricksha between one hour after sunset and sunrise.

(*c*) For prohibiting the pulling of any passenger up any hill declared by the Council of the municipality to be of a gradient unsuited to such traffic. Every such hill to be indicated by a conspicuously placed sign-board.

In the opinion of Your Commissioners, such bye-laws, if properly enforced, will of themselves gradually effect the abolition of rickshas pulled by men.*

Feather Sorting.

264. In Oudtshoorn, the centre of the ostrich feather industry, a considerable number of coloured persons, male and female, are employed in feather sorting.

This is carried on in rooms fitted with benches on which the feathers are sorted. Some of the feathers are soiled with earth, and in the operation of sorting, the bunches of feathers are shaken against the bench, in order to detach from them mud, dirt or refuse. This creates a considerable amount of dust, consisting of powdered earth, dirt and small particles of broken feather and quill scales.

The rooms are, as a rule, very badly ventilated, and are overcrowded with workers. The air while the work is proceeding is hot, vitiated and laden with dust and feather particles.

The Oudtshoorn Municipal Council has in the last year or so, taken the matter up, and, we were informed, has caused considerable improvement, a number of the larger feather merchants having put up special sorting rooms, which are in every way much better ventilated and arranged; but we consider that even some of these leave something to be desired. There are, however, still a number of most unsuitable rooms of the old style used for the purpose. Some of these, belonging to one of the largest of the employers in the trade, we found most unsatisfactory, being overcrowded, very dusty and without proper ventilation.

It was stated by municipal officials that these alterations, together with the reduction of overcrowding and the ceasing to employ young children on the work, has resulted in a distinct reduction in the amount of tuberculosis among the sorters. This disease, however, is still very frequent among them. Unfortunately no figures were obtainable to show the relative amounts of the disease among feather sorters, as compared with the general coloured population.

The following are the numbers of notifications of (excluding dual notifications) and deaths from tuberculosis among Europeans and coloured persons in the municipality during each of the five years, 1908-1912.

	Notifications.		Deaths.	
	Europeans.	Coloured.	Europeans.	Coloured.
1908	7	44	2	29
1909	18	75	8	38
1910	9	35	4	15
1911†	3	36	5	19
1912	8	41	3	21

* Pony rickshas have been strongly advocated by some, in lieu of those pulled by men.
† Population Census year 1911, Europeans 5,471 and Coloured 5,459.

With the exception of the year 1909, (as to the cause of the great increase of notifications and deaths of which we have no explanation), these figures would not seem to indicate any notable reduction in the occurrence of the disease among coloured persons.

Dr. R. M. Truter, attributed the prevalence of tuberculosis among feather sorters to the inhalation of the dust produced during the work. At our request Dr. I. Stusser, District Surgeon, Oudtshoorn, very kindly collected three samples of dust from different feather sorting rooms. Fair samples were collected from deposits on different projections in the rooms (distant from the benches), at a level of about six feet above the ground, where it had settled naturally from the atmosphere. These were submitted to Dr. G. W. Robertson, Government Bacteriologist, Cape Town, for favour of examination.

He reports that he found no tubercle bacilli on microscopical examination, and that guinea pigs inoculated showed no sign of infection.

Microscopically the dusts showed much fine feather debris and micaceous scales from quills. He was unable to express any opinion on its effect on the lung tissue when inhaled.

Recommendation.

265. We would recommend:—

(*a*) That all feather sorting rooms where more than five persons are at any one time employed should be required to be approved in writing by the municipal council before use.

(*b*) That no approval be given for the use of any room unless—

(i) it provides adequately for efficient ventilaion at all times; and
(ii) it provides a minimum of 400 cubic feet of air space for each person at any one time employed therein; provided that this may be reduced to 300 cubic feet per person if approved exhaust fans be erected and kept running over each bench.

(*c*) That whenever possible the Council should require the installation of approved electric exhaust fans over the benches so as at once to withdraw the dust from the room as it is formed.
(*d*) That the employment of children on this work should be discouraged.
(*e*) The above recommendations are intended to apply also to Port Elizabeth or any other place in which feather sorting is carried on.
(*f*) Municipalities in the Cape Province would appear to possess the necessary powers to regulate this occupation by bye-laws under the Section 194 (50), of the Cape Municipal Ordinance, 1912.

CHAPTER XIII.

On the Health of Native Mine Labourers, with special reference to Tuberculosis and Pneumonia.

266. We now propose dealing with the health of native mine employees, with special reference to the occurrence of tuberculosis and pneumonia. We shall do so in sections referring to, (1) the Diamond Mines, (2) the Coal Mines, (3) the Gold Mines, and (4) a Summary of our conclusions and recommendations.

In dealing with tuberculosis, it is necessary to take some account of the health of mine labourers generally, and especially as regards pneumonia. This is also contemplated by Part (*b*) of our Terms of Reference.

Our examination will practically be confined to natives, as very little information is available regarding white mine labourers.

SECTION I.—THE DIAMOND MINES.

A.—The De Beers Diamond Mines.

Origin of the Statistics.

267. Both in the case of these mines and of the Jagersfontein mine, the figures upon which the statistics are based were supplied to the Commission in many sections and in the crude state; also they were got out and supplied to us by

a number of different persons, without any knowledge as to their object. There is, therefore, no possibility of their having been in any way selected.

These mines afford a better field for the investigation of some of the factors affecting the prevalence of tuberculosis among mine native labourers than do the Rand gold mines, for the reason that the circumstances here are less complex than are those on the gold mines, and the natives are under closer control, being strictly confined to closed compounds. There is thus a better chance of ascertaining which factors are most likely to be responsible for the occurrence of this disease, or at any rate, of eliminating some of those factors which might on *a priori* grounds, have been credited with being in casual relation to it. Moreover, speaking generally, as these mines are under one control and more detailed records can be obtained on a uniform basis, the statistical evidence is more complete.

We are greatly indebted, and take this opportunity of tendering our thanks, to Mr. I. R. Grimmer, Assistant General Manager, and to Colonel R. G. Scott, V.C., Superintendent of Compounds and Native Labour, for De Beers Consolidated Mines, for the great trouble they have taken in procuring for us the records which we have asked for, and from which we have been enabled to construct the subjoined tables.

Preliminary.

268. De Beers Consolidated Mines comprise a number of separate mines, of which the Kimberley, Wesselton, Bultfontein and Dutoitspan are at present being worked. They are all underground mines of various depths, and differing in some respects from one another. Each mine has its own surface works and floors, the latter being large areas upon which the "blue ground" is spread in order to weather and disintegrate before it is passed to the mill and washer. Each mine also has its own separate mine compound and surface compound, in which the native labourers employed respectively in the mines and on the surface are housed and strictly confined during their period of engagement. Each also has its hospital, and the same medical officer is not in charge of each. The importance of these arrangements is that the records of each mine, underground and surface, are kept distinct, and moreover, as far as the diagnosis of cases is concerned, the element of personal error is reduced so that we are here in an exceptional position to compare the relative health of underground and surface workers.

In addition to the free boys there are employed on the mines a large number of convicts, numbering at present about 1,400 natives, mostly long-sentence men. These are employed only on the surface, and mostly on the floors belonging to the Dutoitspan, Bultfontein and De Beers mines. Their presence is useful as a standard of comparison with the health of the free surface workers.

The Commission visited these mines and inspected the several compounds and also the convict station. Members also inspected the underground workings of the Bultfontein and Dutoitspan mines, and generally examined into the conditions likely to affect the health, especially as regards tuberculosis, of the workers.

The Compounds.

269. In the opinion of the Commissioners, the compounds left a good deal to be desired. Although it was stated in evidence by Colonel Scott and Mr. Grimmer that during the last few years they had been very greatly improved, and that they attributed the fact that pneumonia had greatly decreased during the last few years to this fact. They considered that the improvement shewn in the health of native labourers during the last five years, as compared with the five years immediately preceding, was due to the improved condition of the compounds. Colonel Scott stated that there has been a steadily increasing all round betterment of the compounds, and that owing to this improvement it had been possible to maintain them in a cleaner condition. He did not think that the improvement in health was due to other causes, as the food and the work was the same, and as far as the general physique of the boys themselves was concerned, this had actually deteriorated during the last ten years. We have no reason to question the correctness of these views as to compound betterment.*

* Drs. Porter and Turner dissent. See footnote to Paragraph 286.

The actual evidence on this subject given by Mr. Grimmer and Colonel Scott was as follows:—

We want to know what has been the cause of the decrease?—Well, I really cannot tell you; the compounds have been improved; they have improved the compounds.

The food has been no different?—The food is the same and the work is the same.

You say the conditions have improved; in what way?—The compounds are better, and I think they are cleaner than they used to be.

Why are they cleaner?—Well——

The compounds are cleaner, or are the boys cleaner?—The class of building lends itself to being kept cleaner.

Are not the boys better—stronger, healthier boys?—I do not know that their physique is better now than it used to be. The physique of these boys about ten years ago used to be very fine indeed. I do not know that it is as good; I should say not.

But you consider the compounds have improved in cleanliness and general conditions?—As we have gone on we have gained by experience, and we are keeping them now probably better than we have

270. The main points which struck Your Commissioners were that the buildings could be improved structurally, that they were overcrowded, there being more inmates than there were bunks, so that many had to sleep on the floor or else outside in the open, that they could be kept in a more cleanly condition, and that earthen floors were unsatisfactory.

All the floors of these huts are of earth, and it was stated by Colonel Scott, that in his opinion it would be a great improvement to have asphalte or concrete floors, that in his experience the concrete floors in the convict station (of which at one time he had been Superintendent) were much more cleanly and satisfactory, and that although the convict has no bunk but sleeps on the floor on a felt mat, no injury to health resulted from chill. He considered that economically such floors would repay themselves, owing to the greater ease with which they could be kept clean, and by the saving of cost which was at present entailed in continually re-making up the earth floors.

No fires or fire buckets are allowed in these huts, and no complaint is ever made by the inmates on account of this restriction. At one time fire braziers were allowed, but they were abolished on account of the danger from fire. No complaint of cold is ever made, although in winter there is occasionally at night as much as sixteen degrees of frost.

Tribal characteristics of mine boys.

271. In these compounds all natives cater and cook for themselves, the food being sold to them at fixed prices from the compound canteens. There is a great difference in the manner in which different tribes feed themselves. Thus the Zulu always provides himself liberally, while the Cape boy is somewhat mean, but nevertheless every now and then goes in for a good feed. The Basuto spends very little money and limits himself too much in his food. But of all the tribes the Bechuana is the meanest and feeds himself very poorly.

The boys prefer catering for themselves as they can better satisfy their own particular likes and dislikes. Some time ago Colonel Scott established restaurants, at which a well-cooked meat meal was provided for sixpence, but they had to be closed owing to their not being taken advantage of.

The company is debarred by the provisions of the Cape Act No. 23 of 1887 from feeding their boys. All wages on the diamond mines have to be paid in cash.

Colonel Scott agreed that the health of the convicts was better than that of the free boys working on the surface, but he considered that was due to the former being of generally better physique, and possibly to their better accommodation on the station, and to the good and regular food with which they were provided and had to eat. Also they had more regular hours. We might possibly add also that they cannot get liquor or dagga.

Condition of engagement and work.

272. The boys are paid by the task, and the average pay for underground work is from three shillings and fourpence to four shillings and sixpence per diem, and on the surface from three shillings to three shillings and a penny per diem. The average amount spent on food is one shilling per diem.

There are three shifts, from 7 a.m. to 3 p.m., from 3 p.m. to 11 p.m., and from 11 p.m. to 7 a.m. The latter is a very small one. A certain small number of boys work double shifts, but this is discouraged, as it takes too much out of the boy. Formerly it was done to a much greater extent; eight or nine years ago a good proportion of double shifts being worked.

There is a certain proportion of "loafers" in the compounds, from day to day. Thus at the time of our visit, in a compound of 2,446 inmates, 422 were not at work, or about fifteen per cent., of which seven or eight per cent. were stated to be actually loafing. The company does not object to this, as it recognises that a boy cannot always be expected to feel up to the mark for work. As they are not paid except when they work, and they provide their own food, this concession costs the company nothing but their housing. We wish to draw particular attention to this point, for as will appear in connection with the Rand mines, the rule there is that every boy must be either working, sick in hospital or remaining idle with the express permission of the compound manager. This is a system calculated to cause boys to work who should be resting, if the compound manager is over zealous in endeavouring to obtain a high percentage of efficients.

The boys are engaged under contract from four to six months, but many re-

engage from month to month, some boys having been in the compound for two years and over. The contract is a time one and not, as on the Rand, for the performance of a certain number of shifts. The average duration of stay is from six to eight months. It is important to note this fact, as it means that the annual statistics which we shall presently give apply on the average to two different sets of boys per annum, and not to one continuously throughout the year.

Very little recruiting is undertaken, nearly all the boys spontaneously presenting themselves at the mines for work. A certain number of boys, sixteen to seventeen years of age are employed underground in accordance with the permission given by section 8 (1) of the "Mines and Works Act, 1911," which provides that no person shall employ underground on any mine a boy apparently under the age of sixteen years." The provisions of the "Native Labour Regulation Act, 1911" are not in force on these mines.

Medical control of native employees.

273. Before being admitted to the compound the boys are examined by the hospital dispenser, and are vaccinated. Any boy found by this examination to be in obvious ill health, is put aside for medical examination by the mine medical officer. Each boy is also given a bath, containing disinfectant, before admission.

The compounds are searched every day for sick boys, but as a rule, such do not care to go into hospital, and if unable to work will hide themselves away. It was stated that it was very difficult to discover sick boys in such large compounds, and it thus happened that occasionally boys were admitted to the hospital suffering from tuberculosis only a few days before they died.

No system of repatriation of sick boys is carried out, but when a boy is sick and unable to work, he is allowed to depart. On the other hand, it was given in evidence by Dr. Mackenzie, one of the mine medical officers, that when a boy who was under treatment in hospital for tuberculosis so far recovered from his active symptoms as to be able to work, he was allowed to return to the compound and to work.

We strongly deprecate such a practice.

Tribal composition of Native Employees.

274. Of the tribal composition of the natives employed on these mines, Bechuanas from Bechuanaland predominate, constituting about half of the surface and a third of the underground boys. Transvaal and British Basutos are in about equal numbers, both on the surface and underground, and form each about five per cent. of the former and fifteen per cent. of the latter workers. Cape Province natives form a little over twenty per cent. of the underground boys, and about fifteen per cent. of the surface boys. There are about seven or eight per cent., both above and below ground, of Natal and Zululand natives, and a few (800 to 900) Inhambane, Shangaan and Zambesi natives.

Condition of Mines.

275. With regard to difference in underground conditions in the several mines, the Commission had the evidence of Mr. H. D. Dickinson, Assistant General Manager, Mining Department, De Beers Consolidated Mines. We were not able to ascertain that any marked distinctions existing in the different mines, appeared to result in marked differences in the health of the workers. Nor that any great changes had within the last few years taken place in underground conditions.

On all the mines practically all the drilling is done by compressed air hammer-drills.

Nearly all the mining is done in the morning and afternoon shifts, ground is only hoisted during the day shift.

At the present time three mines are ventilated mechanically by fans, while the fourth, Dutoitspan, is still under natural ventilation, which takes place largely through connections with the open workings on the 470 feet and 510 feet levels. This mine is said to be the best ventilated, especially at the working faces, and to clear itself quicker than do the other mines.

It should be noted that the ventilation of the underground workings on diamond mines is naturally freer than on gold or other mines, owing to there being a certain amount of communication between the underground workings and the open workings, resulting from the special system of mining.

The fans on the Wesselton were only installed at the beginning of 1913, and on the Bultfontein between 1910 and 1911. The Kimberley has been practically the same for the past ten years, namely by a Sirocco intermediate fan at the 2,520 feet level. This will shortly be replaced by a Weddell exhaust fan at the surface.

Notwithstanding its alleged better ventilation, judging by the carbonic dioxide standard the air, according to analyses, in the Dutoitspan is no better than in the Kimberley, and not so good as in the Bultfontein mine.

There is some difference in the relative wetness of the mines. The Dutoitspan and Kimberley are both dry, only 7,214 and 7,738 gallons per hour, respectively, being pumped. At the Bultfontein 23,903 gallons, and at the Wesselton 42,798 per hour are pumped.

The temperature of the Wesselton, Bultfontein and Dutoitspan mines is stated to be but little above the average surface temperature, but in the Kimberley mine the rock temperature is 92° to 93°, and the mine is decidedly hot.

This mine is considered by the Administration to be the worst to work in on account of the heat and the depth and it recognises this fact by giving better pay and prescribing a shorter task; the boys receiving four shillings and sixpence for drilling fifty feet, as against four shillings for eighty feet on the other mines. Although the rock is harder in the Kimberley mine, their average earnings come out at four shillings per diem as compared with three shillings and sixpence in the other mines. Also no night shift is worked in this mine, in order to give it time to cool off.

Mr. Dickinson held no doubts as to the adverse conditions obtaining in this mine in comparison with the others. He said:—"There is no question about it. There is a difference. That is to say, if you look at the boy on the Kimberley doing thirty-five loads, you realise he is a good deal worse off than the boy at Dutoitspan loading thirty-five trucks."

Of the other mines Mr. Dickinson considered that the Bultfontein was probably the healthiest.

The Kimberley mine is the deepest, the rock hoisting level being at 3,520 feet, and the Dutoitspan the shallowest, the hoisting level being at 750 feet. The boys are hauled from the following levels, respectively: Kimberley, 2,520 feet level; to which, after completing their work, the maximum distance to climb is 240 feet upwards. About twenty per cent. are raised from the 3,520 feet level. Wesselton, at the 500 feet and 980 feet levels, to which they may have to climb a maximum of 280 feet, either to or from their work. Bultfontein, at the 1,000 feet level, to which, after completion of their shift, they have to climb down from 360 to 160 feet, according to the working level. In the Dutoitspan they are raised from the 750 feet level, and the maximum climb on completion of shift is down only thirty feet.

The average pitch of travelling ways is from 26·5 to 30 degrees.

In all but the Wesselton the boys are hauled through the down-cast shaft, and thus meet the cold air stream when returning heated from their work. We were informed that as a rule they do not have to wait long at the station before getting a cage. Arrangements are made to commence hauling boys at two o'clock for the shift terminating at three. Those boys finishing their task before that hour have to wait their chance of getting a cage.

On the Bultfontein the boys wait at the station in down draught having an approximate speed of 600 feet per minute. In the Kimberley there is an air current of about 150 feet to 160 feet per minute, but in this mine about eighty per cent. of the boys wait in a dead end out of the draught.

On the Dutoitspan, with natural ventilation, and on the Wesselton with an upcast shaft, considerations of chill do not arise.

With regard to the class of native employed on the several mines, this is the same for all, except in the case of the Dutoitspan where a better class of boy is found, owing to the better chance of finding diamonds (for which he receives a reward) on this mine.

It will be seen that on *a priori* grounds, one would expect the health of the mine workers to be best on the Dutoitspan and worst on the Kimberley mine. But this expectation is not realised by the figures which we shall presently give for these mines. On the contrary, the Kimberley and the Wesselton shew the better health, while the Dutoitspan is most certainly the worst.

Dust in the Mines.

276. It is usual to look upon the Rand gold mines as the only ones where considerations of the harmful effects of dust arise, but the De Beers mines are also very dusty mines. Their air is hazy and often thick.

Blasting is carried on at frequent intervals during the shift.

Through the kindness of the Assistant General Manager, samples of dust from the workings of these mines were obtained, and were submitted to Dr. G. W. Robertson, Chief of the Government Bacteriological Laboratory, Cape Town, for the favour of examination, and we have to express our thanks to Mr. W. Severn of the Laboratory, for the following report:—

"Sample of dust from the *Bultfontein Mine*.—Particles from the most minute up to 0.2 mm., the largest of which are black and shapeless. Many of the minute grains are very sharp in outline, and some have a micaceous appearance.

"Sample from the *Dutoitspan Mine*.—None of the fragments appear to be much over 0.1 mm. in diameter. This dust is more generally crystalline than the others. Quartz crystals are frequent. A crystal of quartz with transverse striation, and a very sharply defined crystal are visible in the photomicrograph of this dust (reproduced on the opposite page).

"Sample from the *Wesselton Mine*.—There are some dark coloured particles here up to 0.5 mm. in diameter, and large sharp crystals and broken quartz fragments with knife-edges caused by the fractures.

The following results were obtained on chemical examination:—

	Bultfontein.	Dutoitspan.	Wesselton.
Moisture, per cent.	4·96	6·93	7·47
Matter insoluble in dilute hydrochloric acid, per cent.	40·48	36·72	43·16
Matter soluble in dilute hydrochloric acid, per cent.	49·52	63·28	56·84
Iron and alumina expressed as Fe^2O^3 and AL^2O^3, per cent. ...	13·36	28·64	21·92

Aqueous extracts showed very little solid matter on evaporation. The amount of chlorine present was so small as not to be worth estimation."

Inhalation of such dust should be capable of producing pulmonary irritation and fibrosis. And short of this it would seem likely that it is a factor predisposing to pulmonary tuberculosis and pneumonia.*

There is, however, no record of the occurrence of miner's phthisis among the Kimberley miners. Mr. J. T. Ford, the Secretary and Treasurer of the De Beers Consolidated Mines Benefit Society, has kindly supplied us with returns of deaths and causes of sickness of members (Europeans) of the Society for the period 1890-1912, but among the forty deaths from phthisis and other forms of tuberculosis during that time there were no cases returned as miner's phthisis. We were not informed, however, which of the deceased had been employed underground.

This number of deaths gives a mean annual mortality from tuberculosis of only 0·88 per 1,000, on an average membership of 1,985 over the 23 years. The mean annual general death-rate was 7·64 per 1,000.

The membership is confined to male European employees, and a medical examination must be passed as to sound health before admission.

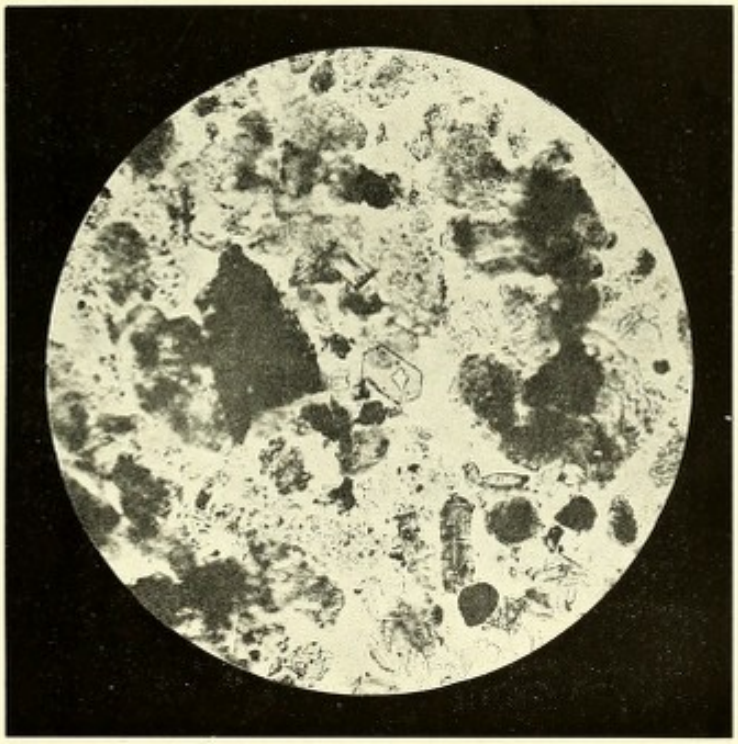
Discussion of Statistics.

277. In the following tables we have given the number of cases of, and the number of deaths from tuberculosis, pneumonia, all other respiratory diseases, scurvy, cerebro-spinal meningitis, all other causes, and all diseases combined. All deaths and disablement from accident or injury have been carefully excluded. Cases only include those admitted to hospital and sudden deaths from disease.

Pneumonia has been selected because of its very great prevalence on the gold mines, and the question of its predisposing to phthisis. Other respiratory diseases

* *Note, dissenting.*—Dr. Porter considers this an unproven assumption, which may or may not be true in regard to pulmonary irritation and tuberculosis, whilst, as regards fibrosis, it is in direct conflict with lengthy medical experience in Kimberley. Moreover, no information is given as to the comparative *amount* of dust in the air of each mine.

MICROPHOTOGRAPH OF DUST COLLECTED IN THE DUTOITSPAN MINE, KIMBERLEY.



A typical Crystal is seen in the Centre of the Field.

have been taken for the purpose of a check comparison with the occurrence of phthisis and pneumonia; scurvy and cerebro-spinal meningitis* because they are of extensive occurrence on the Rand mines, a good deal of the last mentioned being there of pneumococcal origin; while by some authorities scurvy has been deemed to be a predisposing cause of phthisis.

278. It is most necessary to point out in connection with the rates of incidence and mortality given in the ensuing tables for different diseases, that when evaluating from them the general health of the community to which they refer, the same value or degree of importance must not be given to every rate alike; either as between different diseases, or as between incidence and mortality.

For example, in the case of the incidence and mortality rates for tuberculosis, speaking generally, the incidence rate is of more value for purposes of comparison than is the death-rate, because tuberculosis is a chronic disease and the tendency is to discharge from the compounds to their homes as soon as possible all sufferers from it. Therefore the death-rate is not only not a true index,—as more deaths actually result than appear in the record,—but it also does not afford a true comparison, because the extent to which repatriation takes place depends in some degree on the practice and views of the doctor, compound manager and others—and to some extent even on the habits of the particular tribe.

On the other hand, in the case of pneumonia the death-rate, taken in conjunction with the rate of incidence, is of prime importance, as, for one thing it indicates the degree of severity of the disease at the particular time and place, and for another it may be useful in considering the recorded incidence, as some medical men may return as pneumonic, mild or brief attacks of illness, which others would discard as doubtful.

Then again in considering the incidence of sickness and mortality from all causes, here the death-rate must always be the predominant consideration, for death cannot lie; it either occurs or does not occur. But in the number of cases of sickness there is a wide scope for errors of comparison, one recorder recording all manner of trivial complaints of only a few hours duration, while another merely takes cognisance of those which he deems to be of some seriousness. And here also the particular system in operation will make a great deal of difference in the recorded results, as in some compounds there is a temporary ward in which trivial cases are accommodated for twenty-four hours or so, and those cases which are discharged from this ward recovered, without going into the main hospital do not appear in the records at all.

It may be pointed out that the same value as an index of general health or of the effect of adverse conditions of health, cannot be given to all diseases alike. It would, for instance, be most misleading to take from any of the ensuing Tables the case incidence of "Other respiratory diseases" and give it the same value, as an index of health, as is given to the case incidence of, say, pneumonia. The two are not in the same category. "Other Respiratory Diseases" includes any trival affections of the chest which may really have very little bearing on the general health of the particular community.

Also "Other respiratory diseases" and "All other causes" are composite groups and may be swollen from time to time by the fortuitous occurrence of such diseases, as, for example, influenza or enteric.

It would, therefore, be quite misleading in comparing one mine with another, or one tribe with another, or surface with mine workers, to take a table and set down the number of times the rates referring to the one exceed or fall short of the rates referring to the other, and then to argue that the one which has the greatest number of plus or minus rates (as the case may be) is the more healthy or unhealthy (as the case may be). Only by a careful evaluation of all the rates after full consideration of all attendant circumstances can any sound conclusion be made from the figures contained in any of these tables; but when that is properly done, then they afford most valuable evidence of the effects of certain conditions on the health of mine employees.

Bultfontein was only fully working from 1905, and the figures for Dutoitspan only apply to the years 1906 and 1907 and 1910 to 1912.

* In the term cerebro-spinal meningitis we include cases due to infection both by the meningococcus and by the pneumococcus.

Disease Incidence and Mortality, 1903—1912.

279. During the period of the ten years, 1903 to 1912, there were among the natives employed on the above mentioned four mines, whose mean annual strength was 11,376, 34,160 cases of illness and 2,477 deaths from the following causes.

	Tuberculosis.	Pneumonia.	Other respiratory diseases.	Scurvy.	Cerebrospinal meningitis.	Other causes.	All causes.
Number of cases 1903-1912	612	7,844	3,454	5,611	103	16,536	34,160
Number of deaths 1903-1912	245	1,618	43	57	82	432	2,477
Annual rate of case incidence per 1,000 ..	5·38	68·95	30·36	49·32	0·91	145·35	300·27
Annual rate of mortality per 1,000	2·15	14·22	0·38	0·50	0·72	3·80	21·77
Case mortality per cent.	40·03	20·63	1·24	1·01	79·61	2·61	7·25

From this it is evident that both tuberculosis and pneumonia are very rife on these mines. Of tuberculosis, a case incidence of 5·38 per thousand per annum and a death-rate of 2·15 per thousand are high as compared broadly and generally, and so far as it is fair to do so with corresponding rates for other native communities* as indicated elsewhere in this Report, and remembering that this death-rate does not represent the whole mortality, as those cases which are able to leave the mines do so, and the result of the disease passes from the record; and also that the community is one of selected individuals both as regards age and health.

Also an incidence rate of 68·95 per thousand of pneumonia and a death-rate of 14·22 are enormous.* It will be observed that pneumonia constitutes nearly a quarter of all the cases of illness, and two-thirds of all the deaths from disease.

Scurvy is also exceedingly heavy in its incidence. This complaint has always been very common among De Beers labourers, both free and convict, but the amount varies very greatly from year to year. Of recent years it has tended to diminish considerably. It is very much more frequent among Cape Province natives, and least so among Transvaal boys.

Comparison between Surface and Underground Workers.

280. The first point to determine is whether there is any difference in the occurrence of these diseases as between surface and underground workers. Owing to the arrangement of compounds and hospitals on these mines it has been possible to secure returns which enable us to consider this important question. On the Rand mines, as all the boys, whether working on the surface or underground, are treated alike and occupy the same compound, and as boys often change from one form of work to the other during the time of their contract, it has not been possible to secure statistics prepared on this basis.

In the following Table 33 we give the number of cases and deaths from the above mentioned causes occurring during the ten year period, 1903—1912, among the underground and the surface workers, respectively, and also the annual rates of case incidence and mortality per 1,000 of the mean strength, and the percentage of deaths to cases (case mortality).

We have given the figures for the entire period of ten years, and also separated into two groups of five years, 1903 to 1907 and 1908 to 1912.

* *Note.*—Dr. Porter thinks that a standard of comparison, *e.g.*, the Kimberley Convict Station or the Port Elizabeth Location, should be mentioned, while fully admitting that in important respects the conditions differ. On the other hand, no truer standard is available.

TABLE 33.—Showing the number of cases of, and deaths from, and the incidence and mortality per 1,000 of the annual strength of *Underground* and *Surface* workers, respectively, from Tuberculosis, Pneumonia, and certain other causes on the De Beers Consolidated Mines, during the periods 1903-7 and 1908-12.

	Tuberculosis.			Pneumonia.			Other Respiratory Diseases.			Scurvy.			Cerebro-spinal Meningitis.			All Other Causes.			All Causes.		
	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12	1903–7	1908–12	1903–12
Cases :																					
Underground	237	199	436	3,826	2,684	6,510	1,888	1,181	3,069	2,351	984	3,335	33	17	50	6,188	5,613	11,801	14,523	10,678	25,201
Surface ..	111	65	176	969	365	1,334	300	85	385	1,434	842	2,276	31	22	53	2,789	1,937	4,735	5,643	3,316	8,959
Deaths :																					
Underground	99	67	166	870	562	1,432	17	10	27	22	13	35	28	12	40	138	149	287	1,174	813	1,987
Surface ..	44	35	79	148	38	186	12	4	16	18	4	22	27	15	42	95	50	145	344	146	490
Case Incidence pe. 1,000 :																					
Underground	7·53	5·20	6·52	121·60	70·13	93·35	60·00	30·86	44·01	74·72	25·71	47·82	1·05	0·44	0·72	196·66	146·65	169·22	461·56	278·99	361·36
Surface ..	4·68	3·20	4·00	40·87	17·97	30·30	12·65	4·18	8·75	60·49	41·44	51·70	1·31	1·08	1·20	118·02	95·34	107·55	238·02	163·21	203·50
Mortality per 1,000 :																					
Underground	3·14	1·75	2·38	27·65	14·69	20·53	0·54	0·26	0·39	0·70	0·34	0·50	0·89	0·31	0·57	4·39	3·89	4·12	37·31	21·24	28·49
Surface ..	1·85	1·72	1·80	6·24	1·87	4·23	0·51	0·20	0·36	0·76	0·20	0·50	1·14	0·74	0·96	4·01	2·46	3·29	14·51	7·19	11·13
Case Mortality per cent. :																					
Underground	41·77	33·67	38·07	22·74	20·94	21·99	0·90	0·85	0·88	0·94	1·32	1·05	84·85	70·59	80·00	2·23	2·65	2·43	8·08	7·61	7·88
Surface ..	39·64	53·84	44·88	15·27	10·41	13·94	4·00	4·71	4·15	1·25	0·47	0·97	87·10	68·18	79·24	3·39	2·58	3·06	6·10	4·40	5·47

The mean annual strength was :—

	Underground.	*Surface.*
1903–1907	6,293	4,741
1908–1912	7,655	4,065
1903–1912	6,974	4,403

281. The figures in this table are at once interesting and important.

The first point is in connection with the evidence by Colonel Scott, to which we have alluded above, as to the improvement in the last few years in the conditions of the compounds and consequently in the apparent health of the natives. The comparison given in this table between the two five year periods 1903—1907 and 1908—1912 shows that the occurrence-rate and the death-rate of tuberculosis, pneumonia and "all other causes," have fallen enormously between the two periods, both among the underground and the surface workers (but on the whole greater among the latter), with the exception that the fall in the mortality from tuberculosis among the surface workers has been slight.

Without attributing this result entirely to compound improvement, it should serve as an example for other mine compounds.

282. In the next place the figures show conclusively that during the first period there was a much greater incidence of, and mortality from tuberculosis and pneumonia on the underground worker; and this is true for the second period also, except as regards the mortality from tuberculosis. The influence of underground work is seen to effect not only these two diseases, but the worker's health all round.

Taking the ten year period, and expressing the effect of underground work in percentages of difference over surface work we find:—

	Case incidence.	Mortality.	Case mortality.
	Percentage increase.	Percentage increase.	Percentage increase or decrease.
Tuberculosis	63·00	32·22	15·17 decrease.
Pneumonia	208·09	385·34	57·75 increase.
Other Respiratory Diseases	402·97	8·33	78·80 decrease.
Other Causes (except Scurvy and cerebro-spinal Meningitis) ..	57·34	25·23	20·59 decrease.
All Causes	77·57	155·97	44·06 increase.

Thus in the underground worker the amount of tuberculosis is greater by about two-thirds than the amount in the surface worker; but the actual mortality from tuberculosis is only greater by one-third. The case mortality, owing to the number of cases being increased in greater proportion to the number of deaths, actually shows a proportionate decrease of fifteen per cent.

Pneumonia is three times as common, and the mortality nearly four times as great in the underground worker as in the surface worker, and the case mortality is half again as great.

Also other respiratory diseases are over five times as frequent underground, but as the case mortality is only a quarter of what it is on the surface, the rate of mortality is not greatly increased.

Both illness and mortality from other causes are also considerably greater in the underground worker, but as the increase in the number of cases is greater than the increase in the amount of mortality, the average case mortality is not increased.

We have no particulars of the different diseases comprising the groups of "all other causes," but the proportion of sickness and mortality included in it tend to vary considerably from year to year, and it is therefore possible that the main causes also vary from time to time; the chief point about this group, however, is that it is very sensibly increased by underground work.

283. Regarding pneumonia, it is remarkable how constantly there is from year to year a great difference in incidence and mortality between the underground and the surface worker; and as regards tuberculosis, the same holds good, except in the case of the years 1905, 1908 and 1910. (See Table 34). It not only continues in spite of the general improvement in health, but is not obliterated by such matters as seasonal variation.

It is a recognised fact that the prevalence of pneumonia varies much from year to year. One year is particularly bad from the point of view of its occurence, while another is good. The causes leading to these differences are not understood, but whatever they may be they do not seem to effect the relative difference between underground and surface work. This fact is one of great importance, as in our opinion, it indicates that the influence of mining or underground work, in whatever it may lie, is an inherent one and not due to some fortuitous circumstances.

For the purposes of illustrating this we have prepared the following Table 34, showing the rates of incidence and mortality, of tuberculosis and pneumonia year by year for ten years, on the underground and surface worker, respectively.

TABLE 34.—Showing, in respect of Tuberculosis and Pneumonia, the case incidence and rate of mortality per 1,000 of the annual mean strength of workers Underground and on the Surface of De Beers Consolidated Mines, and the case mortality of these diseases in each year, 1903–1912.

	1903.		1904.		1905.		1906.		1907.		1908.		1909.		1910.		1911.		1912.	
	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface
Tuberculosis.																				
Case Incidence per 1,000	12·49	3·62	9·38	5·40	6·98	5·46	7·12	4·95	5·66	4·21	4·66	5·71	2·74	1·50	4·79	2·72	7·46	2·99	5·74	3·65
Death rate per 1,000	4·65	0·66	4·12	2·86	1·47	2·73	3·10	1·31	3·22	2·04	1·55	4·08	1·09	0·38	1·48	2·14	2·49	1·23	1·95	1·37
Case Mortality per cent. ..	37·21	18·18	44·44	52·94	21·05	50·00	43·48	26·47	56·86	48·39	33·33	71·43	40·00	25·00	30·95	78·57	33·33	41·18	34·04	37·50
Pneumonia.																				
Case Incidence per 1,000	82·49	32·55	75·26	29·85	83·09	35·82	184·78	45·57	111·81	46·90	37·05	6·12	69·52	8·65	84·50	31·68	83·63	16·55	61·51	15·98
Death rate per 1,000	18·30	6·25	18·81	5·72	17·46	7·28	42·84	8·44	24·85	3·49	7·57	2·04	12·45	1·50	19·27	1·94	16·39	2·82	14·40	0·68
Case Mortality per cent. ..	22·18	19·19	25·00	19·15	21·02	20·34	21·07	18·53	22·22	8·40	20·42	33·33	17·91	17·39	22·81	6·13	19·60	17·02	23·41	4·24

This demonstrates a continuously greater incidence and mortality of pneumonia, and incidence, and to some extent of mortality, of tuberculosis on the mine or underground workers. This is remarkable when it is remembered that the communities we are dealing with are constantly changing both as regards individual units and as regards average tribal constitution, and that they are being continuously affected by numerous complex and changeable conditions, and it therefore denotes the operation of some powerful and constant factor. Throughout the whole of this ten year period the incidence of pneumonia has been not less than 132 per cent. higher in the underground workers than on the surface workers, and the death-rate not less than 140 per cent. higher. In most years the difference in both cases has been much greater. Also only in one year (1908) has the case mortality not been a little greater in the underground cases.

As regards tuberculosis the difference between underground and surface it is not quite so constant nor so marked, which is to be expected, as tuberculosis is a more chronic disease. But even here only in one year (also 1908) is the case incidence other than greater; it being generally between a third and twice as great. In only three years (1905, 1908 and 1910) was the death-rate greater on the surface. When we come to the case mortality there is little difference, and on the whole the case mortality is greater on the surface.

284. There is a suggestion in this table that there may be some relationship between the rise and fall in the number of cases of pneumonia, both above and below ground, with the rise and fall in the number of cases, respectively, of tuberculosis.* If so, it would support the view generally held by clinicians that tuberculosis not infrequently follows an attack of pneumonia. On the other hand, in view of the comparatively short stay of the individual native on the mine, it may be that the same cause which leads to an increase in the amount of pneumonia also operates in inducing tuberculosis.

The points we have been discussing are better displayed in the accompanying diagram, than by the table.

Comparison of the different Mines (De Beers).

285. The next point to be ascertained is whether this difference between surface and mine or underground work holds good for each of the several mines in working during this period. In Table 35 are given for the Wesselton, Dutoitspan, Bultfontein and Kimberley mines the case incidence, death-rates and case mortality of tuberculosis, pneumonia, and the other selected diseases, for underground and surface workers, respectively.

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* Dr. Maynard has kindly worked out for us the respective co-efficients of correlation :—

(*a*) 0·15 = Correlation from year to year of tuberculosis and pneumonia underground. The probable error being ± 0·22.

(*b*) 0·26 = Correlation from year to year of tuberculosis and pneumonia aboveground. The probable error being ± 0·21.

DIAGRAM TO FOLLOW PARAGRAPH 284 CHAP. XIII.
KAART TE VOLGEN OP PARAGRAAF 284 HOOFDSTUK XIII.

DE BEERS CONSOLIDATED MINES.
DE BEERS GEKONSOLIDEERDE MIJNEN.

DIAGRAM SHEWING NUMBER OF CASES ANNUALLY PER 1,000 OF STRENGTH OF UNDERGROUND AND SURFACE WORKERS, OF PNEUMONIA AND TUBERCULOSIS.
KAART AANTONENDE AANTAL GEVALLEN JAARLIKS PER 1,000 VAN HET GETAL WERKERS ONDER EN BOVEN DE GROND AAN LONGONTSTEKING EN TUBERCULOSIS.

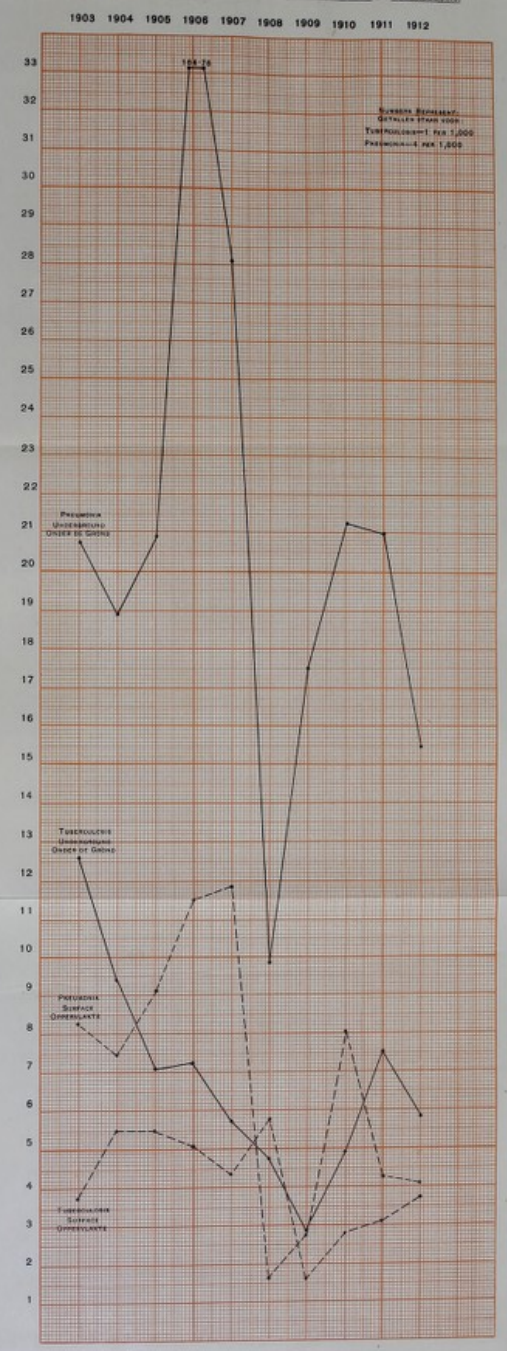

TABLE 35.—Giving separately for each mine of the De Beers Consolidated Mines, the annual rates of incidence and mortality from Tuberculosis, Pneumonia and certain diseases, per 1,000, of the Underground and Surface workers during the period 1903–1912.

	Tuberculosis.			Pneumonia.			Other Respiratory Diseases.			Scurvy.			Cerebro-Spinal Meningitis.			All Other Causes.			All Causes.		
	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.
Wesselton Mine.																					
Underground ..	5·63	2·37	42·07	63·01	11·42	18·13	4·35	0·46	10·71	53·14	0·78	1·46	1·32	1·09	82·35	130·55	5·05	3·87	258·00	21·17	8·21
Surface ..	4·61	2·20	47·62	38·56	4·88	12·66	4·48	0·53	11·88	76·69	0·75	0·97	1·53	1·10	71·42	121·59	3·78	3·11	247·46	13·24	5·34
Dutoitspan. *																					
Underground ..	7·29	3·14	43·00	162·00	40·24	24·84	41·70	0·36	0·87	30·98	0·29	0·94	0·44	0·44	100·00	77·65	3·06	3·94	320·06	47·53	14·85
Surface ..	2·28	0·91	40·00	32·45	2·28	7·04	26·51	..	..	24·68	0·47	1·85	..	..	..	55·30	0·91	1·65	141·22	4·57	3·23
Bultfontein.																					
Underground ..	4·92	1·62	33·00	94·98	19·70	20·74	116·75	0·49	0·42	69·18	0·44	0·64	0·10	0·10	100·00	241·42	3·55	1·47	527·35	25·90	4·91
Surface ..	1·25	0·31	25·00	21·94	4·70	21·43	33·07	0·16	0·47	42·79	0·47	1·10	0·47	0·47	100·00	114·73	3·45	3·00	214·27	9·56	4·46
Kimberley.																					
Underground ..	9·31	2·97	31·87	75·43	19·04	25·24	1·43	..	..	14·02	0·20	1·46	0·82	0·41	50·00	253·02	4·40	1·74	354·04	27·02	7·63
Surface ..	4·56	1·96	4·31	19·34	3·15	16·26	1·18	0·23	20·0	16·12	0·08	0·49	1·18	1·10	93·33	87·83	2·75	3·13	130·21	9·27	7·12

* The figures for the Dutoitspan Mine only refer to the years 1906, 1907, 1910, 1911 and 1912.

It will be seen that there is here displayed by each separate mine exactly the same wide and remarkable difference between the underground and surface worker in respect of the incidence, mortality and case mortality of tuberculosis and pneumonia, as was seen when dealing with the figures in the aggregate. The same point appears in respect of other respiratory diseases and the group "all other causes."

It is noticeable that the incidence of cerebro-spinal meningitis appears to be greater on the surface than in the underground workers. The numbers on which the ratios are based are, however, very small.

286. In view of the difference in the underground conditions of these mines which have been already alluded to, it is necessary to compare more closely the relative occurrence of disease among their respective workers. In the following Table 36 a distinction is made between the earlier and the later portions of the ten year period for which we have records, but as those for the Dutoitspan mine only refer to the years 1906 and 1907, and the years 1910, 1911 and 1912, the figures given in the preceding Table 35 for this mine are not strictly comparable with those for the other mines. In the following we take the same years in the case of each mine.

TABLE 36.—Giving the rates of case incidence and mortality from Tuberculosis, Pneumonia, and All Causes among the *Mine Workers* on each mine, separately in respect of the two periods 1906–1907 and 1910–1912.

	Tuberculosis.				Pneumonia.				All Causes.			
	1906–7.		1910–12.		1906–7.		1910–12.		1906–7.		1910–12.	
	Case incidence per 1,000.	Mortality per 1,000.	Case incidence per 1,000.	Mortality per 1,000.	Case incidence per 1,000.	Mortality per 1,000.	Case incidence per 1,000.	Mortality per 1,000.	Case incidence per 1,000.	Mortality per 1,000.	Case incidence per 1,000.	Mortality per 1,000.
Wesselton Mine	7·80	2·90	3·73	1·55	83·43	18·07	59·30	10·04	357·57	32·79	157·63	15·83
Dutoitspan Mine	6·40	3·71	8·00	2·62	232·05	58·17	99·56	24·27	422·18	67·60	219·66	29·65
BultfonteinMine	4·33	2·34	7·84	1·82	153·08	30·11	90·86	21·28	629·48	37·50	450·51	27·72
Kimberley Mine	8·60	4·07	2·84	2·28	33·95	6·79	23·30	3·99	345·85	14·03	389·17	14·81

There are two points brought out by this table. The first is that there has been great and almost universal improvement between the two periods, 1906-1907 and 1910—1912 on each mine in respect of both the incidence and the mortality from tuberculosis, pneumonia and all causes; the only exceptions being an increase in the number of cases of tuberculosis (the death-rates actually decreased) on the Dutoitspan and Bultfontein mines, and a very trifling increase in the cases of illness and deaths under all causes in the Kimberley mine.

As the Assistant General Manager states that there was practically no alteration in the conditions underground between these two periods, we infer that this improvement has been part of the general health improvement resulting from, among other things, the betterment of the compound life, which we have it in evidence, has taken place, and to which we have already alluded in paragraphs 269 and 270. This is the more likely to be the explanation in as much as the relative difference between the extent of the surface and underground disease has continued about the same in degree, as is shown by the figure in Table 33.*

* *Note, dissenting, by Drs. Porter and Turner.*—We dissent from the inference. The two periods referred to are 1906-1907 and 1910-1912. The Commission's evidence of "*betterment of compound life* is chiefly that of Mr. Grimmer and Colonel Scott (*vide* Minutes of Evidence, pars. 92,603–92,607) and refers mainly to structural improvements. In reply to specific inquiry by the Commission as to nature and date of these improvements, the Assistant General Manager of De Beers' (Mr. Grimmer) kindly furnished the following particulars on the 3rd April, 1914 :—

"Referring to your telegram, No. 266, I beg to say that the following are the chief improvements :—

"*Bultfontein Mine* .. Two large compounds and one large hospital erected 1904-5.

"*Dutoitspan Mine* .. Two large and one small compound and large hospital erected 1904-5.

"*Wesselton Mine* .. New floor compound erected, 1905; extension mine compound, 1905; additional surface compound, 1906; extension to hospital, 1906; second floor compound erected, 1911.

"*Kimberley Mine* .. Mine compound practically rebuilt in 1903; asphalte floors throughout, 1905. Surface compound rebuilt, 1906.

"*De Beers Mine* .. Stable compound rebuilt, 1904; rock shaft compound, large additional rooms, 1905.

"*Workshops* .. .. Workshops compound greatly improved, 1906.

"The drainage and all sanitary arrangements have been greatly improved, and a separate sleeping bunk has been supplied to each labourer."

From the above, it appears that with the exception of (*a*) the "second-floor compound erected 1911" at the Wesselton Mine, (*b*) the improvement of drainage and all sanitary (? latrine) arrangements, and (*c*) the provision of separate sleeping bunks, for which alterations (*b*) and (*c*) no date is given, all this structural "betterment" was effected in 1903-4-5-6. And as these improvements were, for the most part, just as much in existence in 1906-7 as they were in 1910-12, they do not, in our opinion, materially help to explain "the general health improvement" during 1910-12 as compared with 1906-7, more especially as a similar health improvement during the latter period has been observed elsewhere—*e.g.*, in Rhodesia—where there has been no very notable recent alteration of conditions of the mine natives' life.

287. The second point is that the Dutoitspan mine has been, during both periods, the most unhealthy mine.

Between the other mines there is not much to choose, except that the Kimberley shows in a marked degree the best health as far as the occurrence and mortality from pneumonia are concerned. We shall probably be correct in saying that the Kimberley and the Wesselton are the healthiest mines, notwithstanding the fact that during the period 1906-'07 the former mine displayed the greatest incidence and mortality from tuberculosis.

Causes of the difference in health between underground and surface workers.

288. It being evident from the constant marked difference between the health of the underground and surface worker that it is due to some one or more causes operating fairly constantly, and as the conditions of life of the miner and the surface worker only differ in the nature of their work—conditions in the compounds being identical—it is therefore evident that those causes must be sought for in some of the special conditions associated with underground work.

Now there are three sets of factors to which the difference may be due.

The first of these is connected with conditions which may, by reducing the vitality and powers of resistance of the miner, render him more susceptible to disease and less likely to recover from an attack of any infective organism.

The second is connected with the possibility of there existing below ground a larger amount of infection, or better opportunities of coming into contact with it.

We do not propose to discuss either of those contingencies at the present stage.

The third factor is the possibility of the two communities of underground and surface workers not being entirely homologous. It may be, for instance, that the two communities have not the same tribal constitutions, and we know that there is a vast difference in the degree to which the several native tribes fall victims to attacks of tuberculosis and pneumonia. Also that there are great differences in their general physique and constitution.

Effect of tribal difference in the surface and underground worker.

289. With regard to the last mentioned possibility, we have already indicated broadly the tribal composition of the native labourers on these mines, but as it will be necessary to go into this matter with some care, we submit the following percentage tribal analysis of the underground and surface workers for the three years 1910, 1911 and 1912,—the only period for which we could obtain information.

TABLE 37.—Showing the Tribal Composition of Underground and Surface workers on the De Beers Mines.

	Cape Province.		Bechuana-land.		British Pasutos.		Transvaal Basutos.		Matabele and Zulu.		Others.		Total.	
	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.	Under ground.	Surface.	Under-ground.	Surface.	Under-ground.	Surface.
Average annual strength ..	2,003	811	2,841	3,040	1,284	330	1,569	309	582	334	494	359	8,773	5,183
Percentage of entire annual strength :														
1910 ..	26·80	15·14	28·23	57·99	13·54	6·68	20·27	5·72	6·11	7·21	5·05	7·26	100·00	100·00
1911 ..	20·36	15·20	35·08	60·13	15·90	5·52	16·50	6·55	6·56	5·68	5·60	6·92	100·00	100·00
1912 ..	21·32	16·76	33·83	57·85	14·42	6·91	16·89	5·65	7·27	6·32	6·27	6·51	100·00	100·00
1910–1912..	22·83	15·65	32·38	58·65	14·64	6·37	17·89	5·97	6·63	6·44	5·63	6·92	100·00	100·00

It is seen from this that the tribal composition varies very little from year to year, either underground or on the surface, but that there is a considerable difference in the relative proportions of the different tribes underground as compared with the surface, the ratios being approximately :—

	Cape Province.	Bechuana-land.	British Basuto.	Transvaal Basuto.
Underground	7	11	5	6
Surface	5	19	2	2

The proportion of the remaining tribes do not differ much in the two communities.

290. The next point to determine is the comparative incidence and mortality of disease on the different tribes. This is displayed in the following Table 38, for the four main tribes, Cape Province, Bechuanaland, British Basutos (Basutoland) and Transvaal Basutos.* The other tribes are too insignificant to make them worth considering, also the small numbers would not furnish reliable ratios.

These figures are based on the records of the three years 1910, 1911 and 1912.

TABLE 38.—Showing for certain tribes the annual rates of case incidence, mortality and case mortality, of Tuberculosis, Pneumonia and certain other diseases on the De Beers Mines, during the period 1910–1912; separately for Underground and Surface workers.

	Cape Province.			Bechuanaland.			British Basutos.			Transvaal Basutos.		
	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.
Tuberculosis.												
Underground	2·50	0·17	6·66	5·86	2·46	42·00	8·31	2·34	28·12	8·49	2·76	32·50
Surface ..	..	..	..	2·74	1·32	48·00	2·02	2·02	100·00	8·62	3·25	37·50
Pneumonia.												
Underground	47·76	13·81	28·92	68·75	15·02	21·84	144·86	28·82	19·89	73·28	13·17	17·97
Surface ..	10·27	0·41	4·00	22·04	2·19	9·95	26·24	3·03	11·54	51·72	2·15	4·17
Other Respiratory Diseases.												
Underground	31·29	..	..	19·12	0·12	0·61	58·67	1·04	1·77	14·02	0·43	3·03
Surface ..	1·64	..	..	3·62	0·11	3·03	10·09	..	..	3·25	..	..
Scurvy.												
Underground	42·77	0·33	0·78	6·69	0·23	3·51	10·90	0·26	2·38	6·59	0·21	3·22
Surface ..	55·46	..	..	17·98	0·22	1·22	7·06	..	..	20·47	..	..
Cerebro-Spinal Meningitis.												
Underground	0·50	0·50	100·00	0·23	0·23	100·00	0·26	0·26	100·00	0·64	0·21	33·33
Surface ..	..	..	..	0·88	0·33	37·50	..	..	..	..	..	..
All Other Causes.												
Underground	120·65	3·16	2·67	115·44	2·58	2·34	243·51	4·67	19·19	100·25	2·97	2·97
Surface ..	62·04	..	..	89·92	2·30	2·56	83·75	1·01	1·20	135·77	1·07	0·76
All Causes.												
Underground	245·47	17·97	7·32	216·09	20·64	9·55	466·51	37·39	8·01	203·27	19·75	9·72
Surface ..	129·41	0·41	0·32	137·18	6·47	4·71	129·16	6·06	4·69	219·83	6·47	2·94

It will be observed that in each tribe the underground workers again show an enormously increased incidence of disease and mortality (excluding scurvy and cerebro-spinal meningitis) over the surface workers, the only exception being in the case of tuberculosis in the Transvaal Basuto, and in this instance the departure from the rule is entirely due to the occurrence of an unusual number of cases and deaths from tuberculosis among the surface workers of the Wesselton mine in the two years 1910 and 1911, the cause of which we have not the means to trace.

The figures in this table also indicate that the Cape Province native is very much less liable to tuberculosis or pneumonia than any of the other tribes. From this point of view he is in a class by himself.

As regards the Bechuana, the Basuto and the Transvaal Basuto, these tribes differ among themselves in the extent of their liability to tuberculosis and pneumonia. The Bechuana has less tuberculosis than the Basuto or the Transvaal Basuto; of the latter two tribes, the Transvaal Basuto, however, showing a slightly greater liability than the Basuto. But the Basuto has a much heavier incidence of, and mortality from pneumonia than either the Bechuana or the Transvaal Basuto. The Transvaal Basuto is, however, somewhat worse than the Bechuana in this respect.

291. It may be contended by some in regard to the general death-rate among surface and underground labourers, that the difference in favour of surface labour are attributable to variations in the tribal composition of these boys as compared with that of the underground natives. Reference to Table 38 will, however, show that

* Although returned by the Mine as Transvaal "Basuto," it would probably be more correct to employ the term "Transvaal Native," inasmuch as they include a proportion of Shangaans and other Transvaal tribes.

in regard to Tuberculosis, Pneumonia, "Respiratory Diseases" and "All Causes" (with the exception of tuberculosis amongst the Transvaal Basutos) the surface labourer exhibits in each tribal group a very considerably lower rate both for incidence and mortality than underground workers. The tribal composition cannot therefore explain the difference in rates between underground and surface workers and we are left with the other two sets of factors as causative agencies—namely those increasing the means of infection and those lowering constitutional vitality and powers of resistance.

De Beers Convict Station.

292. Before leaving the subject of the De Beers mines it is necessary to glance at the health of the convicts employed in connection with them, as this affords a useful standard with which to compare the health of the free labourers on the surface.

There are from 1,300 to 1,400 convicts continuously employed by De Beers, under Government care and supervision. The very great majority are pure natives, mostly Kaffirs, but there are a few Hottentots, Bastards, and coloured. To this extent, therefore, they are not as a community homologous with the community of the free workers. They are all long sentenced criminals, none under six months. About 75 per cent. are between six months and two years. The average stay on the station is over twelve months. They are said to greatly improve in health and physique after joining the station.

They all, with the exception of those engaged on station work, and about a hundred at the pulsator, are employed on the Dutoitspan and De Beers mines floors, in unloading, spreading and reloading blue ground.

They are housed in excellent stations, with large, clean, airy wards opening upon large airing courts. The floors of the wards are of concrete, and the convicts are provided with blankets and felt sleeping mats.

As is usual in penal institutions the place is kept very clean throughout, and all bedding is aired daily.

The men are conveyed by trollies to and from their work on the floors.

We witnessed the work they were performing, and the gangs appeared to be working at filling trucks as strenuously, or even more strenuously, than the free labourers. They do no work on Saturday afternoons and Sundays.

There is a medical officer (Dr. H. Symonds) who visits the stations regularly. All convicts are medically examined before they are sent to the station, and again examined by the medical officer on admission, and certified if fit for hard labour. The men are stripped and examined by the hospital warder once in three months, and the medical officer visits the station once a week when the men are all assembled there.

As soon as any convict is found to be suffering from chronic disease or becomes unfit for hard labour he is transferred to some other penal establishment.

Immediately a case of tuberculosis is discovered it is placed in hospital, and the kit and clothing are disinfected or destroyed.

The company pays to the Government a daily sum in respect of each convict on the station whether working or not.

We were informed by Mr. E. C. Dyason, the Superintendent, that he considered that there had been of late years a progressive improvement in the general health and well-being of the convicts, which he was convinced was entirely due to the improvement in the convict station and especially the wards, and the allotting of more space to the inmates. The convict regulations had provided for an increased minimum distance between individual sleepers. There was no other obvious factor to which the health improvement could be attributed. The work and conditions of work were the same, and the diet had always been good and had remained practically unaltered.

The following is the scale of diet since 1906:—

Breakfast.

On every day of the week	10 oz. mealie meal, half oz. salt; served as porridge.

Dinner.

On every day of the week	16 oz. bread.

Evening Meal.

On Sundays, Tuesdays, Thursdays and Saturdays ... ... 8 oz. cooked meat, 8 oz. vegetables, half oz. salt, 8 oz. bread. The liquid in which the meat is cooked is served with the vegetables in the form of soup, and must be consumed.

Evening Meal.

On Mondays, Wednesdays and Fridays 16 oz. crushed mealies, 8 oz. potatoes, 1 oz. fat, half oz. salt, cooked and made into a slab; 8 oz. bread.

Every boy is compelled to consume his ration.

Tuberculosis and Pneumonia among the convicts.

293. The following is a statement of the cases and deaths from tuberculosis and pneumonia occurring among the convicts during each year of the period 1902 to 1912.

Showing the annual incidence and mortality of Tuberculosis and Pneumonia among the inmates of De Beers' Convict Station, during the period 1902-1912.

Year.	Mean daily strength throughout the year.	Tuberculosis.				Pneumonia.			
		Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.	Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.
1902	698	2	..	2·86	..	2	1	2·86	1·43
1903	654	1	..	1·53	..	7	2	10·73	3·06
1904	788	1	..	1·27	..	3	..	3·81	..
1905	1,014	2	2	1·97	1·97	4	1	3·94	0·98
1906	1,206	3	2	2·49	1·66	5	2	4·14	1·66
1907	1,295	2	2	1·54	1·54	8	1	6·18	0·77
1908	1,105	5	4	4·52	3·62	1	..	0·90	..
1909	1,219	5	4	4·10	3·28	18*	3	14·76	2·46
1910	1,207	5	3	4·14	2·48	12	1	9·94	0·82
1911	1,191	4	3	3·36	2·52	2	1	2·52	0·84
1912	1,231	7	2	5·69	1·62	8	1	6·50	0·81
Mean of entire period	..	..	..	3·19	1·89	..	..	6·03	1·12

* Said to have been due to a severe epidemic of influenza.

It will be remembered (Table 33) that the annual incidence and mortality per 1,000 of tuberculosis and pneumonia among the De Beers surface workers during the period 1903-1912 were:—

	Incidence.	*Mortality.*
Tuberculosis	4·00	1·80
Pneumonia	30·30	4·23

Therefore, as far as tuberculosis is concerned, both incidence and mortality are practically the same for convicts and free surface workers. They are probably better in the former, however, because the convicts are under stricter discipline and medical observation, and therefore a larger proportion of the cases occurring are detected. Also they are under observation for over a year, on the average, while the free labourers are only for six to eight months, whereas the average time between joining the station and declaring sick with tuberculosis is eleven months

But as regards pneumonia there is no question as to the better health of the convicts, as with them the incidence is only a fifth and the mortality only a fourth of that among free surface workers.

With regard to pneumonia, Dr. Symonds, in his evidence to the Commission, seemed inclined to attribute the much smaller amount among the convicts to the better station (*i.e.*, compound) conditions.

Analysis of the cases of tuberculosis.

294. As to the large occurrence of tuberculosis, he thought that in spite of the careful medical examination, the majority of the cases had come to the station with a focus of infection, and that some must have been actually suffering from active disease at the time.

Analysing the figures of thirty-six cases in convicts treated by him during the period that he had been medical officer, one was suffering with tubercular peritonitis on arrival, and died at the end of six days, and one each had only been, respectively, four, eight, ten, eleven, twelve and seventeen days on the station before declaring sick. As many as eight had been there less than a month when found to be suffering from the disease. Nevertheless, many others had been for many months on the station, some for years, and the average stay had been three hundred and thirty-three days.

Of the thirty-six cases, twenty-four died, nine were transferred to some other institution within a few days or a month; one was discharged, time-expired, one was still in hospital, and of one the issue was not recorded.

All of the twenty-four fatal cases were subjected to post-mortem examination. They had died very rapidly, the average period, after declaring sick, being only thirty-three and a half days, the longest seventy-five days, and there were cases which had been under treatment only four, six, seven, nine, and ten days respectively, while thirteen were under a month.

The form of the disease in the case of ten deaths was general disseminated tuberculosis, in eight tubercular peritonitis (which Dr. Symonds said was really general tuberculosis, peritonitic symptoms being the most prominent during life), four were tubercular meningitis, and only two pulmonary.

Of the twelve cases in which death had not supervened at the time of the record, three were pulmonary, two general, one glandular, and six unspecified.

295. We have got out these details as they are reliable, and are of importance from three points of view. In the first place they illustrate the great tendency of the disease in natives to generalisation, its extremely rapid course, and its fearful fatality.

In the next place they show how difficult it is to obtain prompt discovery of cases among natives, even when they are under the complete disciplinary control of a convict station. It is unlikely, however, that many of these cases were really ill for any long period before coming under observation. Probably the only reliable means of early detections of such cases is by the routine taking of the temperature.

Finally they suggest the question as to whether these men acquired the infection on the station, or came there with the disease in a latent form already on them. This is a difficult question to answer, but viewing all the circumstances, it would appear not unlikely that the majority received their infection on the station.

C. THE JAGERSFONTEIN DIAMOND MINE.

General description.

296. The Jagersfontein Diamond Mine presents certain features of importance from the point of view of our enquiry, which are not found in the case of the Kimberley Diamond Mines, and which not only confirm the conclusions we have already reached, but also add to our knowledge.

The Commission visited the mine, and inspected above and below ground, and took evidence bearing upon the subject of this enquiry. It is indebted to Mr. Paul Debell, late General Manager of the New Jagersfontein Mining and Exploration Company, and to Mr. A. F. Brigham, the present General Manager, for data upon which the subjoined statistics are based, and for their courtesy in assisting the Commission with information on different points.

The mining area has been proclaimed a labour area under the provisions of the "Native Labour Regulation Act, 1911."

The Mine.

297. This mine was worked on as an open mine until August, 1910. From that date underground working was commenced, and was gradually increased—working in the open mine being steadily decreased—until by the end of March, 1913, work in the open mine practically ceased, owing to extensive falls of main reef, and since then not more than a daily average of fifty boys have been employed in the open workings. But from the end of March, 1911, the number of boys working underground predominated over those in the open workings. *Thus from the beginning of the year* 1911 *the mine may be deemed to have become an underground one.*

298. The mine is hot. It is not mechanically ventilated, ventilation being natural, by means of communications with the open workings.

It is a decidedly dusty mine. We found the air hazy with fine dust, and in the neighbourhood of the loading places it was very thick. In January, 1913, Dr. James Moir, Chemist to the Government Mines Department, reported on two samples of air-borne dust from this mine, submitted at the instance of Mr. Finzel and Dr. Vellacott in connection with an official enquiry carried out by them, on the instructions of the Government, in October, 1912, into the high rate of mortality from disease occurring on this mine.

Dr. Moir reported:—

> "From 720 level: sample green, soft and talcose, but under microscope found to be wholly crystalline; by analysis either talc or serpentine. About ten to fifteen per cent. free silica present, chiefly in rather large jagged particles.
>
> "From 780 level: similar, but softer and with less free silica.
>
> "Both samples were tried by violent rubbing on a glass slide with a rubber cork; No. 1 scratched the glass, No. 2 not. I think this is a rather good simple test for dust, since all material of non-silicotic nature has a hardness of five or under, glass being about six."

299. The boys are hauled from the 900 feet level. They are provided with great coats at the surface by the company. About a hundred and fifty yards from the shaft there is a rest house on the surface, kept at a temperature of 55° or over. With the new mine compound they will proceed direct from the shaft to a rest room in the compound, through a tunnel way.

Machine drills are used, but there is a certain amount of hand drilling.

The boys are paid by the task. Drill boys make about three shillings and six-pence per day, and lashers and trammers about two shillings and seven-pence to two shillings and eight-pence per day. Drilling is more continuous work, but it is finished quicker, taking about five hours, and is nearly all done by Fingoes. The loading takes about seven hours and is mostly performed by the Basuto; the Fingo refusing it. In doing this work, which is piece-work, the Basuto works at a great pace for a spell, and then goes into the drives to sit and cool off. In the cold weather, the boys are kept at the working face and are not allowed to come up until the shift is finished, as otherwise they wait about in the tunnel where the draught is heavy. According to Mr. Debell, to Mr. Dickson, the Floor Manager, Mr. A. F. Brigham, at the time of our visit, Mining Engineer to the company, and others, the Cape Colony boy is hardier than the Basuto; he does not work so hard, and he takes much greater care of himself, guarding himself against chill. The Basuto works more strenuously, is more careless, more docile and is much preferred as a worker.

The day is divided into three eight hour shifts for the mine workers, but into two for the surface workers. From sunrise to sundown for a day's work, and from sundown to sunrise for a night's work, with such time off for breakfast and dinner as the company may fix. The surface boys therefore work much longer hours than do the mine boys. There is no Sunday work. "Loafing" is not recognised. A boy must be either sick or injured or working. [Questions 98222-98231.]

Conditions of Labour.

300. When the mine became an underground mine three eight hour shifts, in lieu of two twelve hour ones, had to be instituted in accordance with the requirements of the law, and this added, we are told, thirty-three per cent. to the number of boys, and consequently led to great overcrowding of the mine compound.

There were two compounds, one for the mine boys only (with the exception of a daily average of about thirty-five employed in the compound), and the other for the surface boys. A new compound, however, is in course of erection for the latter, and at the time of our visit was accommodating 1,200 boys.

Compound conditions.

301. Both of the old compounds are extremely bad, being badly placed, of inferior construction, badly ventilated, almost without light, are without bunks, have earth floors, difficult to be kept clean, littered with kit and spilled marewu, and are greatly overcrowded.

A large proportion of the boys have to sleep outside in the yards, but even then they could not accommodate all the boys, but for the fact that there are always a third or a half, as the case may be, out on shift. Thus night and day they are always overcrowded, with the reservation that owing to the opening of the new compound, the old mine compound has recently been relieved of this congestion. But during the time to which the subjoined statistics apply, the two compounds were said in evidence to have been equally bad in every respect.

The Commission of Enquiry above referred to found that the floor space and the cubic space per inmate, both in the mine compound and in the floor compound were much under the regulation requirements. The Government Native Labour Regulations require 200 cubic feet—which is little enough—and it is difficult to understand why such overcrowding has been so long permitted.

The officials of the mine admitted that it would be impossible for all the boys to even get into the sleeping huts, and that in the surface compound which, according to the regulations, should only contain 1,766, and in the mine compound they had had 3,900, while its official capacity was only about 1,600. As has been said, the congestion in the latter has since been relieved by the new compound.

The new compound is constructed of re-enforced concrete, and is of excellent design. Very slow progress, however, was being made in completing it, it having been begun about eighteen months before our visit.

302. The boys are fed by the company. They get as much mealie meal porridge as they care to consume, and a loaf of bread weighing one and a quarter pounds every day, and one pound of meat on Tuesdays and Fridays, with such vegetables as are in season, which are cooked for them in the form of a stew. Also as much tea or coffee as they want. They also receive one pound of sugar, one and a half pounds of boer meal, a span of tobacco and a box of matches every week. Any other articles they buy for themselves at the compound canteen.

303. There is a mine medical officer, and at each compound there is a small compound hospital for minor injuries and ailments, but they are not kept there long, and all serious cases go to the Jagersfontein Native Hospital. Sick boys are allowed to return to their homes if fit to travel. The subjoined statistics only refer to treated cases in the main hospital, but include all deaths wherever they occurred.

The boys are engaged on a three months' contract underground and four on the surface, but many extend it, and the average is from four to four and a half months.

Statistical Tables.

304. Practically all the natives referred to in the subjoined statistics are either Cape Colony natives—mostly Fingoes and some Tembus—or Basutos, from Basutoland or the Orange Free State. A few Transvaal natives were employed in the mine in the years 1906 and 1907.

We have, therefore, the following special factors connected with the statistics relating to this mine:—

(*a*) We can compare not only mine and surface work, but also open and closed mine work.
(*b*) The compounds are bad, and, for the later portion of the statistical period, overcrowded.
(*c*) There are only two tribal distinctions to be considered. The Cape native (Fingo and Tembu) who is of better physique, works less strenuously, and looks after his health better; and the Basuto of poorer physique and taking less care.
(*d*) The individual units forming the community change roughly about three times a year.

The mean annual strength of native employees is not so great as at Kimberley, and the number of cases of illness and death are in some cases small for the purpose of basing proportions. The statistical results therefore cannot be expected to be so even as those of De Beers.

The small number working during the year 1908 was owing to the crisis in the diamond trade, which necessitated a large reduction in the output.

TABLE 39.—Showing the rates of incidence and mortality among Mine and Surface workers on the *Jagersfontein Diamond Mine* from Tuberculosis, Pneumonia and Other Diseases, in each year of the period 1906–1912.

Year ..	1906.			1907.			1908.			1909.			1910.			1911.			1912.			1906–1912.		
Average strength :																								
Mine workers ..	1,446			1,832			672			1,266			1,905			2,789			3,640			1,936		
Surface workers	2,175			2,600			1,355			2,132			2,421			2,602			3,227			1,359		
	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.
Tuberculosis.																								
Mine workers ..	2·76	0·69	25·00	8·19	4·37	53·33	1·49	1·49	100·00	0·79	0·00	0·00	2·10	0·52	25·00	10·40	3·23	31·03	3·02	1·10	36·36	4·80	1·77	36·92
Surface workers	4·60	3·22	70·00	2·69	1·54	57·14	0·00	0·00	0·00	2·81	1·87	66·66	2·06	0·83	40·00	1·92	1·54	80·00	1·24	0·31	25·00	2·24	1·33	59·46
Pneumonia.																								
Mine workers ..	81·60	11·06	13·56	79·15	8·19	10·34	19·34	0·00	0·00	23·70	6·32	26·66	42·52	6·30	14·81	82·11	32·27	39·31	65·39	25·27	38·66	63·02	17·20	27·28
Surface workers	19·31	2·75	14·28	26·15	4·23	16·18	6·64	0·74	11·11	17·35	3·75	21·62	14·46	1·24	8·57	23·83	12·30	51·61	14·87	2·48	16·67	18·23	4·18	22·92
Other Respiratory Diseases.																								
Mine workers ..	17·98	0·00	0·00	14·74	1·09	7·41	8·93	0·00	0·00	29·23	0·79	2·70	12·60	0·00	0·00	29·04	0·36	1·23	36·26	0·55	1·51	24·58	0·44	1·80
Surface workers	5·06	0·00	0·00	5·77	0·00	0·00	4·43	0·00	0·00	25·80	0·00	0·00	6·61	0·41	6·25	9·99	0·38	3·84	21·69	2·17	10·00	12·05	0·55	4·52
All Other Diseases.																								
Mine workers ..	201·94	16·60	8·22	180·68	4·37	2·42	187·50	5·95	3·17	126·38	0·79	0·63	175·33	6·82	3·89	186·09	7·53	4·05	103·02	6·04	5·87	157·71	6·86	4·35
Surface workers	121·84	8·73	7·16	109·62	6·15	5·61	64·94	5·90	9·09	75·98	3·75	4·93	91·70	2·89	3·15	120·67	3·84	3·18	100·09	3·41	3·41	100·47	4·78	4·76
All Causes of Disease.																								
Mine workers ..	304·28	28·35	9·32	282·76	18·02	6·37	217·26	7·44	3·42	180·10	7·90	4·39	232·55	13·64	5·87	307·64	43·39	14·10	207·69	32·96	15·87	250·11	26·27	10·50
Surface workers	150·81	14·70	9·76	144·23	11·92	8·29	76·01	6·64	8·74	121·94	9·37	7·69	114·83	5·37	4·67	156·41	18·06	11·55	137·89	8·37	100·47	132·99	10·84	8·15

305. In the above Table 39 are given the case incidence, death-rates and case mortality from tuberculosis, pneumonia, other respiratory diseases, and all other diseases, among the mine and surface workers, respectively, during each year from 1906 to 1912. The figures are somewhat uneven as no tribal distinction is made, therefore, the effect of variations in tribal composition is merged in the result.

It will be observed that as regards tuberculosis the actual proportion, and also the difference between the mine and the surface worker is variable year by year.

With regard to pneumonia, there has been year by year throughout the period a very great difference between both the incidence and the mortality on the mine, as compared with the surface worker and becoming greater (especially the mortality), in the years following the commencement of underground mining.

In the case of other respiratory diseases, and of "all other diseases," the proportion both of cases and of deaths is, with few exceptions, greater in each year among the mine worker.

306. It will be remembered that the change to underground mining commenced early in the year 1910; by the beginning of 1911 the number of underground workers preponderated, and the change was complete early in 1913. We have, therefore, constructed Table 40, showing the rates of incidence and mortality of tuberculosis, pneumonia and other diseases among the several tribes working respectively in the mine and on the surface during (*a*) the four year period 1906-1909, before the introduction of underground mining, and (*b*) for the two years 1911 and 1912, after its introduction. We have left the year 1910 out of consideration as being the turning point of the change.

TABLE 40.—Showing the proportions of Tuberculosis, Pneumonia and Other Disease occurring on the *Jagersfontein Diamond Mine* among the several tribes employed respectively in the Mine and on the Surface, during (*a*) the period 1906–1909, before the introduction of underground mining, and (*b*) the period 1911–1912, while this introduction was in progress.

	Mine.						Surface.						1906 to 1912.					
	1906 to 1909.			1911 and 1912.			1906 to 1909.			1911 and 1912.			Mine.			Surface.		
	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.
Tuberculosis.																		
Cape Province	1·10	0·37	33·33	3·40	1·42	41·66	2·07	1·27	61·54	0·99	0·49	50·00	2·02	0·81	40·00	1·48	0·82	55·55
Basuto and Orange Free State	1·28	1·28	100·00	9·77	2·79	28·57	4·20	2·62	62·50	2·87	1·72	60·00	6·59	2·13	32·35	3·99	2·34	62·94
Other Tribes	17·15	7·50	43·75	0·00	0·00	0·00	29·85	29·85	100·00	0·00	0·00	0·00	16·38	7·16	43·75	18·52	18·52	100·00
Total All Tribes ..	4·03	1·92	47·62	6·22	2·02	32·50	2·78	1·81	65·22	1·54	0·86	55·55	4·80	1·77	36·92	2·24	1·33	59·46
Pneumonia.																		
Cape Province	29·70	4·40	14·81	38·23	16·14	42·22	12·72	2·07	16·25	13·56	5·92	43·64	32·91	9·98	30·33	12·61	3·05	24·18
Basuto and Orange Free State	50·13	6·44	12·82	114·87	43·30	37·69	38·82	6·82	17·57	31·55	9·18	28·88	89·18	27·34	30·65	33·78	7·51	22·22
Other Tribes	157·56	18·22	11·56	88·23	29·41	33·33	29·85	0·00	0·00	0·00	0·00	0·00	153·53	18·42	12·00	37·03	0·00	0·00
Total All Tribes ..	58·66	7·48	12·74	72·64	28·31	38·97	18·88	3·15	16·67	18·87	6·86	36·36	63·02	17·20	27·28	18·23	4·18	22·92
Other Respiratory Diseases.																		
Cape Province	13·20	0·37	2·77	19·26	0·28	1·47	9·38	0·00	0·00	10·60	0·99	1·30	15·78	0·27	1·71	9·22	0·41	4·46
Basuto and Orange Free State	18·64	1·28	6·90	50·64	0·70	1·38	14·69	0·00	0·00	30·41	2·29	7·55	35·87	0·77	2·16	20·41	0·94	4·60
Other Tribes	33·22	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	0·00	31·73	0·00	0·00	0·00	0·00	0·00
Total All Tribes ..	18·40	0·57	3·12	33·13	0·47	1·41	10·53	0·00	0·00	16·47	1·37	8·32	24·58	0·44	1·80	12·05	0·55	4·52
All Other Diseases.																		
Cape Province	142·28	4·76	3·45	90·06	5·66	6·29	94·93	6·20	6·53	86·76	2·46	2·84	121·10	5·66	4·68	91·59	4·45	4·86
Basuto and Orange Free State	209·51	9·64	4·60	199·72	8·03	4·02	103·88	6·30	6·06	163·51	6·31	3·86	201·05	7·75	3·86	127·14	5·86	4·61
Other Tribes	209·00	9·65	4·62	117·65	0·00	0·00	74·63	0·00	0·00	0·00	0·00	0·00	206·75	11·26	5·45	46·30	0·00	0·00
Total All Tribes ..	174·27	7·09	4·07	139·06	6·69	4·81	96·83	6·17	6·37	109·28	3·60	3·30	157·71	6·86	4·35	100·47	4·78	4·76
All Causes of Disease.																		
Cape Province	186·28	9·90	5·31	150·95	23·50	15·57	119·10	9·54	8·24	111·91	9·86	8·81	171·81	16·72	9·73	114·90	8·73	7·60
Basuto and Orange Free State	279·56	18·64	6·66	375·00	54·82	14·62	161·59	15·74	9·74	228·34	19·50	8·54	332·69	37·99	11·42	185·32	16·65	8·98
Other Tribes	416·93	35·37	8·46	205·88	29·41	14·29	134·33	29·85	22·22	0·00	0·00	0·00	408·39	36·84	9·02	101·85	18·52	18·18
Total All Tribes ..	255·36	17·06	6·68	251·05	37·49	14·93	192·02	11·13	8·63	146·16	12·69	8·68	250·11	26·27	10·50	132·99	10·84	8·15

Note.—The ratios relating to other tribes are of no statistical value, as the numbers on which they are based are too small. In the years 1906 and 1907 a few hundred Transvaal natives were employed underground.

Mean annual strength throughout period 1906-1912 :—

Cape Province Natives. Basuto and O.F.S. Natives. Other Tribes.

The figures in the above table are most important. They demonstrate the following facts:—

(*a*) That among the mine workers both tuberculosis and pneumonia are increased enormously, both in the proportion of their occurrence and in their mortality, in the second period when the work became underground in character. And this increase occurred both among the Cape natives and the Basutos.

Other diseases were increased less regularly and to a lesser extent.

(*b*) That among surface workers there was but little change. Such change as occurred was on the whole in the direction of an increase, especially in the mortality from pneumonia.

It is only right to add, however, that during the later period overcrowding in the compounds increased, and that this increase was greater in the case of the mine compound than the surface compound, for the simple reason that the surface compound was overcrowded during the first period. During the second period both compounds became nearly on a par as regards overcrowding.

(*c*) That during the first period, before underground mining was introduced, the health of surface and mine workers were nearly equal. There was, however, a little more pneumonia and a little less tuberculosis among the mine workers.

(*d*) That when adverse conditions arose from the adoption of underground mining, the Basuto suffered to a relatively greater extent than did the Cape native, especially as regards pneumonia and tuberculosis.

(*e*) That these adverse conditions not only rendered the native more liable to attack, but also less able to recover when attacked.

(*f*) That the greater incidence of disease and mortality, and especially of pneumonia, on the Basuto as compared with the Cape native, which we saw was the rule on the Kimberley mines, is equally shown to be the rule throughout on the Jagersfontein mine.

The figures relating to the year 1913.

307. Since preparing the above tables and drafting our observations on them, it has become possible, owing to the kindness of Mr. Brigham, to examine the figures for the calendar year 1913.

It will be remembered that the system of mining did not become *entirely* changed into underground mining until the beginning of 1913, therefore the full effect on the mine workers from open to underground working was not obtained until this year. It is, therefore, of importance to ascertain whether the increased incidence and mortality from tuberculosis, pneumonia, and other diseases on the mine workers, observed during 1911 and 1912, when the change to underground was in progress, but was not yet completed, persisted during 1913, during practically the whole of which year the mine was an underground mine.

The following Table 41 shows that the difference between underground and surface workers has fully continued during the year 1913, and has persisted and manifested itself in spite of the fact that during this year the underground ventilation and sanitary conditions were improved, and that especially the compound conditions of the mine workers were very greatly improved, the new mine compound already alluded to being occupied by 13 per cent. of mine workers in January, which percentage was increased to 37 per cent. in June and 62 per cent. in December of the year, thus doing away with the severe overcrowding previously existing in the mine compound, and also enabling better sanitary and other conditions to be carried out. On the other hand the compound conditions of the surface workers remained in the bad state already described in a previous page.

TABLE 41.—Showing number of cases and deaths from Tuberculosis, Pneumonia and certain Other Diseases among the Mine and Surface workers, respectively, on the New Jagersfontein Diamond Mine during the year 1913.

	Cape Province Natives.					Basutoland and Orange Free State Natives.					Other Natives.					Total.				
Average Annual Strength:																				
Mine	1,932					1,500					88					3,520				
Surface	2,386					1,133					13					3,532				
	Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.	Cases.	Deaths.	Case incidence per 1,000.	Mortality per 1,000.	Case mortality per cent.
Tuberculosis.																				
Mine	1	1	0·52	0·52	100·00	11	7	7·33	4·67	63·64	..	..	..	..	..	12	8	3·41	2·27	66·66
Surface	2	1	0·84	0·42	50·00	6	..	5·30	0·00	0·00	..	..	..	..	..	8	1	2·26	0·28	12·50
Pneumonia.																				
Mine	79	28	40·89	14·49	35·44	228	86	152·00	57·33	37·72	..	..	..	..	..	307	114	87·22	32·39	37·13
Surface	22	8	9·22	3·35	36·36	28	6	24·71	5·30	21·43	2	..	153·85	..	..	52	14	14·72	3·97	26·92
Cerebro-Spinal Meningitis.																				
Mine	46	..	23·81	0·00	0·00	147	1	98·00	0·66	0·68	1	..	11·36	..	..	194	1	55·11	0·28	0·52
Surface	66	..	27·66	0·00	0·00	79	1	69·73	0·88	1·27	1	..	76·92	..	..	146	1	41·34	0·28	0·69
Enteric Fever.																				
Mine	12	3	6·21	1·55	25·00	15	4	10·00	2·66	26·66	..	..	..	..	..	27	7	7·68	1·99	25·93
Surface	26	12	10·89	5·03	46·15	13	5	11·47	4·41	38·46	..	..	..	..	..	39	17	11·04	4·81	43·59
All Other Diseases.																				
Mine	296	6	153·21	3·11	2·03	476	4	317·33	2·67	..	5	..	56·82	..	..	777	10	220·74	2·84	1·29
Surface	446	0	186·93	..	..	350	3	308·92	2·65	0·85	7	..	538·46	..	..	803	3	227·34	0·85	0·37
All Causes.																				
Mine	434	38	224·64	19·67	8·75	877	102	584·66	67·99	11·63	6	..	68·18	..	..	1,317	140	374·16	39·77	10·63
Surface	562	21	235·54	8·80	3·74	476	15	420·13	13·24	3·15	10	..	769·23	..	..	1,048	36	296·70	10·19	34·35

Comparison of De Beers and Jagersfontein results.

308. It now only remains for us to compare the Jagersfontein results with those obtained in the case of Kimberley. We have seen that the Jagersfontein compound conditions have been worse than those in the Kimberley compounds, and that possibly the Jagersfontein underground conditions are less satisfactory than at Kimberley. We ought, therefore, to expect that the health of the Jagersfontein natives is also worse than that of those at Kimberley. Is this expectation justified? The comparison instituted in the following Table 42 shows that it is justified.

In this table the comparison is made between the mean of the three years 1910 to 1912 at Kimberley (all mines), and the mean of the two years 1911 and 1912 at Jagersfontein.

TABLE 42.—Giving a comparison of the health of natives working at the Kimberley Mines and the Jagersfontein Mine.

	Mine Workers.				Surface Workers.			
	Kimberley.		Jagersfontein.		Kimberley.		Jagersfontein.	
	Case incidence.	Mortality.	Case incidence.	Mortality.	Case incidence.	Mortality.	Case incidence.	Mortality.
Tuberculosis.								
Cape Natives	2·50	0·17	3·40	1·42	0·00	0·00	0·99	0·49
British Basutos	8·31	2·34	9·77	2·79	2·02	2·02	2·87	1·72
Pneumonia.								
Cape Natives	47·76	13·81	38·23	16·14	10·27	0·41	13·56	5·92
British Basutos	144·86	28·82	114·87	43·30	26·24	3·03	31·55	9·18
Other Respiratory Diseases.								
Cape Natives	31·29	0·00	19·26	0·28	1·64	0·00	10·60	0·99
British Basutos	58·67	1·04	50·64	0·70	10·09	0·00	30·41	2·29
All Other Causes.								
Cape Natives	163·92	3·99	90·06	5·66	117·50	0·00	86·76	2·46
British Basutos	254·67	5·19	199·72	8·03	90·81	1·01	163·51	6·31
All Causes.								
Cape Natives	254·47	17·97	150·95	23·50	129·41	0·41	111·91	9·86
British Basutos	466·51	37·39	375·00	54·82	129·16	6·06	228·34	19·50

We see from this that among the surface workers both the incidence and mortality is with one exception universally greater at Jagersfontein than at Kimberley. Both among the Cape Natives and Basutos. Also for underground workers the same holds good as far as the *mortality* is concerned (except in the case of other respiratory diseases); but the *incidence* of all diseases, except tuberculosis is greater in the Kimberley Mines. That in some cases the *incidence* of illness is greater at Kimberley, is no doubt due to the fact that all hospital cases are included at Kimberley, whereas at Jagersfontein some of the minor cases—those treated in the compound hospital—are omitted.

Conclusions.

309. We, therefore,, believe that we may conclude from a consideration of the above statistics, taken in conjunction with the particular circumstances of the Kimberley and Jagersfontein Diamond Mines:—

(*a*) That overcrowding and bad compounds materially affect the occurrence and mortality of pneumonia, tuberculosis and disease generally.

(*b*) That the conditions of underground mining enormously increase the liability of the worker to attack from the disease, and to succumb when attacked.

(*c*) That open mining is possibly a little more unhealthy than surface work, but not much.

(*d*) That the Basuto is more adversely affected by unhealthy conditions, and is more *progressively* affected by *increasingly* bad conditions than is the Cape native (notably the Fingo). In other words, he is constitutionally less adaptable to an adverse environment.

(*e*) That there are good grounds for believing that the superior resistance of the Cape native is in large measure due to his superior physique, to the fact that he takes better care of himself, and possibly that he chooses and performs his work in a manner to cause less physical strain to himself.

(*f*) That arguing from these facts—

(i) that a fall in the incidence of pneumonia and tuberculosis among underground workers is seen to be synchronous with improved compound conditions; [Kimberley, paragraph 286.]*

(ii) that underground work tends to increase the relative proportion of case mortality, as well as the case incidence;

(iii) that the detrimental effect of underground work is shown in respect of other diseases besides tuberculosis and pneumonia, in fact on the health generally; and

(iv) that it manifests itself immediately upon underground mining being introduced (Jagersfontein), and before there has apparently been time for any extensive infection of the workings,

the deductions seems to be justified that the underground workings are not in themselves the main source of the infection of these two diseases, but that the effect of such work is produced by lowering the general powers of resistance of the individual against bacterial invasion.*

D.—The Premier Diamond Mine.

General Conditions.

310. This mine is situate about thirty miles from Pretoria, at an altitude of a trifle over 5,000 feet above sea level. It is thus about 700 feet lower than the Rand Mines. The cold in winter is said not to be so severe as on the Reef.

The mine is an open one, having no underground workings. Although its depth is several hundred feet, the pit is so huge that to all intents the workers are as though they were on the surface. The descent into this pit is by means of an easy inclined road formed of unmined ground.

A daily average of over 14,000 native labourers are employed. The tribal composition varies from time to time, but taking the year 1912, it consisted of East Coast, 28·2; Transvaal, 33·0; Cape Colony, 11·1; Basuto, 21·8; others, 5·3; and Tropicals only 0·6 per cent. In the two previous years the Tropicals amounted to from four per cent. to seven per cent. It will be seen that the tribal composition is such as to lead us to expect on this ground a moderately high aggregate rate of sickness and mortality.

Compounds.

311. The natives are housed in five different compounds. The huts in one of these, known as No. 1, are of the Rand mine type and built of either brick or stone, and have concrete floors with a top layer of granolithic. In the other compounds the huts are of wood and iron, and in all but one compound, in which they are of concrete, the floors are of earth. In all of them the inmates slept in their blankets on the bare floor; but just prior to our visit the company began fitting wooden bunks on iron staging.

* *Note, dissenting, by Drs. Porter and Turner.*—We share the general belief that overcrowding and bad compounds tend materially to affect the occurrence and mortality of Pneumonia, Tuberculosis and disease generally, but we are unable to agree that this conclusion, however probable on other grounds, can safely be based upon the comparison in question, namely, of the statistics and circumstances of the Kimberley and Jagersfontein Diamond Mines, in view of the facts (*inter alia*) that the rates as regards mortality and incidence of Tuberculosis for both underground and surface workers are inconclusive, owing to fewness of events on which they are based; while as regards underground workers, the *incidence rates* for "Other Respiratory Diseases," "All Other Causes" and "All Causes" are distinctly higher at Kimberley, where the conditions are admittedly better.

We are in agreement, however, with the above conclusions marked (*b*), (*c*), (*d*) and (*e*).

Also, while, for the reasons already stated, we do not agree with clause (*f*). (i) above, we concur in the sub-clauses (ii), (iii) and (iv) of clause (*f*), and we are also in accord with the final deduction that is made thereon.

Dr. J. C. A. Rigby, the Company's Chief Medical Officer, informed the Commission that he is of opinion that the Rand type of hut in No. 1 compound was unhealthy, owing to an excess of ventilation, badly distributed, as compared with the wood and iron huts in which the ventilation was less ample and more diffused, as it filtered in through the joints in the galvanised iron. In order to test this he had prepared tables showing for a period of fourteen months the amount of sickness among the occupants of No. 1 compound, as compared with those in the others, and he found that the percentage of sickness in the Rand mine type of hut was about double what it was in the wood and iron structures.

We must point out, however, that this difference possibly might have another explanation, in that while in the wood and iron huts the inmates were sleeping on an earthen floor, in the Rand mine type of huts in compound No. 1, they were sleeping on the colder concrete floors. Also there may have been other important points of difference. We, therefore, cannot deduce much from this observation.

Some of the huts are admitted to be overcrowded at times, less than the minimum of two hundred cubic feet per inmate being provided. This is chiefly the case on Saturday nights when both shifts are in at once.

The huts are occupied continuously day and night by the two shifts.

No fire braziers nor any fire is allowed in the huts; the boys raise no complaint against this. Cooking places are provided in the compound yard.

The mine being an open one the boys are exposed to rain, and therefore very effective steam dryers are provided, in which all wet clothing is dried for them very quickly.

The boys feed themselves entirely, but the company provides them with Kaffir beer once a week. They can, however, buy cooked rations in the compound.

Two shifts are worked, a day and a night.

The term of employment varies considerably. The average stay for other than East Coast is about four months, but for East Coast and such few Tropicals as have been employed, the contract is for twelve months.

Discussion of Statistics.

312. The statistical information in our possession concerning this mine is not great, nor is it best suited for the purposes of this enquiry. For the figures upon which the two following tables are based we are indebted to the Government Native Labour Bureau.

TABLE 43.—Showing the annual death and repatriation rates per thousand of the mean strength from Tuberculosis, Pneumonia and certain other diseases on the *Premier Diamond Mine* during the years 1910, 1911 and 1912.

Year	1910.			1911.			1912.			1910–1912.		
Mean strength ..	10,606			10,490			14,184			11,760		
	Rate of mortality.	Rate of repatriation.	Total wastage.	Rate of mortality.	Rate of repatriation.	Total wastage.	Rate of mortality.	Rate of repatriation.	Total wastage.	Rate of mortality.	Rate of repatriation.	Total wastage.
Tuberculosis	3·68	3·01	6·69	3·62	0·76	4·38	3·24	5·00	8·24	3·48	3·15	6·63
Pneumonia	31·96	13·10	45·06	28·59	1·24	29·83	21·57	5·64	27·21	26·78	6·58	33·36
All Other Respiratory Diseases..	0·84	1·51	2·35	0·09	0·19	0·28	0·14	1·62	1·76	0·34	1·16	1·50
Scurvy	..	0·37	0·37	..	0·19	0·19	0·35	7·26	7·61	0·14	3·09	3·23
Meningitis..	2·64	0·09	2·73	2·48	..	2·48	1·41	..	1·41	2·10	0·03	2·13
Enteric Fever	0·56	..	0·56	1·90	..	1·90	1·48	0·99	2·47	1·33	0·40	1·73
Dysentery..	1·41	2·45	3·86	2·00	..	2·00	1·13	0·91	2·64	1·48	1·10	2·58
Rheumatism	..	1·32	1·32	..	..	..	0·07	1·55	1·62	0·03	1·02	1·05
Cardiac Disease	0·56	0·56	1·16	0·57	..	0·57	0·56	1·06	1·62	0·57	0·59	1·16
Debility	..	5·37	5·37	..	42·79	42·79	..	3·88	3·88	..	15·90	15·90
All Other Causes	2·54	7·07	9·61	2·00	1·52	3·52	3·38	7·97	11·35	2·72	5·78	8·50
All Causes	44·22	34·88	79·10	41·27	46·71	87·98	33·35	35·88	69·23	38·97	38·80	77·77

TABLE 44.—Showing for each tribe (territorial description) the rates of mortality per thousand of the mean strength from Tuberculosis, Pneumonia and other diseases occurring on the *Premier Diamond Mine* during each of the years 1910, 1911 and 1912.

	Tropical.				East Coast.				Transvaal.				Cape Province.				Natal and Zululand.				Basutos.				Others.			
	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12.	1910.	1911.	1912.	1910–12
Mean strength ..	445	793	91	443	2,479	3,456	3,999	3,311	4,215	3,182	4,680	4,026	230	729	1,574	878	221	223	262	235	2,544	1,789	3,088	2,474	372	319	490	394
Tuberculosis ..	4·49	3·78	10·99	4·51	4·84	6·65	6·00	5·94	2·13	1·26	1·50	1·64	9·09	..	3·18	3·03	13·57	..	..	4·25	3·93	3·91	2·91	3·50	3·93	3·13	..	0·84
Pneumonia ..	125·84	83·23	22·96	94·05	24·44	39·64	40·00	37·24	15·89	8·80	10·47	11·82	33·33	15·09	6·99	12·53	18·10	17·93	..	11·33	42·45	25·71	21·37	16·17	53·76	25·07	34·69	38·10
Other Respiratory Diseases ..	2·24	1·26	..	1·50	0·40	..	0·50	0·30	0·47	..	..	0·16	..	..	..	..	..	..	..	..	1·57	..	..	0·54	2·69	..	..	0·84
Meningitis ..	4·49	3·78	10·99	4·51	5·24	4·91	2·75	4·13	1·19	1·26	1·07	1·14	..	..	..	..	..	..	..	..	2·36	1·12	0·65	1·35	5·40	..	..	1·69
Dysentery ..	2·24	3·78	..	3·01	0·40	2·02	1·75	1·51	0·47	..	0·43	0·33	..	6·86	2·54	3·42	4·52	..	..	1·41	3·54	1·68	0·97	2·02	2·69	9·40	..	3·38
All Other Cases..	2·24	12·60	10·99	9·03	4·43	4·43	9·50	6·44	4·03	2·51	4·27	3·70	..	5·48	4·45	4·18	9·04	..	11·45	7·07	3·14	3·92	4·53	3·91	..	9·40	..	2·53
All Causes ..	141·55	108·43	65·93	116·63	44·75	57·55	60·50	55·57	24·18	13·83	17·74	18·81	42·42	27·43	17·16	23·16	45·23	17·93	11·45	24·08	56·99	36·34	30·43	41·09	68·47	47·00	34·69	47·42

In the above Table 43 are given the death and repatriation rates in respect of tuberculosis, pneumonia, and certain other diseases occurring among the natives employed on the Premier Mine during each of the years 1910, 1911 and 1912.

In Table 44 the rates of mortality are also shown separately in respect of the territorial origin of the tribes.

With regard to the repatriations it is necessary to point out that while for the years 1910 and 1912 they have been rendered under the heads of the diseases on account of which they took place, in the year 1911 these have been mostly supplied to us under one group headed "Debility, following pneumonia and other diseases." Therefore, only the total rate of repatriation is of any value for that year.

Tuberculosis.

313. The mean annual rate of mortality from tuberculosis during the three years was 3·48 per thousand, and the repatriation rate 3·15. Distinguishing between the different tribes, or rather the territory of origin of the natives, which for our purpose is much the same, we find that the mortality rates ranged between 5·94 per thousand in the East Coast, to 0·84 per thousand in the group of other tribes; while the repatriation rate on account of this disease (which of course is greatly understated) runs from 4·83 per thousand in East Coast to 1·97 in the case of Transvaal natives.

The only similar undertaking with which we are able to compare these rates is the Kimberley Diamond Mines, but of course there are important differences between the two, the Kimberley Mines being fairly deep underground mines, whereas the Premier is an open working. Also the tribal composition of the mine labourers is quite different on the two. Comparing, however, the rates of mortality over the three years 1910 to 1912, for those tribes which are common to both mines, we then obtain the following figures:—

	Cape Natives.	British Basutos.	Transvaal Natives
Premier Mine	3·03	3·50	1·64
De Beers Mine—			
Underground	0·17	2·34	2·76
Surface	0·00	2·02	3·25

We see therefore that, except as regards Transvaal natives the Premier Min results are bad; but as to Transvaal natives it is not clear why there should be so great a difference between them and the other tribes working on the Premier.

Pneumonia.

314. It is, however, with respect to the occurrence of pneumonia that the Premier Mine appears to be particularly bad, this disease accounting for nearly two-thirds of the total death-rate. The mean rate of pneumonia mortality during the three years was 26·78 per thousand. Stated territorially the rates were:—

Tropicals (only a small number), 94·05.
East Coast, 37·24.
Basutos, 16·17.
Cape Province, 12·53.
Transvaal (Shangaans, Basutos, etc.), 11·82.
Natal and Zululand, 11·33.
Various other tribes (numbers too small to be of value), 38·10.

Compared with these we have on the Kimberley Mines:—

	Cape Natives.	British Basutos.	Transvaal Natives
Underground	13·81	28·82	13·17
Surface	0·41	3·03	2·15

Thus it is seen that the rate of mortality from pneumonia is from two to three times as great in East Coast as compared with other tribes (not taking into account Tropicals). It is also more than three times as great as occurred in the same years—1910, 1911 and 1912—among East Coast natives on the Rand Gold Mines. See table.

Dr. Rigby states that speaking roughly the greatest incidence of pneumonia occurs during the first three months of the boy's stay on the mine. If this be correct, then, and in view of the difference in the average length of stay of East Coast as compared with other natives, the rate of mortality of the latter would apply to about three different natives during the year, whereas that of the East Coast would apply to only one. So that on this basis the rate of mortality of, say the Basuto or the Cape native should be divided by approximately two for comparison with the East Coast.

We have not been able to ascertain the cause of this extraordinary occurrence of pneumonia on this mine.

During the years 1910 and 1911 no inoculations with pneumococal vaccine for the prevention of pneumonia had been carried out on this mine, but during 1912 we are informed that practically one half of all natives had been submitted to inoculation. There was a slight reduction in the mortality from pneumonia in the latter year, but this was not very much greater than had been the reduction between the year 1911, and the preceding year 1910; and in any case it was not sufficiently marked to warrant any safe deduction being made to the effect that the decrease was necessarily the result of anti-pneumonia vaccinations. The disease actually increased each year in the East Coast natives.

The death and repatriation rates from pneumonia for each of the three years were:—

	Death-rate.	Repatriation-rate	Total.
1910	31·96	13·10	45·05
1911	28·59	1·24	29·83
1912	21·57	5·64	27·21

As these figures are inconsistent with certain data relating to this mine contained in a report by Sir Almroth Wright, on the results obtained by prophylactic inoculation against pneumococcus infections, recently presented to the Witwatersrand Native Labour Association, we made enquiries of the Government Native Labour Bureau as to whether the figures furnished to us could be entirely relied on, and we were assured that they were an accurate compilation of the causes of death and repatriation as supplied to the Bureau by the authorities on this mine.

In connection with this question, it is of interest to compare the mortality rates for the three years for those complaints, some of which may also be of pneumococcol origin.

Thus:—

	1910.	1911.	1912.
All other Respiratory Diseases	0·84	0·09	0·14
Meningitis	2·64	2·48	1·41
Dysentery	1·41	2·00	1·13
All other diseases	2·54	2·00	3·38

The fall in the mortality between 1911 and 1912 from meningitis, which is very frequently of pneumococcol origin, may be taken as supporting the view of a reduction resulting from vaccine inoculation.

Seasonal Variation of Pneumonia.

315. The amount of pneumonia and the proportion of the case mortality varies throughout the year in a very marked degree, but there appears to be no particular time of the year when the greatest prevalence of the disease occurs. In one year this may happen in the first two or three months, and in the next in the middle or at the end of the year. This is shown in the following Table 45 compiled from figures given to the Commission by Dr. Rigby, in respect of the three years 1909, 1910 and 1911, before any vaccine inoculation was undertaken on the mine. This gives the case incidence and mortality per thousand of the average strength and the percentage of case mortality, for each month of the year.

TABLE 45.—Giving the case incidence, mortality, and case mortality of Pneumonia on the *Premier Diamond Mine* during each month of the years 1909, 1910 and 1911.

Month.	Case incidence per 1,000.			Mortality per 1,000.			Case mortality per cent.		
	1909.	1910.	1911.	1909.	1910.	1911.	1909.	1910.	1911.
January	2·40	7·57	18·11	0·25	1·23	2·60	10·52	16·21	14·36
February ..	2·38	6·44	12·38	0·63	1·16	2·24	26·32	18·06	18·11
March	3·12	9·29	11·99	0·52	1·73	2·32	16·67	18·64	19·35
April	2·51	11·90	10·55	0·28	2·31	2·85	11·11	19·39	27·03
May	4·65	21·74	9·98	0·45	4·63	2·05	9·68	21·31	20·56
June	3·84	15·79	14·25	0·48	3·22	2·28	12·50	20·38	16·03
July	5·76	14·20	12·06	0·96	3.11	1·89	16·67	21·91	15·67
August	12·34	14·54	11·55	1·66	2·48	1·15	13·41	17·07	15·15
September ..	22·16	7·14	10·45	3·24	0·91	3·62	14·61	8·71	34·71
October ..	18·27	10·13	8·09	3·37	1·55	0·87	18·45	15·29	10·75
November ..	14·41	11·98	5·37	2·25	2·14	1·18	15·60	17·86	22·03
December ..	10·71	21·62	3·67	2·08	3·71	0·71	19·42	17·14	19·44
Mean ..	9·04	12·97	10·71	1·45	2·44	2·04	16·01	18·82	19·02

Two facts appear from this table. One being that the periods of greater prevalence begin suddenly, last for several months and subside gradually. The other is that a greater percentage of case mortality generally coincides with the occurrence of a greater prevalence.

It does not seem possible to reconcile these variations with either of the views that prevalence of the disease results from the prevalence of cold weather, or that it occurs at change of the season. Nevertheless there must be some powerful predisposing cause operating which is able to treble and quadruple the amount of the disease.

Mortality from all Causes.

316. The total death-rate from all causes is extremely high on this mine, the mean for the three years being 38·97 per thousand, while the repatriation rate was 38·80; making a total rate of wastage of 77·77 per thousand. This is an extravagant waste of life and health for which we feel sure there must be some removable cause. A mine such as this should not be so unhealthy as these rates demonstrate. These men are all in the prime of life, and have been more or less carefully selected as to their physical fitness before joining the mine; and the majority of them are subjected to the conditions producing these rates for a very short period of time.

Once more making a comparison with Kimberley of the mean annaul mortality on each mine for 1910 to 1912, we have:—

	Cape Province.	Basuto.	Transvaal.
The Premier	23·16	41·09	18·81
De Beers—			
Underground	17·97	37·39	19·75
Surface	0·41	6·06	6·47

To summarise, it would appear that an undue amount of sickness and mortality occurs on this mine, and that whatever the causes may be, they are affecting the occurrence of tuberculosis as well as pneumonia and other diseases.

SECTION II.—THE COAL MINES.

A.—The Natal Coal Fields.

General description.

317. Of the twenty operating coal mines in Natal, your Commissioners took evidence at and inspected nine of the most important, namely the Natal Navigation Burnside, Durban Navigation, Elandslaagte, Hlobane, St. George's Natal Cambrian, Hatting Spruit and Newcastle Collieries. Of this number, members of the Commission inspected the sytem of underground workings at the Natal Navigation, Durban Navigation and Hlobane Collieries.

We desire to take this opportunity of thanking the respective Mine Managers and other mine officials for their courtesy and assistance to us in conducting our enquiry.

We also took the evidence of magistrates, medical officers and others whose duties were connected with this industry.

Particular attention was paid to the health of native and Asiatic employees, as affected by conditions of housing, diet, labour, medical supervision and general treatment.

The Natal coal fields are situate in the highlands of Natal at the northern extremity of the Province, within a triangular area having its apex South, at Elandslaagte, and its base between Newcastle on the West and Vryheid on the East. Its altitude ranges between 3,500 and 4,500 feet, most of the collieries being over 4,000 feet. The climate is, therefore, very cold in winter, with cold prevailing winds. It is thus extremely trying at this time of year to workers underground, especially to the Indians of the Indentured class.

The combined monthly output of coal is about 250,000 short tons. The total number of employees, although varying from time to time, may be put at between ten and eleven thousand. At the time of our visit it was 10,316; comprising 506 Europeans, 4,110 Asiatics and 5,700 Natives, the latter being mostly Natal natives and Zulus coming from the surrounding districts.

Of the Asiatics about 3,000 are indentured men, the rest are free. Indentured Indians are employed on some eleven collieries. Some mines, as the Natal Navigation, Burnside and Elandslaagte, employ a preponderance of Indians; at others, as the Durban Navigation, Glencoe and Hlobane, it is the reverse.

The Indians are under the supervision and protection of the Protector of Indian Immigrants, but there is no special authority looking after the welfare of the native, consequently the health conditions of his employment are not altogether satisfactory.

Underground Conditions.

318. These mines are of very moderate depth, varying from 100 to about 700 feet. Generally the seam is fairly thick, and there is consequently a good depth of working face, and the drives are fairly spacious. In the lower levels of the Hlobane Colliery they are somewhat cramped, and no doubt there are others like it which the Commission did not inspect.

As a rule the working faces are not far from the shaft; in the St. George's, however, the distance is nearly a mile. In most cases the tramways are laid on a down gradient, and we were unable to find that boys are under any great strain in pushing the tubs to the hauling way. On the St. George's Colliery they may have to push them 700 feet.

Ventilation is mostly by exhaust fans, but in some case it is natural. Most of the mines have two shafts, but in some the one shaft is both up-cast and down-cast. As a rule ventilation is said to be good.

Few of the mines are really wet; the Natal Navigation is raising 360,000 gallons per diem, but this is exceptional. Several are practically dry mines. A number are "dusty," in the explosive sense, and some are gassy, and the use of naked lights prohibited.

Coal Cutting and Dust. Research recommended.

319. Coal cutting is nearly all done by machine cutters, the amount of pick work being comparatively small. Some boys, however, refuse to engage on machine work. The Siskol drill is largely employed. The Jeffrey, Sutherland and Sullivan cutters are also used. To your Commissioners the Siskol appeared to produce the largest amount of dust. Standing near one of these in operation one was soon covered with a layer of extremely fine dust. Some investigation should be made into the health of persons employed in working these dust-producing cutters, as compared with those working with the pick or away from the face. The inhalation of coal dust is not generally believed to be injurious, indeed, owing to the apparent immunity of coal miners from phthisis and on the pathological appearance seen in anthracosis, some physicians have actually prescribed its inhalation for the treatment of pulmonary tuberculosis. Nevertheless we entertain considerable doubt of the innocuousness of breathing continuously air heavy-laden with dust such as is produced by the Siskol drill working in the easily friable coal found in some of these mines.

The ordinary daily task required of a boy working one of these drills necessitates about six hours continuous work at the face.

320. There is very little regard paid to underground sanitation. Certainly a few sanitary buckets were generally provided near the shaft at each level, but we did not see any evidence of their being used, and the statement usually made to us was that they either came to the surface empty, or containing only coal dust. On the other hand we did find evidence of disused drives being employed, and even of the working drives and faces being used. From time to time there has been a good deal of enteric fever on these mines, and at the Hlobane Colliery, between January and June, 1911, there was an outbreak of twenty cases among native employees, of whom seven died. It has also been very rife on the same colliery among the European employees and their families.

321. In no case were we able to ascertain that any supply of drinking water was provided underground for the employees. The natives were said to take marewe* down with them, and the Indians, tea. In no case is the water found in the mine workings fit to drink.†

Conditions of Work.

322. There are two shifts in the twenty-four hours. The night shift, however, is usually a small one and confined to cutting, trimming, squaring up the face, taking down "brushing," and making good defects. The day shift starts going down usually at six a.m., and those who have completed their task commence returning from one p.m. The night shift goes down from 6.30 p.m., and begins returning from 2.0 a.m.

No rest houses or other arrangements exist for tempering and preventing chill to the workers coming up from underground, although on some mines hot coffee is served during the winter months.

Most of the labour is task work, and wages average out at from two pounds ten shillings to three pounds per month. The tasks appear to be moderate.

The bulk of the cutting is done by natives, but otherwise natives and Indians appear to be employed indifferently, both above and below ground.

Indentured Indians are, of course, under contract, but the rest and also natives are engaged by the month.

* This is a thin mixture of boiled mealie meal, which has undergone acid fermentation. It is consumed as a food and drink in large quantities by natives in the compounds.

† We do not refer to the rare cases where a spring is tapped and preserved from pollution, and is pumped to the surface, for use as a domestic supply.

Housing.

323. As a general rule the quarters are bad; on some collieries they are extremely bad. In nearly all cases the rooms have mud floors, and there are no bunks, so that the inmates lie on the floor, which in the majority of cases was extremely filthy, and littered with dirty kit, old sacking and debris of food and marewe. In every native hut innumerable dirty kerosene tins containing this mixture encumber the floor.

Lighting and ventilation is often bad and in a number of cases the huts are back-to-back. There are of course exceptions, such as the new quarters erected on the Burnside Colliery, but such are not numerous.

With regard to back-to-back dwellings and ventilation, the Regulation No. 67, under the "Mines and Works Act, 1911," prohibiting back-to-back quarters and requiring adequate cross ventilation, came into operation on the 1st January, 1913, and if enforced, should lead to improvement.

The use of open fire braziers in the huts is frequent.

324. Many of the Indians are married and have with them their wives and children, and the conditions under which these families live is unsatisfactory.

On most mines a few of the natives are married, and these are usually accommodated in a location of huts. On some collieries there appear to be a good many unattached native females.

An unsatisfactory feature on most of the mines is the imperfect separation of the quarters of married Indians and unmarried natives. In some cases they are actually in the same block of rooms.

325. The surface sanitary arrangements also are lacking. The latrine accommodation is insufficient and improperly placed, with the result that the surroundings of the huts are fouled.

Also there is rarely a proper water supply within reasonable reach. Also in nearly all cases bathing and washing places are inadequate.

Scavenging pigs are a common feature.

Diet.

326. Both natives and Indians are rationed by the companies, the ration for the former, however, varies considerably. The usual ration for the native appears to be from two and a half pounds to three pounds of mealie meal per diem, and two pounds (weighed with bone), of raw meat a week (in some cases per fortnight). No vegetables (except when they are cheap), coffee, sugar or bread. Kaffir beer is usually served free once, and in some cases twice a week. At other times they can buy it from the company or at the store, licensed for the sale of native beer; or some of the married women are allowed each week in turn to make and sell a limited quantity.

In our opinion this is an insufficient diet on which to perform continuous labour, and this fact must have demonstrated itself by ill health and inefficiency, except for the circumstance that the boys either supplement it, or only continue at their employment for short periods at a time. We have already mentioned that the majority of the natives come in from the surrounding kraals, and the thing which strikes one in connection with their employment is the great percentage of the nominal strength who, at any given time, are absent from work, amounting to ten, fifteen or more per cent.

The Indian ration also varies somewhat from the official standard. It may be taken as being six pounds of mealie meal, seven and a half pounds of rice and two pounds of meat per week, with four pounds of dhal and one bottle of oil per month. On some mines, however, no meat or fish at all is given, on others it is only given once a month. Also on some the amount of rice is increased. Vegetables are given occasionally, when procurable.

Medical Attendance.

327. The Indians are attended by the Indian medical officers. We have reason to believe that in some cases their visits to the mines are not made as frequently as should be the case. Patients who are seriously ill are removed to the Indian Circle Hospital. That at Dundee, which serves an extensive area, containing a number of large collieries, is inconveniently placed on the far edge of the circle, and consequently sick Indians generally have to be conveyed long distances to it. At this hospital we found that female patients were entirely nursed by males, there not being a female employee or an employee's wife on the premises, from the Superintendent down to the kitchen boy.

Most mines have an appointed medical officer of their own, either visiting at regular intervals or only when called upon.

On some mines there is a small hospital of an indifferent kind. In some it is only a room reserved for the purpose in one of the ordinary huts. On some there is none. (The St. George's and the Natal Navigation Collieries.) Practically, however, natives are seldom medically treated on the coal mines for any but minor complaints. The universal practice is as soon as they fall sick to allow them —if not actually to encourage them—to clear off to their homes. Often no medical examination is made in order to ascertain if they are fit to travel.

As records of sickness are indifferently kept or not kept at all, it is quite impossible to obtain any idea of the sickness and mortality occurring among native employees. As one witness characterised the register kept on the mine to which he is medical officer: "My interpretation is that it is not a register of the sick at all, but a register of the cases which had to be reported to the Mines Department, or over which correspondence was likely to occur."

As an extreme illustration of the manner in which sick natives are allowed to go to their homes, we may mention the case of certain natives on the Hlobane Colliery. An outbreak of an anomalous disease reputed to be a scurvy, occurred among a body of recruited natives who had been on the mine for some months. On the 6th November, 1912, six of these sick natives (five of whom had been in hospital), were given their discharge to return to Kimberley. Of this number four were so ill that they had to be taken off the train by the time they reached Dundee, and removed to the Betania (Swedish Mission Hospital), where two died on the 8th November, another on the 6th December, and the fourth was in a very parlous state when we saw him at the hospital on the 13th December.

Recommendation.

328. It is our opinion that all natives employed on these coal mines should be brought under the protection afforded by the provision of the "Native Labour Regulation Act, 1911." On this question we had the evidence of Mr. J. W. Cross, Resident Magistrate of Dundee, and other witnesses who were strongly in favour of it, not only on health grounds, but also for other reasons.

We, therefore, strongly recommend that the Natal coal mines be constituted as soon as possible Labour Districts under this Act, and that one or more inspectors of native labourers be appointed under the eighteenth Section of the Act to supervise and control such labourers. In this connection we would suggest whether it would not conduce to greater efficiency in all directions, if the same officer who is appointed Inspector of Native Labourers be empowered at the same time to act under the Protector of Indian Immigrants in the supervision of the welfare of the Indians employed on those mines under the inspector's jurisdiction.

Statistics of disease among Indians on Coal Mines.

329. With regard to Indians, their health and well-being is under the supervision of the Protector of Indian Immigrants, and we are therefore able to furnish certain information regarding deaths and repatriations of Indians on these mines, in respect of each of the four years 1908 to 1911, and to compare these with the occurrences among Indians employed elsewhere in Natal.

TABLE 46.—Showing the proportion per thousand of Indentured Indian Immigrants (men only) employed in Natal (*a*) *On Coal Mines*, and (*b*) *Not on Coal Mines*, who died from, or were repatriated on account of Tuberculosis, during each of the years 1908 to 1911.

Year.	Death Rate.			Returned to India.			Total.
	Phthisis.	Other Forms.	Total.	Phthisis.	Other Forms.	Total.	
Coal Mines:							
1908 ..	9·00	..	9·00	22·65	0·34	22·99	31·99
1909 ..	5·50	1·03	6·53	17·53	..	17·53	24·06
1910 ..	4·48	2·09	6·57	8·68	..	8·68	15·25
1911 ..	5·59	1·78	7·37	14·00	..	14·00	21·37
Not Coal Mines:							
1908 ..	2·52	0·65	3·17	2·00	0·13	2·13	5·30
1909 ..	2·17	1·14	3·31	1·75	0·57	2·32	5·63
1910 ..	2·60	0·88	3·48	2·76	0·60	3·36	6·84
1911 ..	2·59	1·01	3·60	1·55	0·46	2·01	5·61

330. In Table 46 are given the proportion per thousand of indentured Indian men who either died or were repatriated in those years on account of tuberculosis, (*a*) employed on the Coal Mines, and (*b*) employed elsewhere. It will be seen that on the mines there occurred during these years annual death-rates from tuberculosis of no less than from 6·53 to 9·00 per thousand, and repatriation-rates of from 8·68 to 22·99 per thousand; making total rates of wastage from this disease alone, of from no less than 15·25 to 31·99 per thousand; that is from one in every sixty-five to one in every thirty-one men drop out every year from tuberculosis.

But among those indentured Indian men employed other than on coal mines (largely on the sugar estates), the highest annual death-rate from the disease during these years was only 3·60 per thousand, and the highest repatriation-rate only 3·36 or a total wastage of 6·84—that is from one in every 188 to one in every 146 men, each year.

But these other than Coal Mine rates are themselves, of course, extremely high, and in Table 47 we give (from the Protector's figures), for purpose of further comparison and to show what amount of betterment is possible by the adoption of improved hygienic conditions, the rates of mortality and repatriation for the Indians on eight of the principal sugar estates, and for those employed by the Durban Corporation in the years 1910 and 1911. We thus find:—

	Sugar Estates.		Durban Corporation.	
	1910.	1911.	1910.	1911.
Death-rate, Tuberculosis	3·18	4·24	0·45	0·87
Repatriation rate, Tuberculosis ..	2·29	1·60	0·90	0·44
Death-rate from All Causes ..	11·54	15·27	3·61	2·18

TABLE 47.—Rates of mortality from, and of Repatriation for Tuberculosis of Indentured Indians (men and women) in Natal during the years 1910 and 1911, (*a*) employed on eight of the principal Sugar Estates, and (*b*) employed by the Durban Corporation.

	Average Population.			Deaths Tuberculosis.						Repatriations Tuberculosis.						Deaths per 1,000.			Repatriation per 1,000.			Total of Death and Repatriation Rates.			Deaths from All Causes.	Death Rate from All Causes.
				Phthisis.		Other Forms.		Total.		Phthisis.		Other Forms.		Total.												
	Men.	Women.	Total.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.	Total.		
Eight principal Sugar Estates.																										
1910	7,192	4,159	11,351	14	14	2	6	16	20	36	21	3	1	1	22	4	26	2·22	4·81	3·18	3·06	0·96	2·29	5·28	5·77	5·47	131	11·54
1911	7,943	4,565	12,508	18	22	7	6	25	28	53	13	2	4	1	17	3	20	3·15	6·13	4·24	2·14	0·66	1·60	5·29	6·97	5·84	191	15·27
Durban Corporation.																										
1910	1,589	635	2,214	..	..	1	..	..	1	1	2	..	..	..	..	2	..	2	..	1·57	0·45	1·26	..	0·90	1·26	1·57	1·35	8	3·61
1911	1,637	650	2,287	1	..	1	..	2	..	2	1	..	..	..	..	1	..	1	1·22	..	0·87	0·61	..	0·44	1·83	..	1·31	5	2·18

In Table 48 we give the number of deaths and repatriations, furnished by the Protector of Indians, respectively, on each of the principal collieries, separately for each year during 1908 to 1911.

TABLE 48.—Giving for certain Coal Mines in Natal, in respect of Indentured and Free Indians, the annual death and repatriation rates per thousand of the population (as supplied by the Protector of Indian Immigrants) thereon during each of the years 1908-1911.

Mine.	Year.	Population.				Deaths.			Repatriated.			Rates per 1,000.			Total deaths. All Causes.	Total death rate. All Causes.
		Men.	Women.	Children.	Total.	Phthisis.	Other Forms.	Total.	Phthisis.	Other Forms.	Total.	Deaths.	Repatriated.	Total.		
Dundee Coal Co. ..	1908	623	160	166	949	2	..	2	4	..	4	2·10	4·21	6·31	10	10·53
	1909	682	159	176	1,017	2	..	2	..	..	..	1·96	..	1·96	13	12·78
	1910	881	261	275	1,417	4	2	6	10	..	10	4·23	7·05	11·28	18	12·70
	1911	901	274	313	1,488	7	1	8	28	..	28	5·37	18·81	24·18	36	24·19
Elands'aagte Collieries ..	1908	852	254	262	1,368	18	..	18	4	1	5	13·15	3·65	16·80	49	35·81
	1909	875	257	295	1,427	6	2	8	3	..	3	5·60	2·10	7·70	19	13·31
	1910	868	283	370	1,521	3	3	6	3	..	3	3·94	1·97	5·91	39	25·64
	1911	884	295	298	1,477	8	1	9	5	..	5	6·09	3·38	9·47	59	39·94
Natal Navigation Collieries	1908	536	..	..	536	6	..	6	44	..	44	..	..	..	10	..
	1909	599	127	137	863	3	1	4	1	..	1	4·63	1·15	50·78	9	10·42
	1910	625	144	159	928	3	1	4	9	..	9	4·31	9·69	14·00	13	14·00
	1911	529	141	195	865	3	..	3	10	..	10	3·46	11·56	15·02	30	34·68
St. George's Collieries ..	1908	284	..	..	284	5	..	5	13	..	13	..	..	..	8	..
	1909	285	..	..	285	4	..	4	2	..	2	..	..	..	4	..
	1910	268	61	61	390	2	..	2	1	..	1	5·12	2·56	7·68	5	12·82
	1911	296	94	107	497	2	1	3	1	..	1	6·03	2·01	8·04	7	14·08
S.A. Collieries	1908	230	47	28	305	1	..	1	..	..	..	3·27	..	3·27	3	9·83
	1909	250	50	34	334	2	..	2	..	..	..	5·98	..	5·98	3	8·98
	1910	311	83	91	485	4	..	4	6	..	6	8·24	12·37	20·61	5	10·30
	1911	338	95	102	535	3	..	3	4	..	4	5·60	7·47	13·07	10	18·69
W. Lennoxton	1908	..	..	..	..	..	..	..	2	..	2	..	..	..	6	..
	1909	..	..	..	..	..	..	..	..	..	..	..	..	..	4	..
	1910	105	23	54	182	..	..	..	..	..	..	..	..	..	..	..
	1911	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Natal Cambrian ..	1908	..	..	..	..	2	..	2	2	..	2	..	..	..	12	..
	1909	..	..	..	..	..	..	..	..	..	..	..	..	..	14	..
	1910	373	92	91	556	..	1	1	..	..	..	1·79	..	1·79	12	21·58
	1911	455	91	87	633	1	2	3	1	..	1	4·73	1·57	6·30	28	44·23
Hattingh Spruit	1908	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	1909	79	4	5	88	1	..	1	..	..	..	11·36	..	11·36	2	22·73
	1910	97	4	2	103	..	..	..	..	..	..	..	..	..	..	..
	1911	114	18	26	158	1	..	1	..	..	..	6·32	..	6·32	4	25·31
Glencoe Collieries ..	1908	..	..	..	..	..	..	..	1	..	1	..	..	..	1	..
	1909	..	..	..	..	2	..	2	..	..	..	..	..	..	3	..
	1910	230	59	56	345	4	..	4	2	..	2	11·59	5·79	17·38	5	14·49
	1911	206	70	82	358	..	1	1	2	..	2	2·79	5·58	8·37	5	13·96
Ramsay Collieries ..	1908	173	30	10	213	3	..	3	..	..	..	14·08	..	14·08	8	37·55
	1909	138	24	10	172	..	..	..	..	..	..	..	..	..	5	29·06
	1910	146	31	23	200	1	..	1	..	..	..	5·00	..	5·00	3	15·00
	1911	136	33	22	191	3	..	3	2	..	2	15·70	10·47	26·17	4	20·94

N.B.—The Populations are not available in every case.

The deaths and repatriation rates of tuberculosis are high on the coal mines as a whole, but there is a good deal of difference as between different mines.

The following gives the mean annual death and repatriation rates for tuberculosis, and the general death rates on some of the chief mines, taken over a series of years:—

		All Causes.	Tuberculosis.		
	Period Covered.	Death-rate per 1,000.	Death-rate per 1,000.	Repatriation rate per 1,000.	Total.
Dundee Coal Co. ..	1908–9–10–11	15·81	3·70	8·62	12·32
Elandslaagte Collieries	1908–11	22·86	7·08	2·76	9·84
Natal Navigation Collieries	1909–10–11	19·58	4·14	7·53	11·67
St. George's Collieries ..	1910–11	13·53	5·64	2·25	7·89
South African Collieries	1908–9–10–11	12·66	6·03	6·03	12·06
Natal Cambrian ..	1910–11	33·64	3·36	0·84	4·20
Hatting Spruit ..	1909–10–11	17·19	5·73	0·0	5·73
Glencoe Collieries ..	1910–11	19·91	7·11	5·69	12·80
Ramsay Collieries ..	1908–9–10–11	25·77	9·02	2·58	11·60

Conclusions and Recommendations regarding Indians on Mines.

331. At the time of our inspection we found cases of phthisis in Indians being retained on the Mines. For example, we were informed by the mine medical officer that there were about six kept on the St. George's mine, as they were short of labour on that mine. It was stated that they were given a separate living room, and it was tried to give them work on the surface.

In our opinion the Dundee Indian Medical Circle requires reorganising.

With our knowledge of the conditions prevailing in other occupations followed by the Natal Coolie,—as for example, let us say, on the sugar estates,—and particularly of the housing conditions there, it is reasonable to believe that the increased amount of tuberculosis on the coal mines is due mainly to the adverse conditions of environment found on the mines, and among these we must include the effect of underground work, and of exposure at a high altitude to extremes of heat and cold without adequate protection.*

There is no doubt that the health of the Indian mine workers could be improved by the introduction of better conditions, but even so it is a question whether as a class they are physically suited to mine work, especially at that altitude. Many of them doubtless have latent tuberculous foci in their bodies, before commencing this work, and with the generally inferior physique possessed by them they break down under the struggle against an adverse and unusual environment.

B.—The Transvaal Collieries.

332. The majority of the collieries of the Transvaal are situate in the Middelburg district in the Witbank area. The altitude is 5,200 feet above sea level. The country is bare and wind-swept, the cold in winter being severe.

The principal collieries in this area now producing are the Anglo-French, Coronation, Douglas, Landau, Middelburg, Oogies, Premier, Transvaal and Delagoa Bay, Tweefontein, Uitkyk and Witbank.

The Commission selected the two most important—the Witbank and the Transvaal and Delagoa Bay—for visitation, and at these the compounds, native hospitals, native married quarters and the underground workings were inspected. They also heard the evidence, among others, of Dr. F. J. Allen, Medical Officer to these two mines and also to the Coronation mine, and to the Government Native Labour Bureau. The Commission desires to record its appreciation of his valuable evidence and the painstaking assistance he rendered.

*These people wear the same thin cotton coverings up in these highlands as they are accustomed to wear at the hot, moist coastal belt.

The Native Mine Labourers.

333. The average number of natives employed during 1912 was 6,633, and their tribal composition was 174 Tropical, 5,773 East Coast, 247 Transvaal, 303 Cape, 81 Natal and Zululand, 19 Basuto, and 36 other tribes. It will thus be seen that more than six-sevenths of the total of natives employed are East Coast tribes.

This overwhelming proportion of East Coast natives on the Transvaal Coal Mines (which are essential to the carrying on the Gold Mines) is due to the fact that these mines are given by the Witwatersrand Native Labour Association a preferential right over others to a maximum of 80 per cent. of East Coast labourers. This preference is given as these mines are not popular with natives, owing to their being considered by them dirty and uncongenial, and as these mines do not recruit for themselves, they would be short of labour but for this arrangement. The majority of the boys sent here now are Inhambanes, as it is found that natives from this district have less dislike of these mines.

No selection is made of particular boys for the coal mines; they are drafted to them just as they happen to come. This last point is of importance in connection with the following observations.

Rejects and Repatriations on account of Tuberculosis and Silicosis.

334. A very large proportion of the boys employed on the coal mines have previously been workers on the gold fields, and many of them have already developed pulmonary fibrosis, or silicosis before joining the collieries. According to an investigation made by Dr. Allen for the Commission, out of a random sample of 262 apparently healthy East Coast boys working on the Witbank Colliery, only 73, or just under 28 per cent. had not worked previously on the Rand gold mines. Of the remaining 189 boys, or 72 per cent. all but 27 had been on underground work there, and 70 of them had been drill boys, or in other words, 26·7 per cent. of all boys had been drill boys on the gold mines.

Among new recruits sent forward for the coal mines, and examined by Dr. Allen at the Government Native Labour Bureau at Witbank, his percentage of rejections on account of phthisis and silicosis were in 1909, 0·08 per cent.; in 1910, 0·26; in 1911, 1·02; and in 1912, 1·74 per cent. Six-sevenths of these rejections were for silicosis and the remaining seventh for tuberculosis.

Again, of 29 consecutive cases of phthisis occurring on the Transvaal and Delagoa Bay Colliery, 20, or 68·9 per cent. gave a previous history of having worked as machine or hammer boys on the Rand gold mines. So that while of all boys under employment only about 27 per cent. have been drill boys, out of actual cases of phthisis occurring on the coal mines about 69 per cent. had been drill boys on the Rand mines. Yet most of the cases of pulmonary tuberculosis had been for some time on the coal mine before they developed the disease, seven of them having been there for over a year, all of whom had previously been rock drill boys.

It may be added that in six of these 29 cases Dr. Allen states that he actually diagnosed the presence of silicosis as well as tuberculosis, and he believed that many of the others were also fibrotic.

It would thus appear that a very considerable percentage of the natives on these mines have previously worked on the Rand mines, that this has resulted in a marked proportion of pulmonary fibrosis among them, and that this previous work has a decided effect in inducing an attack of tuberculosis while under employment on the coal mines.

335. Of the total number of repatriations on account of tuberculosis during the three years, 1909-1911, 33·8 per cent. had been four months or under on the coal mines; 29·8 per cent. between four and eight months; 17·9 between eight months and a year; and 18·5 per cent. for over a year.

Compound Conditions. Witbank

336. On the Witbank mine there are three compounds. One very old, one erected in 1904, and the third a new one put up in 1910. The last consisted of what is known as the Rand mine type of hut—that is, according to the pattern evolved on the Gold mines to meet the requirements of regulations made under Section II of the "Transvaal Coloured Labourers Health Regulations Ordinance, 1905," since repealed by the Coloured Labourers Regulation Act, 1911.

There is also a location adjoining the compounds for married natives, which consists of wretched tin shanties. These, however, are being replaced by brick rooms ten feet by ten feet. Unfortunately, the common error is being made of placing the door and window on the same side, thus neglecting cross ventilation.

At the time of our visit there were 1,544 employees of whom 120, with 99 women and 35 children, were in the location, and the rest in the compounds. The East Coast natives numbered 1,234. With the exception of 197 Cape Coloured boys, every other tribe numbered under fifty. Therefore for statistical purposes the figures relating to this mine may be taken as referring practically to East Coast natives.

The condition of the compound huts was far from satisfactory. The floors are bad, and at the time of our inspection, very unclean. The older portion of the compound seemed overcrowded, and certainly the immovable, badly constructed bunks were too close together. There was a great collection of dirty kit and other belongings, and much sacking fixed round the bunks.

Transvaal and Delagoa Bay.

337. The native quarters at the Transvaal and Delagoa Bay Colliery contained on the occasion of our visit 557 native employees in the compound, and 367, with 102 women and 51 children, in the married section, or a total of 1,077.

The compound was in marked contrast to those at the Witbank, as far as cleanliness and good order are concerned, but as far as construction goes they were bad, being of brick, but without windows or proper means of ventilation, and quite dark when the doors were closed. When we saw them they were very clean and in good order, and were devoid of all kit and belongings, these being kept in a store specially provided for the purpose. Neither were any fire braziers allowed in the compound huts, and there were no other fire places. Mr. Howard, the then General Manager, informed us that he had no trouble whatever in enforcing these two rules. This matter appeared to us of great importance, inasmuch as the improvement in the condition of the huts as compared to what is the condition in the compounds on the Rand and elsewhere, was so manifest, and also as the managers of such compounds had always protested to us that it was impossible to get natives to accept such arrangements. We therefore checked our own observation by enquiries made of inspectors and others acquainted with this mine, and we were assured by them that on every occasion on which they had visited the compound they had found it in the condition we have described.

On this mine there is also a location for married boys, consisting of 340 well-arranged, very superior native huts, all of which we found not only kept in excellent condition as regards cleanliness, but that a great amount of time had evidently been expended in colouring and decorating the inside walls, which could not well have been carried out merely for the occasion of our visit.

We mention the condition of these quarters because it demonstrates what can be done by proper compound management.

Many of the boys have been for long periods on the mine, the percentage of those of over a year's employment being high, showing that they do not object to the restrictions. The mine management also gives them encouragement in several directions, such as by affording them a reasonable amount of ground in the vicinity to cultivate, and by assisting them with their ploughing.

Comparison of Mortality on Witbank and Transvaal and Delagoa Bay Collieries.

338. There are other very important factors which affect mine health besides mere compound conditions, and one of these we shall presently discuss; nor are we able to assign to each cause its exact value, but there can be little doubt that the remarkable difference shown by the following figures in the health of native employees on this mine as compared with the Witbank, is in some measure due to the better compound conditions of life.

	1909.		1910.		1911.	
	Transvaal and Delagoa Bay.	Witbank.	Transvaal and Delagoa Bay.	Witbank.	Transvaal and Delagoa Bay.	Witbank.
Mortality per 1,000 from Tuberculosis	3·5	7·8	1·3	4·6	7·1	8·0
Repatriations per 1,000 for Tuberculosis ..	1·8	16·3	6·6	8·5	17·9	14·0
Total wastage due to Tuberculosis	5·3	24·1	7·9	13·1	25·0	22·0
Total mortality per 1,000 from disease	10·6	21·7	13·2	9·8	15·5	16·7
Total repatriations per 1,000 on account of disease	3·5	20·5	11·9	12·4	19·1	18·7
Total wastage from disease	14·1	42·2	25·1	23·2	34·6	35·4

Underground Conditions.

339. The underground workings do not differ greatly from those elsewhere in the Transvaal. In the Witbank the depth is only 98 feet, the thickness of seams is five feet seven inches, and the workings therefore are not cramped. The ventilation is good. The mine is cool and generally dry, except in places.

At the Transvaal and Delagoa Bay Colliery the depth is also very shallow, being not much over one hundred feet, and the adit is on an easy gradient. The seams are of great thickness, and in consequence the galleries and working faces are very spacious. The mine is well ventilated, but decidedly warm, being about 87 deg. in the warm parts, and the air very moist.

The change of temperature from underground to surface is in winter very marked.

In both mines there were evidences of contamination of the workings by promiscuous defæcation.

Effect of acid mine water. Recommendations as regards research.

340. We are informed that the water in these mines has an acidity equal to one per cent. sulphuric acid, and it is probable that this would be destructive to most germs with which it comes properly into contact.

The water in most of the Rand mines is also highly acid, or soon becomes so after opening up of the mine, and we would suggest that a thorough series of experiments should be undertaken for the purpose of ascertaining to what extent these acid waters are destructive, under actual mine conditions, to different pathogenic organisms, especially of those diseases of more important occurrence among miners, including the tubercle bacillus, pneumococcus, and intestinal parasites. It has already been found that the water of the Rand mines is destructive to the anchylostome.

Tuberculosis and Pneumonia.

341. In the following Table 49 is shown the death-rates and repatriation-rates on account of tuberculosis, pneumonia, and all diseases on the coal mines in the Witbank Labour District, during the four years 1909 to 1912 (the figures respecting pneumonia, however, not being available for the year 1909).

TABLE 49.—Showing the death and repatriation rates in respect of Tuberculosis, Pneumonia and All Diseases per 1,000 of the natives employed on the Coal Mines in the Labour District of Witbank, Transvaal, during the years 1909-1912.

Year.	Mean annual strength	Tuberculosis.			Pneumonia.			All Diseases.		
		Deaths per 1,000.	Repatriations per 1,000.	Total wastage per 1,000.	Deaths per 1,000.	Repatriations per 1,000.	Total wastage per 1,000.	Deaths per 1,000.	Repatriations per 1,000.	Total wastage per 1,000.
1909	4,325	14·33	11·33	25·66	Figures not available.			36·99	20·58	57·48
1910	6,143	6·18	6·51	12·69	7·65	0·00	7·65	21·32	13·84	35·16
1911	6,362	5·82	9·90	15·72	7·39	0·00	7·39	18·86	15·25	34·11
1912	6,633	5·58	14·17	19·75	3·77	0·30	4·07	19·75	23·82	43·57
Mean rates	..	7·42	10·48	17·90	6·22	0·10	6·32	23·10	18·28	41·38

It is seen that the mean mortality from tuberculosis over this period was at the rate of 7·42 per thousand per annum, while the mean repatriation rate was 10·48; giving a total wastage per annum of no less than 17·90 per thousand.

Of pneumonia the mean death-rate was 6·22 per thousand, the repatriation rate, however, being only 0·10. These rates are extraordinarily low considering the nature of the work and that the labourers are practically all East Coast boys. The death-rate from pneumonia of East Coast natives on the Premier Diamond Mine, where the general health conditions from all points of view should be better than here, was for the year 1910, 24·44; 1911, 39·64; and 1912, 40·00 per thousand (See Table 43.)

The mean mortality on these mines from all disease was 23·10 per thousand and the mean repatriation rate 18·28, making a total rate of wastage of 41·38 per thousand per annum.

The rates of mortality and repatriation varied, however, from year to year, this, as will presently be seen, being largely due to the relative proportion of overtime worked.

Conditions of labour. Hours of work and overtime cause over-strain.

342. As on other mines, payment is based on the completion of a definite minimum task; anything over the minimum being paid extra. The native is paid on tickets of thirty days, which on a rough average takes the boy from six weeks to two months to complete.

There are two working shifts in the twenty-four hours on these mines. The day shift is from 6 a.m. to 6 p.m. on ordinary days, and from 6 a.m. to 1 p.m. on Saturdays. The night shift is from 6 p.m. to 6 a.m. This is a small shift, and is mainly confined to cutting coal and clearing up.

The white men take their breakfast down with them, and also knock off work from 1 p.m. to 2 p.m. for dinner; only two or three white men remaining underground during this hour for the purpose of supervision.

The native worker, however, is given no interval or stop for his meals. Thus on the Witbank Colliery, shortly before our visit, of 181 natives interrogated haphazard as they left the pit at 6 p.m., only 25 had had food at mid-day. Of the 181, 11 were pick boys, 73 filling boys, 31 machine boys, and 14 drilling boys—of all of whom only eight had had food. The remainder—52—were rope, road and air-pipe boys, 17 of whom had had food. As a result of representations, each boy on this mine is now given a loaf of bread with his cocoa when he goes down in the morning. This constitutes his ration for the middle of the day, which he is supposed to eat while at work.

But the boys often work overtime, the hours of continuous work on a stretch then being increased to fifteen or even eighteen hours. No extra food is supplied during overtime. The boys are usually paid extra for long shifts in proportion to the extra coal they get, but on the Coronation Mine they are given extra food in payment of overtime worked.

On the Coronation Mine the shift is virtually eleven hours, as although the time is from 6 a.m. to 6 p.m., the boy gets one hour off for meals. In this eleven hours he is able to perform his minimum task. But on the Witbank and Transvaal and Delagoa Bay Collieries his minimum task generally requires the

full twelve hours. Drillers and machine boys can get their piece completed in a shorter time, and then come up; but the hardest work is that of filling and tramming, and these boys cannot usually get done under the full twelve hours. This work is exceedingly heavy, being performed with a very large shovel, and the boys feel the strain more than the others.

Recommendation.

343. We consider that from the point of view of health and physical fitness, twelve hours labour is much too long and is utterly uneconomic. Twelve hours labour without an adequate interval for rest and proper food is worse. But when overtime is worked on top of this, condemnation cannot be too strong. The average output, stated in tons of coal mined per twelve hours shift, has been found to be greatly reduced when overtime is worked, and we venture to think that if these men were paid by the time that they worked or by the shift, instead of by the task, those responsible for fixing the hours of work and for securing the maximum of efficiency, would soon recognise the waste and destruction of human energy and life that is involved in such hours of labour. The average owner of a horse would not think of working it like this, for he would know that he would be running the risk of breaking down or killing his animal. Even the mechanic responsible for the working of a mere engine knows that it must not be overloaded and that it cannot work without fuel and oil in due proportion.

Effect of working overtime on Sickness and Mortality.

344. The demand for coal fluctuates, and as no reserve stocks are carried, times of increased activity have to be met by an increased output, and this again, with labour never in excess, has to be obtained by the working of overtime by the employees.

The Commission was furnished with several very valuable statistical returns showing the harmful effect of working overtime on the health of the mine labourers, as gauged by the mortality and wastage from disease.

In Table 50 is given a comparison of the rates of case incidence and of mortality from tuberculosis, pneumonia and other causes in each of the years 1909, 1910 and 1911, on the Witbank Colliery and the Transvaal and Delagoa Bay Colliery.

TABLE 50.—Showing the incidence and mortality per thousand from Tuberculosis, Pneumonia and Other Causes among Native Labourers on the Witbank and Transvaal and Delagoa Bay Collieries, with special reference to the effect of working overtime.

Name of Colliery	Witbank Colliery.											
Year	1909.				1910.				1911.			
Condition as regards overtime work	Overtime (very heavy) worked every month.				No overtime last six months of year.				Overtime frequently worked.			
Average annual strength	1,655.				1,526.				1,498.			
	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.
Tuberculosis	29	13	17·52	7·85	15	7	9·83	4·59	41	12	27·37	8·01
Pneumonia	58	9	35·04	5·45	43	3	28·18	1·96	39	6	26·03	4·01
Other Respiratory Diseases	145	1	87·62	0·60	57	1	37·35	0·65	129	0	86·11	..
All Other Diseases	554	13	334·74	7·85	236	4	154·65	2·62	214	7	142·86	4·67
All Disease	786	36	474·92	21·75	351	15	230·01	9·82	423	25	282·37	16·69

Name of Colliery	Transvaal and Delagoa Bay Colliery.											
Year	1909.				1910.				1911.			
Condition as regards overtime work	No overtime.				Overtime last six months.				Overtime continuous.			
Average annual strength	565.				755.				839.			
	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.	No. of cases.	No. of deaths.	Case incidence.	Rate of mortality.
Tuberculosis	11	2	19·47	3·54	5	1	6·62	1·32	23	6	27·42	7·15
Pneumonia	16	2	28·32	3·54	17	6	22·52	7·95	28	4	33·37	4·77
Other Respiratory Diseases	16	0	28·32	..	30	2	39·73	2·65	43	0	51·25	..
All Other Diseases	119	2	210·62	3·54	247	1	327·15	1·32	223	3	265·79	3·58
All Disease	162	6	286·73	10·62	299	10	396·02	13·24	317	13	377·83	15·50

Repatriations per thousand.	Witbank.				Transvaal and Delagoa Bay.			
	Tuberculosis.		All Causes.		Tuberculosis.		All Causes.	
1909 ..	27	16·31	34	20·54	1	1·77	2	3·54
1910 ..	13	8·52	19	12·45	5	6·62	9	11·92
1911 ..	21	14·02	28	18·69	15	17·88	16	19·07

On the Witbank Colliery very heavy overtime was worked during every month of the year 1909. During 1910 overtime was only worked during the months of January to May; and during 1911 overtime was frequently worked. Therefore, if the working of overtime has any effect in increasing the amount of illness then the rates for 1909 should be the worst; those for 1911 should come next; while those for 1910 should be the lowest. It will be seen from the table that this is exactly what happened with surprising regularity, the only notable exception being that tuberculosis was a little higher in 1911 than in 1909.

TABLE 51.—Witbank Colliery analysis of year 1910. Case incidence only.

Period	January—June.		July—December.	
Condition as regards overtime work.	Overtime worked January—May.		No overtime worked	
Average strength	1,625		1,462	
	Number of cases.	Rate of case incidence.	Number of cases.	Rate of case incidence.
Tuberculosis	6	3·69	9	6·16
Pneumonia	29	17·84	14	9·58
Other Respiratory Diseases	54	33·23	33	22·57
All Other Diseases	147	90·46	89	60·87
All Diseases	236	145·22	145	99·18

In Table 51 the case occurrence for the same diseases are given for the two halves of the year 1910, in the first of which overtime was worked and in the second not. Here again the increase in the proportion of cases of illness when overtime is worked appears with also mathematical regularity; the only exception being tuberculosis, and this may be because the manifestations of tuberculosis resulting from the strain of overwork may follow more slowly.

If we compare the repatriations from this mine on account of disease, we see exactly the same difference in respect of these years; thus:

	For Tuberculosis.		For All Diseases.	
	Numbers.	Proportion. per 1,000.	Numbers.	Proportion per 1,000.
1909	27	16·31	34	20·54
1910	13	8·52	19	12·45
1911	21	14·02	28	18·69

Reverting to Table 50, and the Transvaal and Delagoa Bay Colliery, no overtime was worked in 1909; overtime was worked in the last six months of 1910; and in 1911 it was continuously worked. So that these three years should show progressively higher rates; and, making allowance for the smallness of the figures, this is what they show to have occurred.

And the same with repatriations on this mine:—

	For Tuberculosis.		For All Diseases.	
	Numbers.	Proportion per 1,000.	Numbers.	Proportion per 1,000.
1909	1	1·77	2	3·54
1910	5	6·62	9	11·92
1911	15	17·88	16	19·07

Exactly the same results were shown to occur on the Coronation mine when overtime was worked.

Comparison of sickness and mortality in New and Old Boys.

345. We were furnished in regard to the Witbank mine, with the number of cases of illness and the number of deaths from disease among new boys, that is among boys who had not yet completed their first working ticket, which as before mentioned, takes roughly six weeks to two months. We were also furnished with the average number of new boys on the mine throughout the year. From these we obtain the following comparison between new boys and all boys in the mine, taking in each case the mean of the three years 1909-1911:—

	All Boys.		New Boys.	
	Annual case incidence per 1,000.	Annual mortality per 1,000.	Annual case incidence per 1,000.	Annual mortality per 1,000.
Tuberculosis	18·17	6·84	21·60	2·16
Pneumonia	29·92	3·84	43·19	2·16
Other Respiratory Diseases ..	70·74	0·43	153·35	0·00
All Other Diseases	214·57	5·13	529·16	10·80
All Diseases	333·40	16·24	747·30	15·12

It will be observed that in the case of tuberculosis and pneumonia, and of disease generally, there is a much greater incidence upon the new boy who has not had time to adapt himself to his new work and environment. The rate of mortality, excepting perhaps as regards pneumonia naturally does not show itself to its fullest extent in the new boy as the disease has not had time to complete its course in the short period in which the patient ranks as a new boy.

Summary.

346. We therefore see in the above series of figures exactly the same factor at work as we have seen to be in operation in the case of the Kimberley and Jagersfontein diamond mines, and in the case of the Natal coal mines with respect to Indians, namely the effect of unaccustomed and undue physical stress and strain and of adverse environment in increasing the liability to attack from disease and the liability to succumb when attacked. In those cases we saw the effect generally of bad housing and unhealthy occupation; in the present case we see how these effects tell on the new-comer and how they are intensified by the additional strain of overwork.

SECTION III. THE WITWATERSRAND GOLD MINES.

Difficulties of proper enquiry.

347. In the case of the Witwatersrand Gold Mines the difficulties in arriving at definite conclusions regarding any question affecting the health of native mine employees is almost insurmountable. This is due to several causes:—

In the first place no matter what the question that may be under enquiry, it is certain to be directly or indirectly affected by such a number of complex, interacting influences,—some of which we may be able to recognise, while others we can hardly even guess at, but the full effect of none of which we can accurately gauge,—that it is nearly impossible to disentangle the main issue and arrive at a clean cut conclusion on it.

Thus there is hardly a question that can be properly considered without at the same time taking cognizance of such factors as the tribal composition of the natives concerned (of which at least seven groups must be considered). Also the length of the time the particular boys have been working on the mines. The innumerable and varying compound conditions, housing, diet, general treatment and management. The conditions of work, whether surface or underground; and, if underground the nature of the work performed and the particular conditions of

the mine, such as depth, ventilation, temperature and moisture. The amount of development work being carried on, the character of the stopes, the extent to which dust preventive measures are in operation, whether the boy walks or is hauled up at the conclusion of his task whether he waits at an upcast or a downcast shaft, and many other differences of a like far-reaching kind.

In the next place there is the absence of proper statistics, of figures there are any quantity, but unfortunately few of them are really based upon a well considered scheme covering the different subjects on which the records should afford information. Therefore whatever the enquiry may be about, it is promptly brought to a standstill owing to there being no numerical data available on which to work.

Thus so far as we are aware there is not a figure available on the Rand which distinguishes between that most fundamental of all differences affecting the health of mine employees, namely whether performing surface or underground work. It is almost futile to attempt to investigate the influence of underground mining conditions, when you do not even know who of the group of individuals you are considering is actually working underground.

Repatriations.

348. Another difficulty is the big question of repatriations. The bulk of the statistics available merely deal with deaths. The proportion of cases of the disease is only obtainable to a limited extent. There are certainly available figures regarding repatriations, but as the correctness of the recorded cause of the repatriation is often very problematical, and as the extent to which repatriation takes place varies widely on different mines, these afford but very little additional information to that yielded by the record of mortality.

Under these circumstances we do not find ourselves in a position to deal adequately with the subject of the health of mine labourers on a statistical basis.

With regard to the question of repatriations, it is necessary here to point out that too much reliance must not be placed upon the number of repatriations assigned to any particular disease, as the actual medical cause of the repatriation is not always (and sometimes cannot be) accurately given. There is one cause of repatriation in particular which is given with great frequency—that is "debility." In many cases this is qualified by stating the disease that has given rise to the debility. In such cases, in constructing the following tables, the repatriation has been credited to the particular disease mentioned.

Another not infrequently given cause of repatriation is that of "physically unfit." The use of these terms should be discarded, whenever possible, in favour of more definite diagnosis.

The Commission found in the course of its investigations in the Native Territories and elsewhere that cases of tuberculosis had been repatriated under the term "debility," and this was admitted in the course of evidence before the Commission. Whilst aware of the difficulty which exists in some cases, we think that greater care and accuracy of diagnosis are desirable.

We cannot too distinctly indicate that a mere consideration of the number of deaths without at the same time taking into consideration the number of repatriations is of no value in arriving at a conception of the actual amount of disease taking place on any particular mine, or on the Reef as a whole. As an example of this let us take the case of the two coal mines, "Oogies" and "Tweefontein." In the same year the rates of mortality and repatriation on the former were, respectively, 47·2 and 14·9 per thousand, and on the latter 19·9 and 41·3. Now if we consider the death-rates alone, the mortality on the Oogies Mine was nearly three times as great as on the Tweefontein, but if we consider also the repatriation rates we see that the wastage from disease on the two mines was nearly the same, namely 62·1 and 61·2 per thousand, respectively.

Relative mortality among the various tribes.

349. The Witwatersrand Native Labour Association, Limited—familiarly known as the W.N.L.A.—an association of mine owners and others, is a body through which a large proportion of the native labour supply to the mines passes. It maintains certain records, and issues from time to time statistics regarding the labourers recruited and distributed through the Association, to the various mines. The figures do not comprise quite such large numbers as those dealt with by the Government Native Labour Bureau, as that office takes account of *all* native labourers, but they are more detailed.

The following Table 52 gives the total number of natives of each tribe employed by the members of the W.N.L.A. during the year 1905 to 1912, inclusive, and the total number of deaths from disease (excluding accidents) during this time, with the death-rates per thousand.

In a separate column is shown the ratio which the mortality of each tribe bears to that of the Natal and Zululand native, which has the smallest death-rate. It must be pointed out, however, that this is not strictly speaking a tribal, but a territorial distribution.

TABLE 52.

Tribe or Territorial Origin.	Total number of annual units 1905-1912.*	Total number of deaths over whole period 1905-1912.	Mean annual mortality per 1,000.	Ratio of deaths to 100 deaths of Natal and Zululand.
Natal and Zululand	63,935	918	14·36	100
Cape Colony	232,532	3,753	16·14	112
Swaziland	13,601	266	19·56	136
Transvaal	99,733	2,645	26·52	185
Basutoland and Orange Free State	38,521	1,185	30·76	214
East Coast	522,420	17,078	32·69	228
Bechuanaland	8,182	349	42·65	297
German South-West Africa ..	2,719	164	60·32	420
Tropicals	110,672	7,806	70·53	491
All tribes	1,092,315	34,164	31·28	..

Thus during this period of eight years, from 1905 to 1912, there was an average of 136,539 annual units employed on the mines (including the Premier Diamond Mine and those coal mines and a few other undertakings which are members of the LabourAssociation). Out of this number there occurred 34,164 deaths from disease, giving a mean annual death-rate over the entire period of 31·28 per thousand.

It should be explained that by East Coast Native is meant a native inhabiting the Portuguese Territories of Inhambane, Gazaland and Lourenco Marques, on the East Coast, South of latitude 22° South.

The term Tropical Native includes natives from Africa North of latitude 22° South, namely, from Beira and Chinde; Zambesi, Quilimane, Tete and Barue; Mozambique; Portuguese Nyasa; British Nyasaland Protectorate; North Eastern Rhodesia; and Fort Jameson.

Transvaal Natives include the 'Msuto, Bavenda, Shangaan and other tribes.

Mortality among Tropical Natives.

350. It will be seen from the above Table 52 how widely the mortality varies in the different tribes.

This variation is demonstrated more clearly by a reference to the last column of the Table, in which is shown the ratio that the mortality bears in the different tribes as compared with the natives of Natal and Zululand, the mortality among whom is taken as 100.

Put in another way this means, taking the four territorial tribes which have furnished the bulk of the native labour supply of the mines, namely the Cape Colony, Transvaal, East Coast and Tropical native—that out of *equal* numbers of these tribes, to every Cape Colony native that has died, one and a half Transvaal, two East Coast and four and a half Tropical natives have succumbed.

But even this does not represent the true state of things as regards the East Coast and Tropical, because as will be seen below, a not inconsiderable number of deaths occur among East Coast and Tropical (especially) at the Compound of the Witwatersrand Native Labour Association, while waiting to be assigned to the mines or repatriated from the mines.

* By "annual unit" is meant the equivalent of one boy serving throughout the year.

The number of these deaths are known, and also the average annual population of Tropicals in the Compound is available, but not the population of East Coast natives.

Combining then the populations and deaths of the Mines and the Compound, then the mean annual death-rate, over these eight years, for East Coast tribes was about 34 per thousand (See Table 54), instead of 32·69.

As regards Tropicals, however, the following shows the amended annual death-rates produced by combining the Mines and Compound mortality:—

	Average annual population on Mines and in W.N.L.A. Compound combined.	Number of deaths on Mines and in W.N.L.A. Compound.	Annual death-rate per thousand.
1905	9,841*	1,159	117·77
1906	7,654*	559	73·03
1907	7,855	829	105·54
1908	11,080	936	84·48
1909	14,980	1,227	81·91
1910	20,076	1,982	98·72
1911	24,169	2,140	88·54
1912	21,791	1,518	69·66
Mean of entire period ..	14,681	1,294	88·13

So that instead of Tropicals dying at the rate of four-and-half to one Cape Province native, they died at the rate of five-and-half (5·46) to one Cape Native.

It may be argued that we should not take the mean rates of mortality over the whole of these eight years, because an improvement has taken place in the rates during recent years. But the result is even worse if we take 1912, the last year of the period, for the ratio is then 5·61 to one Cape native instead of 5·46.

Nor does this mortality really represent the whole of what is taking place, for with the Tropical native it begins before he reaches the Rand, on the voyage down the Coast and on the way up, at Ressano Garcia, etc.†

Also it is safe to believe that all of those who are repatriated do not reach their homes.

That Tropical natives are returning to Nyasaland suffering from tuberculosis, is shown by the reports made to the Commission by medical officers of that Territory, and printed in Annexure "A" to this Report. Especially Dr. Laws refers to this (Paragraph 6 of his statement) mentioning that in the case of a batch of natives arriving from South Africa and examined by the authorities, eight were found infected with tuberculosis.

Now all of these natives are in the prime of life, mostly between the ages of twenty and thirty years. The death-rate of 16 per thousand per annum for the Cape Colony native may be assumed with safety to be at least double that which it would have been had he remained at his kraal instead of coming to the mines. We of course have not any information as to what is the normal rate of mortality of the young adult Tropical native at his kraal.

Recommendation regarding recruitment of Tropical Natives.

351. The Terms of Reference to the Commission require it to report on the extent and causes of the mortality among Tropical natives employed on the mines. The recruiting of these has since been stopped by order of the Government.

The average number during the year 1913 dropped to 19,010 and at the end of March, 1914 the number on the mines was only 9,372.

Under these conditions it will suffice for us to record our opinion that the Tropical native has shown himself from the health point of view to be unsuited

* *Note.*—The population of the Compound for these years (1905 and 1906) is only a close approximation.

† At Ressano Garcia the number of deaths of Tropicals were:—1907, 21; 1908, 3; 1909, 1; 1910 20; 1911, 30; and 1912, 32.

for work on the mines, and we strongly recommend that no further recruiting of Tropicals should be permitted unless and until the Government is fully satisfied that there is no reasonable likelihood of the recurrence of such mortality.

Annual mortality for the different tribes in each year 1905-1912.

352. In the above Table 52 we have given the mean mortality over the entire period 1905-1912; in the following Table 53 we give the rates of mortality from disease (excluding accidents) for each separate year of the period.

It will be seen from this that the rate of mortality appears to have been decreasing fairly steadily for all tribes.

TABLE 53.—Giving the rates of mortality from disease per thousand of the different tribes employed on the Mines, which are members of the W.N.L.A., in each year 1905–1912.

Tribe or territorial description.	Annual rates of mortality per thousand of average strength.								
	1905.	1906.	1907.	1908.	1909.	1910.	1911.	1912.	Mean of 1905–12
Natal and Zululand ..	10·96	13·65	9·99	16·22	18·67	14·35	15·20	12·04	14·36
Cape Colony	23·03	13·60	17·54	17·77	19·64	15·70	14·87	12·42	16·14
Swaziland	17·13	14·08	19·73	21·38	9·17	21·37	26·63	17·18	19·56
Transvaal	68·82	24·30	25·36	27·50	30·45	23·43	17·18	17·14	26·52
Basutoland and Orange Free State	28·45	10·72	30·00	33·18	37·84	39·89	29·05	27·49	30·76
East Coast	39·00	33·80	31·91	32·74	33·33	31·48	32·37	28·72	32·69
Bechuanaland	81·02	36·65	13·33	38·82	54·54	41·20	30·20	23·56	42·65
German South-West Africa	103·50	60·26	50·89	45·45	34·18	54·83	39·28	24·69	60·32
Tropicals	108·85	64·46	75·64	64·51	69·34	81·76	67·89	49·05	70·53
All tribes	46·92	33·11	31·71	31·22	32·18	30·85	29·50	24·24	31·28

Note.—The figures for German South-West African Natives are based on too small numbers to be significant.
The numbers of the Bechuanaland were also small.

It is not, however, sufficient to take merely the death-rates actually occurring on the mines; the loss by repatriation must also be considered.

Thus, as we have already observed, in the case of East Coast and Tropical natives a considerable number of deaths occurred each year in the Compound of the W.N.L.A., on the one hand of those boys awaiting allotment to the different mines, and on the other hand of those boys received from the different mines for repatriation. We therefore have shown in the following Table 54 the death-rates per thousand of the annual strength of these two tribes, which occurred at the W.N.L.A. Compound while awaiting allotment and while awaiting repatriation.

It should be stated that in the case of Tropical boys the custom was to retain them at the W.N.L.A. Compound for a period of three weeks before distribution, in order to acclimatise them to Rand conditions.

TABLE 54.—Showing the rates of mortality per thousand of East Coast and Tropical Natives employed on the Mines (*a*) pending allotment to the different mines, and (*b*) returned for repatriation, and (*c*) while on the mines, in each year 1905–1912.

Annual death-rate per thousand.*	1905.		1906.		1907.		1908.		1909.		1910.		1911.		1912.		Mean of period 1905–12.	
	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.	East Coast.	Tropical.
Deaths in W.N.L.A. Compound																		
(*a*) Death-rate among Natives awaiting allotment* ..	0·59	10·16	0·54	7·58	0·57	32·59	0·31	22·66	0·14	14·09	0·36	21·82	0·16	22·26	0·35	22·53	0·36	19·95
(*b*) Death-rate among Natives awaiting repatriation*	0·51	1·52	0·91	2·22	1·58	2·94	1·38	1·26	1·38	2·67	0·65	1·34	0·89	1·94	0·68	0·83	1·00	1·71
Total annual death-rate in W.N.L.A. Compound*	1·10	11·68	1·45	9·80	2·15	35·53	1·69	23·92	1·52	16·76	1·01	23·16	1·05	24·20	1·03	23·36	1·36	21·66
(*c*) *Death-rate on Mines* ..	39·00	106·09	33·80	63·23	31·91	70·01	32·74	60·56	33·33	65·15	31·48	75·56	32·37	64·34	28·72	46·30	32·69	66·46
Total annual death-rate ..	40·10	117·77	35·25	73·03	34·06	105·54	34·43	84·48	34·85	81·91	32·49	98·72	33·42	88·54	29·75	69·66	34·05	88·13

* NOTE.—These rates for East Coast natives have been calculated on the average annual strength on the mines, as the annual strength of East Coast under detention at the W.N.L.A. Compound is not available. The number, however, is not great and would not materially alter the above rates.

It will be seen from this table how great a mortality has occurred among Tropicals while undergoing acclimatisation at the compound, averaging 19·95 per thousand of all tropicals recruited for the mines and arriving on the Reef; and ranging from 7·58 to 32·59 per thousand.

Also of those tropicals awaiting repatriation the mean death-rate over this period calculated on the same strength, was 1·71 per thousand.

Mortality among the Chinese on the Mines.

353. As compared with these rates we may contrast the mortality from disease that occurred among the Chinese labourers employed on the mines between the years 1905 to 1909 inclusive, which was as under:—

Year.	Number of deaths from disease.	Annual death-rate per thousand of strength.
1905	459	11·50
1906	561	10·91
1907	450	9·27
1908	164	8·47
1909	30	4·60

It would appear from the above that the rate of mortality diminished as the Coolies became acclimatised to the work.

Rates of mortality and repatriations in respect of Tuberculosis, Pneumonia, etc.

354. In Table 55 are given the rates of mortality and repatriation of tuberculosis, pneumonia and other diseases on the Witwatersrand Gold Mines during the years 1910, 1911 and 1912.

The figures in this and the succeeding tables are constructed from returns furnished to the Commission by the Government Native Labour Bureau.

TABLE 55.—Showing the annual rates of mortality and repatriation in respect of Tuberculosis, Pneumonia and other diseases per thousand of the strength of certain tribes employed on all the Witwatersrand Gold Mines during each of the years 1910, 1911 and 1912, based on returns of the Government Labour Bureau.

Disease.	Year.	Tropicals.			East Coast.			Transvaal.			Cape Colony.			Natal and Zululand.			Basutos.			Others.			Total.		
		Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.
Tuberculosis	1910	7·55	5·61	13·16	7·13	7·36	14·49	4·31	4·38	8·69	3·03	5·03	8·06	1·47	1·62	3·09	2·32	2·09	4·41	5·06	1·45	6·51	5·05	5·45	10·50
	1911	10·43	16·20	26·63	8·84	9·76	18·60	3·32	5·29	8·61	2·65	5·76	8·41	2·22	3·75	5·97	3·45	5·61	9·06	2·13	2·45	4·58	5·76	8·08	13·84
	1912	7·64	18·37	26·01	8·49	12·71	21·20	4·50	8·48	12·98	2·80	7·76	10·56	2·46	5·64	8·10	4·79	4·95	9·74	4·05	6·91	10·96	5·40	10·23	15·63
Pneumonia ..	1910	34·25	1·15	35·40	13·20	0·97	14·17	10·81	0·54	11·35	5·07	1·10	6·17	5·09	1·00	6·09	5·80	5·10	10·90	14·24	1·45	15·69	12·09	1·12	13·21
	1911	32·62	7·52	40·14	13·40	2·56	15·96	10·21	0·51	10·72	5·43	1·24	6·67	7·95	1·98	9·93	13·53	1·01	14·54	18·98	0·98	19·96	12·91	2·45	15·36
	1912	30·33	8·96	39·29	11·64	3·14	14·78	7·02	3·78	10·80	3·69	2·83	6·52	4·65	2·38	7·03	8·94	3·20	12·14	10·22	9·31	19·53	9·92	3·89	13·81
Silicosis ..	1910	0·05	..	0·05	0·40	0·30	0·70	0·31	0·23	0·54	0·13	0·02	0·15	..	..	..	..	..	..	..	..	..	0·22	0·13	0·35
	1911	..	0·45	0·45	0·48	0·45	0·93	0·06	..	0·06	0·02	..	0·02	0·06	..	0·06	..	..	..	..	..	..	0·18	0·16	0·34
	1912	0·55	0·33	0·88	0·65	0·63	1·28	0·13	0·20	0·33	0·14	0·14	0·28	0·26	0·26	0·52	0·32	0·16	0·48	..	..	..	0·34	0·33	0·67
All Other Causes.	1910	20·35	38·23	58·58	9·80	19·62	29·42	9·01	8·46	17·47	6·75	23·95	30·70	4·79	10·35	15·14	3·72	8·82	12·54	6·51	7·73	14·24	9·36	20·96	30·32
	1911	19·24	84·54	103·78	10·70	20·86	31·56	5·74	6·70	12·44	6·93	19·59	26·52	6·23	17·36	23·59	8·21	11·08	19·29	8·02	7·19	15·21	9·66	25·98	35·64
	1912	15·22	109·08	124·30	8·09	30·53	38·62	4·17	17·69	21·86	4·71	26·40	31·11	4·71	18·65	23·36	4·31	12·30	16·61	4·21	13·67	17·88	6·84	34·02	40·86
Total for All Diseases.	1910	62·20	44·99	107·19	30·53	28·25	58·78	24·44	13·61	38·05	14·98	30·10	45·08	11·35	12·97	24·32	11·84	16·01	27·85	25·81	10·63	36·54	26·72	27·66	54·38
	1911	62·29	108·71	171·00	33·42	33·63	67·05	19·33	12·50	31·83	15·03	26·59	41·62	16·46	23·09	39·55	25·19	17·70	42·89	29·13	10·62	39·75	28·51	36·67	65·18
	1912	53·74	136·74	190·48	28·87	47·01	75·88	15·82	30·15	45·97	11·34	37·13	48·47	12·08	26·93	39·01	18·36	20·61	38·97	18·48	29·89	48·37	22·50	48·47	70·97

From this table it is seen that, taking all tribes and all diseases, the annual mortality and repatriation rates per thousand of the average strength were:—

	Death-rate.	Repatriation-rate.	Total rate of wastage.
1910	26·72	27·66	54·38
1911	28·51	36·67	65·18
1912	22·50	48·47	70·97

From this it is evident that while the death-rate has been going down, the repatriation-rate has been steadily going up faster than the mortality has been diminishing, so that the total rate of wastage from death and disease increased in 1912 by 13 per cent. over what it was in 1910. This well illustrates the fallacy involved if the health of mine natives on the Rand be considered merely on the recorded mortality and without reference also to the repatriations.

This increase occurred in the combined rate for every tribe, except the Basuto, which slightly diminished, and the Natal and Zululand native which remained stationary.

The fall in the mortality and increase in the repatriations during these three years 1910-1912 was distributed over all diseases in the case of nearly all tribes. Especially has the rate of repatriations increased in the case of tuberculosis and "other diseases."*

It will be observed that the greater mortality and sickness in the Tropical and East Coast natives as compared with, say, the Cape Colony native, to which we drew attention in Paragraph 350 is not due only to an excess of pneumonia as is often thought, but occurs all along the line. Thus for the year 1912 the rates per thousand were:—

	Tuberculosis.			Pneumonia.			Other diseases.		
	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.
Tropicals ..	7·64	18·37	26·01	30·33	8·96	39·29	15·22	109·08	124·30
East Coast ..	8·49	12·71	21·20	11·64	3·14	14·78	8·09	30·53	38·62
Cape Native ..	2·80	7·76	10·56	3·69	2·83	6·52	4·71	26·40	31·11

* *Note by Dr. Turner.*—It must be noted that though there is an increase in the number of boys repatriated for sickness, this is not so great as would appear because in former years sick natives were sent home, but no particular records kept of them. Whereas nowadays any boy with the slightest ailment or injury—such, for example, as an amputated toe—is repatriated and records kept in the W.N.L.A. Hospital or Government Native Labour Bureau Compound, and so swells the figures for repatriation.

Comparison of Outcrop and Deep Level Mines.

355. In Table 56 are given for Outcrop and Deep Level Mines, in respect of the three years 1910, 1911 and 1912, the average annual strength and the numbers of deaths and repatriations from tuberculosis, pneumonia, and other diseases for each tribe.

In Table 57 are given separately for Outcrop and Deep Level mines the annual rates of mortality and the annual rates of repatriation per thousand of average strength of each tribe in respect of tuberculosis, pneumonia, silicosis, and All Other Diseases, for each year 1910, 1911, and 1912.

TABLE 56.—*Outcrop and Deep Level Gold Mines.*—Showing in respect of the several tribes, the number of Deaths and Repatriations in respect of Tuberculosis, Pneumonia and other diseases during the years 1910, 1911 and 1912. From returns supplied by the Government Native Labour Bureau.

		Tropicals.			East Coast.			Transvaal.			Cape Colony.			Natal and Zululand.			Basutos.			Others.			Total.		
Mean Annual Strength.																									
1910.	Outcrop	7,534			36,933			7,294			31,242			8,691			1,941			2,941			96,576		
	Deep	11,530			22,529			5,468			20,575			4,256			2,369			1,202			67,929		
1911.	Outcrop	11,429			38,062			9,818			32,932			10,453			3,541			5,114			111,349		
	Deep	10,914			24,615			5,854			19,542			5,276			3,405			998			70,004		
1912.	Outcrop	9,469			32,306			8,725			34,238			9,500			2,828			5,042			102,108		
	Deep	11,530			22,529			5,468			20,575			4,255			2,369			1,202			67,929		
		Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.
Tuberculosis.																									
1910.	Outcrop	58	54	112	273	270	543	36	21	57	99	160	259	9	16	25	7	5	12	12	2	14	494	528	1,022
	Deep	86	53	139	151	168	319	19	35	54	58	101	159	10	5	15	3	4	7	9	4	13	336	370	706
1911.	Outcrop	106	169	275	343	329	672	26	22	48	85	149	234	22	36	58	13	16	29	10	10	20	605	731	1,336
	Deep	127	193	320	206	277	483	26	61	87	55	155	210	13	23	36	11	23	34	3	5	8	441	737	1,178
1912.	Outcrop	70	124	194	283	380	663	31	43	74	94	256	350	30	40	70	14	20	34	19	18	37	541	881	1,422
	Deep	68	208	276	187	324	511	37	85	122	58	164	222	7	45	52	16	11	27	8	28	36	381	865	1,246
Pneumonia.																									
1910.	Outcrop	263	6	269	420	24	444	75	6	81	176	35	211	46	11	57	18	19	37	45	6	51	1,043	107	1,150
	Deep	390	16	406	365	34	399	63	1	64	87	22	109	20	2	22	7	3	10	14	..	14	946	78	1,024
1911.	Outcrop	388	56	444	486	94	580	86	4	90	155	17	172	62	23	85	47	2	49	71	3	74	1,295	199	1,494
	Deep	341	112	453	346	65	411	74	4	78	130	48	178	63	8	71	47	5	52	45	3	48	1,046	245	1,291
1912.	Outcrop	299	105	404	358	107	465	58	22	80	112	64	176	48	18	66	25	10	35	51	34	85	951	360	1,311
	Deep	249	57	306	287	67	354	48	35	83	88	89	177	22	18	40	31	10	41	17	28	45	742	304	1,046
Silicosis.																									
1910.	Outcrop	1	..	1	14	12	26	3	3	6	2	..	2	..	..	..	..	..	..	..	..	..	20	15	35
	Deep	..	..	..	10	6	16	1	..	1	5	1	6	..	..	..	..	..	..	..	..	..	16	7	23
1911.	Outcrop	..	..	..	23	25	48	1	..	1	..	..	..	1	..	1	..	..	..	..	..	..	25	25	50
	Deep	..	1	1	7	3	10	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	8	4	12
1912.	Outcrop	7	3	10	28	26	54	1	2	3	7	4	11	..	3	3	1	1	2	..	..	..	44	39	83
	Deep	3	3	6	8	9	17	1	1	2	1	4	5	..	1	1	1	..	1	..	..	..	14	18	32
Other Causes.																									
1910.	Outcrop	144	303	447	345	656	1,001	82	78	160	216	714	930	45	91	136	6	22	28	10	28	38	848	1,892	2,740
	Deep	244	426	670	238	511	749	33	30	63	134	527	661	17	43	60	10	16	26	17	4	21	693	1,557	2,250
1911.	Outcrop	192	621	813	399	585	984	43	41	84	182	412	594	69	94	163	26	43	69	28	30	58	939	1,826	2,865
	Deep	238	1,268	1,506	265	710	975	47	64	111	182	616	798	29	179	208	31	34	65	21	14	35	813	2,885	3,698
1912.	Outcrop	127	*879	1,006	241	790	1,031	28	84	112	126	618	744	44	127	171	10	38	48	16	55	71	592	2,591	3,183
	Deep	148	1,092	1,240	207	901	1,018	35	183	218	129	811	940	27	154	181	17	39	56	12	36	48	575	3,216	3,791
Total All Diseases.																									
1910.	Outcrop	466	363	829	1,052	962	2,014	196	108	304	493	909	1,402	100	118	218	31	46	77	67	36	103	2,405	2,542	4,947
	Deep	720	495	1,215	764	719	1,483	116	66	182	284	651	935	47	50	97	20	23	43	40	8	48	1,991	2,012	4,003
1911.	Outcrop	686	846	1,532	1,251	1,033	2,284	156	67	223	422	578	1,000	154	153	307	86	61	147	109	43	152	2,864	2,781	5,645
	Deep	706	1,574	2,280	824	1,055	1,879	147	129	276	368	819	1,187	105	210	315	89	62	151	69	22	91	2,308	3,871	6,179
1912.	Outcrop	503	1,111	1,614	910	1,303	2,213	118	151	269	339	942	1,281	122	188	310	50	69	119	86	107	193	2,128	3,871	5,999
	Deep	468	1,360	1,828	689	1,301	1,990	121	304	425	276	1,068	1,344	56	218	274	65	60	125	37	92	129	1,712	4,403	6,115

* See Footnote to Table 57.

TABLE 57.—Comparison between *Outcrop* and *Deep Level Gold Mines*. Showing in respect of the several tribes the rates per thousand of average annual strength of Mortality and Repatriations in respect of Tuberculosis, Pneumonia and other diseases during the years 1910, 1911 and 1912. From Returns supplied by the Government Native Labour Bureau.

		Tropicals.			East Coast.			Transvaal.			Cape Colony.			Natal and Zululand.			Basutos.			Others.			Total.		
		Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.	Death rate.	Repatriation rate.	Total.
Tuberculosis.																									
1910.	Outcrop	7·70	7·16	14·86	7·39	7·31	14·70	4·93	2·88	7·81	3·16	5·13	8·29	1·03	1·84	2·87	3·6	2·58	6·18	4·08	0·68	4·76	5·10	5·46	10·56
	Deep	7·46	4·59	12·05	6·70	7·45	14·15	3·47	6·40	9·87	2·81	4·91	7·72	2·35	1·17	3·52	1·26	1·69	2·95	7·48	3·33	10·81	4·95	5·44	10·39
1911.	Outcrop	9·27	14·78	24·05	9·01	8·67	17·68	2·64	2·24	4·88	2·58	4·52	7·10	2·11	3·45	5·56	3·67	4·52	8·19	1·95	1·95	3·90	5·16	6·56	11·72
	Deep	11·64	17·68	29·32	8·57	11·53	20·10	4·44	10·42	14·86	2·81	7·93	10·74	2·46	4·36	6·82	3·23	8·98	12·21	3·00	5·00	8·00	6·30	10·53	16·83
1912.	Outcrop	7·39	13·09	20·48	8·76	11·76	20·52	3·54	4·94	8·48	2·74	7·48	10·22	3·15	4·21	7·36	4·95	7·07	12·02	3·77	3·56	7·33	5·28	8·63	13·91
	Deep	7·91	24·18	32·09	8·10	14·03	22·13	5·81	13·35	19·16	2·92	8·24	11·16	1·26	8·08	9·34	4·66	3·20	7·86	4·96	17·35	22·31	5·56	12·61	18·17
Pneumonia.																									
1910.	Outcrop	34·91	0·79	35·70	11·37	0·65	12·02	10·28	0·82	11·10	5·63	1·12	6·75	5·29	1·26	6·55	9·28	9·78	19·06	15·30	2·04	17·34	10·79	1·10	11·89
	Deep	33·82	1·39	35·21	16·20	1·51	17·71	11·52	0·18	11·70	4·22	1·07	5·29	4·70	0·47	5·17	2·96	1·26	4·22	11·64	..	11·64	13·93	1·14	15·07
1911.	Outcrop	33·95	4·89	38·84	12·77	2·47	15·24	8·76	0·41	9·17	4·70	0·52	5·22	5·93	2·20	8·13	13·27	0·56	13·83	13·88	0·59	14·47	11·63	1·78	13·41
	Deep	31·24	10·26	41·50	14·41	2·70	17·11	12·64	0·68	13·32	6·65	2·46	9·11	11·00	1·39	12·39	13·80	1·47	15·27	45·09	3·01	48·10	14·94	3·50	18·44
1912.	Outcrop	31·58	11·08	42·66	11·08	3·31	14·39	6·64	2·52	9·16	3·27	1·87	5·14	5·00	1·95	6·95	8·84	3·53	12·37	10·11	6·74	16·85	9·31	3·53	12·84
	Deep	28·95	6·63	35·58	12·43	2·90	15·33	7·54	5·49	13·03	4·43	4·47	8·90	3·95	3·23	7·18	9·03	2·91	11·94	10·55	17·35	27·90	10·82	4·44	15·26
Silicosis.																									
1910.	Outcrop	0·13	..	0·13	0·38	0·32	0·70	0·41	0·41	0·82	0·06	..	0·06	..	..	..	..	..	..	..	..	..	0·21	0·15	0·36
	Deep	..	..	..	0·45	0·26	0·71	0·18	..	0·18	0·24	0·05	0·29	..	..	..	..	..	..	..	..	..	0·23	0·11	0·34
1911.	Outcrop	..	..	..	0·60	0·66	1·26	0·10	..	0·10	..	..	..	0·09	..	0·09	..	..	..	..	..	..	0·22	0·22	0·44
	Deep	..	0·09	0·09	0·29	0·12	0·41	..	..	..	0·30	..	0·30	..	..	..	..	..	..	..	..	..	0·11	0·05	0·16
1912.	Outcrop	0·74	0·32	1·06	0·87	0·80	1·67	0·11	0·23	0·34	0·21	0·11	0·32	..	0·32	0·32	0·35	0·35	0·70	..	..	..	0·43	0·38	0·81
	Deep	0·35	0·35	0·70	0·34	0·39	0·73	0·15	0·16	0·31	0·05	0·20	0·25	..	0·18	0·18	0·29	..	0·29	..	..	..	0·20	0·26	0·46
All Other Diseases.																									
1910.	Outcrop	19·12	40·21	59·33	9·34	17·76	27·10	11·24	10·69	21·93	6·91	22·85	29·76	5·17	10·47	15·64	3·09	11·33	14·42	3·40	9·53	12·93	8·76	19·55	28·31
	Deep	21·16	34·94	56·10	10·56	22·68	33·24	6·03	5·49	11·52	6·51	25·61	32·12	3·99	10·10	14·09	4·22	6·75	10·97	14·14	3·33	17·47	10·20	22·92	33·12
1911.	Outcrop	16·80	54·33	71·13	10·48	15·37	25·85	4·38	4·18	8·56	5·53	12·51	18·04	6·60	8·99	15·59	7·34	12·14	19·48	5·47	5·87	11·34	8·43	16·40	24·83
	Deep	21·81	116·18	137·99	11·03	29·56	40·59	8·02	10·93	18·95	9·31	31·52	40·83	5·06	31·26	36·32	9·10	9·99	19·09	21·04	14·03	35·07	11·61	41·21	52·82
1912.	Outcrop	13·41	*92·83	106·24	7·46	24·45	31·91	3·21	9·63	12·84	3·67	18·00	21·67	4·63	13·37	18·00	3·53	13·44	16·97	3·17	10·91	14·08	5·80	25·37	31·17
	Deep	17·20	12·69	29·89	8·97	39·03	48·00	5·49	28·74	34·23	6·49	40·78	47·27	4·85	27·66	32·51	4·95	11·36	16·31	7·44	22·31	29·75	8·39	46·91	55·30
All Diseases.																									
1910.	Outcrop	61·86	48·16	110·02	28·48	26·04	54·52	26·86	14·80	41·66	15·76	29·10	44·86	11·49	13·57	25·06	15·97	23·69	39·66	22·78	12·25	35·03	24·86	26·26	51·12
	Deep	62·44	40·92	105·36	33·91	31·90	65·81	21·20	12·07	33·27	13·78	31·64	45·42	11·04	11·74	22·78	8·44	9·70	18·14	33·26	6·66	39·92	29·31	29·61	58·92
1911.	Outcrop	60·02	74·00	134·02	32·86	27·17	60·03	15·88	6·83	22·71	12·81	17·55	30·36	14·73	14·64	29·37	24·28	17·22	41·50	21·30	8·41	29·71	25·44	24·96	50·40
	Deep	64·69	144·21	208·90	34·30	43·91	78·21	25·10	22·03	47·13	19·07	41·91	60·98	18·52	37·01	55·53	26·13	20·44	46·57	69·13	22·04	91·17	32·96	55·29	88·25
1912.	Outcrop	53·12	117·32	170·44	28·17	40·32	68·49	13·50	17·32	30·82	9·89	27·46	37·35	12·78	19·85	32·63	17·67	24·39	42·06	17·05	21·21	38·26	20·82	37·91	58·73
	Deep	54·41	43·85	98·26	29·84	56·35	86·19	18·99	47·74	66·73	13·89	53·69	67·58	10·06	39·15	49·21	18·93	17·47	36·40	22·95	57·01	79·96	24·97	64·22	89·19

* *Note.*—The high repatriation rate among Tropicals on Outcrop Mines in 1912 was due to the following unusual repatriations :—

New Kleinfontein	Debility	217
Randfontein Central	,, ...	42
Simmer and Jack.....	,, ...	36
New Modderfontein	Scurvy	30

Unfit and other causes also account for the large rate.

The distinction between Outcrop and Deep Level Mines is that given by the Director of Native Labour in his Annual Reports. We have not, however, been able to obtain a very clear definition of the difference between these two classes of mine, as in a large number of cases the original outcrop mine has been combined in a deep level. Also an outcrop mine may be deeper than a deep level. However, taking the classification broadly, the deep levels are deeper than the outcrop mines, have vertical shafts until they cut the reef, and the mine workers cannot walk out of them. They consequently possess to an enhanced degree, speaking generally, those characters which are considered to render mining unhealthy.

356. Comparing outcrop and deep mines it is difficult to deduce from the table a very decisive difference in the occurrence of disease between them.

Taking all diseases as a whole, and taking the entire population irrespective of tribe, the proportions of mortality and repatriations are markedly greater in the case of the deep mines.

Thus:—

Proportions of disease from All Causes per thousand.

	1910.			1911.			1912.		
	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.	Deaths.	Repatriations.	Total.
Outcrop	24·86	26·26	51·12	25·44	24·96	50·40	20·82	37·91	58·73
Deep	29·31	29·61	58·92	32·96	55·29	88·25	24·97	64·22	89·19

Also in the case of pneumonia and of all other diseases, both the mortality and the repatriations are decidedly greater in respect of the deep mines. Tuberculosis is also greater in the deep, but only slightly so.

But when we split the figures up into the several tribes the effect of the deep mines is seen to be by no means so regular, but broadly the following observations may be ventured.

The Deep show more tuberculosis among all tribes except the East Coast and the Basuto, in both of which tribes the amount of the disease is considerably greater in the Outcrop.

The Deep show much more pneumonia among all tribes except the Tropical and the Natal and Zululand natives. In both of these tribes the amount of pneumonia is greater in the Outcrop mines.

The Outcrop show a much greater proportion of silicosis in all tribes than do the Deep.

The Deep mines show very much more disease from "All Other Causes" than the Outcrop in all tribes, except Natal and Zululand natives, in whom the Outcrop mines are decidedly the worse.

Of course these variations would admit of complete explanation, could we but know all the conditions, some however, are explicable in a general way.

The Outcrop mine is usually an old mine, it often has an old compound; when he has finished his task the labourer can usually walk out of it, instead of waiting be hauled. Therefore the outcrop mine usually has a good name with the natives, natives, and he will stay on and extend his period of employment, or return to it again and again.

Then again certain tribes are more prone to stay on for longer continuous periods than do others. This is notably the case with the East Coast Native.

Also the outcrop mine, being older and also usually having a short life, frequently does not possess the improved conditions, both compound and mine, that the deep level possesses.

Therefore tuberculosis being a disease the liability to which increases with the length of mine employment, would tend to occur to greater extent among the old boys on the outcrop mine, and this effect would reduce and mask the effect of the deep mine in inducing tuberculosis. And this would especially occur in the case of the old East Coast boy. This is what Table 57 shows to be the case.

But the effect of the old boy frequenting the outcrop mine is particularly seen in the instance of silicosis, so that this disease preponderates in the outcrop mines, whereas *a priori*, one would expect it to occur with greater frequency in the deep mines, especially those in which a greater amount of development is proceeding, with inferior ventilation at the working faces.

Pneumonia, however, which is a disease of the earlier period of employment, and is one which we should expect to be particularly affected by the special conditions attaching to deep level mining does show itself decisively greater in the deep levels as is seen in the Table. Why, however, in the case of the Transvaal, the outcrop mine yields most pneumonia, we are unable to explain.

With regard to "All other diseases," we are not able to analyse these by splitting them up into their component parts, so we cannot say which particular diseases are chiefly affected.

SECTION IV. CONCLUSIONS AND RECOMMENDATIONS WITH REFERENCE TO THE HEALTH OF MINE LABOURERS, WITH SPECIAL REFERENCE TO TUBERCULOSIS AND PNEUMONIA.

357. In the preceding discussion of the occurrence of disease among native mine labourers, we have demonstrated that the three most important primary factors determining the amount of disease among mine workers are:—

(i) The personal factor connected with the native himself, *i.e.*, his constitutional or physical power to withstand the effect of adverse environment and strain. This is illustrated in the bulk or aggregate by the tribal differences seen in the amount of sickness and mortality occurring, with surprising constancy, in the different tribes employed on the mines.

(ii) The direct effect of adverse environment and over strain. This we have seen is operating on the surface under bad compound conditions,* but it reaches its maximum effect in underground mining. We have shown that it occurs to some extent even in open mines, such as was Jagersfontein; that it is much enhanced in underground Diamond mining; that it occurs in the case of the Coal mines, and that, although we cannot demonstrate it in the case of the Gold mines, owing to their being no differentiation made here in the available statistics between underground and surface workers, yet we have seen that among these mines, the deep levels have a larger amount of disease than do the outcrop mines. And it is the practical experience of those officials whose duty it is to deal with the health of mine workers, that bad underground mine conditions are reflected in an increase of ill-health, and sickness and mortality in the workers subjected to them.

Also as regards over-strain. We have seen the effect of over-work in the labourers in the Coal mines, and it is also seen in practice, from time to time in connection with the gold mines, as for example, in the case of such over-effort as that entailed by walking up from the mine, instead of being hauled.

(iii) The dissemination of infection. It is difficult, if not impossible, to prove definitely that any given condition does actually spread the infection of tuberculosis or pneumonia; but if we admit that these diseases are spread by infection; then it is not difficult to forecast the conditions which would be likely to lead to the spread of infection, and if we find that there is a greater occurrence of these diseases where such conditions exist, then we are justified in inferring the probability of those conditions having been operative in producing spread.

Among such conditions are:—

(*a*) The admission of tuberculous workers into the compounds and mines.

(*b*) Conditions of the compounds favouring the retention and diffusion of infection when introduced, *i.e.*, bad lighting, inefficient ventilation, uncleanliness.

(*c*) Overcrowding and other conditions bringing the healthy into contact with infection either already existing free, or being given off by an infective individual.

* Drs. Porter and Turner refer to their note to paragraph 309 (*f*).

358. Dealing, then, with these conditions, as far as possible, in the order above employed.

1. It seems to us essential that some attempt at classification should be made of natives employed on the mines into those, on the one hand, who are best fitted to labour under the more adverse conditions, and on the other, those who are only suitable for employment on the least exacting kind of task.

We are aware that to a great extent the native selects his own kind of job. That is to say that though they are nearly all contracted for underground work, he is permitted as far as possible to choose for himself whether he will work underground or on the surface, as hammer boy or trammer, and so on; but nevertheless the choice of unsuitable work by the boys themselves should be discouraged. Besides which there is a certain amount of selection made by the management in many cases. This is especially so in the case of those boys who for any reason are found to be unsuited for hammer work. These are liable to be put on a simpler but at the same time more arduous task, such as lashing, which means a continuous 8 hours shift. It is thus often the physically inferior boy who gets the severer task.

Of course mine managers much prefer the docile steady working tribe for underground jobs, but it is just these tribes which it is not unusual to find least resistant to adverse conditions.

We may here draw attention to the fact which we have elsewhere shown to be indicated by the mortality and sickness statistics of native mine labourers, namely, that like conditions of unusual stress act with proportionately greater effect on those tribes showing the greatest tendency to disease on the mines as compared with those tribes showing the least, *i.e.*, say, the Basuto as compared with the Cape or Natal native.

2. Any circumstances which tend to add to the effect of the unavoidably inimical conditions inherent in certain kinds of work, should be carefully avoided. Thus to particularise some of those cimcumstances which at the present time are not infrequently deliberately brought into effect.

(*a*) Walking up out of the mine. We cannot too strongly deprecate this practice. We do not do so merely on theoretical grounds, but on actual observation of its effects. This was well seen by us at the conclusion of the day's shift on the Robinson mine, when the boys were walking up from the 1,000 foot level. The condition of some boys on arriving on the surface was one of very marked physical distress. They were staggering, breathing rapidly and with obvious difficulty, nostrils expanded, pupils dilated, and pulse very rapid, and in some cases hardly perceptible at the wrist. On comparison with those boys coming up in the cage from the lower levels of the mine, the most casual and unskilled observer could not fail to see the difference.

A boy brought to this extremity would not return to his normal condition for a long time, and while in this state is not in a fit state to take his evening meal and would be liable to go down under an infection which normally he would be able to resist.

We are of opinion that no boy should be required to walk up more than the distance of two levels, that is the distance between three levels, or say a maximum of 400 vertical feet.

This should be embodied in a mining regulation and apply to all mines. Especially should it apply to those cases, where in a deep mine the boy is required to walk up the incline shaft to the bottom of the vertical shaft, and there to wait until he is hauled. In one mine which we visited we found a number of boys of all tribes, including tropicals, sitting at the bottom of the vertical shaft in a cold down cast draught after being heated and overstrained by having to climb up 600 to 800 feet on the incline. On questioning we found that some of them had been waiting a considerable time. We may add that on the surface there was a change house erected for their use in order to prevent chill on coming out of the mine.

We are aware that many boys finish their task some time before hauling of the shift begins, and that such boys would consider

it a hardship if prevented from getting out of the mine, as soon as their work is done. We also recognise that there are in many cases difficulties in hauling boys at odd times, owing to the difficulty of of changing over from rock to shift hauling. But we think that in many cases these difficulties could be overcome. At any rate in our opinion boys should not be allowed to climb any distance over that which we have named.

3. We are also of opinion that boys should not be allowed to carry up their drills. We have caused the drills which we have seen boys carrying up to be weighed, and found that the average bundle weighs about 30 lbs. This is an unnecessary waste of energy and should not be allowed. This, of course does not apply to carrying their drill in the level to the hauling shaft.
4. Mine labourers should not be required to remain underground longer than necessary. As soon as their appointed task is finished they should be brought to the surface. If underground conditions are of themselves inimical to health, as we believe them to be, then the shorter the time the person is exposed to them and the longer the time he is on the surface in the fresh air and sunlight recuperating, the better it must be for him.
5. Also tasks which can be done on the surface should not be carried on underground. For example, on one of the largest mines a considerable staff is constantly employed on the different levels in drill sharpening This is carried on at many forges established on the 4th, 7th, and 8th levels, No. 1 shaft; on the 10th, 11th, 12th, and 13th levels, No. 3 shaft; on the 11th level, No. 6 shaft; on the 5th and 12th levels, No. 7 shaft, and on the 8th level, No. 8 shaft.

   This, apart from requiring the person to work underground under adverse conditions of health, would seem to us, from our observations, to be likely to result in adding to the unhealthy conditions already existing underground.

Mine Ventilation and Dust-laying.

359. In view of the particularly harmful effects of air-vitiation and the inhalation of silicous dust in predisposing to tuberculosis and pneumonia, it is essential that every effort be continued, pursuant to the Mining Regulations, to secure adequate air-change underground and the adoption and enforcement of the methods prescribed from time to time for the prevention and allaying of dust.

Compound Conditions.

360. Speaking generally the compounds are of two kinds namely (*a*) the old type and (*b*) the "Rand Mines Type" (*a*) the old type, of which the Jumpers and Spes Bona compounds are examples, are usually old low-roofed wood-and-iron buildings with earthern-floors, inadequate lighting and ventilation and often otherwise lacking in what are usually regarded as the recognised essentials of modern hygiene. Notwithstanding these shortcomings, however, the mortality is very appreciably less in some of these old quarters than in compounds of the modern type. This has been variously attributed to circumstances such as the natives being mostly old boys and therefore acclimatized, or to their diet being more generous; or to the mine being an outcrop; but whilst the effect of such conditions cannot be overlooked, they do not in our view suffice entirely to explain this curious and somewhat disabling fact. (*b*) The newer, or Rand Mines type, consist of a series of rooms, usually of brick or stone, built on the lines of the "Rand Mines type of hut," which was specially devised and officially approved for the reception of Chinese coolies by the Coloured Labourers Compound Commission of 1905. This type of hut is figured in Appendix D of the Report of the 1905 Commission: its walls are of brick or stone: iron roof with lantern louvres and and lights: impervious floor: glazed windows equal to 1/10th floor-space: extra means of cross-ventilation by openings between top of walls and roof (eaves-ventilation) and by special openings with sliding or flap covers, placed in opposite walls 2 to 4 inches from the ground: bunks usually arranged in 2 tiers: airspace per inmate, 200 cubic feet, calculated on not more than 12 feet average height where bunks are in single tier and 14 feet where bunks in double tier. The rooms are constructed to house from 25 to 50 or more natives.

The 1905 Commission ascertained experimentally that allowing 200 cubic feet of free air-space per head, the frequent air-change permitted by the special means of ventilation provided, ensured sufficient and effective perflation; and, in practice, these rooms answered very satisfactorily for housing the class of labourer, namely the Chinese coolie, for which they were devised.

After the departure of the Chinese, however, the same rooms were used for the reception of all classes of natives, including tropicals, and it was then found that the comparatively frequent air-change, of which the hardy Chinaman made no complaint, was a source of considerable discomfort to the South African native. From the results of practical experience for upwards of six years of housing natives in these compound rooms, we have reached the opinion that they are too large (*i.e.*, that each room is constructed to receive too many natives), that the present allowance of floor-space and cubic-space is insufficient; that the special arrangements for ventilation render them too draughty; and that through the interstices of the lantern-louvres on the roof-ridge, dust is freely admitted and inhaled by the inmates, to the obvious detriment of their health. We recommend, therefore, that future compound rooms for natives be of simple construction, designed to receive not more than 10 natives and preferably less; adequately cross-ventilated by means of opening windows protected outside (where necessary for purposes of compound discipline), by very strong steel netting; and that each inmate be allowed 36 square feet of floor-space and 300 feet of cubic-space. We also recommend that each native have a separate bunk, and suggest that more floor-space would be available for general purposes if the bunks were fixed parallel with, instead of at right angles to, the walls.

With regard to existing rooms built on the Rand Mines plan, we are of opinion that the allowance of 200 cubic feet per inmate should be increased to 300 cubic feet.

361. In reference to the supervision of compound rooms, we think that the manufacture of M'heou by natives in their living rooms should be prohibited, that the production of this article should be undertaken by the mine authorities, and that it be issued as a regular item of diet. This will make for greater room-cleanliness, in regard to which there was considerable need for improvement in many cases which came under our notice.

362. We are further of opinion that every mine should arrange for the use, jointly or otherwise, of a portable steam-disinfector (as at the Premier Mine) for the frequent and regular disinfection of blankets and clothing, which are generally in a filthy condition: that hangings such as are fixed by natives round their bunks should be prohibited in all compounds (*vide* Transvaal Government Notice No. 292 of 1907, dated 21/2/1907), and that, where practicable, a store-room be provided for the reception of boxes containing the private belongings of natives.

The suggestion has also been made that special rooms be provided in which the natives to take their meals. This arrangement answered well with the Chinese. It has, however, been found from actual experience with those natives who succeeded the Chinese on mines where such dining rooms existed, that they were not used by the natives. It is true that at the W.N.L.A. compound, the native is required to eat his food on an open granolithic surface; but in this compound, the circumstances of discipline are different, and the exigencies of mining requirements do not operate. We are, nevertheless, of opinion that the adoption of this suggestion is desirable, and that if it be found practicable to enforce it, considerably greater cleanliness of the native living rooms will result.

Heating of Compound Rooms.

363. This is usually by means of a bucket-fire, which is preferred by the natives, who sit round it and cook extra food which they have provided. The bucket-fire is supposed to stand beneath a stove-pipe and canopy, though in practice it is very often placed in another part of the room. Certain compounds have been heated by steam-pipes, but these installations are at times liable to get out of order, and in one large and well-known compound, the system has been found in practice to be unsatisfactory. On the whole, we are of opinion that if the fire-bucket be firmly and securely clamped under the canopy, it will meet the requirements of comfort, while assisting materially in ventilation.

Locations versus compounds.

364. The suggestion has recently been made that, as opportunity offers, the natives should, so far as practicable, be "dispersed" or "scattered" in huts with

their families, instead of being barracked in compounds. Amongst the natives employed on the Panama Canal, this measure is believed to have brought about a sudden and permanent drop in pneumonia on the Isthmus. In some instances in the Transvaal it has also answered admirably, notably at the Transvaal and Delagoa Bay Colliery. But, as regards the Gold Mines of the Rand, we feel that this proposal should be approached with considerable caution. Under present conditions a large proportion of mine natives return periodically to their kraals after from 12 to 18 months of work on the mines. If, however, the wives and families of such natives were brought to the Rand, the native would have less inducement to leave work, and often no home to go to. He would consequently lose the recuperative effect of the long rests which he now periodically enjoys, and which we believe to be invaluable. Whilst, therefore, we do not doubt that his morbidity and mortality from pneumonia would be materially decreased by family life in a location hut, we think there is reason to fear, that one effect of continued mine work without the intervention of the present long periods of rest and change would be a marked increase in tuberculosis.

Diet.

365. "The Minimum Ration Scale for Native Labourers" laid down by "The Native Labour Regulations 1911" (*vide* Annexure B to "Special Regulations for the Transvaal") prescribes the equivalent per native of roughly 4,000 large calories with a physiological sufficiency of protein and fats. In our judgment this ration is sufficient: but we wish to emphasize our belief that in some instances there is a great lack of supervision in the distribution of foods. Too much is left to the discretion of the compound police-boy, with the result that owing to favouritism or other cause, certain boys—probably the weakly ones who most require nourishment and are least able to obtain it from outside sources—go without their full ration.

Vitamines.

Having regard to what is known as to the importance of vitamines, it has occurred to us that much of the food of the mine native may lose in value by excessive heating, and we think that this point might be usefully investigated. In view of the large proportion of cases in which tuberculosis amongst native miners is of the abdominal type, we are of opinion that care should be exercised as regards the cleanliness of cooking and feeding utensils; that tuberculous natives should on no account be allowed to work in the kitchens: that the mine medical officer should make frequent inspections of the meat supply to satisfy himself that it is of sound quality; and that the native custom of buying pigs from any source to kill in the compounds, be discouraged, especially as pigs from the vicinity of mines are probably the most likely to be tubercular.

366. It remains for us to make brief reference to the necessity for enforcing the use of change houses and for adequate provision, more especially at some of the coal mines, for bathing and for washing clothing; also to the importance of fly-screening kitchens and latrines, and of an effective system at all mines of latrines and disposal of excrement and refuse, both underground and on the surface. We are further strongly of opinion that the water-carriage system of excrement disposal should be adopted on the surface wherever practicable, and that every reasonable facility should be extended to mining properties to connect with any public system of sewerage which is properly available.

SECTION V. ON THE FUTURE CONTROL OF THE HEALTH OF MINE EMPLOYEES AND MINE SANITATION.

367. On the 24th March, 1914, the Chairman circulated to your other Commissioners a memorandum in which, after recording and shortly discussing his view that along the Reef there are too many and overlapping Authorities concerned with the health of mine employees and mine sanitation, he proposed

> "That the jurisdiction of municipalities over mine health and sanitation, including compounds, be entirely abolished, and that a representative Board of Health be established, having sole and undivided control over all these matters. This Board to be supervised by only one Government Department (the Department of the Interior), to which it will be solely responsible, and that it have at its head a permanent paid Chairman or Commissioner, who shall be a member of the Civil Service."

On the 7th April, the Chairman (Drs. Te Water, Porter and Turner being also present) moved the following resolution:—

"That the future control of the health of mine employees be based on the suggestions contained in his memorandum furnished to members of the Commission on the 24th March, 1914."

This was not seconded. The Chairman thereupon reserved the right to embody his opinions in a Minority Report, and on 24th April, 1914, intimated his intention to do so. Therefore, although the Commission was, on 19th February, 1914, definitely relieved of the necessity of reporting apart from its First Term of Reference, yet, in view of the nature of the Chairman's proposal and decision, a majority of your Commissioners have felt it necessary to deal with these matters in a special section.

Present Method of Control of the Health of Mine Employees and Mines Sanitation.

(*a*) *Underground Conditions.*

368. As regards all mines within the Union, the responsibility for securing underground sanitation rests with the Mines Department, and is provided for in the Mining Regulations.

(*b*) *Surface Sanitation.*

369. (*a*) *The Health of White Employees and their Housing, etc.*, are, speaking generally, regulated by the same statutes or by-laws as apply to the non-mining population of the Province or district or municipality in which such mines are situated. In addition, however, the Mining Regulations (*vide* No. 67) now embody a recommendation of the Transvaal Mining Regulations Commission, 1910, prohibiting the erection and use by mine employees of back-to-back rooms or quarters as bedrooms or living rooms.

(*b*) *As regards the Health of Natives and Coloured Employees*, such matters as housing, latrine provision, water supply and medical attendance, are supervised, in the Transvaal and Orange Free State, by the Native Affairs Department, which, in the Transvaal, also specifies a diet-scale and hospital provision.

370. In the Natal colliery districts (*vide* par. 181) the supervision of the general well-being and medical care of Indians is a function of the Indian Immigration Trust Board, and is controlled by the Protector of Indian Immigrants, an *ex officio* member of this Board. As regards natives, inasmuch as these mining areas have not yet been declared Labour Districts, the Native Affairs Department does not stand in any similar special relationship to the native miner. Such matters (for both Indians and natives) as housing, latrine provision, water supply and prevention of infectious disease, fall under the Health Administration of the Union.

371. In Kimberley, the principal mining centre of the Cape Province, the position as regards mine surface sanitation is somewhat peculiar. Owing to the fact that Kimberley has not been declared a Labour District (though such a declaration is seriously contemplated) the jurisdiction of the Native Affairs Department is very considerably restricted. There is in Kimberley an officer of that Department styled "Protector of Natives and Inspector of Compounds," appointed under "The Diamonds Trade Act" No. 34 of 1888 and "charged with the duty and invested with the power of inspecting, from time to time, all compounds . . . .," but we are without further definition of his duties and powers. Ordinance No. 2 of 1874 provides for the establishment of hospitals and boards of management in Griqualand West, for imposing a tax, for the maintenance of such hospitals and boards, of one shilling on every Contract of Service, and for making certain sanitary regulations from time to time.

At present the local Health Authority is the Kimberley Board of Health, established under Act 10 of 1884, and constituted by Proclamation 174 of 1884, for the (very limited) purpose of the Cape Public Health Act 1883. This Board is composed of two representatives of the Municipality and two of the Mines, with the Civil Commissioner as Chairman. The duties of the Board's medical officer include supervision over mine surface sanitation. The matter is not, however, referred to in the medical officer's annual reports.

372. Both the Native Affairs Department and the Mines Department are advised on matters of health and sanitation by the Mines Medical Inspector (Dr. S. van Niekerk, who is on the establishment of the Department of the Interior), with

the qualification or exception that within the Municipality of Johannesburg the duties of the Medical Officer under the Native Labour Regulations 1911—111, 26 (except as regards hospitals and the medical examination of natives) have been delegated (*vide* Part III, art. 26) to the medical officer of health for Johannesburg.

373. We have no evidence of any overlapping having occurred in practice as regards the relations of the Department of the Interior, the Mines Department and the Native Affairs Department to mines, health and sanitation.

Johannesburg.

374. As regards the sanitary supervision of mines within the Municipality of Johannesburg, special arrangements exist. Up to October, 1903, this work was left to the Inspectors of the Native Affairs Department and of the Mines Department, officials who are not sanitary specialists. In October, 1903, the Municipal Council of Johannesburg appointed Mr. A. Cowie, C.E., Cert. Sanitary Inst., as Mines Sanitation Inspector for the mines within the Municipal Area. It is believed that this was the first appointment of the kind, at any rate so far as British communities are concerned.

Both as regards surface and underground conditions, Mr. Cowie at first worked entirely under the direction of the medical officer of health, Johannesburg. In June, 1904, however, as the outcome of a conference between representatives of the Mines Department, the Chamber of Mines, the Mine Managers' Association and the Municipality, it was agreed that, to avoid overlapping and possible friction, and also to secure legal right of entry underground, the inspector should, as regards underground sanitation, work under, and report direct to, the Government Mining Engineer, and that the latter officer should initiate any necessary prosecutions, supported by the evidence of the mines sanitation inspector, and, where desirable, of the medical officer of health, Johannesburg.

Reports by the inspectors of the existence of nuisances or other general defects of surface sanitation are taken up and carried through by the M.O.H., Johannesburg, direct with the mine authorities, in the same way as in regard to any other property owner within the Municipal area, and under the same powers.

Native Housing Accommodation must, however, comply with (*a*) the specified requirements of the Native Labour Regulations as to general type, material, lighting, ventilation, air-space, warming, bunks, etc.; and with (*b*) the Municipal building by-laws. Plans have, therefore, to be deposited both with the Native Affairs Department and the Municipality. As regards building requirements, they must satisfy the Town Engineer, and in respect to type, lighting, ventilation, air-space and the like, must be approved by the medical officer of health, Johannesburg, representing the Native Affairs Department as delegated Medical Officer under the Native Labour Regulations.

It may here be observed that there is a nominal discrepancy between the Native Labour Regulations and the Municipal Public Health By-Laws, inasmuch as the former require special ventilation arrangements and only 200 cubic feet of air-space per head, whereas the latter specify no special means of ventilation, but 300 cubic feet of air-space and 36 square feet of floor-space. In practice, however, this has not given rise to any difficulty whatever, for if, as in the case of native married quarters, a mine does not choose to provide such special means of ventilation, the requirement of 300 cubic feet and 36 square feet is enforced.

If, however, any inconvenience or conflict did occur in practice, as regards the Native Labour Regulations 1911 and any by-laws of any municipality or local authority, Article 24 provides that the Governor-General "may by Proclamation in the 'Gazette' suspend, in respect of any mine or works in any labour district, the operation of any," such "by-law." The possibility of any such inconvenience or conflict is therefore fully provided for.

Since 1903, inspectors of the Native Affairs Department have continued to take cognizance of matters of surface sanitation, and in particular, to press the Management of the Mine to carry out the recommendations contained in the reports of the mines sanitation inspectors. It appeared, however, during 1913, that this procedure occasioned some inconvenience, and it was agreed in October, 1913, at the suggestion of the Director of Native Labour, that the officers of his department should refer to the medical officer of health for Johannesburg, any matters affecting health or sanitation which came to their notice, leaving them to be followed up by the mines sanitation inspectors employed by the Municipality, and thus eliminating any overlapping.

A copy of each of the mines sanitation inspector's reports on surface conditions is sent to the manager and doctor of the property concerned, the Native

Affairs Department, Government Mining Engineer, Medical Inspector of Mines, and the Chamber of Mines. A copy of each report on underground sanitation is furnished by the Government Mining Engineer to the mine officials and the medical officer of health, Johannesburg, and by the latter to the Director of Native Labour, the Medical Inspector of Mines, and the Chamber of Mines.

In January, 1909, August 1912, and June 1913, assistant mines sanitation inspectors were appointed, and the total staff now numbers four.

In 1910, at the request of the Government Mining Engineer, a Code of "Recommendations in Regard to Underground Sanitation" (based largely on Mr. Cowie's experience), and in November, 1913, a similar series of "Recommendations in reference to Surface Sanitation on Mines," were prepared and circulated by the medical officer of health, Johannesburg. (*Vide* Annexure F.)

375. With regard to the efficiency of the Johannesburg system, we have it in evidence that conflict of *opinion* has arisen between the medical officer of health, Johannesburg (when advising the Native Affairs Department as delegate Medical Officer under the Native Labour Regulations) and an Inspector of Native Labourers as to the necessity of reconstructing certain old compounds as well as the desirability of doing so on certain particular lines suggested by that inspector, who took a keen interest in the matter and very fairly observed [Question 48006] that "the extraordinary part is that you will get better health in these dirty old compounds."

On the other hand, the Director of Native Labour agreed that the Johannesburg arrangement had worked satisfactorily in co-operation with the mines; whilst the Government Mining Engineer testified as regards underground sanitation, that he had found it worked very well, without friction, that he believed it had been working smoothly right since it started [Question 57791/2): that if he could get the same system in other municipalities he thought it would be excellent [Question 57779]: that naturally the municipal officer in touch with the local medical officer is, in a way, the best man to do that kind of work, because largely the system of underground inspection concerns the looking after sanitary buckets, which can best be done by the local authority [Question 57790]: and that "There has been a systematic and general improvement in underground sanitation resulting from the attempt made to approximate to the conditions we have in Johannesburg." [Question 57807.]

With this experience, we are of opinion that much benefit might be expected to follow the appointment of carefully selected well-trained men as mines sanitation inspectors in the other mining districts. This view was recorded by the Transvaal Mining Regulations Commission 1910, and the actual test of practice for many years has disclosed no overlapping which was not easily and promptly obviated. By Section 180 of the Transvaal Local Government Ordinance 1912, the Administrator of that Province may now require any local authority to appoint a "mines sanitation inspector" to inspect the underground and surface workings of any mines within its district, to report to the local authority, to any officer specified by the Minister in charge of Public Health, and to any other public officer whose duty it is to enforce regulations which have been contravened. The local authority cannot, however, prosecute except with the consent of an officer deputed by the Minister in charge of Public Health. This Section 180 does not, however, apply to any local authority which has appointed and continues to employ a mines sanitation inspector who is certified by its medical officer of health to be properly qualified, unless after due inquiry the Administrator is satisfied that such inspector's duties are not being efficiently carried out

As a matter of fact, we are not aware of any local authority which has yet been called upon to make an appointment, and, consequently, at the present moment the local authorities throughout the Transvaal continue to possess under their bye-laws exactly the same powers of inspection and prosecution in regard to surface conditions on mines as they do in respect of any other part of their district. They have, however, no statutory powers to inspect or deal with underground conditions.

Proposed Establishment of Special Board of Health for the Mines.

376. The next question for examination is the proposal that the jurisdiction of municipalities over mine health and sanitation, including compounds, be entirely abolished and replaced by a Board of Health responsible only to the Minister of the Interior. It is claimed that possibility of overlapping and conflict of authority would be thereby eliminated. But the only municipality which has hitherto exercised active jurisdiction over mine health and sanitation is that of

Johannesburg; and whatever fancied or theoretical possibilities exist, the experience of eleven years has afforded no evidence of practical conflict of authority, nor of any serious overlapping which (as already stated) has not been readily and promptly obviated. On the other hand, the Heads of both the Government Departments concerned (Mines and Native Affairs) have testified to the satisfactory working result of the system in question.

377. It has also been suggested that the problems of miners' health and sanitation are constantly in a state of flux and change, and could be best dealt with by such a Health Board. But by Notice No. 291 of 26th February, 1912, in *The Union Gazette* of 27th February, 1912, the Honourable the Minister for Mines appointed a Standing Committee known as the "Miners' Phthisis Prevention Committee" to "inquire into by experimental or other investigation, and to report from time to time upon the improvement of the methods for the prevention of miners' phthisis in the Witwatersrand Gold Mines, and to advise upon the introduction of a systematic and uniform policy and the amendments to the Mining Regulations which may be necessary for combating the disease."

This Committee consists of 23 members, and could hardly be more representative or skilled, for it includes the Government Mining Engineer, Chief Inspector of Mines, two Inspectors of Mines, the Government Bacteriologist, the Mines Department Chemist, a number of well-known consulting mining engineers and mine managers, a practical miner, one or more mine medical officers, and an expert pathologist and medical statistician. This Committee meets frequently, has several sub-committees, has conducted prolonged investigations, published two important reports (August 1912 and June 1913), in blue-book form, and made various recommendations as to amendments of the Mining Regulations in matters affecting the miners' health. It does not, therefore, appear to us that in this respect the suggested Health Board offers any substantial advantage, because any special matter requiring expert investigation can, if necessary, be specially referred by the Minister to this existing Committee.

378. It has further been urged that, on the Rand .the succession of mines along 60 miles of Reef, with a huge native mining population derived almost entirely from native territories, constitutes an unique condition of affairs which of itself calls for a special and unusual form of administrative health control. We are, however, unable to follow this contention, or to admit that the creation of a special Board of Health will necessarily alter or improve the position, though it will certainly involve considerable expense, including the appointment of various highly-paid officials to do the work at present administered by the Department of Native Affairs and the Government Mining Engineer, with their respective staffs. We are, in short, of opinion that a continuation, extension and careful co-ordination of the present functions in this respect of the Department of the Interior, the Mines Department and the Native Affairs Department, in collaboration with the local authority (as in regard to factory supervision in England), together with the co-operation of a sufficient staff of carefully selected mines sanitation inspectors will satisfactorily meet the requirements of the case from the point of view of the native mining population.

379. There is, however, as regards the Rand, another and very important side to the proposal under discussion, namely, its interference with local government. The Rand, from Springs to Randfontein, may not unfairly be regarded as practically one long more or less uninterrupted urban community, and the proposal involves nothing less than the cutting out of a continuous zone through the very heart of the districts of the various local authorities, and, by placing that zone under the jurisdiction of a special and possibly costly Board of Health, the creation of an *imperium in imperio*. This, on the face of it is in opposition to all modern local government practice and public health teaching. It is particularly in the industrial and densely populated communities of England and the Continent that the tendency to-day is, not to place the often extensive factory and industrial districts under one sanitary jurisdiction and the residential areas under another, but to bring them, by borough extension schemes, under one local authority; whilst as regards the factories themselves, both Government and local authority exercise close and direct sanitary supervision. The public health, financial and general grounds for such urban extension schemes are obvious and well-known. Their recognition has recently called into being Greater Capetown between Fishhoek and the Twelve Apostles. In Johannesburg these principles were fought out in 1903 before a Government Commission, and resulted not merely in a wide extension of the boundaries, but in the inclusion of the mines. In a memorandum on the subject forwarded to the High Commissioner, the Town Council then stated—"It is earnestly to be hoped that we may have one Johan-

nesburg and not two or three at bitter enmity between themselves. It will not help to unite the Transvaal, if we begin by dividing the Rand. Apart from this, there will be no finality about such a settlement. If Johannesburg is cut into two or three parts, such a measure would never extinguish the cry for unification." And most of the specific arguments then advanced are as true now as they were eleven years ago, and, speaking generally, apply equally to the other Reef municipalities, namely, that the mines (many within and all close to the town) are in matters affecting the Public Health, especially in respect to notification and control of infectious disease, fraught with distinct and constant danger to the municipality: that it is essential that the municipality should have, in regard to infectious disease on the mines, precisely the same sources of information, and powers of control as it possesses in respect of such disease in all other dwellings within its boundaries: that any possible conflict of two sanitary authorities should be avoided: that the municipality should also have full power of inspection and action in respect of nuisances, food supplies, milk, water for domestic purposes, etc.: that within the boundaries are several townships which, if the mines were not included, would be more or less isolated from the main portion of the Council's jurisdiction: that it is essential to the thorough and efficient execution of the large works of sewerage, surface-water drainage, tramways, water supply, public lighting and road-making that the mining land should be a constituent part thereof. To these may now be added the fact that the Council carries on the night soil removal services on the surface and underground, and (in Johannesburg) owns the sewerage system with which it is hoped the mines will shortly be able to connect.

Our recommendations are as follows:—

380.

1. That the Kimberley Diamond Fields and the Natal Collieries be declared Labour Districts and thereby brought under the supervision of the Native Affairs Department.
2. That in Natal the Native Affairs Officer, who would then be appointed Inspector of Native Affairs, be empowered also to act under the Protector of Indian Immigrants as regards the health and sanitary supervision of Indian miners.
3. That the abolition of the jurisdiction of municipalities as regards mines within their areas and the establishment of a special Board of Health for the Mines would involve unnecessary and undesirable interference with local government, unnecessary and possibly considerable expense, and as regards the Rand would probably at once revive difficulties and create friction.
4. That whatever the possibilities of the present system of control may be, we have no evidence of conflict of authority, nor of any overlapping which was not easily capable of prevention.
5. That the continuation, careful co-ordination and extension of the present relations and functions of the Department of the Interior, the Mines Department and the Native Affairs Department, with the co-operation of a carefully selected staff of Mines Sanitation Inspectors, will satisfactorily meet the requirements of the case.
6. That in the case of the larger municipalities and of others willing to do so, the mines sanitation inspector be appointed by the local authority to co-operate, where necessary, with the Native Affairs Department as regards surface conditions, and to act under, and to report direct to, the Mines Department in respect of underground conditions, both Departments to receive a copy of all reports

CHAPTER XIV.

Bovine Tuberculosis.

381. On the subject of tuberculosis among stock, your Commissioners took the evidence of a considerable number of witnesses having expert knowledge of South African conditions in relation to this important question. These included Sir Arnold Theiler, Director of Veterinary Research for the Union; Mr. C. E. Gray, Chief Veterinary Surgeon for the Union; Mr. J. D. Borthwick, the late Chief Veterinary Surgeon for Cape Colony and now Principal Assistant Veterinary Officer for the Union; and also the following Government Veterinary

Officers: Mr. W. M. Power, in charge of the Province of Natal; Mr. William Robertson, of Grahamstown and of the Union Institute of Veterinary Research; Mr. James Spreull, Umtata; Mr. A. Goodall, Kokstad; Mr. G. W. Freer, Eastern Province of the Cape and subsequently Acting Officer in charge of the Orange Free State; Mr. A. F. Harber, Durban; and Mr. J. I. Edgar, Zoutpansberg. The Commission also had the benefit of evidence tendered by Mr. F. A. Verney, the Principal Veterinary Surgeon for Basutoland; and by Mr. J. Irvine Smith, Director of the Johannesburg Municipal Abattoirs and Live Stock Market. In addition to these gentlemen, all qualified in veterinary science, the Commission had evidence from Government bacteriologists and from Municipal Medical Officers of Health.

Furthermore, from the side of the dairy-farmers and stock-owners themselves, the Commission was assisted by the evidence of witnesses appointed by the Transvaal Agricultural Union, and by the Witwatersrand Dairy Farmers' Association, namely, General Tobias Smuts, Mr. E. W. Hunt, Mr. J. Quilliam, Mr. T. W. Read and Mr. F. T. Nicholson.

Early history in the Cape Province.

382. Although the disease probably was introduced early into South Africa with the frequent importation of Stud Stock, bovine tuberculosis has only comparatively recently come into prominence in South Africa. The Chief Veterinary Surgeon for the Union states that until 1905 he held the opinion that for all practical purposes this disease did not exist in South Africa, and Mr. J. D. Borthwick, who, until the commencement of Union was Chief Veterinary Surgeon for the Cape Colony, informed us that there it only came to notice about fifteen or twenty years ago. In fact it was not until about the year 1904 that in the Cape the prevalence of tuberculosis in the dairy herds really began seriously to engage the attention of the Colonial Veterinary Department.

In 1905, Mr. William Robertson, a Government Veterinary Officer, had occasion to test with tuberculin certain well-known dairy herds in the Cape Peninsula, and a very extensive and unexpected infection was disclosed. As a result of his personal experience, he then estimated that over 60 per cent. of the dairy cattle of the Cape Division was affected.

383. For a number of years it had been the practice to require that all cattle imported into the Cape Colony should be accompanied by a certificate of clean health, granted after the application of the tuberculin test, but there is reason to believe that this certificate was not always reliable, besides which at that time the checks and safeguards necessary to the use of this test were not so fully appreciated as they are at present. Cases, therefore, arose in which animals certified clean were found on arrival at Cape ports to be suffering from tuberculosis when re-tested, and as a result of this experience, Proclamation No. 568 of 1908 was issued, requiring a thirty days quarantine after arrival before applying the re-test.

There can be no doubt but that the importation of pedigree stock, which unfortunately is particularly liable to suffer from tuberculosis, has in the past introduced, and been the primary factor in the occurrence of the disease in South Africa. And Cape Town, by reason of its geographical position, has been the chief port of introduction.

384. In the latter half of 1906 the Cape Act No. 16 of 1906 was passed, which amended the rather weak "Animals Diseases Act" of 1893, and gave the Colonial Veterinary Department powers to test with tuberculin animals which had been in contact with infected beasts, and to slaughter those suffering from tuberculosis. It authorised compensation to the owner of one-fourth the value, but not exceeding £15.

Proceeding under this Act, in the divisions of the Cape, Malmesbury, Stellenbosch, Paarl and Caledon during the five years, 1907 to 1911, the Veterinary Division had superintended the testing of 16,796 animals, including herds tested on account of tuberculous animals having been otherwise discovered among them. Of this number, 429, or 2.55 per cent. reacted; but the proportion of reactors in the herds tested on account of previously discovered infected animals was much higher than this, amounting some times to as much as two-thirds of the entire herd. These results are shown in the following Table 58.

TABLE 58.—Showing the number of animals tested with tuberculin and the number which died or were destroyed for Tuberculosis in the Western Province of the Cape of Good Hope during each of the five years 1907-1911.

Division.	1907.			1908.			1909.			1910.			1911.			Total.		
	Number tested.	Number died or destroyed.	Percentage affected.	Number tested.	Number died or destroyed.	Percentage affected.	Number tested.	Number died or destroyed.	Percentage affected.	Number tested.	Number died or destroyed.	Percentage affected.	Number tested.	Number died or destroyed.	Percentage affected.	Number tested.	Number died or destroyed.	Percentage affected.
Cape	34	19	55·88	1,591	147	9·23	2,686	66	2·42	2,164	49	2·26	2,327	51	2·19	8,802	332	3·77
Stellenbosch ..	125	4	3·2	607	12	1·97	692	8	1·15	577	8	1·39	776	16	2·06	2 777	48	1·73
Paarl	41	..	..	278	6	2·15	228	..	..	353	2	0·57	281	3	1·07	1,181	11	9·31
Malmesbury ..	130	14	10·77	1,778	12	0·67	694	6	0·86	461	1	0·22	753	..	..	3,816	33	8·65
Caledon ..	60	5	8·33	..	..	..	43	..	..	117	..	..	..	..	..	220	5	2·27
	390	42	10·77	4,254	177	4·16	4,343	80	1·84	3,672	60	1·63	4,137	70	1·69	16,796	429	2·55

The divisions of the Cape, Malmesbury, Stellenbosch and Paarl were therefore under this Act declared, on the 10th August, 1908, to be infected areas as regards tuberculosis, and the removal of cattle therefrom to other parts of the country was only permitted under a veterinary certificate granted after tuberculin inoculation.

These certificates, however, have not furnished the security against the distribution of infected stock which they should have done—probably owing to insufficient control having been exercised over their issue. Numerous instances were brought to the notice of the Commission, where very shortly after the admission to one of the Provinces of a newly certificated animal from the Cape, it had been found to be suffering from tuberculosis.

For many years, the Western Province of the Cape has been supplying Colonial-bred breeding stock, much of it of Friesland breed, to the rest of South Africa, and there is evidence that by this means the disease has been distributed in widely different parts of the Union.

385. From 1904 onwards, the Cape Department of Public Health encouraged local authorities and others to submit samples of milk supplies to the bacteriological laboratory for bacterial examination, but not many samples were submitted. Out of twenty-five samples sent in by the Medical Officer of Health for Cape Town in 1908, three were found to contain the tubercle bacillus, and subsequent investigation of the cows by the Veterinary Department disclosed infected dairy herds.*

In Natal.

386. In Natal, action in regard to bovine tuberculosis appears to have originated later than at the Cape. Under Act No. 14 of 1907 all animals imported into that Colony, other than those accompanied with an approved certificate of freedom from the disease, were required to be tested with tuberculin on arrival, but precautions against the importation of tuberculous stock had been adopted some time prior to that Act.

Shortly after the war, considerable numbers of Madagascar cattle were imported. Few of these were cows, as their exportation from the island is discouraged. In 1906, out of a consignment of 64 such cattle landed at Durban, no fewer than 42 reacted to tuberculin, many of them being very severely affected with the disease. Also 65 per cent. of Madagascar cattle imported through Port Elizabeth were found to be tuberculous. Although the importation of Madagascar stock was stopped eight or nine years ago, nevertheless, on testing some of these animals comparatively recently, they have been found to be severely affected with tuberculosis. Although the shortest time these could have been in this country was eight years, Government veterinary surgeons are of opinion that they were infected before arrival.

The testing of some dairy herds in Natal has recently disclosed high percentages of animals to be infected. Thus of 152 animals tested on account of the

* It is of interest to note that in the case of one of these samples, the tuberculin test disclosed in the herd two reactors, both these on slaughter were found affected with tuberculosis. Although these were probably the source of the tuberculous milk, in neither was any affection of the udder discoverable on minute examination.

discovery of cases of tuberculosis, 43 reactors were discovered, slaughtered and proved tuberculous post-mortem, or 28.2 per cent. Of 56 tested without suspicion of tuberculosis, 14 reacted and were destroyed, or 25.0 per cent.

In one dairy herd of 51 animals, 12 were proved tuberculous after post-mortem, and 16 were doubtful reactors, one of which was subsequently slaughtered and found tuberculous. Some time later a further test was carried out on this herd, then numbering 44, when nine reacted, were slaughtered and found tuberculous, while a further eight were doubtful reactors. Of this last number three were subsequently slaughtered and found tuberculous. Thus out of this herd 25 were proved tuberculous, and there yet remained other "doubtful" reactors. The milk from this dairy was supplied to the inhabitants of Durban, in spite of the protests of the municipal authorities.

In the Free State.

387. As to the experience of the Orange Free State, your Commissioners are in possession of but little information. It would appear that this State, in the absence of a Government Veterinary Department, which was not established until recent years, relied for its protection as regards the importation of infected stock, upon the precautions taken by the coastal Governments. Apparently very little tuberculosis has up to the present been discovered. In the Bloemfontein municipal abattoir, where annually over three thousand cattle and nearly two thousand pigs are killed, it would seem that tuberculosis is rarely found. Quite recently, however, tuberculosis has been found in pigs sent in for slaughter.

In the Transvaal.

388. In the Transvaal the disease appears not to have attracted notice until about the year 1903, when, by Proclamation No. 1 of that year, tuberculosis was proclaimed a disease under the "Diseases of Stock Ordinance, 1902," and by the Government Notice No. 834 of the same year, regulations were issued, providing for the compulsory application of the tuberculin test to cattle imported into the Colony without an approved certificate to the effect that the animals had been recently tested with tuberculin and found free from tuberculosis. It also empowered Government Veterinary Officers to submit to the tuberculin test all stock *suspected* of suffering from the disease. Cattle found to be so suffering being required to be slaughtered within a period of *six* months from the date on which the disease was diagnosed.

Under these powers the following outbreaks were dealt with:—

Administrative Year.	Number of outbreaks.	Number of Contacts tested.	Number died or destroyed.	
1903–4	6	0	6	
1904–5	8	211	11	(Several being
1905–6	6	297	6	Madagascar cattle.)
1906–7	2	25	2	
1907–8	3	22	3	
1909–10–11	25	606	52	

By Government Notice No. 877 of 1908, the importation into the Transvaal of breeding cattle from the districts of the Cape, Caledon, Malmesbury, Paarl and Stellenbosch in the Cape Colony, was prohibited except under authority of the Department of Agriculture.

Experience of the Johannesburg Municipal Abattoirs.

389. In October, 1910, the Johannesburg Municipality established public abattoirs on an extensive scale, and as a result of the meat inspection carried out at this institution under the Directorship of Mr. J. Irvine Smith, M.R.C.V.S., it has been possible to obtain some idea as to the extent to which tuberculosis occurs among slaughter stock. Also in some instances, by tracing back an in-

fected animal to the herd from which it originated, a valuable insight has been afforded of the extent to which the disease prevails among dairy-herds on the Rand.

The following figures have been supplied by Mr. Smith:—

	From 24th October, 1910 to 30th June, 1912.			From 1st July, 1912 to 30th June, 1913.		
	Number slaughtered.	Found to be tubercular.	Proportion per 1,000 affected.	Number slaughtered.	Found to be tubercular.	Proportion per 1,000 affected.
Cattle.						
Oxen	87,803	30	0·34	65,631	53	·807
Africander Cows ..	8,554	Nil	0·00	6,391	Nil	0·00
Cows of heavy milch strains other than Africander ..	130	68	523·07	100	27	270·00
Calves	4,909	1	0·203	3,377	1	0·29
	101,396	99	0·976	75,499	81	1·072
Sheep and Goats ..	564,005	1 Goat Sheep Nil	0·00017	369,229	Nil	0·00
Pigs	45,174	325	7·19	31,318	313	9·99

These figures would indicate that an increase in the amount of tuberculosis in slaughter stock is taking place.

These proportions of animals found tuberculosis compare very favourably indeed with these found to occur in Europe. It is difficult to make any exact comparison, because so much depends on the thoroughness of the inspection, this, generally speaking, being so much more complete in the case of the later records, and on the kinds of stock included in the comparison as the amount of infection among cows is everywhere much greater than in ordinary slaughter stock. Ostertag in his work on meat inspection gives the proportion in German public abattoirs as ranging in different years, for cattle between 6·3 and 45·8 per cent.; and of swine between 0·61 and 7·7 per cent.

In many cases, however, the amount of tuberculosis in swine has increased enormously of recent years, owing to the practice of feeding on the waste products from creameries.

Under the Federal meat inspection in the United States of America (which only applies to export meat), during the year ended 30th June, 1908, out of over seven million cattle slaughtered 0·961 per cent. were found tuberculous; of nearly two million calves, 0·026 per cent.; and of thirty-five million hogs, 2·049 per cent. were tuberculous.

Also at Glasgow, during the year 1912, the following was the percentage of animals found tuberculous at the Corporation Abattoirs:—

	Slaughtered No.	Affected.	
		No.	Percentage.
Cattle	99,558	9,676	9·71
Calves	8,890	30	·337
Swine	50,490	3,590	9·109
Sheep	322,680	..	..
Goats	20	..	..

Referring to the figures supplied by Mr. Smith, of the oxen, one was a stall-fed bullock, one a trek ox(and seven were ordinary veld oxen. In this connection we may mention that we were informed by the Principal Veterinary Surgeon for

the Union, that in the case of a large dairy herd in Natal, among which tuberculosis was discovered, and in connection with which 433 animals had so far been tested, it was found that veld cattle were also affected, about 13 per cent. of those tested reacting positively to tuberculin. In this case, however, the dairy cattle had been turned out to graze with the veld cattle.

Johannesburg Dairy-herds.

390. With regard to the above 68 cases discovered among dairy-cows sent to the Johannesburg abattoirs for slaughter, Mr. Smith gave particulars of the following causes:—

1. A tuberculous cow slaughtered at the abattoirs was traced to a certain dairy in Johannesburg, and the herd of 43 milch cows was thereupon tested by the Government. Of these, 18 reacted, and were slaughtered at the abattoir, and all found tuberculous. One other cow which did not react was ultimately sold on the live-stock market, and slaughtered, and also found to be badly affected with generalised tuberculosis. Thus there were 20 affected out of 44, or 45·4 per cent.
2. A slaughtered tuberculous cow was traced to another Johannesburg dairy, where there were 48 cows in the herd. These were tested and 11 reacted and were slaughtered. Also one cow died of pneumonic tuberculosis. That is 13 out of 49, or 26·5 per cent.
3. Another slaughtered cow found tuberculous was traced to a Johannesburg dairy. The herd numbered 48, and 9 reactors were discovered and slaughtered and found to be tuberculous; making 10 out of 49, or 20·4 per cent.
4. A slaughtered tuberculous cow was traced to another Johannesburg dairy herd of 60 cows, of which number 10 reacted and revealed tuberculosis post-mortem, or 11 out of 61; a percentage of 18·3.

The cows of two other herds numbering 5 and 17 animals, which had been grazing on the same commonage with this last mentioned herd, were also tested, with a negative result, but an isolated cow of the latter herd died of pneumonic tuberculosis, giving for that herd a percentage of 3·9.

5. In the case of another Johannesburg dairy herd, 21 cases were detected, and the whole herd, with the exception of three cows were slaughtered, revealing 87·5 per cent. infected.

All of these instances happened within the first few months of the opening of the public abattoirs, and Mr. Smith states that as a result of the wiping out of the last mentioned dairy no more dairy cows were sent in for slaughter, and his records have abruptly ended. It is, however, evident from this experience that the dairy-herds supplying milk to Johannesburg and the towns along the Reef must be very heavily infected.

A census of the dairy cows kept within the Johannesburg municipal area was made in January, 1913, when the number was found to be 3,779. The estimated daily yield of milk is 6,000 gallons. In addition to this about 2,500 gallons are brought in daily from outside.

The Principal Veterinary Surgeon estimates the number of dairy cattle in the Witwatersrand area at about 8,000.

Views as to the probable extent of the disease within the Union.

391. The general opinion of all the expert witnesses examined by the Commission, was to the effect that there was probably very little tuberculosis among the veld cattle of the Union. Also that there is not likely to be much among draught cattle. But among imported stock, among the better class of South African breeding stock, and in dairy-cattle, especially in the better bred heavy milch cows, it probably exists to a very considerable extent. While, however, some believe that among dairy and breeding stock the proportion of affected animals will be found to be heavy, others think that among even these it may be found not to be so extensive as the tests up to the present carried out would seem to indicate, as these tests have mostly been applied to herds as the result of the previous discovery of disease among them. Moreover, these herds have in the majority of cases been maintained in or in the neighbourhood of large towns and have to a great extent been stalled. In other words, it is probable that the disease is mainly confined to well-bred stock, which to a large extent is stall

fed, and that in the veld stock it neither exists to any extent, nor, if existing, is likely to spread. Still this opinion is largely a matter of surmise, and it is therefore evident that before any measures can be decided upon, it is necessary to ascertain with some degree of certainty the extent of the evil that has to be dealt with.

The number of the Veterinary Staff inadequate for necessary work.

392. There are at present two difficulties in the way of this; in the first place the Veterinary Department have a staff entirely insufficient to undertake the necessary work of testing. Mr. Grey estimated that in order to make any effective attack on the disease he would require at least twenty additional veterinary surgeons, and he estimates the annual cost of such a staff, with attendant expenditure, at about £20,000. He found that a veterinary officer could not properly test with tuberculin more than about 150 animals per week, and that on this basis it would occupy one veterinary surgeon for about a year to test the dairy cattle in the Witwatersrand area alone.

Another matter is the possession of adequate legal powers for the purpose, and here we must refer to the existing statutory provisions.

Existing Statutory provisions relating to Animal Tuberculosis.

393. In 1911 the "Diseases of Stock Act" was passed, which repealed all previous enactments then in force in the several Provinces.

Under Section No. 10, Sub-section (2), it provides that:—

> "The Minister or any officer specially deputed by him, shall, in the event of any stock within the Union being found to be infected with any of the following diseases, proceed as in this Section is provided, that is to say:—
>
> "(2) If any stock be visibly infected with tuberculosis he shall cause it to be destroyed, and shall subject to the tuberculin test any stock which has been or is suspected of having been in contact with any stock, so infected, and he may, in his discretion, subject to such a test any stock susceptible to tuberculosis and cause any stock reacting to that test to be destroyed or dealt with in such manner as he may direct or to be isolated in accordance with his instructions.
>
> "Compensation shall be payable by the department in respect of any stock destroyed under the powers of this Section."

And in the Second Schedule to the Act the scale of compensation is provided:—

> "Tuberculosis: One quarter of valuation, with a maximum compensation of £15. Where the hides and carcases can be utilized, the value of these hides and carcases shall be deducted from the compensation payable."

These provisions are in certain important respects unsatisfactory.

The present means of obtaining information regarding the occurrence of outbreaks of Tuberculosis is inadequate.

394. In the first place it would seem that the Act provides no powers to enable the Government to take the initiative. It cannot apparently undertake any systematic campaign for the general discovery of the disease by tuberculin testing and its eradication within the Union as a whole, or even in limited areas of the Union. The veterinary officer is required to wait until stock is actually found to be infected with tuberculosis, but when that event has occurred he is required without option to destroy any stock *visibly* infected with the disease, and he *must* test all stock which has or is suspected of having been in contact with the diseased animal.

It is true that he can exercise a discretion as to testing any other susceptible stock, but it would appear that the exercise of this discretion is contingent upon there being an actual outbreak of the disease present at the time. At any rate, this is the interpretation which is put upon the clause by the Government Veterinary Department.

But if this be the case, then in what way is the Department to become acquainted with the existence of possibly infected herds, or even of severely affected animals? We have seen that up to the present practically the whole of the information in possession of the Government regarding the occurrence of tuberculosis in cattle has been derived either from information of outbreaks obtained from the authorities of some public slaughter house notifying the occurrence of an infected carcase; or from post mortem knowledge occasionally gained by veterinary surgeons; or from information given by health authorities as the result of examination of dairy milk; or from the testing of cattle before removal from a district declared infected; or from the results of the testing of a dairy herd at the request of the owner, who believing his animals to be clean, sought a veterinary certificate for trading purposes. Of these the first has been the most important, but it will become less so as stock owners begin to recognise the results that may ensue to them by sending in possibly tuberculous animals to public slaughterhouses for slaughter.

It is even questionable whether under the powers of entry provided by the Act (Section 17 (1)) a veterinary officer is empowered to enter on private premises and inspect stock, unless he has grounds for suspecting disease among them.

395. One other, but a very ineffective means of obtaining information exists, which is that of requiring owners of stock themselves to notify to the Department the occurrence of tuberculosis among their cattle. This can be done by regulation under Section 16 (J) of the Act, but, so far as we are aware, no such regulation has yet been promulgated.

This should in our opinion be done, and any such regulation should require notification, not only by the owner or person having charge of a diseased animal, but also by any veterinary surgeon on becoming aware in the course of his practice of the existence of any such animals; and not only should tuberculosis be notified by owners, but also any symptoms specified by the regulation as being suspicious of being due to tuberculosis, among which should be included "lumpy udder."

In certain regulations published under Government Notice No. 297, to which we shall presently refer, the duty of notification is placed upon any veterinary surgeon performing a tuberculin test; upon any person or inspector in charge of a slaughterhouse, discovering a case of tuberculosis; and upon any person discovering tubercule bacilli in milk to notify the fact to the Government. The only person who has no duty in this regard being the owner himself of a tuberculous animal.

We, however, gather that the feeling of the Government Veterinary Department at the present time is that it is useless for it to invite information regarding the occurrence of tuberculosis in herds, while the number of its professional staff remains too limited to undertake the work with which it already has to cope.

The destruction of reactors to tuberculin.

396. In the next place the Act is unsatisfactory, in that it lays down that any visibly affected animal shall be destroyed. This is too drastic, for it may well be that valuable breeding stock can be kept solely for breeding purposes, under precautions satisfactory to the Veterinary Department. Also any cow in calf may be preserved until the progeny is born. To destroy such animals would only have the effect of exciting opposition to all measures of control. While, however, expressing this view, we are of opinion that under no circumstances should any infected animal be allowed to remain in or in relation to any dairy herd, or on the premises of any person purveying milk. To this point we shall return later.

397. Yet in spite of these very definite provisions of the Act, the Department has caused to be promulgated (by Government Notice No. 297, dated the 18th February, 1913) the following regulations on the subject, which even if not *ultra vires* the powers of the Act, go to exactly the opposite extreme, appear to us to establish a very undesirable principle and under conceivable circumstances, to render easy evasion of precautions necessary for the public safety:—

> "(*d*) In the event of any animal being *found to be suffering from tuberculosis*, or to have reacted to the tuberculin test, such animal *may, upon the instructions of the Minister*, be destroyed . . . . . or the Minister may order the infected animal to be branded with a T and Crown and numbered, and authorise a permit to be issued to the owner to keep the animal under such conditions as the Minister may see fit to impose, with a view to slaughtering it within a period fixed by him, or till such time as the permit is withdrawn."

By a further clause (*f*), if the conditions imposed are infringed, only the Minister (not even the Principal Veterinary Surgeon) can withdraw the permit or order the animal to be destroyed.

Furthermore, it is provided by clause (*j*) that:

"No person shall use, sell, barter, or give, or permit to be used, sold, bartered, or given to any person the milk of cows suffering from tuberculosis of the udder unless the milk has been boiled."

From this it is evident that a person is authorised to sell, barter, or give the milk, infected and unboiled, from a tuberculous cow, provided that the udder be not affected, and presumably he would not be debarred from making and selling butter, cheese and other products made from the unboiled milk, even though it came from a tuberculous udder.

The Royal Commission on Human and Animal Tuberculosis,* however, has shown that the milk derived from a tuberculous cow may contain tubercle bacili, even though no infection of the udder can be found on the most careful examination, either during life or post mortem. (Chapter ii, Paragraph 25 (5)), and indeed this fact is now common knowledge. So long ago as 1903, the Chief of the Pathological Division of the Bureau of Animal Industry of the United States, pointed out, as a result of extensive investigations, that tubercle bacillus may be demonstrated in milk from tuberculous cows when the udder shows no perceptible evidence of disease, either macroscopically or miscroscopically. Also that cows secreting virulent milk may be affected with tuberculosis to a degree that can be detected only by the tuberculin test. (See also footnote to paragraph 5, *supra*.)

A tuberculous cow may also give off tubercle bacilli in large numbers in the foeces and uterine discharges, and, as pointed out by the Royal Commission on Human and Animal Tuberculosis, the milk may, and frequently does, become infected by contamination by these.

398. But officers of the Government Veterinary Department have themselves informed the Commission in evidence that in their opinion tuberculous milch cows should be destroyed. They have stated further that it is extremely difficult in life to tell whether an udder is or is not tuberculous; and they have declared that it is not safe to trust to the boiling of milk from a tuberculous animal; that although right enough in theory, in practice it is so liable to be inefficiently carried out that it affords no adequate protection to the consumer. Sir Arnold Theiler was very positive on this point. He could not recommend such milk being used, whether boiled or sterlized. [Questions 14806-809.]

Furthermore the Cape Medical Council, on becoming aware of these regulations, appointed a committee to consider their effect from the point of view of the public health, and as a result that body sent to the Government a strong protest against permitting the selling of the milk from any tuberculous cow.

Your Commissioners are in accord with these views, except that they are of opinion that if there are reasons for preserving a tuberculous animal for breeding purposes, and it can be done under conditions as regards isolation that are satisfactory to the Government and in accordance with regulations on the subject, this should be permitted. We have already said that no tuberculous animal should be permitted in or in connection with any dairy herd, and it follows even more strongly that the milk from a tuberculous cow should be destroyed, and neither be sold nor used for any feeding purposes.

In saying this we may add that while we hold the view that all cow's milk should be either sterilized or boiled before consumption, as a general measure of precaution, yet we cannot believe in the wisdom of consuming milk infected with the organisms of a disease peculiarly fatal to human beings, on the mere assumption that a safeguard most difficult of control, has been properly carried out.

The question of compensation for animals compulsorily destroyed.

399. Another and very important respect in which the provisions of the Act are faulty is in the matter of compensation. It would appear that if the principle of compensation is to be adopted, the amount of one-quarter the value, not to exceed in any case the sum of £15, is inadequate. The evidence laid before the Commission was unanimous on this point. Heavy milkers are usually of the best bred stock; and these are the very animals which are the most liable to tuber-

* Section 77, third paragraph, page 40 of its Final Report.

culosis. Most witnesses consider that one-half the value, up to a maximum payment of £30, would be reasonable. Mr. Gray, the Principal Veterinary Surgeon for the Union, gave it as his opinion that two-thirds would be a fair compensation. The witnesses appointed by the Transvaal Agricultural Union and by the Witwatersrand Dairy Farmers' Association, stated that they were prepared to accept as fair and reasonable compensation the basis of one-half the value.

Quite apart from the question of equity, it is certain that so long as compensation is fixed at its present inadequate rate the great body of dairy-farmers and stock owners will be opposed to any measures for the eradication of the disease, and without their co-operation no measures which can be devised are likely to succeed, and we would see continued the exercise of pressure against the carrying out by the Government of any adequate measures at all, such as is reflected in the regulations we have been discussing.

400. We must also draw attention to the provision in the Act which requires the value of the hide and carcase to be deducted from the compensation payable. This appears to be an arithmetical blunder which has crept into the Act, as any proceeds from this source should be shared in the like proportions by the owner and the Government, and therefore only three-quarters of the amount should be deducted from the compensation due to the owner.

Put into practice this requirement of the Act operates very unfairly on the owner of a destroyed animal. For example a cow, one of a number reacting to tuberculin, which belonged to a dairyman at Durban, was ordered by the Government to be slaughtered. The animal was valued by the Government Veterinary Surgeon at £15, and one-quarter of this amount, £3 15s., was awarded as compensation. The flesh and hide, however, was sold "in the interests of the owner," for £2 16s. 6d., which sum being deducted from the compensation, left eighteen shillings and sixpence, which amount the Government paid over to the owner, or rather, to his estate, for in the meanwhile he had gone bankrupt. It is conceivable that on such a basis of calculation, had the flesh and hide sold for a little more than they did, the Government would have made a small profit out of the transaction.

401. In the opinion of your Commissioners, and distinctly subject to the remarks which follow, compensation when paid should be on the basis of one-half of the value of the animal, the total amount not to exceed the sum of £30 in respect of any one animal.

Further, they recommend that any proceeds from the disposal of any part of the carcase should be apportioned in equal shares to the Government and the owner.

402. The question, however, arises as to how the expense of granting compensation is to be met. Of course, Parliament may decide to meet it out of the Public Revenue, and no doubt this would commend itself to the majority of stock owners, but, ignoring for the moment the question of the equity of such an arrangement, we are convinced that although Parliament might accept the principle, it would probably demur to the provision of the funds necessary for putting it into effect, and the result would be that the law would remain, as at present, practically a dead letter.

403. There are certain considerations which require to be taken into account in deciding this matter. In the first place, should the dairyman or the stock owner be compensated at the expense of the public for the eradication of tuberculosis from his herds? Is it not an ordinary trade risk incidental to his particular business, which he knows may occur, and against which he should protect himself?

If a tuberculous animal is sent to a public slaughterhouse and condemned by the authorities, no question arises as to compensating the owner for his loss. It is accepted as an ordinary trade risk.

The dairyman's reply to this is that the eradication of tuberculosis is in the interests of the public more than in his own, and that the public should therefore bear a major share of the expense of destruction; that if it be a trade risk it is a risk which has suddenly been created by the legislature without due warning; and lastly, that he cannot protect himself against it, as he has no means, ordinarily, of discovering if his cattle are tuberculous.

404. Only in a broad sense are these contentions true. The public certainly has a general interest in fostering the industry of stock rearing and dairying and in protecting it against injury by bovine disease. But beyond this limited and general interest, all it is concerned with is in seeing that if tuberculous disease does exist the public will not be made unknowingly to consume the tuberculous meat or milk of infected animals. If this is adequately secured against,

it is really immaterial to the general public whether the stock owner elects to destroy his infected beast, or to keep it under proper safeguards. It is the stock owner himself who is mainly interested in the question as to whether it is better at once to stand the loss involved in destruction, or to risk the infection of other beasts by keeping the diseased animal.

To a limited extent the general public is interested in this decision because it is better for it if the animal be destroyed than to have to keep a watch over the stock owner to see that he does not supply the public with tuberculous food from the tuberculous animal or from some other animal which has been infected from it. Only in accord with this limited extent is it reasonable for the stock owner to hope for a contribution from the public funds towards his loss by destruction.

405. Again there is some truth in the contention that by requiring by legislative enactment the destruction of tuberculous cattle, a new trade risk is suddenly created to the business of stock rearing and dairy farming, and to this extent a larger claim to compensation is well founded. But this claim can only be of force while the risk is new, and it must die out as soon as the trade has had sufficient time to adjust itself to the new risk.

On this question your Commissioners took some evidence. Among other witnesses, Mr. Grey said he would fix the period of seven years, after which date compensation would cease. [Question 50498.]

This would include the best portion of the productive period of the life of cattle, and would induce the owner to clean his herd, while at the same time affording him sufficient time in which to do it.

The representatives of the Transvaal Agricultural Union—who we may mention took up a very reasonable attitude on this and on the whole question of tuberculosis in bovines, as also did the representatives of the Witwatersrand Dairy Farmers' Association—thought that a five years limit would be fair.

The following is taken from their evidence:—

> Question 49,045.] Supposing the Government share your risk with you, and give you compensation for clearing out your infected animals?—It all depends on the amount of compensation given by Government.
>
> 49,046.] Supposing they give you reasonable compensation?—Then I would say five years.
>
> 49,047.] What do you expect them to do in that five years?—Test every beast throughout South Africa, or wherever the disease is suspected throughout the country.
>
> 49,048.] And having discovered the disease, what then?—Well, we are satisfied with half compensation—fifty per cent. I think that is a reasonable proposition. We are not asking for more than fifty per cent. But at present with compensation on the basis of quarter value, up to £15, if I have a cow worth £60, I receive £15 compensation, that is ridiculous.
>
> 49,049.] Can you not clean your herds in less time than five years?—If the Government give us half compensation, and do the testing; we cannot do testing ourselves.

Thus among dairy farmers themselves it is admitted that the claim for compensation should be limited in duration, provided *the Government fulfils its duty in the carrying out of testing and other measures.*

406. This brings us to the third contention that the stock owner cannot be expected to protect himself against the introduction of tuberculosis into his herd because he has no means of detecting its presence. This difficulty, however, also exists to a greater or less extent in the case of other diseases beside tuberculosis; but with tuberculosis there is on the contrary the tuberculin test, which, if properly conducted, affords a remarkably sure means of recognising the disease, and the dairy farmer who has once cleaned his herd, can always protect himself by its use, by not introducing fresh stock except under a tuberculin warranty. And so long as the Government undertakes the duty of testing animals whenever required to do so, no stock owner can rightfully assert that he has not the means of adequately protecting himself.

407. While, however, the question of the amount of compensation to be awarded and the period during which it should be payable is of very great importance from the point of view of the stock owner, and the securing of his co-operation, the question of real moment, from the point of view of the taking of systematic, effective action by the Government, is where the money required for

the carrying out of measures and for compensation is to come from. However the matter is looked at, a very large sum of money will be required, and it is unlikely, judging from past experience, that a sufficient amount would be forthcoming from the public exchequer for the purpose.

408. That an energetic and comprehensive scheme for eradicating the disease throughout the Union should be promptly undertaken by the State is the universal opinion of those who gave evidence. Among all the witnesses whom we have examined as to this, there has not been a single dissentient voice. It is held by all that measures must be undertaken at once, if it is desired to prevent bovine stock in the Union becoming infected to the extent that it is in other countries. It is stated by the most authoritative witnesses that unless steps are taken, the disease will rapidly extend simultaneously with the increase of better bred stock, with the expansion of the dairying industry, and with more intensive methods of farming. It is literally a case of now or never.

Furthermore, witnesses like Mr. Gray, and others of the Government Veterinary Surgeons of long experience in South Africa, state positively that the best and, in the end, the most economical means to adopt is that of tuberculin testing and the destruction of reactors. Indeed we have not met any witness who has suggested the advisability of undertaking any less drastic measures. Subject to adequate compensation this is the view held by the dairy farmers themselves.

While admitting that the system of isolation of the least affected animals, instead of their destruction,* may be applicable to such a country as Denmark, we consider, in view of all the circumstances, that as regards the Union this system, owing to difficulties of supervision, would not be unattended by risk, and would be inapplicable in respect of dairy herds.† It should therefore not be followed, except when the Government is satisfied that adequate measures of isolation and for preventing the rearing of infected progeny can be satisfactorily carried out.

409. It is thus evident that the provision of adequate funds is of supreme importance. There would appear to be but one feasible means of securing them, and this is by a system of compulsory insurance of stock.

The system of protection by insurance is in operation on a voluntary basis in Britain and European countries. In Switzerland it is very extensively carried out among peasant owners. But there it is in the interest of everyone to insure, as individual owners are poor and mostly possess only one or two cows against the possible loss of which they are consequently led to their own interests to insure. In this country where the number of animals owned by one person is often great, and where infection is not wide-spread, only a limited few could be induced to insure voluntarily. Only those dairy owners who suspect that their herds may be infected would come forward, and the limited number of premiums thus obtained would not be sufficient to provide an adequate insurance fund. If therefore such a scheme is to succeed it must be universally applied, and to accomplish this it must be rendered compulsory.

The Establishment of a State Insurance Fund.

410. But if made universal and compulsory the owners of ordinary veld slaughter stock would still remain dissatisfied at being required to make contributions towards tuberculosis, which would be mainly in the interests of an entirely distinct class of stock owner, namely the dairy farmers. This difficulty, however, would be at once overcome and the matter be placed on a footing of equality all round, if the Fund thus created be applied not merely to tuberculosis, but to dealing with and providing compensation in respect of all, or certain specified, diseases of cattle.

The Fund would be a Government undertaking, the premiums being collected through Government channels, and the whole administered by Government Officials. The scale of compensation being once laid down, the payment of such compensation, whenever awarded, would be paid by the Government, and the solvency of the Fund be guaranteed by the State. It would indeed be an equitable principle for the State to contribute to the Fund an amount in *pro rata* proportion to the amount collected from stock owners, this contribution replacing the individual payments at present made by the State in the shape of compensation

* Described in Chapter II, Paragraph 29.

† In the United States the Bang method has not found indiscriminate favour in the different States which have acted upon it. In some (Maine) all reactors are now slaughtered. In others they have had to abandon isolation, as it has been found impossible to ensure it being properly carried out. Professor Pope has stated that although at first the system seems to satisfy the farmer he soon finds that it involves too much trouble and expense to carry it out.

for the compulsory destruction of diseased animals. Sir Arnold Theiler considered that the State should contribute to the Fund on the pound for pound principle. [Question 14711.] This point is, however, one which would be settled by the Legislature when deciding on the fully elaborated scheme. We consider that the State should contribute to the Fund, but we are not in a position to suggest the proportion which such contribution should bear to the amount raised from stock owners.

Such a scheme as this is very strongly advocated by the Principal Veterinary Surgeon of the Union. He believes that if an annual tax of one shilling were levied upon every head of cattle throughout the Union it would provide sufficient funds to deal satisfactorily with all bovine diseases, including tuberculosis. But we are of opinion that a considerably smaller universal levy would provide sufficient funds.

Such a scheme is not new. It has already been adopted in a modified form with success, we are informed, in Swaziland, in connection with the combating of East Coast Fever. Here the levy has taken the form of a tax of two shillings per head for a period of two years, and one shilling per head for the following three years, on all European owned cattle, and a special poll tax of two shillings on each adult male native. The yield of these taxes has produced per annum a sum of £2,300 from natives and £700 from Europeans.

It has been stated to the Commission that there should be no difficulty experienced in collecting a cattle tax from natives in native areas. We are not altogether satisfied on this point, but assuming that the number of cattle actually owned by each native in his kraal can be ascertained, then we do not see any difficulty in collecting the tax along with the hut or poll-tax now levied.

Advantages of such a scheme.

411. Such a scheme has manifest advantages, while on the other hand it would not appear to present serious drawbacks.

(*a*) It would place the stock owner not only in a position of security against undue loss by disease, but this position would be acquired on a proper basis of co-operation, and not on Parliamentary doles.

(*b*) The annual premium would be so small as not to be a burden financially on any contributor.

(*c*) It would require those who at present are receiving benefit by a large expenditure of public funds to contribute in some small degree towards that benefit.

(*d*) In this last connection it is pointed out that it would reach the native who, although the owner collectively of vast numbers of stock, at present contributes comparatively little towards the expense of dealing with outbreaks of disease among it, and this though their stock "is the first to get disease, and the last to shake it off."

(*e*) It would enable an effective campaign to be conducted against tuberculosis, which under present conditions it seems useless to hope for. Incidentally it would render possible an increased veterinary establishment, which would result in an all round improvement and effectiveness in dealing with stock diseases throughout the Union.

412. We are of opinion that it is imperative in the interests both of the Public Health and of South African stock farming that immediate action be taken to deal with tuberculosis in bovines. We are satisfied that this opinion is held by all veterinarians throughout the Union, and we believe that it is shared by all good stock owners and dairy farmers. The greatest obstacle to the taking of such action is the question of compensation. This has to be settled before anything can be done. At present money is being wasted, and irritation and consequent opposition being caused, by sporadic attempts at tuberculin testing, and the destruction of reactors, the net result of which is that we are—in the words of Mr. Gray—merely "marking time."

413. The first essential then is to settle this question of compensation, and the establishment of a fund out of which to meet it.

When this has been decided a carefully arranged plan of testing should be carried out at the public expense in various parts of the Union, on dairy-stock, breeding-stock, and veld herds, for the purpose of ascertaining definitely where and to what extent the disease prevails.

As soon as the information on this point is complete it will be possible to decide the lines upon which a thorough campaign for the eradication of the disease should be conducted.

Speaking generally, we may say that we are in accord with the view that the most effective and, in the long run probably the most economical plan, is the destruction of tuberculin reactors (subject to reservations in regard to the preservation of valuable breeding stock under proper safeguards); but we recognise that if the disease be found to be very widespread and very prevalent such a procedure may be economically impossible, and in that case the slower and less effective measure of the destruction of visibly infected animals and the strict isolation of reactors would have to be adopted.

We are, however, unhesitatingly of opinion that in the interests of the public health, the latter process should not be followed in the case of dairy cattle. No milch cow reacting to tuberculin or suspicious of being affected with tuberculosis should be allowed to be kept by any dairy farmer or purveyor of milk on or in connection with any land or premises used in connection with the business of dairy farming, or the purveying of milk or the manufacture of milk products. It should be an offence to use the milk from any such cow directly or indirectly for food purposes. The public have the right, in our opinion, to be protected to this extent.*

Action by Local Authorities.

414. Should the Government not see its way to undertake effective action to deal with bovine tuberculosis, then we are of opinion that local authorities should be granted legal powers for the purpose of protecting the health of the inhabitants of their areas, by empowering the authority, to require, when it deems necessary, the safeguard obtainable from the application of the tuberculin test to dairy herds supplying milk within their areas, and to prohibit the sale therein of any milk derived from any herd in which there is, or with which there is associated, any animal reacting to this test.

At present the inhabitants of large centres like Cape Town, Johannesburg and Durban are being supplied with milk, much of which, it is certain, is derived from tuberculous animals.

At Durban Your Commissioners had evidence led before them to the effect that on a certain large dairy farm supplying milk to the inhabitants, reactors existed, regarding which the Government had stayed taking action for a long time, yet the Town Council, knowing the circumstances, had to suffer the sale of milk from these cows to be continued within the Municipality. Eventually, some nine of the reactors were slaughtered at the instance of the Government, and found to be badly tuberculous. There were still other reactors among them which were not slaughtered. The facts of this outbreak, of which they have not here given all the details, particularly impressed Your Commissioners.

415. There are obvious objections to local authorities undertaking tuberculin testing, but it is clear that if they cannot otherwise secure adequate protection of the health of their inhabitants, this power should be given to them.

It may be mentioned that powers to require a tuberculin test in case of suspected disease are already provided to Councils by regulation under Section 72, sub-section (18) of the Transvaal Local Government Ordinance, 1912; but to the exercise of these powers dairy farmers are strenuously opposed, not on the ground that municipalities should not protect their inhabitants against the sale of tuberculous milk, which right they recognise, but because they consider, firstly, that the power of tuberculin testing should be exercised only by the Government, and secondly, that the limited extent to which it could be applied by municipalities would be neither in the interests of their inhabitants nor of the dairy farmers.

* *Note, dissenting.*—"Dr. te Water is of opinion that until further research and actual experiment by isolation of infected cattle in the open veld under favourable conditions of pasturage, have proved that the disease is not arrested under those circumstances, and that tuberculous cattle become a danger to healthy cattle with which they may come in contact and that they do not recover but die, destruction of reactors should not be resorted to, excepting in cases of advanced disease, such as disease of the udder in dairy cattle, etc., but provision should be made for their separation and strict isolation. The results of experiments of this nature comparatively recently made by the Government of Canada seem to be so promising that in South Africa, where conditions are more favourable for open air treatment, and investigation is desirable before resorting to a policy of destruction, seeing that our experience in the past with this heroic method with other cattle diseases, has not shown encouraging results. There appears no reason, while human beings in early stages of tuberculosis very generally recover under the open air treatment and with generous diet, why bovines under similar favourable surroundings should not do so likewise in the early stages of the disease; veterinarians, when examined on this point by your Commission, agreed that there was none."

Influence of tuberculous persons, in spreading the disease to bovines.

416. With regard to the propagation of tuberculosis among cattle there are two points which arose in the course of our enquiry.

One was whether there was danger of clean herds becoming re-infected from tuberculous persons working among them. The whole of the evidence led before us negatived the likelihood of such an occurrence. Experimentally bovines on inoculation with the bacillus of human origin generally only develop a retrogressive localised lesion, and death never ensues.

Influence of grazing clean along with infected stock.

417. The other point was whether clean cattle could become infected by grazing on the veld with infected stock. The general opinion of veterinary surgeons was to the effect that it would be a most unlikely occurrence. In view, however, of certain evidence, especially that regarding the finding of reactors among veld cattle grazing along with dairy cows in the case of a large dairy herd in Natal, we are disposed to think that this event may occasionally happen.*

But for practical purposes the source of infection is to be sought for in the cow sheds and kraals, and, in the case of calves, in feeding on tuberculous milk. Could all dairy cattle be kept always in the open and be not brought regularly to any common milking ground, the spread of the disease would be to a considerable extent prevented. We were told, however, that this is not feasible in the case of good class stock, nor at the higher altitudes where the cold is often severe.

The Commission considers it is very desirable that experiments on the lines of those undertaken by the Government of Canada, should be made at a suitable place in the Union, *e.g.*, at the Government Agricultural School at Grootfontein, Middelburg (C.P.), with the object of ascertaining:—

(1) The effect of open-air treatment on tuberculous cattle.
(2) The extent to which healthy cattle are liable to infection by tuberculous cattle when running day and night in the veld.
(3) The percentage of calves that can be reared from tuberculous cows, kept without any precautions in the open.†

Subsidiary means of dealing with Bovine Tuberculosis.

418. Subsidiary means of dealing with tuberculosis exist in the control of milk and meat supplies, and measures with this object should be in operation within all urban areas, and, as far as may be necessary and possible within rural areas.

The control of milk supplies:—Recommendations.

419. As regards the control of cow-sheds, dairies and milk shops, regulations designed for this purpose are so well known as not to require extended reference to in this report. It should be said, however, that it is not sufficient that such regulations shall be in force in all urban areas, but it is necessary that they shall be enforced by the local authorities, and the Central Authority should see that

* The following experience related by Dr. Butler at the Sixth International Congress on Tuberculosis, held at Washington in 1908, while not free from fallacy, is very suggestive. A sick cow that had gone dry was run in the open with a herd of 33 head, composed of non-reacting dry cows and young beef cattle from two to three years old. Three months later, as she was still showing evidence of disease, she was tested, reacted, and removed. Later on the herd of 33 tested animals which had been associated in the open with this cow were retested, and 13 reactors discovered, which on post mortem examination were found to be tuberculous. There was no indoor exposure to this cow whatever. The animals had been kept in the open and well fed. On the other hand, Dr. Rutherford, in charge of the "Health of Animals" Branch of the Agricultural Department of Canada, reports as uncompleted an experiment of this nature on a herd of 43 cattle, 21 being dairy cows; 28 reacted to tuberculin, 15 were free of the disease; these were kept for three years in the open air. Out of the 28 reactors, one died from generalised tuberculosis and one was killed on account of tuberculosis of the udder. Of the 15 free of disease, kept with the others, feeding from the same rack, grazing on the same ground, drinking out of the same pool of water, not a single one became affected in three years. Of the calves, 75 per cent. failed to react and 25 per cent. reacted at various ages.

† *Note by the Chairman.*—I am not prepared to concur in this recommendation if it is to have the effect of postponing action which is urgently required for the purpose of eradicating the disease. Such an enquiry would take years to carry out and would not be likely to materially advance our present knowledge on the subject.

this is done. In most towns very excellent regulations relating to this subject are in force, but in comparatively few are they carried out.

(*a*) In all cases the measures of control should include the licensing of cow-sheds, dairies, milk-shops, and milk vendors, and this should be coupled with efficient periodical inspection. These provisions should apply in like extent to cow-sheds and dairies situated without the limits of the urban area, and from which milk is brought for sale within the urban area; unless such cow-shed or dairy is already licensed and inspected by the authority of the district within which it is situate.

(*b*) Having regard to the fact that a large proportion of the dairies supplying urban areas are situate in rural areas, we are of opinion that where such dairies exist, and in the case of co-operative dairies, the rural authority of the district should be required to enforce the like regulations and measures of control in respect of all such dairies, as are required to be enforced in the case of urban authorities.

Urban authorities should also be given adequate powers over these dairies outside, but supplying milk within the limits of their areas.

(*c*) In all cases the milk supplies to urban areas should be from time to time sampled and subjected to bacteriological examination.

(*d*) We would also suggest that it should be made the practice in the case of all State and State-aided public institutions in which prisoners, patients, children or destitute persons are maintained, to incorporate in their contracts for milk supplies a clause requiring that only milk of cows which have passed the tuberculin test shall be supplied.

(*e*) It should be a rule that no person suffering from active tuberculosis shall be allowed to be employed in or about any cow shed or dairy or in the business of milk vending.

(*f*) The pasteurization of all public milk supplies should be encouraged by all available means.

(*g*) If a mechanical milker can be devised that is capable of easy and thorough cleansing, and is thus free from spreading bacterial infection, we suggest that the Agricultural Department, Agricultural Societies and Local Authorities should endeavour to obtain its adoption by dairy farmers and dairymen.

The control of meat supplies:—Recommendations.

420. On the necessity for the establishment of public abattoirs and the carrying out of an efficient meat inspection Your Commissioners cannot too strongly insist. In the great majority of the towns in the Union these two measures are entirely neglected. Even in the larger towns, such as Cape Town and Johannesburg, the provision of municipal abattoirs is only of quite recent undertaking. In most of the smaller towns the slaughtering is carried on under conditions that are revolting, and the inspection of meat is altogether neglected. Your Commissioners make this statement with a full knowledge of the facts.

It is suggested that those large towns which have established proper slaughter houses under efficient control should undertake the training of persons in the principles of meat inspection on behalf of the smaller authorities throughout the Union. For example, arrangements might be made at Cape Town, Johannesburg and Durban to afford a three months' course of training in meat inspection to sanitary inspectors in the employ of other local authorities.

The Central Authority should gradually require that all local authorities or urban areas having upwards of two thousand inhabitants shall employ at least one inspector certified to possess a proper knowledge of meat inspection.

421. There is one great difficulty in the matter of meat inspection which confronts all the larger urban local authorities, which is that of the introduction into their areas of meat for sale which has been slaughtered outside the town. We are aware that farmers view with extreme jealousy any attempt to restrict the right to supply urban markets with meat killed on their farms, and in the Cape and the Orange Free State this right has been specifically safeguarded by legislative enactment. We fully sympathise with the farmers' point of view, but at the same time such an unrestricted right is liable to the greatest abuse, not by the farmers themselves, but by unprincipled persons who, being in possession of diseased animals which they know would be condemned and seized if brought to a public abattoir, slaughter such animals outside the urban limits and bring the meat into the town for sale.

At Bloemfontein insurmountable difficulty has arisen by the provisions contained in section 86 of the Public Health Ordinance, 1907, for the protection of *bona fide* farmers, being used as a cover for the improper operations of meat speculators. At that town, upwards of 140 carcases of sheep killed outside have been put on the market tables on a single day.

422. We recommend that all urban local authorities should be empowered to prohibit the introduction of meat for sale into their areas, unless submitted for inspection at such place and time as the local authority shall appoint for the purpose, and accompanied by such undetached viscera (including the head), as the authority may specify for each kind of meat or animal.*

423. With regard to the disposal of the carcases of tuberculous animals the practice generally adopted is to pass as fit for food the meat of tuberculous cattle on the lines laid down by the English Royal Commission on the Use as Food of Tuberculous Meat and Milk.† Although all Your Commissioners are not in agreement with this practice they do not feel inclined to specifically condemn it. They are, however, unanimous in the opinion that such meat should not be sold to the public on the same footing as meat from a perfectly healthy animal. They consider that the purchaser has the right to be informed of the origin of the meat he is buying, and they therefore recommend that all such meat should be branded in such a manner as to clearly indicate its origin to the purchaser.

Tuberculosis in Swine.

424. We have seen that meat inspection at the Johannesburg Public Abattoirs has shown that pigs are not infrequently infected with tuberculosis. Out of 76,492 slaughtered at this slaughterhouse, 638 were found to be infected, or 8·34 in every thousand. The principal seat of the disease is nearly always in the submaxillary and pharyngeal glands, and occasionally it is extensively generalised, and involves the thoracic and abdominal organs.

It is seen in the table in Paragraph 389 that the proportion indicates a tendency to increase. In the case of other public slaughter houses the same thing is found to occur.

A large proportion of the pigs are bred by natives, it being the practice of certain dealers to go round the native locations buying up the pigs of the natives and sending them to the Reef and elsewhere.

Tuberculous pigs have been traced back from the slaughterhouses to native kraals in a number of instances, and it was stated in evidence that while the Veterinary Department had been unable to discover any tuberculous cattle at these kraals, they had seen natives there who appeared to be suffering from phthisis.

Such pigs are always common scavengers and roam through the location devouring all manner of filth, including the excrement deposited by all the inhabitants of the location. It is among these pigs that the greatest amount of tubercular infection is found, and this occurs most frequently in the submaxillary and pharyngeal glands. In a number of instances in which a bacterial examination has been made at the Government Veterinary Research Laboratory, the bacillus was found to be of the human type.

425. In better class pigs the amount of infection is much less, and in these cases it is usually more diffused, pointing to the infection being of bovine origin. We were informed that in such cases the pig has usually been fed on tuberculous cow's milk. This was the case in regard to certain tuberculous swine discovered at the Potchefstroom Experimental Farm.

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* See Section 157, sub-sections (11) and (12) of the Transvaal Local Government Ordinance, 1912.

† The following are the recommendations of that Commission:—

(*a*) When there is miliary Tuberculosis of both lungs	The entire carcase and all the organs may be seized.
(*b*) When tuberculous lesions are present on the pleura and peritonium	
(*c*) When tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles	
(*d*) When tuberculous lesions exist in any part of an emaciated carcase	
(*a*) When the lesions are confined to the lungs and the thoracic lymphatic glands	The carcase, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized.
(*b*) When the lesions are confined to the liver ..	
(*c*) When the lesions are confined to the pharyngeal lymphatic glands	
(*d*) When the lesions are confined to any combination of the foregoing, but are collectively small in extent	

426. Of 59 cases of swine tuberculosis investigated by the British Royal Commission on Bovine Tuberculosis, in 26 the tuberculosis was localised and in 33 generalised. In 50 cases, including all in which the disease was generalised, the bacillus was of the bovine type, in 3 cases it was of the human type, and in 5 of the avian, while in one it was a mixed infection of avian and bovine.

We have no knowledge as to the relative frequency in which the different types occur in the Union, nor as to whether the avian exists at all; but veterinary opinion is decided that most of the swine tuberculosis is to be found in natives' pigs, and that much of it is of human origin and acquired by scavenging. In this view we are led to concur, as a result of our own observation of native location conditions, and of a consideration of the evidence placed before us.

It may be mentioned with regard to the experimental infection of pigs with the human tubercle bacillus that the British Royal Commission on Human and Animal Tuberculosis ays in its Final Report: "The goat and the pig are not to any great extent affected by the human tubercle bacillus. In both animals the inoculation of this bacillus leads only to a slight retrogressive tuberculosis. Pigs perhaps are slightly more susceptible than calves."

Recommendations.

427. (1) We are of opinion that special care should be exercised in the inspection of the carcasses of pigs intended for sale as meat, and that whenever any tuberculous infection is discovered the entire carcase should be condemned and destroyed. We base this recommendation upon several grounds. These are—

(*a*) that the tubercule bacillus, being frequently of the human type, the possibilities of danger to human beings is increased to that extent;

(*b*) that the bovine type of the disease is more likely to be generalised in the pig than in the ox.

(*c*) that the probability of destruction by thorough cooking before consumption is less in the case of pork than of beef, as much of the meat is cured or is incorporated into sausages.

(*b*) that the value of the entire carcass is small compared to that of an ox, and therefore the economic factor involved is not so great.

With regard to this last mentioned reason we are aware that it is not a sound one from a theoretic point of view, as the question of expense should not be a determining factor where the public health is at stake, but in actual practice we find that this is generally the first question that is considered.

In recommending entire destruction we are supported by evidence led before the Commission, and by the opinion of competent authorities, including the recommendations of the British Royal Commission on the use as food of the meat and milk of tuberculous anials.

This Commission recommended destruction of the entire carcass as did every authority, including all veterinary surgeons who gave evidence on this point. The only witness who did not hold this view, but was of opinion that the carcase could be passed if the affected pharyngeal glands were removed, was Sir Arnold Theiler. And he based this opinion on the ground that human tubercle infection does not generalise, while as a rule the bovine type is generalised, and that in the majority of cases in South Africa, if the neck glands are apparently only infected then the infection is probably with the human bacillus.

These views may be correct, but infection with the bovine type of bacillus may also be localized. The English Royal Commission found that 36 per cent. of of the cases of bovine origin were localized. But in any event the difficulty exists of deciding definitely in every case whether the infection is actually localized and affected glands do not exist in other parts of the carcass.

(2) It is a common practice for dairymen and pig-breeders on a small scale, to slaughter such animals on their own premises and to send the meat into neighbouring towns for sale. We are of opinion that in view of the great possibility of such animals having been tuberculous, no inspection of pig's meat by local authorities should be considered effective unless the entire carcass with all the glands and viscera *in situ*, be submitted for insnection.

(3) There would not appear to be any effective means by which the infection of swine can be prevented by State interference, but we would suggest, as tending in that direction,—

(*a*) that as far as possible the presence of scavenging pigs in native locations should be discouraged, and to this end in those locations which

are under municipal or other such control, their possession by native inhabitants should be prohibited by the authorities, except express permission be given, and this should be contingent upon the pigs being kept in proper styes; and

(*b*) that as far as possible correct records of the place of origin of each pig sent in for slaughter should be secured by the authorities having charge of public slaughterhouses, so that in the event of the animal being found to be tuberculous, it will be possible to work back on to the original source of infection, with the view of taking measures in regard thereto.

Recapitulation.

To recapitulate and summarise:—

(1) That owners of stock be required to notify all cases of tuberculosis or symptoms suspicions of being tuberculosis, including "lumpy udder," occurring among their cattle. [Paragraph 395.]

(2) That the Veterinary Department be empowered to test with tuberculin any cattle, irrespective of there being reason to suspect tuberculosis in such cattle. [Paragraph 394.]

(3) That the Government test all cattle free of charge to the owner.

(4) That the veterinary staff be increased so as to admit of a general and systematic testing being carried out. [Paragraph 392.]

(5) That in the first instance such testing be directed to ascertain the extent to which tuberculosis prevails in different classes of stock and in different parts of the Union. [Paragraph 413.]

(6) That as soon as this is ascertained a systematic plan for the eradication of tuberculosis be decided upon and consistently carried out.

(7) That every animal which has reacted to tuberculin, or shows visible signs of tuberculosis be destroyed, unless there are adequate reasons for preserving it for breeding purposes, under satisfactory conditions for maintaining strict isolation and for satisfactorily preventing infection of the progeny.

(8) That a certificate of non-reaction to tuberculin be required in proclaimed areas before breeding stock can be sold for any purpose other than slaughter.

(9) That under no circumstances should any reactor be allowed in, or associated with any dairy herd.

(10) That the granting of reasonable compensation for cattle destroyed is an essential condition of any plan for the eradication of tuberculosis.

(11) That the rate of compensation laid down under the existing law is inadequate and is incorrectly computed.

(12) That the rate recommended by the Commission is one-half the value of the animal, but not exceeding £30.

(13) That it is considered that such compensation should not continue to be granted for a period exceeding seven years from a date to be fixed by the legislature, after which loss on account of tubercular disease should be deemed to be an ordinary trade risk to which the Public Treasury should not be expected to contribute compensation. But this limitation would not affect compensation out of any fund created as in the next clause.

(14) That for the purpose of meeting the cost of compensation and attendant expenditure, in connection with all cattle diseases there should be established a State fund maintained by an annual tax levied universally on all cattle in the Union, and a *pro rata* contribution from the Public Treasury. [Paragraphs 410 and 411.]

(15) That this fund should be applied to the cost of eradication and dealing with all imported diseases of large stock, as well as of tuberculosis.

It has been estimated that such a tax would not exceed an annual charge of one shilling per head of cattle, but it would probably be less.

(16) That unless the State is prepared to undertake and carry through without delay general measures for the testing of cattle and the eradication of bovine tuberculosis, local authorities be empowered to prohibit the introduction into their districts of any milk or milk product from any dairy herd, any number of which has not been efficiently tested with tuberculin within a period of six months and found not to react thereto. [Paragraph 382.]

(17) That the limitation of infection of bovine tuberculosis should be also accomplished by measures carried out by local authorities for the control of milk supplies. [Paragraph 418.]

(18) That public slaughterhouses be established in connection with all urban areas having a population of 2,000 or over, and the inspection of meat be properly carried out. [Paragraph 420.]

(19) That the training of inspectors in the detection of diseased meat should be undertaken on behalf of other local authorities by the authorities in charge of large public abattoirs. [Paragraph 420.]

(20) That all meat slaughtered outside for sale within urban areas should be submitted, with specified viscera *in situ*, for official inspection. [Paragraphs 421 and 422.]

(21) That meat of tuberculous animals, if allowed to be sold for human consumption, should be branded so that the purchaser may be made aware of its origin. [Paragraph 423.]

(22) That in the case of tuberculosis in pigs, the entire carcase should always be destroyed. [Paragraph 427 (1).]

CHAPTER XV.

On Measures for the Prevention of Tuberculosis.

428. As to the measures to be recommended for combating tuberculosis in the Union, we have, when dealing with the various sections of the subject, made incidental suggestions which we believe will have, if acted upon, the effect of materially lessening the occurrence of the disease.

We now have to consider measures of a more specific character, and especially those intended to apply to actual cases of the disease.

Measures for improving general conditions of housing and environment.

429. We believe that in the course of this report we have conclusively demonstrated that one at least of the chief factors in the occurence of tuberculosis is exposure to an unhealthy environment. We have seen that the greatest amount of tuberculosis occurs whenever conditions exist which lower the vitality of those exposed to them. That it is not sufficient for the spread of this disease that infection in the shape of the tubercle bacillus should be present, but that it is also necessary (unless possibly the amount of the infection is very great indeed) that the powers of resistance, natural or acquired, which we all possess, should at the same time be so depressed in the person exposed to the infection, that they cease to protect. We have seen this fact signally demonstrated in the case of workers on the mines, where the depressing effect of underground work, and of overwork and strain are constant in producing an increase in the incidence of tuberculosis and other disease.

Just as fresh air, sunlight, dryness, good food, rest and healthy living (which are the essence of sanatorium treatment) will increase the powers of resistance in the consumptive, and go far to effect the cure of tuberculosis, so conversely, will overcrowding into ill-ventilated, dark, damp, dirty, sunless dwellings, want of sufficient food, over indulgence in alcohol, overwork, and unhealthy living lower the vitality and conduce to an attack of the disease.

In most instances the conditions which predispose to tuberculosis are also those which best favour the spread of infection, so that they are two-fold and cumulative in their action.

It follows from this that the most powerful of all the means we possess for the prevention of tuberculosis in a community is the improvement of the general conditions of living.

We do not hesitate to say that if we could only approximate the ordinary conditions of living to the conditions observed in a sanatorium, then tuberculosis would very rapidly become a thing of the past.

We wish to emphasise this point, because it is futile to talk of a "campaign" against tuberculosis, and to propose elaborate measures, chiefly directed to treating and dealing with cases of tuberculosis as they arise, when all the while the remedy lies not only at our doors, but behind our doors, inside our houses. It is of little avail to establish tuberculosis dispensaries and sanatoria for the treatment of patients, the supply of whom is being kept up in the slum dwellings or the filthy locations of the town.

For this reason we have in the course of this report dealt at length with the conditions of housing of the coloured and native inhabitants, prevailing in most of our towns; and for this reason we have also described in considerable detail the conditions under which natives are employed upon the mines.

The conclusions we have come to and the recommendations we have thought fit to make on these two aspects of the subject are so fully set out in Chapters XII. and XIII. that it is unnecessary here to enter again into them.

The Teaching of Hygiene.

430. Yet, while a great deal can be effected by those in authority in the improvement of the conditions under which the people live, nevertheless it is on the individual himself that the ultimate issue rests. He alone by his own action can secure his own health. Although much may be done by outside effort, by assisting or compelling, it is only within narrow limits that we can order a man's home or set the manner of his life. In this pass we must rely upon the power of education. But unfortunately education is a slow process in the adult, in whom habit has become second nature. It is therefore mainly in the child that the influence of education may be expected to effect improvement. We therefore desire to urge the teaching of hygiene in schools as the next most important measure for the eradication of tuberculosis.

431. But by the teaching of hygiene we do not mean merely the conveying of a smattering of scientific half-truths, described with exaggerated simplicity of language and corresponding inaccuracy. We have no objection to teaching about the life-history of the tubercle bacillus, but on the other hand we would be quite content if it were not taught at all.

What we mean by the teaching of hygiene is something broader than this. It is not only the teaching of principles, but the training in habits of healthy living; the inculcating of cleanliness and a love of space, of fresh air and of sunlight, and an abhorrence of filth, and especially of human and animal excretory matters.

The child who is herded into stuffy overcrowded school rooms, such as frequently are found throughout the Union, or who polishes his slate with his spittle, cannot be expected to grow up in habits of healthy living, and all that may be told him as to the dangers of the tubercle bacillus will not help him one bit.

Recommendations regarding School Hygiene and the teaching of Hygiene.

432. In the following observations it is to be understood that we have not in mind the institution of measures merely intended for the prevention of tuberculous infection; on the contrary we consider that the main point to be aimed at is to improve the child's general condition of health and to inculcate in him sound sanitary ideas, as the surest way of preventing tuberculosis both at school ages and in after life.

In regard to this matter we wish to say that the several Directors of Education have displayed in the evidence given by them before the Commission a keen appreciation of the importance of the things we are about to mention, and if many of them are still in the realm of the unaccomplished, this is mainly due to the other necessities that they have had to meet, with wholly inadequate funds for the purpose, resulting from the great and rapid growth of elementary education during recent years.

Wherever in the following remarks we refer to the Education Department we mean the Department controlling public elementary education in each Province, and when we speak of the Education Authority we mean the body managing the schools within a local area.

433. (1) In our opinion each Education Department should be assisted by a Medical Adviser. For this purpose the services of one or other of the Government Medical Officers of Health or Medical Advisers already appointed by the Union or Provincial Governments probably could be utilised.

(2) We are of opinion that the first most urgent step is to teach the teachers, and to this end every teacher should be required to possess a certificate in health subjects. Proper courses of instruction in these subjects should be arranged for, and in the case of present teachers, these should be provided as vacation classes held at centres convenient for their attendance thereat. Local medical practitioners competent to conduct such classes can generally be found in most centres.

The course should include instruction in both the principles of hygiene as applied to the management of school life, and the teaching of general hygiene to pupils.

Suitable text books on the subject should be appointed by the Department.

(3) The Education Department should lay down a definite scheme, with prescribed text books and readers, for the teaching in all schools of health subjects, and such teaching should have a recognised place in the school time-table.

We have been informed that the time-table is already too overcrowded to admit of this being done. All we can say is that if this is so, the time assigned to some other subject should make room for it. We do not wish to repeat platitudes, but it seems to us that the knowledge of how to secure and preserve good health is of primary importance, and that without it other knowledge is but a poor equipment with which to face life under civilised conditions.

We imagine that all educationalists recognise this very trite fact, but that they consider that this knowledge should be gained elsewhere than in the school.

School Inspectors should be required, as part of their official duty, to examine into and report on the manner in which this subject is being taught.

(4) All school teachers should be required, before appointment, to furnish a satisfactory medical certificate of good health and freedom from tuberculosis, and the Education Department should reserve to itself the right to require, should it deem fit, at any time during the course of the teacher's engagement a certificate by an approved medical practitioner as to his or her state of health.

It was given in evidence that in the past there have been teachers employed who were suffering from phthisis, and also that occasions have arisen when the Department has had reason to suspect this condition, but was unable to obtain the necessary evidence.

(5) The medical examination of school children should be an established practice throughout the Union. This should be carried out as soon as may be after first joining the school and at suitable intervals thereafter.

This examination should aim at the discovery of physical and mental defects and should result in

(*a*) the institution of measures for their treatment or correction, as the case may be, either by the parent or guardian, or, failing him, by the Education Authority, with power of recovery from the former if in a position to pay, and

(*b*) the regulation of the system of schooling so as to suit the particular needs of the child, especially in the case of the backward and mentally deficient.

With regard to the manner of the provision of such special schooling, we are unable to make any recommendation. In the absence of any medical inspection it is impossible to say what numbers of cases will have to be met. In the larger towns no difficulty should be experienced in providing for their needs.

We do not think that the standard of health of children in the Union will be found to be of such a character as to need the establishment of school clinics as a regular measure, although in the case of some of the schools in large towns at which the children of the poorer coloured classes attend this may be necessary, and therefore we are of the opinion that concurrently with the medical examination, arrangements should be made for the treatment or correction of such conditions as visual abnormalities, dental caries, adenoids, enlarged glands, contagious skin diseases, verminousness, and the like.

The provision of such measures as these should be neither difficult nor expensive in the larger urban centres, but we recognise that there is greater difficulty in the case of outlying schools, but even here it should be nearly always possible to arrange with a local medical practitioner to perform the duty.

Children suffering from tuberculosis in an infectious condition should be excluded from school association with healthy children. When discovered they should be passed on to the local administration dealing with this disease.

(6) In addition to the medical inspection of school children, teachers themselves should be instructed to look out for and immediately report to the education authority any suspicious symptom or appearance affecting the health of any pupil. A descriptive list of what to look out for should be furnished to all teachers.

(7) It should be made an established rule that teachers should inspect each morning the condition of their pupils with regard to cleanliness and general

well-being, and any observed neglect in such matters should be at once pointed out by the teacher to the parent or guardian, and should improvement fail to result therefrom, it should be reported to the Education Authority for action.

In cases of wilful neglect of children in this respect by parents the Education Authority should be empowered to proceed against such parents in any competent court.

(8) We are of opinion that in very many cases school buildings and class rooms are unsuitable, and that overcrowding exists. Also that adequate measures are not taken for the maintenance of proper cleanliness of the schools, their ventilation and lighting. On occasions we found unsuitable and often uncleanly places being used for school purposes. We fully recognise the great difficulties that have to be overcome by Education Authorities who have to provide for the educational needs of an increasing number of children, often with wholly inadequate funds; but we submit that compulsory elementary education should not be divorced from the observance of the elementary laws of health. Moreover, many of these defects are easily remediable without much, if any, financial expenditure.

To enumerate some of the more important defects observed by us:—

(*a*) Structurally unsuitable class rooms; low-pitched, with broken or crumbling walls, and earthen floors. Proper floors should in every case be insisted upon by the Education Department.

(*b*) Insufficient ventilation. It was common to find on entering class rooms an exceedingly offensive atmosphere.

(*c*) Insufficient and badly arranged lighting; pupils being seated in their own light.

(*d*) Overcrowding, and the common practice of taking simultaneously several large classes in one room.

(*e*) Want of cleanliness. We came across some schools where the class rooms were said to be only cleaned out between the terms.

In our opinion the Education Department should make it an invariable rule that all class rooms must have the floors sprinkled with water, or with some moist cleanser, and swept out at least once a day during the absence of the scholars.

Also that at least once a week the floor shall be washed or scrubbed and that all furniture, and, where possible, walls shall be wiped down with damp cloths. Where walls cannot be so treated they should be frequently lime washed.

(*f*) The absence of proper latrine and lavatory accommodation, separate for each sex.

We consider that such provision should be made a *sine qua non* by the Education Department.

(*g*) Unsuitable school furniture. In many schools the desks and forms are of a kind to produce deformity in the pupils having to use them.

(*h*) Dirty slates and no means of cleaning them, except by saliva. We suggest that the use of slates should be abolished.

(9) We desire to strongly recommend the adoption whenever possible of open-air classes. In South Africa, with its magnificent climate, we consider that instead of crowding children into unhealthy class-rooms, this should be accepted as the rational practice in the case of schools not in crowded parts of towns, and especially with young children.

Against this proposal it has been urged that there are serious drawbacks, in that the pupil's attention is apt to be distracted by natural objects, that in windy weather papers, blackboards, charts and books get blown about, and that in wet or cold weather the pupils would have to be taken inside. We consider these as being difficulties, but difficulties that can be overcome by simple arrangements of screens, and for wet and inclement weather, the provision of simple shelters.

It appears to us remarkable that the practice of open-air teaching should be ignored in favour of overcrowding into unsuitable buildings, such as is at present the custom, especially in country districts. We feel sure that if open-air teaching were once officially recognised as a desirable system, its practice would soon become general. It is its novelty which is against it.

We have in mind the case of the Old Somerset Hospital at Cape Town, wherein are maintained many old, infirm and chronic sick paupers. Owing to the day-time accommodation being insufficient, large open shelters were erected

in the grounds with the best results, the patients using them with comfort as day accommodation and for meals.

(10) Although we have heard of occasional instances of insufficient feeding, we doubt if the conditions obtaining anywhere within the Union are such as to require the provision of free meals to scholars, as is now the practice in England under the Education (Provision of Meals) Act of 1906, but we are of opinion that the arrangement of school hours is often such as to necessitate the postponement of the child's midday meal to an unsuitable hour.

(11) We are also inclined to the opinion that in many cases, especially in young children, the school hours are too long and the home lessons too exacting for the average child to conform to without undue strain.

(12) With regard to the practice in operation in England of keeping the school play-grounds open during vacation time for the recreation of school children, we doubt if this is necessary in South Africa where there is everywhere so much open space, but in the case of poor schools in crowded districts of the larger towns, it may be a desirable proceeding.

(13) We are of opinion that it is most desirable that the Education Department should exercise control over the health and sanitation of native mission schools, whether these schools are aided by grants from the public revenue or not, and whether they are confined to the teaching of elementary subjects or attempt higher education and the training of native teachers. We consider that the conditions obtaining in some of these are inimical to the present and future health of the scholars.

We think that this supervision and control should extend to all boarding establishments connected with such schools.

We have had most reliable medical evidence as to the bad effect on the physique of native children attending these schools.

Also with respect to those native colleges having boarding establishments, while we do not wish to indicate any institution by name, we are constrained to state that considerable evidence has been led before the Commision as to the effect of such institutions, and one in particular, in infecting its scholars with tuberculosis. [Questions 94884-890; 94731; 95678-680; 94113; 95539-561; 95477-482.]

It seems to us that it is immaterial from the point of view of the scholars' health whether such schools are State-aided or not, and that it is essential that the Government should exercise control over them, and that this can best be done by the Education Department.

Of measures specifically directed against Tuberculosis.

434. With regard to the institution of measures specifically directed against tuberculosis, as apart from those undertaken in the interests of the Public Health generally, there exists very great difficulties in the devising of a practical scheme for the Union.

These difficulties are:

(*a*) The vast extent of the country to be covered; the sparseness of the population, except in the few towns; and the great distances separating administrative units.
(*b*) The different and divergent races to be dealt with.
(*c*) The ignorance in which the native, the largest part of the population, is steeped.
(*d*) The absence over a large area of the Union of any organised bodies dealing with local affairs. Much of this area is not under very comprehensive administration even by the Government.
(*e*) The divided, and in some instances dual control exercised by the Union Government and the Provincial Governments over matters relating to the Public Health.

It is unnecessary to dilate on the difficulties caused by (*a*), (*b*) and (*c*); they are obvious. But in regard to (*d*) and (*e*) something more must be said.

Union, Provincial and Local Control over Health Matters: Divided, Overlapping and Incomplete.

435. In the Cape Province practically the whole area, except the Native Territories and the Native district of Glen Grey, is under some form of effective

local government. In the urban areas there are either Municipalities or Village Management Boards, these being in sole charge of the public health of the inhabitants within their areas.*

Nearly all the Province is divided into fiscal divisions and over every division there is a Divisional Council, which for that portion of its division outside the area of any of the urban authorities just mentioned, is for all purposes the health authority. Even in the Native Territories there are several divisional councils, and there are municipalities or village boards over most of the urban areas, while over the several districts there is a form of limited authority, in the shape of Native Councils, with over them a supreme General Native Council.

Thus, so far as the Cape Province is concerned, there is nearly everywhere some sort of a local body through which to work.

In Natal, the Transvaal and the Orange Free State, there are only urban local authorities, consisting of Municipalities, and in Natal, Local Boards, in the Transvaal, Village Councils and Health Committees, and in the Orange Free State, Village Management Boards. All of these deal with all matters relating to the public health.†

Thus in these three Provinces there are large tracts which are under no form of local authority at all. In these areas, then—as also practically throughout the Cape Native Territories, except in urban and divisional areas—any health administration as is attempted is undertaken by the Resident Magistrate of the district, acting either on his own initiative, with or without the advice of the District Surgeon, or on instructions emanating from the Union Government. Both the Resident Magistrate and the District Surgeon, it may be added, are Union officials, and are not in any way amenable to the Provincial Administration.

There is, however, a very essential difference between the position of the local authority and the Government in regard to the control of health matters, for whereas the former has, as a rule, ample public health powers, especially in respect to the healthiness of dwellings and the enforcement of sanitary ordinances, the Government is practically without statutory powers, except in respect of certain infectious diseases.

All of the above local authorities, with the exception of the Native Councils who are under the Native Affairs Department of the Union, are directly responsible to, and are under the sole control of the Provincial Administration.

Thus then part of the Union is under the administration of local authorities amenable only to the Provincial Administration of the particular Province, while the rest of the Union is entirely under the direct administration of the Union Government.

436. But this is not all. Under the South Africa Act, 1909 (Section 85 (v)) "the establishment, maintenance, and management of hospitals and charitable institutions" belongs to the Provincial Councils. These in practice include all general hospitals and chronic sick hospitals, and the granting of charitable relief, and the several councils annually expend large sums out of their revenue in the direct maintenance of chronic sick hospitals, in direct relief to paupers, and in grants-in-aid of public hospitals, and other institutions supplying medical treatment and charitable relief.

On the other hand the Act of Union makes no mention of asylums, or of infectious diseases hospitals, or of the governmental control of the public health, and this fact has been interpreted as placing these and cognate matters directly under the Union Government.

Consequently the care of lunatics, lepers, and syphilitics, and the dealing with extraordinary outbreaks of disease, such as plague and malaria, and the provision of public vaccination, and the exercise of supervision over local bodies in the prevention of small-pox, enteric and all infectious diseases, including tuberculosis, are undertaken by and at the expense of the Union Government. Also in certain cases expenditure incurred by local authorities in suppressing certain infectious diseases is subsidised out of the Union Exchequer.

Also the Government Medical Officers of Health, appointed to advise on and supervise the Public Health are entirely Union officials.

As a natural consequence the Public Health Acts in force in the several Provinces are entirely administered by the Union Government. It is under these

* There are also one or two "Local Authorities" established under Section 13 of the Public Health Amendment Act, 1897.

† In the above account we have said that all urban areas are under an urban authority, but this is not strictly accurate, for in every Province there are a number of small urbanised areas, the inhabitants of which for various reasons, but chiefly with the desire to escape the payment of rates and the constraints of bye-laws, have not elected to come under any form of urban local authority.

enactments that general statutory powers for dealing with infectious diseases are provided, and among them are those relating to tuberculosis.

437. But since the beginning of Union several of the Provincial Councils, by means of Provincial Ordinances relating to local authorities, and which have received the assent of the Union Government, have been steadily transferring public health powers—both general and those relating to infectious disease—from the scope of the Public Health Acts to the control of the Provincial Administration.*

Nevertheless in view of Section 85 of the South Africa Act, and of the provisions of the Sections 4 and 12 (*b*), and the Second Schedule of the Financial Relations Act, 1913—which are very emphatic on the definition of the powers of Provincial Councils—we presume that it would not be competent for any Provincial Council to directly deal with or to devote any of its revenue to dealing with the suppression of tuberculosis *qua* an infectious disease, without an Act of Parliament conferring upon it the necessary powers to do so.

438. It is seen therefore that the matter is decidedly complicated. To summarise the position:—

In all urban areas of the Union, and in most rural areas of the Cape Province, there are local bodies empowered and required by the law to enforce all measures affecting housing, sanitation and general health. It is to be noted that these measures are of paramount importance in the suppression of tuberculosis.

The authorities are in these matters directly under the control of the Provisional Administrations.

But these local authorities are also the bodies empowered and required under the Public Health Acts to prevent and suppress infectious diseases, among which is tuberculosis. In this matter they are under the Union Government, but those which have acquired independent powers under recent Provincial legislation would seem in this respect to be under the control also of the Provincial Administration.

In all areas outside the limits of jurisdiction of these local authorities, and over all natives in reserved locations, wherever they may be situated, the Union Government is in the position of sole local authority for all health purposes, but without any adequate statutory powers.

It would seem that among Governments, only the Union Government can expend funds directly or by way of subsidy for dealing with tuberculosis as an infectious disease under the Public Health Acts.

On the other hand the Provincial Government is the body which would defray the cost of hospital and dispensary treatment of consumptive patients in general and chronic-sick hospitals, if admitted to such institutions in the ordinary way and without reference to the disease.

Also this is the Administration specifically charged with the duty and expense of giving poor relief; and such relief will be required in the case of some consumptives and their dependents.

On the other hand it is the Union Government which runs a staff of Government Officers, whose duty it should be to generally direct a systematic campaign against tuberculosis.

439. Under these circumstances we find ourselves unable to make recommendations based on any assumption as to the respective functions of the Union and Provincial Governments, but we shall continue to speak, as we have hitherto done throughout this Report, merely of the "Central Government," leaving it to others to determine to which government the term shall apply in any particular case.

At the same time it is right that we should state our considered opinion on two points. First, that there should be as far as possible only one governmental authority controlling or dealing with this disease. And, second, that that authority should be the Union Government.

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* Witness, for instance, Section 72, Sub-sections (10), (11) and (12) of the Transvaal Local Government Ordinance, 1912, which cover the entire range of the provisions of the Public Health Acts dealing with infectious and contagious diseases.

Also see the Cape Municipal Ordinance, 1912, Section 149, Sub-sections (43) and (50), and Section 210, sub-section (9), and others affecting the Cape Public Health Acts.

Proposed scheme for dealing with Tuberculosis.

440. Any scheme for combating tuberculosis must include the following:—

(1) The discovery of cases.
(2) The care of the patient at his own home, the safeguarding of his associates, and the prevention of spread.
(3) The diffusion of information concerning the disease, and the improvement of general health conditions.
(4) The Sanatorium for the short-period treatment and educative training of early cases, and the Farm Colony for the continuation treatment of suitable cases.
(5) The Institution for the care and isolation of advanced and unrecoverable cases.

Under the first of the above measures falls a system of compulsory notification of tuberculosis. This we have already discussed in Chapter V of this Report, where our recommendations will be found under paragraph 101.

The tuberculosis dispensary is the *local* organization supplying the machinery for the second and, to a great extent, the third of the above items.

The sanatorium and the chronic-sick institution are of restricted application and will receive patients from extensive areas.

The Tuberculosis Dispensary.

441. The Tuberculosis Dispensary is the most important part of the organization for dealing locally with tuberculosis. In it should centre all of the local measures against the disease and for dealing with patients. It should be the place to which anybody having concern with or requiring information regarding the disease should turn. It is therefore much more than an institution for the treatment of tuberculous perons. Its functions will be:—

(1) To diagnose the disease and to advise and treat tuberculous persons who are not already under the treatment of a private medical practitioner.
(2) To inquire into the home conditions of each case, and to advise the patient and his friends on the taking of precautionary measures and the improvement of any unhealthy conditions found to exist; referring to the local authority any conditions requiring active interference by that body.

If the sleeping accommodation of the patient is unsuitable, to arrange for the supply of a portable shelter, and if the use of such is not possible, and the patient's retention in his home constitutes a danger to the other inmates, to arrange for his or their removal.

(3) To medically examine the other members of the family or household, with the view to the discovery of any other and possibly incipient cases, and to provide for the observation and treatment of any such case.
(4) To investigate the conditions of the patient's employment, with the view to the discovery of any which may have been responsible for the disease in him, or calculated to spread the disease from him to fellow workers.
(5) To arrange for visits by the district nurse or a health visitor, when necessary.
(6) To supply disinfectants, spit-cups and medical necessities; and when necessary, and acting in this respect through local charitable organizations, to cause to be supplied material assistance in money or kind to the patient or his dependents.
(7) To arrange for the transfer to the sanatorium or to the chronic-sick institution of patients in whom this measure is necessary; and to undertake the after care of patients when discharged from these institutions.
(8) To give advice on any matter connected with the disease; and to arrange for the spread of information among the public by lectures, classes, interviews, the distribution of literature, and other means.
(9) To keep proper registers and records relating to the disease.

Every dispensary must be under the executive control of a medical officer who should, as far as possible, have had some practical experience of the working of these institutions and of the dealing with tuberculosis. In Cape Town, and some of the larger towns, this should be regarded as a *sine qua non*.

He should visit when necessary patients at their homes.

He should be assisted with the services of one or more, according to the size of the institution, nurses who should also visit and assist at the patients' homes.

The dispensary should be conveniently situated for the work it has to perform. At least four or five rooms adequately fitted will be required. The accommodation should comprise office, dispensary, consulting room, small laboratory, waiting-room, and dressing rooms for male and female patients.

No charge should be made of any kind, but those patients who can afford to pay for medical treatment should be referred to private practitioners for treatment. Also any article of value supplied to a person having means, should be paid for.

Many of the activities above described fall within the scope of the public health functions of the local authority, while others, for efficiency, require to be exercised with its direct co-operation. Its medical officer of health then, if not actually in medical charge of the dispensary, must be in every case in close touch with its work.

All notifications of tuberculosis made to the local authority would be promptly communicated to the dispensary to take action on.

In the majority of cases and in the smaller towns the dispensary nurse would also be a district nurse or health visitor employed by the local authority for general health purposes.

The dispensary should not be empowered to exercise any form of compulsion. Whenever statutory powers require to be acted upon the matter must be referred by it to the local authority. The local authority would in no case be relieved of any of its statutory responsibilities. In this respect the dispensary would fulfil the role of a vigilance committee to the local authority.

The dispensary should therefore be an institution intimately connected with the local authority. It should be run by a committee of members of the local authority, to which should be co-opted members representing those local organisations, hospital, philanthropic and other interests, whose activities, experience or influence will be of service in the work of the dispensary. Indeed in many cases it may be found advisable to run the dispensary in connection with the local hospital.

442. The need for securing local co-operation in any measures is of the first importance. Therefore whatever may be the financial share borne by the Government, and whatever the extent of the supervision it may exercise, the actual work should as far as possible be in local hands. The getting into touch with patients and their families requires local knowledge and social capacities which no official machinery can ever possess. Also it is only through local philanthropic societies carrying on social work that reliable information as to the extent of material aid appropriate in individual cases can be obtained.

In those districts in which there is no local authority, the Resident Magistrate will have to take charge of operations, and he and his officials, through the establishment of a local committee, should seek the co-operation of such local forces as may be available.

It is also most important to secure the co-operation of the local medical practitioners. When precautions have to be instituted in connection with a tuberculous person, it should whenever possible, be done through the medical practitioner in attendance on the patient. In the majority of cases the medical attendant will doubtless be ready to accord his assistance without fee, but if claimed, then a reasonable fee according to a scale to be laid down, should be paid.

In our recommendations on the subject of the notification of tuberculosis we have made provision for the co-operation of the medical practitioner, in the official form of notification which we propose for adoption. (Paragraph 101).

443. The running cost of an institution fulfilling the above objects would be small. Salaries of officers and supplies to patients would constitute the chief expenditure. In most cases the Town Council or the Local Hospital could give it house room.

Its funds should be provided by

(*a*) grants from the funds of the local authority,
(*b*) voluntary contributions,
(*c*) a pound for pound contribution on the sum of (*a*) and (*b*) from the Central Government.

One or more local authorities, urban or rural, should be empowered, with the sanction of the Government, to combine in the management and financial support of a dispensary serving their areas.

A tuberculosis dispensary should be established in, or in connection with every town, in which the Central Government considers this to be necessary, and it should take powers to see that this is done. In Cape Town it is probable that one or more branches to the dispensary would be required.

Most up-country towns serve as the centre for all administrative, commercial, social and church purposes of the surrounding district, and similarly the dispensary would deal with all cases of tuberculosis coming to it from the district. It would seldom, however, be able to arrange for the visitation of the homes of such cases.

In those districts in which there is no local authority the Government would establish dispensaries sufficient for the needs of the district.

In every case the dispensary would operate indifferently among all races in the area in which it is established.

Institutional treatment for Whites and Coloured Persons.

444. Sanatoria and chronic-sick hospitals for the institutional treatment of tuberculosis should be established and run entirely by the Government.

Each institution will necessarily have to serve a very wide area, and no question of local control should come in.

These institutions would have to admit, however, all cases sent to them through the tuberculosis dispensary or by the local authority, provided they were suitable cases for treatment in the particular institution.

The value of sanatorium treatment is not only curative but educative, as it teaches the patient to adopt precautions both in his own interest and in that of others.

Sanatorium Treatment.

445. With regard to the provision of sanatoria (and also Farm Colonies) we approach this question with a good deal of doubt, not because we do not think a trial of such institutions is necessary, but because we have no means of ascertaining to what extent they are required or would be taken advantage of.

There are certainly a not inconsiderable number of male Europeans within the Union who would be benefited by a course of sanatorium treatment. It has been put before us repeatedly in evidence that the absence of such institutional treatment has been in many cases sorely felt. In Durban, Cape Town, and Kimberley this has been brought home to us.

To what extent such accommodation is wanted in the case of European females we have still less means of judging ,but we are sure that there are numbers for whom it is desirable, although the cases are fewer than among males.

Also among better class coloured persons in the Cape there are no doubt many who would gladly avail themselves of such treatment; probably in greater number than Europeans.

Of natives we doubt if there would in the present state of their attitude to hospital treatment be many who would submit to sanatorium treatment in the strict sense, although a few educated natives might be found to do so. Nevertheless we had it in evidence from several medical men in the Native Territories and native districts that they had had native patients who had been willing to go to a sanatorium had any such been available; and indeed some of these patients had gone away to the high veld in the hope of effecting a cure. We shall return to the question of natives presently.

446. We therefore have to recommend that as a beginning, and to some extent as a tentative measure, an institution be established to provide under one administration, on the one hand a Sanatorium and on the other a Farm Colony, for the treatment of Europeans and for better class coloured persons.

We think that this institution should be established by preference at a convenient centre in the Cape Province, as the majority of cases will come from there. We do not think any useful purpose would be served by indicating any particular site, as its selection must depend upon many local circumstances which would only come to light when the comparative merits of different sites came to be

definitely considered. We may, however, indicate some of the conditions which would have to be met in any site chosen.

(*a*) It should be at a medium altitude. A high altitude is undesirable.
(*b*) A more important consideration is that it should be beyond the coastal belt.
(*c*) It should be on or within easy reach of a line of railway, preferably a main line.
(*d*) The position should be sheltered from prevailing cold winds. At the same time it should not be so placed in a hollow or on the hot side of a kopje that the heat is severe in the summer.
It should have a sunny aspect, and be on a gentle slope.
(*e*) The locality should be free from dust storms.
(*f*) It should have pleasant surroundings, should have an ample supply of good water, and sufficient land, with suitable soil to allow of the carrying on of gardening and farming operations. There should be at least an acre of arable land per patient.

Authoratative information regarding the construction of sanatoria and the management of sanatoria and Farm Colonies for the treatment of tuberculosis is now so readily available that it is unnecessary for us to go into details regarding these points, except to say that the class of building should be the *simplest* of its kind, and the arrangement should be such that while beginning in a small way it could be extended to meet increasing needs.

The accommodation should of course be so arranged as to keep distinct European and coloured in all respects, and the Farm Colony should be quite apart from the Sanatorium.

Under each head provision should be made for both males and females.

Probably as a beginning the sanatorium accommodation should provide for each sex and each race twenty-five beds, or a total of one hundred. The Farm Colony should begin on a smaller scale.

The administrative provision should be sufficient to serve the needs of a considerably larger establishment.

It is difficult to give a reliable estimate of the probable cost, but judging from the experience in the case of sanatoria elsewhere, it would we think be safe to put it at about £200 per bed, including all administrative accommodation, fittings and equipment, but exclusive of the cost of the site. Additional beds could be provided at a very much smaller cost.

The cost of maintenance should be comparatively small, and should be considerably less than the cost of maintenance of patients in a general hospital.

In theory farm colonies are expected to be self-supporting, but this is not entirely so in practice.

Many patients, probably the majority of the Europeans, would be able to defray the whole or a considerable share of the cost of their maintenance.

It is essential that the institution be placed under the control of a competent medical superintendent who has had practical experience of the management of sanatoria and farm colonies, and of sanatorium treatment in all its details.

He would require to be assisted by a farm bailiff having a competent knowledge of mixed farming under South African conditions.

Institutional treatment of advanced cases.

447. For the advanced case who cannot be looked after at his home or who is living under such conditions as to be a danger to others, it is absolutely necessary that institutional treatment of another kind should be provided. Such patients would be at the most only partially or temporarily benefited by the institutional treatment. Their case is usually hopeless.

There are many such patients, especially among the coloured classes, and hitherto local authorities have had no means at their disposal of dealing with them. With the exception of a few beds at the Old Somerset Hospital, Cape Town, at the Chronic Sick Hospital, Grahamstown, and at the Rietfontein Chronic Sick Home, Johannesburg, so far as we are aware, there has been no place to which they could be sent. We understand that some accommodation is being provided at the New Alexandra Hospital in course of erection at Maitland, by the Cape Provincial Administration.

We see no objection to dealing with these cases in separate accommodation in connection with chronic-sick hospitals. It may be possible to provide some

separate accommodation for such cases in connection with existing general hospitals. It would seem, however, that much more extensive provision will have to be made than at present exists or is in contemplation.

Accommodation is required in all the Provinces. It is essential that every local body dealing with tuberculosis should have some place to which it can without delay send such cases as these for treatment.

Furthermore, whenever in the opinion of their medical officer of health it is necessary in the interests of healthy persons or the public that any such case be isolated, the authority should have the power and the means to do so. We consider that this does not admit of argument. [See paragraph 41.]

Measures in the case of Europeans.

448. Speaking generally, the dealing with whites will not, we believe, be found to necessitate the taking of very extensive measures. We have seen that the amount of active disease among Europeans appears not to be great, and that it is tending to decrease. We have also seen that to a large extent its presence in the past has been due to the unrestricted immigration of consumptives into South Africa. With the reduction of this means of recruiting cases, and with the usually good conditions of European life obtaining in South Africa, the disease should continue to decrease if the most ordinary general measures of precaution be adopted.

Immigration of European Consumptives.

449. In the Interim Report which we made on the subject of the restriction of the immigration into the country of consumptives we laid down certain principles which we considered should govern the admission of such persons into the Union. These are set forth in paragraph 19 of that report.

Stated briefly, they aim at restricting and controlling, rather than wholly preventing the entrance into the Union of tuberculous persons.

Thus, no such person, not being a citizen of the Union, should be permitted to enter, except under a permit issued on the authority of the Minister, and subject to the proper observance by the immigrant of conditions to be written into the permit, and having for their object (*a*) the keeping of the immigrant under suitable surveillance and control, and (*b*) the observance by him of adequate measures for preventing the spread of infection. No permit should be issued unless satisfactory guarantees are furnished as to his ability to support himself in conformity with the conditions contained in the permit. Every permit should be renewable from time to time, or revokable at any time, during a period of three years from the date of entry into the Union.

Among the conditions proposed for observance is one requiring him to report himself to the magistrate and to the Health Authority of the district, and to undertake to observe and carry out such requirements as to conditions of residence, disposal of sputum, disinfection, and generally for preventing the spread of infection, as may be laid down by the local Health Authority, or, in its absence, as may be imposed by the District Surgeon or other authorised Government officer.

We do not know whether these recommendations have been brought into operation, but we wish to say that during the further course of this Inquiry we have not found any reason to modify our views on this subject. On the contrary we are more than ever convinced that it is inadvisable to admit consumptives unless under stringent safeguards that they will not become a danger or a burden to the community.

The accommodation of Consumptive Europeans in Boarding-houses, etc.

450. One of the difficulties in dealing with tuberculous Europeans is the fact that in many instances the subject of the disease is a young man dependent entirely upon small earnings which do not admit of his providing suitable accommodation for himself, so that he is compelled to live in some second-rate boarding-house, where he not infrequently has to share a bedroom with some other lodger. In such cases we are of opinion that it should be the duty of the local health authority to require his removal to more suitable quarters, and failing his being able to find such, to compulsorily effect his removal to suitable quarters.

Portable Shelters.

451. Assuming the existence of the tuberculosis dispensary, the necessary arrangements would be made by this body. This should consist in the provision of some simple, cheap form of portable shelter. It will rarely happen that

arrangements cannot be made for the placing of such a shelter in a suitable spot on the premises occupied by the consumptive or to be found by the dispensary.

In taking action on these lines care should be exercised not to harass the individual or to jeopardise him in his employment, nor should fears be engendered among his associates, which might result in his expulsion from their midst. If it be made clear to him and them that the occupation of such a shelter is as much or even more in the patient's own interest as in that of his associates, such a result should not ensue.

But not only in the case of consumptives living in boarding-houses will the provision of portable shelters be necessary. We are convinced that their use will be of the greatest value in the case of consumptives living in their own homes, and not only of Europeans, but in the case of a large proportion of better class coloured persons.

At Oudtshoorn, in one case we saw a tent used as a shelter supplied by the local authority, being used in the yard of premises occupied by a coloured family of which the mother was suffering from phthisis. These people expressed themselves as highly satisfied with the arrangement, and said that it had effected an improvement in the patient's condition. From what we saw it was evident that the tent was being used by the patient, and that its value (although a very unsuitable form of shelter), was thoroughly appreciated.

We are satisfied that in this country the principle of the portable shelter is capable of very extensive application, and that where it can be applied it will solve many difficulties.

There is a drawback in the case of women, especially white women, not caring to sleep outside of the house, but in most cases arrangements can be made to meet this objection.

There are now many kinds of suitable and cheap forms of shelters. But in any case a very good kind can be cheaply made locally at a cost of from £5 to £10, according to its character and finish.

No charge should be made for the use of such shelters unless the patient is in easy circumstances.

Measures in respect of Coloured Persons.

452. The measures applicable to coloured persons will in most cases involve the use of all the machinery we have above outlined. In the term "coloured person" we include natives living within the limits of an urban authority.

As a rule these persons are extremely poor and their means allow no margin to meet the calls which a case of tuberculosis among them entails. In the majority of cases they are living in the location or under such conditions on premises in the town as do not admit of their taking any precautions. Under these circumstances separate sleeping accommodation will have to be provided for them and its use insisted upon. As has been said, this will in the majority of cases be possible by means of portable shelters, or in locations by the provision of separate municipal huts.

In the Cradock location the municipality have erected several huts on its confines for the accommodation of consumptives, but they have cost a good deal and we consider they are unnecessarily substantial. Also being at a distance from the rest of the location there was a difficulty in getting them occupied.

We consider that the local authority should be required to provide sufficient and suitable accommodation for this purpose, and the cost should be defrayed by it out of the revenue derived from the location.

Where the infected person neglects to use separate accommodation provided for him, the local authority should compulsorily isolate him under detention. The exercise of this power, once it were recognised that it might be enforced, would rarely become necessary.

The rôle of the District Nurse and Health Visitor.

453. In the case of coloured persons the visiting nurse will chiefly be required, and we wish to emphasize the value of this measure, not only in giving aid to the patient, but in the far more important direction of educating the household in improved domestic hygiene.

From this point of view we venture to suggest that, while an important item in the scheme of anti-tuberculosis measures, the rôle of the district nurse or visitor is of far wider application in connection with general measures of public health control, and especially in the prevention of infant mortality. Therefore, we con-

sider that the majority of urban local authorities should appoint a district nurse and health visitor, whose services would also be utilised in connection with cases of tuberculosis. Her duties would, of course, not be confined to coloured persons.

The Cradock municipality has appointed for service in the location a native woman trained in nursing at the Victoria Hospital, Lovedale.* We doubt if a native is competent to undertake this work. We, however, recognise the difficulty of getting a European woman to undertake services in a location or among poorer coloured persons and natives. The difficulty could possibly be got over by giving her a native female assistant.

454. In dealing with cases of tuberculosis among the poorer class of European, it will occasionally be necessary, and among the coloured it will very frequently be necessary, to give assistance in the shape of medical comforts and food. This will generally be best distributed through existing charitable organisations.

455. With regard to tuberculosis in Asiatics, the indentured and free Indian would continue to be entirely looked after by the Protector of Indian Immigrants and the Indian Immigration Board medical service; while all others would be dealt with on the same lines as coloured persons in the Union. The Board, however, should take steps for the early detection of cases of tuberculosis among the Indian community in its charge, and for their treatment on approved lines.

The care of Tuberculosis in the raw Native.

456. The dealing with tuberculosis in the raw native is a problem presenting the greatest difficulty. His ignorance, his superstitions, his habits and manner of life, his objection to European medical treatment, all render him an almost impossible subject to deal with in this regard.

The evidence given to the Commission on this question was uniformly pessimistic. Magistrates, missionaries, doctors, recruiters, old residents among them, and educated natives themselves, one and all had practically nothing to suggest for combating tuberculosis in the native, except the one measure of educating him up to a better standard of living. And when asked how long this would take, the reply was always the same. It would take generations, and in the meantime the disease would go on increasing.

While we agree generally with this view, we believe that the progress of education will be quicker than is usually expected. In the first place sufficient account does not appear to be taken of the great change in the habits and outlook of the native, which is proceeding at an ever accelerating pace, as a result of his going to labour centres and especially to the mines, where he not only comes into contact with, but actually experiences in his own person the uses of the most developed civilisation. And in the next place the average native is by no means devoid of common sense. It is very difficult to get him to understand anything which is unfamiliar to him, but once he understands he is not slow to see wherein his interest lies.†

Necessity for educating towards improved conditions of living.

457. We are therefore inclined to believe that if the Government were to arrange a steady educational campaign, the process of enlightening the native on some of the simplest and yet more formidable of the things which now endanger his health, might prove less difficult than is usually thought.

We suggest that the teaching should be confined to a constant reiteration of a few essentials, and that minor questions be left alone.‡

These matters should be continually put before him officially and given official weight, by the Resident Magistrate and the District Surgeon at meetings whenever the opportunity serves.

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* See Chapter XII, paragraph 249 (1).

† In the matter of vaccination, for example, having become satisfied that this is good for him, he is now (at any rate, the Cape native is) always ready to present himself for the operation, often travelling long distances to the vaccination centre. We are informed also that in the Native Territories, since East Coast Fever, he is eager to dip his cattle, and the Native Councils have constructed many dipping tanks.

‡ For example: On the improvement of huts. To build large ones. To build them with higher walls. To leave a space between the top of the walls and the eaves of the roof. To put in windows. To have a doorway large enough to walk through upright. To keep the interior of the huts clean. To let the sun and air into them freely during the day and as much ventilation as the occupants can stand at night. To sleep on a bench instead of the floor. Not spit inside the hut, and if this must be done then into the fire or into a box filled with earth. Not to overcrowd the huts at night. Not to sleep in the same hut with sick persons, especially those with a cough or diarrhœa, but to give sick persons a separate hut. Also on the signs of pulmonary tuberculosis, the dangers of infection from the expectoration, the advantages of treatment, and the power of the sun and air to purify. On the danger of adopting European clothing without proper care as to cleanliness and sufficient changes.

Where printed matter on the subject is likely to be read, appropriate statements in suitable form in the native languages should be officially issued bearing the imprimatur of the Government.

Also in the Native Territories the Native Councils should be induced to take the matter up.

Missionaries should also use their influence in the same direction among their adherents.

Also at the labour centres the same simple instruction might be officially imparted to the large bodies of natives collected there. Periodical addresses by the Native Affairs Inspectors could be given to gatherings called together at suitable times.

When communicating with natives on the subject of tuberculosis it would be a great advantage if pulmonary tuberculosis could be identified with a single distinctive name, and the disease thus given a definite entity in his mind.. At present several generic names are applied by natives, indifferently to a cough or a pain in the chest, or to pulmonary tuberculosis, or to bronchitis, pneumonia, asthma or other chest complaint. It is difficult to impart information to a person regarding a disease unless it has a definite distinctive name by which it can be identified in his mind.

458. We would suggest whether, as the native is a great imitator, good would not result from the Government requiring its native officials who live in native huts to erect huts of a standard type embodying the desired improvements. A small bonus might be paid to those who conform properly to the standard.

In Natal, since 1876, "all houses of European construction inhabited by natives having only one wife and otherwise conforming to civilized usages" are exempt by statute from the annual hut tax of fourteen shillings per annum. It was stated in evidence by the Acting Native Commissioner for Zululand, that the tendency of this was beneficial, although advantage was taken of it only by Christian natives.

When the native poll tax of one pound per annum was in force in that Province, the unmarried man having a "ilawu" or bachelor's hut paid the fourteen shillings hut tax, and he was then exempted from the poll tax, thus saving six shillings per annum. We were informed that this induced an enormous number to build these separate huts.

459. Here we may mention that in our opinion the imposition of a hut tax is bad policy from the point of view of the natives' health, as it tends to cause overcrowding, the native naturally being averse to paying taxes which he can evade by doing without an additional hut. Evidence on this point was given before the Commission by magistrates in Natal. It was also pointed out that the same effect occurred in the case of natives on private land, from the farmer charging rent on the number of huts rather than on the individual or the family.

Where the hut tax has been interpreted by the authorities, as at the Cape, rather as a wife tax than a hut tax, this effect does not follow. [Questions 64065-64076.]

Return of Tuberculous Natives from Labour Centres.

460. At present sick natives returning from the mines pass to their kraals and are generally entirely lost sight of. We recommend that the several native labour bureaux and pass offices, when returning boys to their homes who are known or believed to be suffering from tuberculosis, should notify the particulars to the Resident Magistrate of the district in which the sick native lives. This procedure would not entail much trouble. We do not suppose that the authorities of the district would be able to get into touch with a large proportion of such natives on their return, but there would be some whom the authorities would be able to advise or place under suitable treatment, and in those cases it would let the native see that the Government is concerned with the matter. But apart from this it would have the effect of keeping the magistrate and district surgeon informed of what is taking place in his district.

Medical examination of Natives proceeding to Labour Centres.

461. An appreciable number of natives leave the native districts for the mines, who are suffering from tuberculosis, and as the proportion of "old boys" returning to the mines increases, this number should tend also to increase. According to the evidence given by recruiters, the proportion of recruits rejected on the Rand and returned to them on account of physical unfitness has averaged

from one to two per cent. Some recruiters have pursued the plan of having their recruits examined before sending them forward, in order to avoid the expense of having rejected boys returned, as in such cases the recruiter loses his outlay on the boy. The number, however, who have done this has been few, and of these most of them discontinued it, as they found boys whom they had rejected, being sent forward by some rival recruiter, or going up on their own account.

Since the Native Recruiting Corporation, Limited, has come into being, the system under which much of the recruiting is carried on by the mines has been altered, and medical examination before engagement now takes place in the Cape Native Territories, and some other places; the payment being one shilling per head.

At one time the Cape Government required a medical examination before the contract with the native was officially attested, but this practice was only continued for a short time. Under this arrangement the fee paid to district surgeons for the examination was one shilling and sixpence.

We are of opinion that if it can be arranged it is advisable to insist upon every native who is proceeding to any labour centres for all classes of work, undergoing a medical examination before the issue of his travelling pass.

Such examination should be directed to determining whether a native is—

(*a*) fit to undertake all kinds of work, or
(*b*) not fit to undertake certain classes of work, as underground mining, or
(*c*) is not fit to proceed to a labour centre at all.

Under such a scheme all natives suffering from active tuberculosis would be placed in the last class (*c*). This not only for their own sakes, but because it is essential that natives carrying tuberculous infection should not be allowed to proceed to labour centres, where they would be likely to spread infection, especially under compound life.

In the second class (*b*), would be placed all those boys whose general physique or standard of health is such as would render them liable to break down or to develop tuberculosis under conditions of strain or bad environment. The limitations placed on the native's fitness should be endorsed on the pass issued to him.

There is another condition than tuberculosis which makes a medical examination very necessary before a native is allowed to go into service, namely syphilis, which disease is exceedingly rife, and in the Native Territories is said to be rapidly increasing. We are not concerned in this report with this disease, but we mention it here in order to show that on general grounds, as well as on account of tuberculosis, such an examination as we propose is necessary.

The majority of witnesses in native areas have expressed themselves in favour of the proposal. From the recruiting point of view, however, the objection is raised that many of the district surgeons and medical men who would perform the medical examination would possess insufficient knowledge of the conditions obtaining at the labour centres and especially on the mines, to enable them to arrive at correct judgements as to fitness. We think any difficulty of this kind could be satisfactorily overcome by the issue of guiding instructions to examiners.

The question of expense is a more serious matter. We are of opinion that in view of the numbers who would be examined a very small fee would be remunerative, and should be covered by one shilling. In evidence medical practitioners expressed the opinion that this amount would be adequate.

As the examination is undertaken in the interests of the native himself, it would seem equitable that he should defray the cost of it, and we suggest that a fee of one shilling be charged for each travelling pass to meet it.

Age of Natives proceeding to Labour Centres.

462. It would seem here to be a suitable place to refer to the very young ages at which boys are allowed to proceed to labour centres. Many boys on the Rand are mere children, and in our opinion too young to be exposed to the conditions, physical and other, obtaining at such centres. Under section 1 (*a*) of the "Native Labour Regulation Act, 1911," it is provided that no contract entered into with a native recruit shall be attested unless the attesting officer is satisfied that the native is apparently over the age of eighteen years. We have, however, seen recruits who were apparently much under that age; and in the Native Territories it was stated in evidence that boys under age had got their contracts attested by means of impersonation. We understand that the Native Affairs Department has since issued instructions on the subject.

We are of opinion that boys under the age of eighteen years should be discouraged from going to labour centres.

Institutional treatment for Natives.

463. With regard to the provision of institutional treatment for natives,—especially the raw native,—suffering from tuberculosis, we are of opinion, after a careful consideration of the evidence and of all the circumstances surrounding the question, that an attempt should be made to ascertain what measures of success can be obtained in this case from careful institutional treatment.

It is due to the native that a fair and extended trial of this nature be carried out. We believe that it will be found to yield beneficial results.

It is very desirable, not only for the patient's own sake, but in the interests of the other members of his kraal that he should be induced to undergo institutional treatment, rather than be left to die at his home.

We recognise that only by mild and tactful measures will his antipathy to institutional treatment be overcome.

While, therefore, he is kept under strict medical discipline when undergoing sanatorium treatment, it should be made plain to him that he is in no sense a prisoner, and can leave at once should he wish it. Also he should be given adequate opportunity of seeing his friends.

Treatment on the most approved sanatorium lines should be attempted. His stay in the sanatorium should also be utilized to educate him in the causes of the disease and the precautions to be taken to prevent spread of infection.

While every endeavour should be made to bring under treatment the early cases, yet advanced cases should not be refused admission, so long as it is made clear to such that they should not expect a cure at that stage.

The diet should be liberal and of the European type. We mention this, because we have observed in native hospitals a tendency to feed sick natives on mealie meal, as though they were healthy individuals in a native compound.

The accommodation should be very simple and of the open shelter type. But care should be taken not to allow simplicity to degenerate into a kind of lazaretto for the hopelessly afflicted. The treatment and management should be kept on as high a plane as possible.

No charge should be made to the inmates, but the Transkeian General Council should be induced to interest itself in the movement and to subsidise it out of its funds.

Should it prove successful it should be extended both in the Native Territories and to Natal, the Orange Free State and to the native areas of the Transvaal .

Provision of Hospital Treatment for Natives.

464. We should like to remark here on the provision made for the hospital medical treatment of natives. We have been struck in the course of this enquiry with the extremely meagre provision made in this respect for natives in Native Territories and Areas. We consider that the Government might with advantage act more liberally in this matter. Having regard to the large revenue derived from the native by direct and indirect taxation, more should be expended upon him for the provision of hospital care and medical treatment. Even when a direct hospital tax is levied on him or his employers the whole of it does not always go to his benefit.

In the Zoutpansberg District of the Northern Transvaal we were particularly impressed with the small provision made by the Government for the medical care and treatment of natives. So much so, indeed, that we sought exact information on the subject, and we are indebted to the Resident Magistrate for the following particulars:—

This area at the time of our visit comprised the Sub-Native Commissioner's Districts of Pietersburg, Blaauwberg, Haenertsburg, Louis Trichardt, Sibasa, and Groot Spelonken.

Its population was, Europeans, only 9,469, and natives, 412,526.

In this large area there are five district surgeons. Four are in private practice. It is only a small part of their official duties to treat natives, mostly for syphilis, malaria and the like. There is also one whole-time medical officer, whose duty it is to travel through the Northern Transvaal (including the Waterberg District), and to treat natives for these diseases.

The united salaries and retainers of these officers amount to £1,520 per annum. This is paid by the Union Government.

There are three hospitals:—

(*a*) One general hospital at Pietersburg, having 26 beds for Europeans and 24 for natives. Annual expenditure by the Provincial Government on Europeans £1,797, and on natives £896. Average number of natives per diem treated free slightly over 10.

(*b*) The Elim Hospital, conducted by the Swiss Mission, seventy-five miles from Pietersburg, having 15 beds for Europeans, and 30 for natives. Annual Provincial Government Grant: for Europeans £600, for natives only £200. The native patients contribute annually over £200 for their treatment. The European patients, we were informed in evidence, mostly came in on a pauper certificate and paid nothing.

(*c*) The Bochem Hospital, conducted by the Berlin Mission, fifty miles from Pietersburg. It has no medical staff. It has 30 beds, but can accommodate about 165 native patients on mats on the floor. Nearly all patients are treated for syphilis. Annual Grant by Provincial Government, £600 for maintenance of native patients, and £400 for cost of Staff.

Other provision made by the Provincial Administration for pauper medical relief in this district is, Europeans £500, natives £25.

The total Government annual expenditure on the medical care of this huge native population is therefore under £3,500, most of it being incurred in respect of the suppression of syphilis and malaria.

The following are the annual collections in cash from these natives:—

Poll tax	£136,385
Passes	3,189
Dog tax	2,349
Judicial fines	1,431
Total	£143,354

Against this there is the expenditure on the Sub-Native Commissioners and Staff, Native Police, and Native Chiefs' stipends, amounting to £12,546. In addition to this there is a certain amount of expenditure, which it is not possible to assess, connected with the European Police and with Headquarter Administration.

We think it will be conceded that a more generous provision for the medical care of this native population is justified.

Regulation against Spitting in Public Places.

465. We are of opinion that a general regulation prohibiting spitting in public places, except in a receptacle provided for the purpose, should be applied throughout the entire Union. At the present time such a regulation has been framed by some municipalities as a local bye-law, but in the majority of places there is no such regulation.

It should be a general instruction to the police to take cognizance of any infringement of the law in this respect.

We do not, however, rely so much on the perfect enforcement of such a law as on its educative effect on the public.

"Public place" should include the side-walk in any public thoroughfare, and any public market, public building (including theatres, halls, churches, chapels, restaurants, eating houses, bars and other places of public resort), public vehicles, and shops, stores, workshops and factories.

We had it in evidence from several witnesses in the Native Territories that they would welcome such a law, as at the present time a great nuisance occurs in their stores frequented by natives, but that they could not take action, in the absence of a law on the subject, without risking losing custom to less particular storekeepers, but that if there were such a law they would see that it was enforced, not only in their own stores, but in those of their neighbours.

Necessity for local Medical Officers of Health.

466. It is necessary to direct attention to the very inadequate extent to which local authorities are advised technically on health questions arising in connection with the exercise of their public health functions.

Only in Cape Town, Pretoria, Durban, Johannesburg, Bloemfontein, Kimberley and, quite recently, East London, is a whole-time (not engaged in private practice) medical officer of health employed by the local authority. In other municipalities the medical officer is a general practitioner who is paid a small retaining fee, and who is usually regarded merely in the light of a consultant whose advice is to be sought only when it is thought desirable. In many cases, however, the incumbent himself extends the scope of his activities, to the extent of making inspections and reporting defects on his own initiative.

In rural areas the necessity for the assistance of a medical officer of health is practically entirely disregarded.

In every district of the Union the Government appoints a general medical practitioner as district surgeon, whose services are from time to time requisitioned by the Government for public health matters in connection with outbreaks of infectious disease, but whose chief duties are medico-legal and the medical care and treatment of prisoners, paupers, police, and certain subordinate Government officials.

Without wishing to belittle in any way the work of those medical men who, under circumstances of great discouragement, and often to the detriment of their private practice, have done much to improve local health conditions ,it is evident that in the interests of the public health and incidentally of tuberculosis prevention, there should be employed to a larger extent whole-time medical officers of health having the full responsibility on them of supervising the health conditions of their districts.

We recognise that in such a large area as the Union with small local authorities widely separated, great difficulties exist in this matter, both financial and administrative, but making every allowance for these, we are satisfied that better arrangements than those at present in operation could in many cases be devised.

It should be quite easy in those cases where the area of a single local authority is insufficient for the services of a separate medical officer of health, to combine for the purpose the areas of several adjacent local authorities. For example, the district of Port Elizabeth, comprising the municipality, all the outlying urban areas and the rural district would provide more than enough work to occupy the entire time of one medical officer of health; and if it did not, then the town and district of Uitenhage could be combined with it. Again in the Oudtshoorn district where there are a large municipality, a number of outlying urban areas, and a very thickly populated rural district, a whole-time medical officer of health is most necessary. The same may be said of Grahamstown, and the surrounding district, as well as of others. Also in the case of the towns along the Reef and the area surrounding them, there is occupation enough for at least two whole-time medical officers.

We are convinced that no general or marked improvement in local public health administration can be expected without the appointment of expert whole-time Health Officers who are independent of private practice.

Elsewhere than in South Africa this is an old and well-established experience, and the time has arrived when it should be also recognised in South Africa. In the case of those towns in the Union where a whole-time medical officer of health has been appointed, the resulting improvement in sanitary administration has been marked, and this alone should demonstrate the necessity for such appointments in other areas.

We consider that the Central Government should possess the power to determine what areas, or combination of areas, should appoint whole-time medical officers of health, and, when necessary to do so, it should exercise its powers.

In England the local medical officer of health is under the partial control of the Local Government Board, and the Board defrays a portion of his salary. We consider that this principle should be acted upon here, where the necessity for the Government granting assistance in this matter to the local authority is much greater than it is in England.

Further statutory powers required in relation to Public Health.

467. Many of the recommendations made in the course of this report will require legislative powers to enable them to be brought into being. Most of them should find a place in an effective Public Health Act. There is, however, but little effective Public Health legislation, and such as there is differs in the several Provinces.

In the Cape Province there are the two old Public Health Acts No. 4 of 1883, and No. 23 of 1897. Neither of them contain provisions which would meet the

conditions contemplated by our recommendations. It is true that these Acts provide machinery for dealing with tuberculosis, but they deal with it on the same lines as violent epidemic diseases, like small-pox, plague and cholera. For many years prior to Union fresh legislation for the Colony was under contemplation, in order, *inter alia*, to provide proper powers for dealing with the classes of infectious disease, requiring special administrative methods, among which is tuberculosis.

Our proposals regarding the manner of notification of tuberculosis could not be given full effect to under these Acts.

In Natal the Public Health Act, 1901, which was constructed so as to require Parliamentary renewal from year to year, has lapsed since Union, and there is now no Public Health Act in that Province under which powers for dealing with tuberculosis can be derived.

In the Orange Free State there is an effective Public Health Law in the Ordinance No. 31 of 1897. This required the notification of tuberculosis and empowers the Government to proclaim what provisions for the prevention of its spread shall apply to persons suffering from the disease. The Act, with certain exceptions, only comes into operation on the application of the local authority, and so far it is only fully in operation in a few municipalities.

In the Transvaal there is no general Public Health Act, but merely laws dealing with certain infectious diseases, such as small-pox, leprosy and plague.

It is evident therefore that the first essential requirement is an effective Public Health measure for the Union, furnishing *inter alia*, powers for dealing with tuberculosis on the lines now proposed. Nevertheless, much of the proposed scheme of dispensaries and institutional treatment could be brought into operation under the powers already possessed by local authorities under local government legislation, at any rate as far as urban authorities are concerned.

Financial Relations.

468. Regarding the financial question involved in the proposals for dealing with tuberculosis, contained in this report, a considerable amount of evidence was led before the Commission by the representatives of local authorities in different parts of the Union. The opinion almost universally expressed was to the effect that direct measures for the combating of tuberculosis and for treating persons suffering from the disease should be undertaken by the Government and at the expense of the Union Treasury. Some few mayors agreed that the local authority might equitably be called upon to defray a portion of the cost, but one and all made it clear that if the whole of the cost of the measures to be undertaken has to be met by the local authority, then very little would be undertaken at all. It was pointed out that the matter was one of national importance and concern; that the magnitude of the task was quite beyond the powers of any local authority; that it had arisen and had reached its present proportions through no fault of theirs; and that if it had to be dealt with by the local authority, those municipalities which took adequate and proper measures,—which in effect would be only the larger municipalities,—would have to treat, not only their own cases, but they would attract to their areas and become responsible for a large proportion of the consumptives from all over the Union.

In the main we consider these objections well founded. We do not, however, think that the local authorities, and especially certain of the municipalities, can be acquitted of having been to a certain extent responsible for the growth of the disease among the coloured and the native population within their areas, arising from the bad housing conditions they have permitted to obtain, especially in their municipal locations. At the same time the Central Government has been in some measure a contributory to this, by means of its own laxity in not forcing the local authority to perform its obligations. Moreover, there are other factors, such as the peculiar difficulties arising from the character of the races that they have had to deal with, and the effect of the immigration of consumptives from oversea, all of which were beyond their control.

We think therefore that the combating of this disease must be regarded as a national question to be controlled or defrayed by the State. It is, however, right that some part of the expenditure should be borne by the local authority, or be raised locally. We base this view on two grounds. That the local authority is in part responsible for the spread of the disease within its area, and it is well to give a monetary expression to this responsibility. And that in the case of those anti-tuberculosis measures which will be entrusted to local hands to carry out it is necessary that a curb on extravagance should be provided by the knowledge that they are spending their own as well as the country's funds.

With regard to the contention (founded to some extent on actual experience, as in the case of Durban and Cape Town) that the municipality which instituted proper measures would attract to it the cases from other parts of the country, we consider this would certainly be true in respect to sanatorium and institutional treatment. Sanatorium and chronic-sick hospital provision should be concentrated for large areas of the Union. It, therefore, should be undertaken by the Government, and we consider be paid for by the State.

469. We, therefore, recommend,—

(*a*) that the Central Government contribute pound for pound to the funds raised locally, either by subsidy from the revenues of the local authority, or by public subscription, for the carrying on of the Tuberculosis Dispensary.

Receipts of the dispensary in payment of any thing supplied by it should not rank for contribution.

Also, the half of approved expenditure incurred by a local authority on things solely and directly required for dealing with cases of tuberculosis, such as payments to medical men for notification, the purchase or erection of shelters, and like specific objects, should be refunded by the Central Government.

The defraying half of this expenditure should be contingent upon the local authority performing efficiently its duty in the care of the public health within its area.

(*b*) that expenditure on the establishment of sanatoria, farm colonies and chronic-sick institutions, and on the maintenance of patients therein should be defrayed by the Central Government.

That it is necessary that the State should contribute largely to the cost of anti-tuberculosis measures is an established principle, and finds its exemplification in the action of the Imperial Treasury in defraying half the estimated cost of approved schemes undertaken by local authorities in England for dealing with tuberculosis within their areas. [See Chapter II., paragraph 39.]

Also in South Africa the principle is already acknowledged that the Government should defray the cost of dealing with paupers; as is seen in the maintenance of chronic-sick institutions, the subsidising of general hospitals, the granting of individual poor relief and medical treatment through the Resident Magistrates, and the free treatment of persons suffering from certain other diseases such as syphilis.

Estimate of probable cost of Anti-Tuberculosis Measures.

470. With regard to the probable cost of the anti-tuberculosis measures which we have proposed, it is difficult, or rather impossible to make any reliable estimate. At the same time the amount in the aggregate should not reach a high figure. Moreover, it would not be great at first, but would increase as the organisation developed and got to work.

As a mere indication we may hazard the expectation that as soon as operations have properly begun the following expenditure may be anticipated.

Primary capital outlay on Sanatorium, Farm Colony and additional Chronic-sick hospital accommodation, say, £30,000.

The average inclusive cost per yearly patient under institutional treatment—sanatorium and chronic-sick—may be put down at £90 per annum. An average of two hundred patients constantly under treatment would amount to £18,000; but towards this sum there should be an unknown, but not inconsiderable amount derived from paying and part-paying patients.

For the medical treatment of natives, say, £5,000 per annum.

The average annual cost of each Tuberculosis Dispensary may tentatively be put at £150. Of course, in the larger centres it would greatly exceed this. Only half of this would be a charge on the Central Government.

In making these estimates we have taken into consideration the experience of the cost of other forms of hospital treatment in South Africa. We have endeavoured to err on the side of excess rather than risk an under statement.

Conclusion.

471. In concluding this report we wish again to emphasize the fact that measures for combating tuberculosis must begin with the prevention of cases, and that the way to effect this is by improving the conditions under which so large

a proportion of the coloured and native population live in the urban areas, and by improving the conditions under which they work at the industrial centres, especially on the mines.

We wish to say that in formulating recommendations we have always endeavoured to reach a moderate and practical solution, not to advance proposals, which, however sound in principle, would not be likely to prove reasonable and practicable if adopted.

As to the measures we suggest for attacking the disease, we believe that if they evoke the co-operation of the public and are consistently developed on the lines we have laid down, they will result in a steady reduction of the suffering and mortality produced by this disease. We must, however, insist on the necessity for making such measures general throughout the Union and not confining them to a few of the more progressive centres.

That this will entail a certain amount of expenditure is inevitable, but that the cost will be excessive we do not believe.

It is a matter for surprise that, while in nearly every other civilised country a systematic endeavour is being made to eradicate tuberculosis, here in South Africa where a large section of our population is threatened with the worst consequences of the disease, the State ha sso far done nothing to check its spread. Indeed throughout the length of the Union we know of not a single public institution where the consumptive patient can obtain the treatment proper to the early stages of the disease, and only three where a person dying of it and dangerous to his associates may end his days.

We would also express the earnest hope that measures may be taken without undue delay to stop the further spread of and bring about the eradication of tuberculosis in stock. We are impressed with the grave danger which threatens not only the people, but also the future of the growing dairy industry of the Union from this cause.

In the course of this report we have availed ourselves of the opportunity to express our grateful acknowledgment to those who have furnished us with special information on subjects under discussion. We now desire to record our great appreciation of the assistance rendered to us in a difficult enquiry by the many witnesses, official, professional and private, who, often at considerable trouble and inconvenience to themselves, tendered evidence before the Commission and prepared statistics for its use.

We also wish to acknowledge the untiring zeal of Mr. G. H. S. Lyne, who attached to the Commission by the Department of Finance, has discharged the secretarial duties and has supervised the clerical work of the Commission, besides rendering valuable assistance in many directions.

All of which is submitted for Your Excellency's gracious consideration, this 15th day of May, 1914.

A. JOHN GREGORY,
*Chairman.**

* But dissenting entirely from Paragraphs 367 to 380 relating to the future Control of Health of Mine Employees and Mine Sanitation. Also to Paragraphs 359 to 366, in so far as the latter are at variance with my Minority Report.

R. JAMESON,
Member.†

† With the exception of Paragraphs 367 to 380, relating to the Future Control of Health of Mine Employees and Mine Sanitation.

T. TE WATER,
Member.

CHARLES PORTER,
Member.

G. A. TURNER,
Member.

REPORT BY DR. GREGORY

ON THE

FUTURE CONTROL OF THE HEALTH OF MINE WORKERS AND MINE SANITATION ON THE WITWATERSRAND.

May it please Your Excellency,—

1. It is with regret that I find myself in the position of having to submit a Minority Report on the Future Control of the Health of Mine Workers and Mine Sanitation on the Witwatersrand.

2. In paragraphs 367 to 380 of the Main Report, Drs. Porter and Turner have set forth their views on this subject, and it appears that these have received the approval of Dr. Te Water. None of these paragraphs, nor their subject matter, have been considered or voted on by the Commission as a body, they having been introduced into the Report subsequently to the final sitting of the Commission. As indicated in paragraph 367, they were inserted at the last moment for the purpose of combating my proposals as to the future control of Mines Sanitation and Health. From the point of view of the necessity and feasibility of those proposals, the fact that it is deemed necessary by these Commissioners to vigorously assail them has in it an element of satisfaction.

It is, however, distasteful to have to criticise the views of one's fellow Commismissioners. It is still more distasteful to be compelled to criticise their actions in their official capacities, not as Commissioners. Yet in the present instance, in order to do justice to the case for improved mine health supervision, th's becomes inevitable, inasmuch as two of them hold posts which identify them intimately with the existing system of control; one being Medical Officer of Health to the Johannesburg Municipality, and the other Medical Adviser to the Witwatersrand Native Labour Association, which body deals with the bulk of the native labour employed on the mines.

Also the first mentioned has been largely responsible for the creation of the present undesirable system,—as I consider it to be,—and, indeed has been actively engaged in perpetuating it, both administratively and legislatively, since the Commission began its inquiry.

3. It may perhaps be here not out of place to mention that the inconvenience, resulting from members of the Commission being called upon to sit in judgment upon their own official activities, manifested itself early in the course of the inquiry into the health of mines, rendering it so difficult to pursue it satisfactorily that twice I deemed it best to resign from the Commission, but on each occasion I was asked by the Minister to withdraw my resignation, which I did.

4. That the conservation of the health of workers, both European and native, on the Gold Mines of the Witwatersrand, has not been in the past satisfactorily effected, is demonstrated by the amount of adverse comment, and the number of commissions and inquires which the subject has evoked during the past few years.

In paragraph 375 of the Main Report, Drs. Porter and Turner claim that the existing system, or as it is there termed "the Johannesburg System," has worked well in the past. Yet if this be so, it seems difficult to account for the necessity for the large number of recommendations concerning improvements to which they have set their names in the Report. But as a matter of fact the system has not worked well, and cannot be expected to ever work well.

Indeed, the very arguments advanced on behalf of this so-called system by its advocates in paragraphs 374 and 375 of the Main Report clearly indicate, although not to the full extent, the clashing and overlapping that results from the present multiple control, and the personal efforts that have to be made by the officials to avoid it.

5. There has, of course, been some improvement in the health of mine workers during recent years, but not as a result of this so-called system, but from other causes, and mainly as a consequence of outraged public opinion, which has become justly alarmed at the prevalence of Miners' Phthisis among Europeans, and at the terrible mortality from disease occurring among the native mine workers.

6. In fairness we must admit that in connection with the gold mining industry of the Rand there have been many conditions to be met, which are perculiar to it and have no counterpart elsewhere, so that often new methods and fresh standards have had to be devised to suit them, and this could only be accomplished gradually and as the result of accumulated experience. But while giving full recognition to the just-

ness of such a contention, the fact still remains that improvement has been unnecessarily slow, and that the institution of many obvious measures of reform required for the protection of the health of the mine worker, have been delayed or neglected, so that at the present time, as shown in this Report, there are still many directions in which improvement is necessary and is easily possible.

Indeed any impartial observer must admit that much of the amelioration that has been effected of recent years has resulted from the stimulus imparted by public opinion. But for this, who can doubt that at the present moment Tropical Natives would be still being brought on to the mines to die at the enormous rates that have shown to have occurred in the Main Report. (See Paragraph 350.)

7. The causes of this state of things are not far to seek. The fundamental ground upon which the gold mining industry rests is purely commercial, its main concern being that of securing an adequate return upon invested capital, and, if the industry is to exist at all, it is the proper duty of those responsible for it to make it pay. Hence with Mine Managements we must expect that questions of health will ordinarily take second place to those of economy.

8. Moreover, the control of the industry has been in the hands mainly of corporate bodies, and it is a recognised fact that persons will do things in a corporate capacity from which they would shrink as individuals in a private capacity. The corporate body may have a head, but it rarely has a heart, and when it does exercise the more human virtues, this is generally as the result of the personal advocacy and effort of some more conscious member of the body.

9. Under these circumstances it is evident that if the taking of adequate steps for safeguarding the lives and health of the mine workers is to be secured, the responsibility and power of doing so must be placed in the hands of some outside independent and supreme authority. In such a case the authority must be that of the Government itself.

10. The gold mining industry, and indeed all mining, is essentially a National one. It deals with the natural resources of the nation, and in a country situated as is South Africa, its successful prosecution must be of the highest national importance.

11. But apart from this basal consideration, it happens to be in South Africa the one industry which employs by far the largest amount of labour, and especially of native labour. It concentrates to its use large masses of natives, and under conditions that have no parallel elsewhere in the Union. It is vitally affecting the health and well-being of the native races to an extent to which no other industry in the Union is capable; and, as has been shewn in the course of the Main Report, this effect has been almost entirely for the worse. In every year many thousands of natives come up to the mines healthy, of whom in the course of a few months many die and many are sent back diseased to their kraals. It is safe to say that work on the mines is effecting a greater revolution in the health, habits and thought of the native, than would have occurred under ordinary circumstances in many generations. Changes, therefore, which begin on the mines do not end there, but have far reaching consequences throughout the Union.

12. Of all undertakings, therefore, the mining industry requires the firm and judicious control of Government, and in no direction is this more essential than in safeguarding the health and lives of those engaged in it, and who, individually or by themselves, are powerless to accomplish their own protection.

Yet it is this most important national duty which the framers of the sections in the Main Report dealing with Mine Health Control, assert should continue to be left in the hands of the local authorities along the Reef; that is to six incoordinate municipalities, of whom, the framers themselves remark, in paragraph 376, "But the only municipality which has hitherto exercised active jurisdiction over mine health and sanitation is that of Johannesburg." As this is the net result of ten or eleven years experience it is more than astonishing that the continuation of such a condition of inefficiency should be advocated while human life continues to be sacrificed on account of it.

13. At the present time, however, the Local Authority is not the sole, nor even the most important authority dealing with mine health and sanitation, and indeed it is impossible that it can ever be so. The control at present is spread over a number of independent and overlapping authorities, whose measure of supervision has in each case grown up as a consequence of its own particular functions.

14. In the first place there is the Department of Mines, which concerns itself mainly with mine sanitation underground, but not entirely so, as it also deals with the living quarters of mine employees. It derives its power for this under the "Mines and Works Act, 1911."

15. Secondly there is the Department of Native Affairs, which, through the medium of the Director of Native labour, undertakes the duty of supervising the

health and well-being of the Native employees of the mines, under powers conferred by the " Native Labour Regulation Act, 1911," and Regulations framed under it.

It may be here mentioned, as showing the chaotic state of things, that these Regulations provide for the appointment of a " Medical Officer," who is charged with certain duties under them. There is a Government Medical Inspector of Mines who is the medical officer under these Regulations, except in the Johannesburg Municipality, where, in order to prevent friction with the municipal administration, Dr. Porter, the Medical Officer of Health for the Municipality, has, I understand, been appointed personally to the office, to the exclusion of the Government's own official.

16. Thirdly there is the Department of the Interior, which being charged with the duty generally of watching over and safeguarding the Public Health throughout the Union, and of administering those special laws relating to the subject, exercises a general supervision over the health of everyone and everything within mining areas both above and below ground.

17. Fourthly we have the local authorities. There are six municipalities along the line of Reef, and nearly every mine is situated partly or entirely within the area of some one of these municipalities. Some are situated within the area of more than one municipality.

Until recently the extent of the jurisdiction of the municipalities was confined to matters on the surface, and even to this extent their powers were doubtful, but in the year 1912, the Transvaal " Local Government Ordinance, 1912 " was passed, which, under Section 180, gave to local authorities, subject to the authority of the Administrator and with certain reservations as to authority of the Union Government, control over both the surface and underground sanitation of mines.

There is, however, a very important proviso to this section, contained in its sub-section (4), which has the effect of removing the curb of the Administrator and the Union Government from the local authority in the exercise by it of these powers, and to render it independent of government control.

18. As originally introduced into the Provincial Council, the draft of this measure did not contain this provisio, but while the Bill was being considered by the Select Committee of the Provincial Council, to which it had been referred for report, the Municipality of Johannesburg, represented by its Medical Officer of Health, appeared before this Committee and put forward the said sub-section (4), containing this proviso, in order to remove the Municipality from the operation of the restraints contained in the Bill.

19. The evidence given by Dr. Porter before this Committee in support of the introduction into the Bill of this proviso, is interesting, as shewing the autocratic views of the Municipality in regard to this subject.*

The witness stated that Johannesburg Municipality was the first authority. *Municipal or Government in the world* to appoint Mine Sanitation Inspectors. (Q. 6574.)

That it was absolutely the pioneer. (Q. 6575.)

That, as regards Johannesburg, there was no reason why there should be any change. (Q. 6576.)

That it would mean the interference of the Administrator as the Provincial Authority, and of the Public Health Department of the Union, as the Union Authority, with the work which has hitherto been done to the satisfaction of all parties by the Municipal Council. And that the Council's Officials know far more about it than anybody else in the country. (Q. 6577.)

Dr. Porter did not wish to criticise the Government, but he claimed to have had more experience than anybody else in regard to the working of mine sanitation inspection here, because nobody else has had mine sanitation inspection work to do. (Q. 6587.)

In my experience, and I have been a good deal both of surface and underground sanitation, it is the underground sanitation that requires special attention, as far as I am aware there is no other district but Johannesburg that has attempted that. Quite recently they made some appointment in England. (Q. 6608.)

He had no experience of England, but he did not think anybody else has either, because there has been none up till quite recently. (Q. 6609).

He had never had any prosecutions at all, and he never had had any reason for one all the time (eight years). (Q. 6581).

His representations regarding sanitary defects on the mines had always been acceded to. It was one of the most striking things in his fairly long sanitary experience. (Q. 6582).

*The evidence will be found in the Minutes of Evidence of the Local Government Committee of the Transvaal Provincial Council, 14th August, 1911. (Questions 6572 to 6629.)
In the original Bill, Section *one hundred and eighty* bore the number 175.

On the whole, compound managers welcome the inspector, and give us the greatest assistance. "I can assure you that this mining sanitation work is one of the pleasantest parts of my work, because of the co-operation of the mining people". (Q. 6595).

He had two inspectors on the mines. He had one man who was the very best sanitary inspector he had ever met. This man gets on splendidly. The working is done most harmoniously and beneficially. (Q. 6588).

The inspector can go along through all his mines in three months probably.* (Q. 6593).

20. However, it is scarcely necessary to quote further from this evidence, of which there is much more of the same kind. It appears to reflect a condition of mental exhaltation that pictures the mining world as the best of all possible worlds, and Johannesburg inspectors and mine managements as being something more than human.

21. But this Local Government Ordinance has had another effect besides that of widening the powers of the Local Authorities over mine sanitation, for it has conferred somewhat wide statutory powers on the Administrator in connection with this subject, through his control of the local authorities. The Administrator, however, is entirely independent of the Government, and it is difficult to see how he is to keep himself in touch with mining policy and requirements.

22. The position of the Mine Manager under this multiplicity of incoordinate and often conflicting authority is one of difficulty, and it would not be surprising, with so many authorities to answer to, if he tried to evade them all.

23. In paragraphs 373, 374 and 375 of the Main Report, it has been sought to shew that this multiplicity of control does not result in friction or inefficiency. There can be no doubt, however, that both friction and inefficiency has resulted, and that where friction has been avoided, this has only been due to two circumstances, namely to the personal efforts of the officers themselves, not to collide with one another, or to the fact that the work of administrative control has been evaded.

24. But the advocates of the present system have to admit the necessity for administrative adjustments in order to prevent friction. In paragraph 372 of the Report it is described how, within the Municipality of Johannesburg, the jurisdiction of the Government Medical Inspector of Mines has been abolished, and the work delegated to the Medical Officer of Health for the Municipality.

In paragraph 374, an account is given of how it had been agreed that the Sanitary Inspectors of the Johannesburg Municipality should be instructed to work under the Government Mining Engineer, and not directly under the Municipal Medical Officer of Health, in order "to avoid overlapping and possible friction."

It is stated in the same paragraph that in regard to plans of Native Housing Accommodation, they have to be submitted by Mine Managements both to the Native Affairs Department and to the Municipality, to satisfy both the Government and the Town Engineer, and it is admitted that the municipal Bye-laws and the Government Regulations require different standards, but that if inconvenience or conflict occurs in practice, then it is open to the Governor-General by proclamation in the *Gazette* to suspend in respect of any mine the operation of any such Bye-law.

It is also stated that the Government Inspectors of the Native Affairs Department, taking cognizance of insanitary conditions in connection with the mine native compounds occasioned inconvenience, and that in consequence and "to eliminate any overlapping," they are now required, as far as Johannesburg is concerned, to make representations on such matters to the Medical Officer of Health to the Municipality, and not to the Mine Management.

In this connection, one of the senior inspectors of the Native Affairs Department gave evidence before the Commission as to the inconvenience of this method. He referred to the disagreements which resulted from this dual control and gave instances where most insanitary compounds, against the continuation of which he had reported, had been referred to the Medical Officer of Health for Johannesburg, who had refused to condemn them. Two of these compounds were inspected by the Commission and found to be of a disgraceful character, and immediately after our inspection the Medical Officer of Health reversed his previously written verdict regarding one of them and ordered its entire reconstruction, thus perpetrating a complete *volte-face*. It is not worth while entering into the details of this business, but it disclosed the most extraordinary difference of opinion regarding the condition of buildings, which even the mine officials themselves admitted were not fit for habitation. (Questions 47,971—48,073).

* In his evidence befor the Commission, Mr. Alexander Cowie, the Inspector above referred to, stated that the area to be supervised was about thirty square miles, about ten miles long, and comprised about thirty mines, and that a thorough inspection of either the underground or surface conditions was not made oftener than once in six months. At this time there were three inspectors. (Questions 50625—50636).

25. But even between the Municipalities themselves there occurs inconvenience, owing to some mines being situated in more than one municipal area. Mr. Alexander Cowie in his evidence before the Commission instanced several of these cases in connection with the Johannesburg Municipal Area. He also related an outbreak of Enteric Fever which occurred in the compound of a mine in the Johannesburg area, but was traced to the underground conditions of the mine itself, which is in the Germiston area, and the Johannesburg officials had to pass out of their district into that of another local authority in order to investigate it.

26. Also between the several Government Departments there is evidence of inco-ordination. And this was particularly displayed in the evidence given by Dr. S. van Niekerk, the Medical Inspector of Mines, regarding the nature of his duties and responsibilities.

27. But the fact that there are so many different authorities dealing with the supervision of the health of mine workers and the control of mine sanitation, is in itself evidence of the number of different and sometimes conflicting interests involved in the matter, and this becomes one of the strongest arguments for the institution of one responsible guiding authority, which, while combining and having due regard for all interests, but not unduly favouring any, will be capable of efficiently protecting the health of mine workers.

A Mines Board of Health.

28. In my opinion, this can only be attained by the establishment of a properly constituted Board of Health, on which the several interests involved are adequately represented. Such a Board could speak and act with the undivided authority, which none of the present authorities can possibly hope to exercise. Such a Board would be in a position to consider every side of a question before coming to a decision, and, inasmuch as its judgment would be presumably based on a just consideration of all interests, each of which would be represented by its members, its actions could hardly be objected to by any separate individual interest.

Also from the mere standpoint of public policy, the existence of such a body should create public confidence where there is now often doubt, if not distrust, and would relieve the Government of many difficulties which at present beset its administration of this matter.

Its Constitution.

29. With regard to its composition, I would suggest the following :—

(*a*) The Medical Officer of Health for the Union, as representing the Department of the Interior.

(*b*) The Government Mining Engineer, as representing the Department of Mines.

(*c*) The Director of Native Labour, as representing the Department of Native Affairs.

(*d*) A representative nominated by the municipalities along the reef, and failing such nomination by them being made, then a representative of their interests to be nominated by the Administrator of the Transvaal.

(*e*) A representative to be nominated by the Chamber of Mines.

(*f*) A representative nominated by the Association of Mine Managers.

(*g*) A representative of the European mine employees, to be elected by ballot of all such employees actually employed on any mine within the jurisdiction of the Board on the last day of the month preceding the date of such election.

(The coloured workers will be represented by the Native Affairs Representative).

(*h*) A Permanent Chairman, to be appointed by the Governor-General, and to retain office during the Governor-General's pleasure. He should be an officer of the Civil Service of the Union, and should hold the rank of a Head of a Department. He should be a firm, capable and tried administrator. It would probably be better if he were not a professional man. He should represent the Board in all matters, and, subject to Regulations, be its chief executive officer.

Functions of the Board.

It should be the duty of the Board to take cognizance of, and supervise everything affecting the health of mine workers, both above and below ground.

The matters falling under the Board would thus include all underground conditions affecting health; including ventilation; dust; sanitation; etc. And above-ground would comprise all questions affecting the healthiness and sanitation of compounds; feeding arrangements; change houses; medical treatment

and mine hospitals; disinfection; etc. But, of course, the duty of carrying out proper measures for securing proper health conditions and sanitation, would still remain, as at present, entirely the duty and responsibility of the mine owners, the function of the Board being merely to see that such measures are carried out, and to enforce them in the event of the default of the mine owners.

The Board, however, would in no way interfere with or have concurrent jurisdiction with any local authority in regard to any mine buildings occupied as residences, or boarding-houses, or the like, nor over stores, Kaffir eating-houses or any trade or business carried on independently of the mines. Over these ordinary matters the municipalities would exercise their ordinary functions, nor would in any way be relieved of their duties in these respects.

Nor would the Board have any demarcated *area* of jurisdiction. It would deal with particular *things*, not particular *areas*; so that the limits of the municipalities would remain unaltered, and there would be no question (as it is stated in Paragraph 379 of the Main Report, would be the case), of "the proposal involving nothing less than the cutting out of a continuous zone through the very heart of the districts of the various local authorities, and, by placing that zone under the jurisdiction of a special and possibly costly Board of Health, the creation of an *imperium in imperio*."

The municipalities would still remain intact; Johannesburg would still retain its *imperium*; the same property would still be rateable by them; and their officers would still have the right of entry into any premises to which they at present have the right of entry for purposes of inspection.

The only difference would be that the municipalities would no longer directly control certain matters on mining property, and any municipal bye-laws at present affecting such matters on such property would no longer apply.

On the other hand, such sanitary services, including a nightsoil removal and drainage, as are afforded to other ratepayers of the municipality, would continue to be available to mine managements, under such changes and such rules as apply within the area to such services.

For the purpose of carrying out its functions, the Board would have authority to exercise any powers conferred under any law on any officer of the Government for the protection of mine workers, and it should be empowered to frame, with the sanction of the Governor-General, all necessary regulations, not inconsistent with the provisions of any law at the time being in force.

The Governor-General should have power to repeal or alter any existing regulations of the Board, with or without its concurrence, and to prescribe rules for the guidance of the Board in the carrying out of its duties.

30. The Board should be in touch with the Government of the Union by means of the Minister of the Interior, through whose Department all communications between the Government and the Board should pass. Any act or decision of the Board should be open to appeal by any person or body affected thereby, to the Minister of the Interior, who should, after due enquiry, and after consultation with the Board, have the power to alter or annul any such action or decision; provided that the Minister shall state in writing to the Board his reasons for so doing.

At the close of each calendar year, the Board should report fully on its operations during the year to the Governor-General, and such report should be presented to the session of Parliament next ensuing.

31. The Board should have power to appoint and remove, with the approval of the Minister of the Interior, a mines medical officer, and such other technical officers, assistants, and inspectors, together with such clerical staff as may be necessary for the proper carrying out of its duties.

Initiating Research.

32. One of the functions, and not the least important, of the Board, should be that of initiating systematic research into questions affecting the health of mine employees. The decision as to exactly what are the best measures to adopt for the protection of health, is a difficult one, and this difficulty has been recognised in the past by the appointment of numbers of Commissions and enquiries, apparently in the expectation of their being able to settle once and for all the matter at issue.

Thus, to mention a few: The Coloured Labourers Health Commission 1903-1905; the Miners' Phthisis Commission in 1902-1903; the Mining by Single Outlet 1906-1907; the Mining Regulations Commission 1907-1910; the Second Miners' Phthisis Commission 1911-1912; and the Miners' Phthisis Prevention Committee now sitting. But such Commissions and Enquiries never can be finite on such a subject as the present one, which is in a constant condition of flux, and regarding

which it is difficult even to formulate final principles, much less lay down fixed measures.

One of the most serious aspects in the case of such limited and incomplete enquiries, as have been held in the past, is that they have recommended reforms, which when adopted, have cost large sums of money, only to be found later on to have been ineffective.

Financial Arrangements.

33. The financial requirements of the Board should be provided by the mine owners. There would seem to be no reason why this service should be defrayed out of the public chest. Funds might be obtained by means of an annual rate levied on the authority of the Minister uniformly on the value of mine property. In order, however, to bring the Board under proper financial control, this rate should be paid into the Union Treasury, and the annual expenditure of the Board should be voted by Parliament on the Estimates; the receipts to the votes being set against the parliamentary provision in the usual manner. This would ensure proper control, and the exercise of economy. It would have to be understood, however, that the rate levied should not be such as to yield any considerable surplus to the General Revenue of the Union.

Alternatively, the Board should be empowered to levy for itself rates within defined limits, and subject to the sanction of the Minister. It would then have to meet its expenditure out of the proceeds of such rates, Parliament or the General Revenue not being responsible for the Board's expenditure.

Precedents.

34. The principle involved in the constitution of such a Board is already familiar to legislative and administrative procedure of the Union, although not entirely in the form now suggested. There are a number of existing boards, each having control or partial control in matters of State administration, which are so well known that we need not here allude to them; but in the domain of public health there also already exists within the Union two Boards, which in principle are very analogous to that at present proposed. These are, the Kimberley Board of Health, which, so far as the prevention of all infectious disease is concerned, exercises jurisdiction over the Kimberley Mines and surrounding areas. This Board being constituted of Government and mining representatives, and obtaining its revenue from mine rating, and exercising jurisdiction, to the exclusion of municipalities and other local authorities, over the mining area and surrounding district.

Again, in the Indian Immigration Board of Natal, we have a Board consisting of representatives of the employers of Indian labour with a Government representative, the Protector of Indian Immigrants, charged with the duty of looking after the health and medical care of indentured and free Indian labourers, and obtaining its revenue for this purpose from the employers of such labour.

In making the above suggestion, I have had in view only the case of the Gold Mines of the Witwatersrand, with, perhaps, the Premier Diamond Mine, but the area of the jurisdiction of such a Board might well be extended so as to include the coal mines and possibly the other mines of the Transvaal.

I am convinced that unless some such combined authority be established, the health of mine employees on the Rand Mines cannot possibly be placed on a sound and effective basis.

Recommendations for the improvement of Conditions affecting the Health of Mine Native Labourers.

35. I now propose to deal with some of the matters which I am of opinion require the attention of the authorities, if the health of mine native employees is to be improved, and the present severe wastage from sickness and mortality is to be reduced.

In Chapter IX. of the Main Report the type and course of Tuberculosis in the native, and the effect of environment and strain in the production of this disease were discussed; and in Chapter XIII. a large amount of statistical evidence was given, demonstraing the actual effect of adverse environment and of overstrain in the production of Tuberculosis, Pneumonia, and other forms of disease in mine workers, and we saw that in the case of the diamond mines this found its greatest effect in underground mining, and in the case of the coal mines in excessive hours of labour.

In the case of the gold mines it is not possible to demonstrate the effect of underground as compared with surface work, because no separate statistics are available in respect of these two classes of workers, although we may be sure that the very high mortality and sickness occurring among native labourers on the Witwatersrand Mines is mainly caused by the adverse conditions of underground work. Indeed, among these mines it is demonstrable that there is a larger proportion of disease among the workers on the deep level as compared with the outcrop mines, resulting from the severe conditions generally existing on the deep level mines.

Broadly there are three sets of conditions which have to be considered when dealing with the health of native mine workers.

Firstly, there are those comprised in the personal factor of the native himself, such as his general physical development and constitutional power of withstanding adverse environment and the effect of strain, and the degree to which he has acquired a previous immunity to Tuberculosis, Pneumonia, and other infective diseases. This is illustrated in the bulk or aggregate by the tribal differences, displayed with extraordinary constancy, in the comparative amount of sickness and disease occurring among different tribes employed on the mines, from the Zulu and Cape Province native at one end of the scale to the Tropical native at the other.

Secondly, there are all these conditions directly affecting the general health of the native and his powers of resistence to disease, which may be summed up in the term "environment and undue strain," to which we have just alluded.

And thirdly, there are those conditions which result in the introduction and dissemination of the infection of such diseases as Tuberculosis, Pneumonia, Cerebro-spinal meningitis, Enteric Fever, and the like. These conditions include: (*a*) The introduction of actual cases of infectious disease into the compounds and mines, and among these are especially cases of Tuberculosis; (*b*) conditions favouring the retention and diffusion of infection when introduced into compound or mine, and especially with the former; and (*c*) overcrowding and other conditions which bring the healthy into close contract with infection, either already existing free, or being given off by an individual in an infectious condition.

The place of Infection; whether Compound or Mine.

36. It is probable that the chief place of infection is in the compound hut. Possibly it occurs also in the mine, but of this we have no evidence, and compared with the opportunities for infection existing in the huts, those underground are probably small. But with regard to the capacity of the mine for harbouring infection, we have at present practically no information. Reference has been made in the Main Report to the probability of the acid mine water being germicidal to pathogenic organisms, but even so, only a small proportion of tubercle and other infection deposited by workers underground (and there must be a considerable amount of such infection), would be likely to come into contact with such water, while on the other hand, the warmth, moisture and darkness of the mine would be favourable to the continued vitality of such organisms. Mine timbers rot rapidly, and the amount of fungus seen underground is evidence of the suitability of underground mine conditions to the growth of some organisms.

The question as to how far and under what conditions the tubercle bacillus is capable of surviving in mine workings is deserving of investigation by the Institute of Medical Research.

37. In discussing some of the matters affecting the health of mine native labourers, which I consider are in need of attention, I propose to take them in the following orders:—

(*a*) Those relating directly to the native himself; his selection for the particular class of work, and the prevention of injurious overstrain;
(*b*) Those relating to mine or underground conditions, and
(*c*) Those relating to compound conditions, including the housing and feeding of the native and his medical treatment.

(A.) Matters relating to the Native himself.

Better selection of Mine Boys required.

38. Much greater care should be exercised in order on the one hand to prevent the admission to work on the mines of any native who is suffering from Tuberculosis in any degree, or who, by reason of inferior physique or of impaired health,

is liable to acquire Tuberculosis, or to contract disease, or to break down in health; and on the other hand, to effect the prompt discovery and repatriation of early cases of Tuberculosis or of other disease. To this end more thorough and frequent medical examination of the native should be undertaken at different stages of his recruitment for employment on the mines.

Medical Examination of Natives before granting Travelling Pass to proceed to Labour Centres.

39. A suitable medical examination should be made in the Native Territories, native districts and other native areas before any native is granted his travelling pass. This should apply to all natives going to any industrial centre, and not merely to those going for work on the mines. Those found suffering from Tuberculosis or other infectious disease should be refused permission to leave, while those who are deemed to be unfit for mine work (or other specified class of work) should have their passes so endorsed, and should thereupon be ineligible for such employment. The subject of this recommendation has been more fully discussed elsewhere in the Main Report. See paragraph 209 of Main Report.

More searching Medical Examination required at Labour Bureau.

40. At the present time a medical examination is conducted at the Government Labour Bureau and Pass Offices on the Witwatersrand before recruits are passed on to the mines.

The proportion of rejections varies according to the tribe, and to some extent according to the general views as to standard of fitness for mine work held by the examining medical officer.

At the Government Native Labour Bureau at Germiston, through which the bulk of the natives recruited for the mines pass (other than Tropical and East Coast natives), the following were the numbers and percentages of rejections for the years 1911, 1912 and 1913, given in respect of each tribe:

Territory.	1911.			1912.			1913.		
	Number of Recruits.	Number of Rejects.	Percentage of Rejects	Number of Recruits.	Number of Rejects.	Percentage of Rejects	Number of Recruits.	Number of Rejects.	Percentage of Rejects
East Coast	3,993	69	1·7	4,531	111	2·4	4,056	90	2·2
Basutoland	6,672	160	2·4	8,239	189	2·3	6,980	338	4·8
Bechuanaland	1,332	57	4·3	1,936	117	6·0	2,476	352	14·2
Cape Province	61,148	1,085	1·8	74,004	2,016	2·7	63,764	2,135	3·3
Natal and Zululand	11,649	266	2·3	9,167	219	2·4	7,179	298	4·2
Swaziland	3,372	21	0·6	4,162	49	1·2	3,604	107	3·0
Transvaal	8,120	183	2·3	6,014	359	6·0	4,859	381	7·8
Southern Rhodesia	1,179	15	1·3	1,376	1	0·1	892	3	0·3
Others	192	3	1·5	152	0	0·0	132	0	0·0
Total	97,657	1,859	1·9	109,581	3,061	2·8	93,942	3,704	3·9

41. It will be observed that the proportion of rejections has been steadily increasing for all tribes (except the few Southern Rhodesia and "others"), and that over the entire number of recruits, it has doubled between the years 1911 and 1913. This, like the increase in the proportion of repatriations, must be kept in mind when comparing the health of mine natives year by year. That greater stringency is being exercised in the weeding out of the unfit before passing recruits to the mines is a satisfactory feature.

These rejections were mainly in respect of underground work. As a matter of fact, in 1913, 42 per cent. of the rejects were registered for surface work on the mines, and 13 per cent. were released on six-day passes to look for work elsewhere.

With regard to the causes of rejections from the 1st January, 1911, to the 31st October, 1912, there were 3,554 rejects at this office, classified as follows:—

	Number.	*Percentage of total rejects.*
Tuberculosis	131	3·7
"Weak Lungs"	641	18·0
Heart disease	284	8·0
Defective vision	704	19·8
Deformities	1,098	30·9
General unfitness	390	11·0
Other causes	306	8·6
	3,554	100·0

Many of these natives, although rejected for work on the mines, are given passes to look for work elsewhere.

At the Witwatersrand Native Labour Compound the following were the number of rejections:—

	Tropicals.	*East Coast.*
1910	82	60
1911	536	132
1912	614	117

This increasing percentage of rejections is itself evidence that in the past an insufficient degree of weeding out has taken place. I am of opinion, however, that there is still room for greater stringency in the carrying out of this examination, and that a considerably higher standard of physical development and fitness should be required before boys are certified to be capable for underground work.

Periodical Examination of Native Mine Labourers for the detection of Disease or Unfitness.

42. The following figures obtained from a consideration of all the cases of Tuberculosis and Pneumonia consecutively occurring on some twenty-two gold mines, selected at random, shows the average duration of employment on these mines before declaring sick with these diseases:—

	Tropical.		East Coast.		Basuto.		Transvaal.	
	Deaths.	Repatriations.	Deaths.	Repatriations.	Deaths.	Repatriations.	Deaths.	Repatriations.
TUBERCULOSIS.								
Number of cases ...	122	178	259	346	11	9	52	67
Average number of days at work before declaring sick	271	203	722	402	165	94	349	265
Average number of days in hospital before death or repatriation	31	28	36	25	25	24	25	29
PNEUMONIA.								
Number of cases ...	497	32	444	58	21	3	83	10
Average number of days at work before declaring sick	155	199	411	231	121	71	169	173
Average number of days before death or repatriation	10	35	11	31	7	29	11	34

	Natal and Zululand.		Cape Province.		Others.	
	Deaths.	Repatriations.	Deaths.	Repatriations.	Deaths.	Repatriations.
TUBERCULOSIS.						
Number of cases	19	23	57	134	6	9
Average number of days at work before declaring sick	453	246	235	200	715	98
Average number of days in hospital before death or repatriation	31	31	35	27	27	21
PNEUMONIA.						
Number of cases	25	2	113	31	10	8
Average number of days at work before declaring sick	196	143	170	118	240	92
Average number of days before death or repatriation	14	33	10	33	11	26

With regard to Tuberculosis the feature of this table is the much greater average duration of employment before declaring sick, in those cases which *die*, as compared with those which are repatriated. This suggests that the tendency is for the disease to run a rapidly fatal course in those who have continued at work for a long time, but it may also be due to tuberculous natives being taken on for employment on the mines and rapidly breaking down.

In any case it emphasizes the need for the early discovery of all cases of Tuberculosis, and for rejecting them for employment or if already employed, for getting them off the mines. Another point is the shortness of the average stay in hospital before death supervened. This again indicates the necessity of instituting effective measures for the prompt discovery of early cases.

The figures would also seem to afford some indication that those tribes, like the tropical and Basuto, which are most prone to Tuberculosis, also develop the disease after a shorter stay on the mines than those which are less susceptible. But in this respect the figures are not altogether consistent, although this may be due to the error caused by too small numbers.

Regarding pneumonia the figures are incomplete as they do not show recoveries. In the case of Tuberculosis all *discovered* cases either die or are repatriated, but this is not so with pneumonia, as many such cases recover and return to work to complete their contract.

So far, however, as deaths and repatriations are concerned (which may be taken as representing the severer cases of pneumonia), the length of time under employment before attack is noteworthy, the average being five or six months, which is longer than is the general belief.

The average duration of the disease after declaring sick and before death appears to be only 10 to 11 days.

43. A periodical examination of all natives on mines should be undertaken for the purpose of promptly discovering early cases of Tuberculosis or of commencing ill-health. This can be best done as the boys return to the compound after completion of their day shift. It can be carried out by the European Hospital Superintendent or by a trained white hospital orderly. The temperature of each boy should be taken, and any who show an increase of temperature above the normal or who show any signs of departure from health, should be set aside for medical examination by the mine medical officer.

This examination should be carried out in each individual at least as often as every second month. With a little system it can be very expeditiously performed and by its means many of those cases of Tuberculosis should be discovered, which as we have seen at present continue at work until the disease is so far advanced, that when they do declare sick and go into the hospital they die within a few days or a month.

In this connection it is necessary to remember the objection which the average native has to going into hospital, their general idea being that if once they enter hospital it is only by a fluke that they come out alive. It cannot be doubted that at present a large proportion of cases of Tuberculosis are not discovered until far advanced, and that a still larger proportion are never discovered at all. This is indicated by the fact that out of 1,292 consecutive cases of Tuberculosis referred to in the above table, 40·7 per cent. died within an average of thirty-three days after admission to hospital and only 59·3 per cent. could be sufficiently patched up to repatriate to their homes—which some of them never reached.

All Natives before being discharged from Mine should be medically examined and condition reported.

44. Before being discharged from any mine, whether under repatriation on account of disease or physical unfitness, or as time-expired boys, every native should be subjected to medical examination and his condition reported as fit, or if not fit, then the nature of any disease he may be suffering from should be stated. Furthermore, as recommended in the Main Report (paragraph 460), if the boy is suffering from Tuberculosis or any infectious disease or is so disabled as to require looking after, the facts as to his condition, with particulars for identification of his headman and kraal should be communicated, in advance of his departure, to the Resident Magistrate of his district.

Classification of Mine Natives according to fitness for different kinds of work.

45. It seems essential that an attempt should be made to classify natives employed on the mines according to their fitness to perform different kinds of work. That is into those who are fitted to undertake the more arduous tasks under the more adverse and trying conditions, and those who are only suitable for employment on the least exacting kinds of work.

All mine boys are, as a routine measure, contracted to perform underground work, although to some extent on arrival on the mine the boy is allowed himself to select his kind of work, whether drilling, tramming or lashing, but probably in the majority of instances the management assigns to him his particular work, having some regard, however, to keeping him with his "brothers."

Especially does the management decide the matter in the case of those boys who for any reason are found not to be drilling as many inches per day as are considered sufficient, in which case the boy, possibly a weakling, is taken from hammer work and put on to a simpler, but at the same time more arduous task, such as lashing, which means a continuous eight hours shift.

Again mine managers much prefer the docile steady-working tribe for underground jobs, but it is just these tribes which are usually the most susceptible to adverse conditions.

It has already been shown in the Report that statistics indicate that those tribes, the members of which show the greatest proportion of sickness and mortality, also display the greatest susceptibility to adverse conditions of environment and stress. Thus, for example, bad conditions will affect much more profoundly the Basuto than the Cape native, and the Tropical native than the Basuto.

Yet we find that the Tropical has been set to work under some of the most exacting conditions, instead of being reserved for the easy and least trying tasks.

It is clear, therefore, that some sort of classification both of individuals and broadly of tribes, in relation to the kinds of work they are to be employed on is necessary.

As far as Tropical natives are concerned, these as already recommended in Paragraph 351 of the Main Report should not be employed on the mines at all.

Duration of term of employment should be limited.

46. The question of the duration of the term of continuous employment of natives on the mines is one of very great importance. As to exactly what are the most advantageous limits to fix in each case, or as a rule, we have not sufficient data upon which to pronounce definitely. On the diamond mines the average stay is only three or four months. On the gold mines the Union native is recruited nominally for a term of six months, but actually to perform 180 shifts, which in practice takes about seven or seven and a half months to work off. The East Coast native is, and the Tropical native was, recruited for a period of twelve months, but the average stay of the East Coast is about seventeen months.

There are two main considerations affecting a judgment on this matter. The first is that pneumonia, and possibly some other conditions of ill-health, are generally considered to be more prevalent in the early part of the period of employment, and if so, this would seem to indicate that the boy has to adapt himself to his new environment and conditions of life on the mines, and that this he is not able to do all at once, but that he receives his equilibrium only by degrees. On the other hand, the effect of overstrain and exposure to adverse conditions is to some extent cumulative, so that while for a time and up to a certain point the native can react satisfactorily to the extra call made upon his powers, physical and constitutional, the moment in most cases sooner or later arrives when his capacity for compensation begins to fall short of the call made upon it, and he commences to flag and to go downhill.

Of the 1,292 consecutive cases of tuberculosis above-mentioned, the average duration of employment before declaring sick was 382 days; the period being longest among East Coast natives, the average of 605 cases being 540 days; while for 191 cases among Cape Province natives the average was only 211 days.

Of 1,367 cases of pneumonia occurring on the same mines during the same period, the average duration of employment before declaring sick with this disease, was 221 days. Here again the average for 502 cases among East Coast natives was 390 days, and for 144 Cape Province natives only 159 days.

Inasmuch as the average duration of the term of employment of all East Coast natives is about two and a half times that of all Cape Province natives, and as the incidence of both these diseases is very much greater in the East Coast than on the Cape Province native, it is possible, from the above figures that the liability to both tuberculosis and pneumonia increases with the duration of the employment.

It may be mentioned that the general idea that pneumonia is most frequent soon after arrival on the mines is based upon observations made on Tropical natives. It may, however, be that the latter on arrival possess no acquired immunity against this disease, while other tribes have already acquired a fair degree of immunity before reaching the mines, and that it is only when health becomes increasingly impaired by prolonged subjection to adverse conditions on the mines that resistance breaks down and the individual becomes receptive to infection.

With regard to silicosis this disease becomes increasingly prevalent with the extension of the term of employment, and hence it is very common among the East Coast natives.

The important question then is at what time does this turning point in the individual's powers of compensation and resistance to disease arrive. It doubtless differs for each person and for each set of circumstances, but for general working purposes, it should be possible to arrive at a fairly close approximation of an *optimum* limit which *continuous* employment on the mines should not on the average exceed.

Unfortunately there is not sufficient data available to enable such a limit to be fixed, but we recommend that very careful investigations be made into the question with the view to determining what is a safe limit to fix, having regard to all the conditions affecting different tribes.

On one point, however, there can be no doubt which is that the alternation of employment on the mines with periods of free and open life at the kraal is the salvation of the native labourer—not only on the mines, but also in other industrial employments, and it is therefore also of essential importance that the interval spent at the kraal should be sufficient to admit of adequate recuperation.

47. It is nearly certain that year by year there is an increasing number of boys returning to the mines who have worked there on some previous occasion or occasions. Unfortunately, figures are not available showing the extent to which this is taking place, except in the case of East Coast natives passing through the records of the Witwatersrand Native Labour Association, and here it is only known that they are "old boys," but not the number of times nor the aggregate length of time they have worked on the mines.

This matter is of importance because it may be presumed that the old boy is likely to be better salted against the effects of mine work than the newcomer. On the other hand, it must gradually tend to raise the average age of the boys employed on the mines, and if this becomes high, it would have the effect of lowering the average standard of health, also it would tend to the production of a greater proportion of silicosis, and possibly also of tuberculosis among them.

The following are the number of recruits of East Coast natives and the percentage proportion of old boys among them, each year, at the Witwatersrand Native Labour Association:—

	Number of Recruits.	*Percentage of old boys.*
1904	27,633	53·09
1905	38,469	56·91
1906	36,401	55·79
1907	41,134	64·54
1908	42,453	69·12
1909	39,969	63·02
1910	44,684	64·13
1911	40,894	67·61
1912	45,549	77·54
1913	35,569	65·54

So far for 1914 the proportion approximates to 77 per cent. This percentage is a surprisingly high and increasing one of old boys, and its extent must always be borne in mind when considering questions connected with the health of East Coast mine labourers.

Inasmuch as the adult recruitable population, between the ages of 18 and 40 years, of Inhambane, Gazaland and Lourenco Marques, is estimated (but very approximately) at only 180,000 natives, this percentage is likely to still further increase.

Therefore steps should be taken to regulate the duration both of employment and of the interval that must elapse before re-employment on the mines.

A reasonable amount of resting or "loafing" should be recognised as necessary.

48. Adequate opportunity should be given to native mine labourers to rest. At the present time overmuch importance appears to be placed by those responsible for mine control upon the daily percentage of efficients. By this is meant the percentage of those at labour and those not working out of the total number of natives in the service. Periodical returns are required by the controlling houses of each compound management showing weekly or monthly, as the case may be, the percentage of non-efficients and the grounds for their not being at work, *i.e.*, whether on account of sickness, accident, in gaol, absent or other cause. It thus becomes a matter of importance to compound managers, and to some extent a test of their administrative capacity, to have as small a percentage of avoidable ineffectives as possible.

Also on many mines the rule exists that every boy on the roll must be either at work or in hospital, and, as has already been mentioned, most natives have a great antipathy to going into hospital at all, and as they receive no pay unless actually at work, there is already a strong inducement for them to keep at work when they should be resting. It is therefore manifest that the operation of such a rule or even an excessive desire to maintain a high rate of efficients is likely to react detrimentally on the mine labourers' health.

Of course, in a large body of men there will always be habitual shirkers, and against these it is necessary for the mine to protect itself, but this can always be done by the simple practice of requiring every boy not working to obtain a "loafers' ticket" from the compound authorities. It being an instruction, however, that this should not be refused except in clear cases of shirking. Indeed, a reasonable daily percentage of resting boys should be recognised by mine managements as being a necessary and proper thing.

The limitation of the amount of work performed.

49. Another matter requiring attention is the limitation of tasks. The majority of boys come to the mines with the express purpose of earning as much money in as short a time as possible. Hence many of them are inclined both to work too hard and to spend too little of their earnings on additional articles of diet. In the past, mine managers have been only too ready to get as much work out of their boys as possible, although there have always been some who have recognised the fact that in the long run this is uneconomical, so that, while on one mine the management has been giving bonuses for extra work, on the adjoining property (in some cases under the same controlling house) the management has been discouraging it

We have seen the bad effects on the health of the worker of the performance of overtime on the Transvaal coal mines. Also at Kimberley it will be remembered that the mine management has had to set its face against the working of double shifts, which in spite of this still goes on to some extent. It therefore seems clear that the Government should take this matter into consideration and should issue a schedule defining the maximum extent of the task in respect of each kind of work, such as hand drilling, lashing, tramming ,etc., for which any boy's ticket may be marked for any one shift.

I am aware that this presents difficulties as that which may be an easy task for one boy is a severe one for another, also the conditions under which tasks are performed vary so greatly, especially those affecting drilling, but the mines have already set the minimum tasks which count for a shift, and it, therefore, should not be impossible to fix the maxima, especially if the Government Mine Inspector be given powers to vary the limits in particular cases.

(B.) Matters relating to Mine Conditions.

Hauling of Mine Labourers.

50. The practice of requiring native mine labourers to walk up out of the mine cannot be too strongly deprecated. This view is based not merely on theoretical grounds, but its bad effects can be easily observed. This was well seen by the Commission on the Robinson Company, where, at the conclusion of the day's shift, the boys were seen walking up from the thousand foot level. The condition of these boys on arriving on the surface was one of very marked physical distress. They were staggering, breathing rapidly and with obvious difficulty, with dilating nostrils, eyes staring, and pulse rapid and weak, and in some cases scarcely perceptible at the wrist. Compared with those boys who were being hauled at the same shaft, but from lower levels, the most casual observer could not fail to be struck by the marked difference in the physical condition between the two.

A boy brought to this extremity would not return to his normal condition for a long time, and certainly would not be in a fit state to consume his meal on arrival at the compound. During this time his normal resistance to the invasion of any infective disease, such as pneumonia, would be likely to be greatly impaired.

No boy should be required to walk up a greater distance than two levels, or more than a maximum of 400 feet, reckoned on the vertical, whether this is to the surface or to any other level to a hauling station. This should be embodied in a regulation applying to all mines.

Waiting in draught at Hauling Station.

51. Boys should not be required to wait at draughty hauling stations until hauled to the surface. In many cases the shaft, or the section of the shaft, used for hauling boys is a downcast shaft, and boys heated by work often have to wait for long periods at a station in a cold down-draught. At the Cinderella Deep, for example, I found eighteen boys, sitting waiting to be hauled, shivering in a very cold down-draught, at the bottom of the vertical shaft, to which they had had to climb from 600 to 800 feet on the incline, at the conclusion of their shift. These boys said they had been sitting there for some time. Some of them were tropicals. On the surface was a change-house erected in order to prevent them getting a chill on coming out of the mine.

All mines should be required to provide proper shelters at hauling stations for persons waiting to be hauled. This is a most necessary provision, especially at stations on down-cast shafts.

Waiting underground at conclusion of task.

52. Recognising that underground conditions are *per se*, inimical to health, it is clear that every mine boy, indeed every employee, should be required to spend no longer time underground than is absolutely necessary to complete his task. The shorter the time he is underground and the longer time he has in the sunlight on the surface ,the better will be his health, other things being the same.

It is recognised that it is not always easy to arrange for the hauling of every boy as soon as he has completed his task, for the reasons that they begin coming off shift at irregular intervals over a period of three or four hours, and that on many mines the gear does not admit of a quick change over from rock hauling to the hauling of boys. Nevertheless, there can be no doubt but that much better arrangements than at present exist can be made on many mines. It would appear that on some mines the hauling gear is inadequate, but in such cases the welfare of the mine worker should not be sacrificed to the necessity for hauling rock.

Work that can be done on the surface should not be done underground.

53. Work which can be done on the surface should not be done underground. This seems such an obvious rule that it should scarcely be necessary to state it, yet it does not seem to be recognised on some mines. For example, on the Crown Mines a large staff is constantly employed underground on the different levels, sharpening drills. This is carried on at many forges established on the 4th, 7th and 8th levels, No. 1 shaft; on the 10th, 11th, 12th and 13th levels, No. 3 shaft; on the 11th level, No. 6 shaft; on the 5th and 12th levels, No. 7 shaft; and on the 8th level, No. 8 shaft.

Apart from the injury to health of working under such conditions, it is safe to say that no worker can continuously perform as good work underground as on the surface, also to my observation it seemed that the heat and products of combustion were unnecessarily adding to the unhealthiness of underground conditions.

The performance of such work as this underground should be prohibited by the Government.

Carrying of Drills to the surface by Mine Labourers.

54. Boys should not be allowed to carry up their drills. At one mine out of which boys had to climb and were carrying their drills, I caused an average bundle to be weighed, and found it to scale thirty pounds. This is an unnecessary strain and waste of energy, and should be prohibited. Under the regulations the carrying of drills out of mines, except on a vertical ladder-way or steeply inclined shaft or winze is allowed. This regulation should be modified. I am aware that there are boys who bring them up voluntarily, as they like to keep their own drills.

This prohibition would, of course, not apply to the carrying of drills along the levels to the hauling station.

Change Houses.

55. Change houses on the surface in proximity to the shaft have been supplied for Tropical natives, and they are also required for European miners. It is strange that it should have been deemed unnecessary to supply them for other native workers. There can be no doubt, however, that they are necessary for *all* underground workers, especially during the cold season of the year. Every underground worker should be provided with the means, *immediately on reaching the surface*, of cooling off, washing, and of exchanging his wet mine clothes for dry, warm garments. For this purpose a blanket is not advisable as it flaps open and does not form sufficient protection against a cold wind when walking to the compound. Greatcoats should be provided, as in the case of Tropicals.

Improvements of underground conditions.

56. It would appear possible to improve in many directions the underground conditions, especially on some mines. Of course, one of the chief of these is the suppression of dust, but in as much as of late very considerable attention has been, and is being given to this subject, and as a special committee is engaged in its investigation, it is unnecessary to deal with it here. The question of dust in mines is obviously a matter which is capable of being satisfactorily dealt with, and it is equally obvious that it is absolutely necessary in the interests of the mine worker, that it should be effectually dealt with.

I am bound to say, however, that on going below ground I rarely found the dust-allaying appliances working efficiently. However, it is only fair to say that this was some time ago, and things may have improved since.

Medical Supervision of Underground Conditions.

57. At the present time there is practically no *medical* supervision of underground conditions affecting the health of mine workers, other than such rare and casual inspections as the one Government Medical Inspector is able to personally carry out. At present the Government medical supervision of all mines, not only in the Transvaal, but elsewhere, and both surface and underground, is provided for by the appointment of *one* Medical Inspector of Mines, stationed in Johannesburg, who has no assistants, and who holds in addition the important and onerous post of Chairman of the Commission, charged with the duty of examining and advising on all cases of miners' phthisis under the Miners' Phthisis Act. It is needless to say that it is a physical impossibility that any adequate health control can be exercised by such means over the sixty miles of mines along the Reef, leaving out of consideration all other questions. In saying this I desire it to be understood that there is no intention to reflect upon the capacity or work of the present holder of the office of Government Medical Inspector of Mines, who is a zealous, hard-working official.

The medical officers appointed by the Mines consider it to be no part of their duty to go underground; although, as a voluntary act, some of them do occasionally go through the workings in order to keep themselves in touch with the conditions. But as a rule their appointment is merely that of medical attendant upon the

native mine workers, and strictly speaking only comprises their medical treatment and medical examination, when required; although in the majority of cases these officers also keep an eye over the compound conditions and feeding, as affecting the health of the natives.

A number of mine medical officers were questioned on this matter in evidence and they all repudiated any responsibility in regard to underground health conditions, and expressed the view that such work should not be expected of them.

It should be explained that very few of the mine medical officers are whole-time officers, and the opinion was expressed that it would be unreasonable to expect of general practitioners that they should undertake special work of this kind for which they had neither the training nor the time. Besides which there is always a certain amount of risk incurred in going underground, against which they are not indemnified. The view was also expressed that this duty might bring the medical officer into conflict with the mine management, and that therefore it was essentially work that should be undertaken by an independent Government official.

So far as the health of natives in the compound is concerned, this is watched by the Inspectors of Natives, of the Native Affairs Department, but these gentlemen, although very zealous in the matter, have no professional training, besides which they are not supposed to go underground.

Recently the Transvaal Local Authorities Ordinance, 1912, has, as previously pointed out, conferred certain powers on the municipalities in respect of mines sanitary supervision, but, with the exception of the Johannesburg Municipality, little, if any, action appears to have been taken by them so far.

It is clear that the Government should establish a thorough and effective system of mines sanitary inspection and control by means of a sufficient staff of qualified medical inspectors, acting under an administrative head. This is essential if conditions affecting the health of the mine worker, both above and below ground, are to be properly controlled.

Supervision of the Health of Contractors' Natives.

There is another matter in connection with the Government supervision of the health of mine workers which may be here alluded to. On most of the mines a certain amount of work is let out to contractors. This is especially the case with work on the "dumps." It would appear that comparatively little supervision is exercised by the Government over the health of natives employed by such contractors. Both their housing and their feeding is far inferior to that required in respect of the ordinary mine boy.

Contractors' natives should be subjected to the same health supervision by the authorities as are those employed directly by the Companies. Especially should this apply to housing, feeding and the provision of proper medical care and treatment.

Blasting and the advantage of an interval between shifts.

59. Another matter which requires greater supervision is that of blasting. On several occasions when making an underground inspection, blasting was taking place on different levels long before the end of the shift or the time officially fixed as before which blasting is not supposed to commence. If this occurred during an official inspection, one could not help wondering what happens on ordinary occasions.

Not only should the rule be more stringently enforced of clearing the mine before starting blasting, but in my opinion the health of mine workers would be greatly benefited if a longer interval between shifts could be arranged for, so as to allow of the mine clearing itself and settling down after the blast. It is now recognised that the chief factor in dust distribution is the effect of blasting operations, and it is not the coarser dust which is so injurious, as the finer particles forming the "haze" in the mine atmosphere, and it is this which requires a long time to clear. There is little doubt that a single shift system in the twenty-four hours would go far to improve the health of mine workers.

Allusion may be here made to the action of the De Beers Mines Management in instituting the single shift in the case of the Kimberley mine, in order to counteract the unhealthy conditions connected with that mine.

Lighting of Mine Workings.

60. It is probable also that improvements in the health conditions of mines would result from better lighting of the underground workings by electric lamps. In the

absence of sunlight, bright electric lighting is the next best thing, and would, I am confident, have a strong physiological effect in promoting the well-being of the underground worker.

It might also be expected to reduce to some extent the accident rate.

Necessity for the provision of a proper supply of drinking water underground.

61. A safe and sufficient supply of drinking water should be provided for workers underground, and boys should be prevented from drinking mine water, or filling their water bottles therewith.

Wetting drill holes.

62. The practice in hand drilling of keeping the drill hole wet by squirting water out of the mouth is insanitary and should as far as possible be prevented. On the one hand it is dangerous to the performer, as the water may be polluted, while on the other it is quite possible, if he himself be diseased, that he spreads infection by this means.

The drill hole can be kept wet by other and simple means.

Underground sanitation

63. The present system of conservancy leaves much room for improvement. Under the circumstances I doubt if any other than the bucket system is feasible, but a larger number of latrines should be provided, and these should be placed nearer to the working faces. It should be possible to design a convenient portable form of latrine, which could be moved along as the work progresses. At present it is doubtful if any large proportion of the mine workers make use of the existing latrines, as to do so they must in many cases go considerable distances to reach them, and there are few natives who will do this.

The buckets should not be nearly so large, they should have closely fitting lids for removal and a special receptacle should be provided in which they should be stacked to bring them to the surface.

(C) Matters relating to Compound Conditions, including the Housing and Feeding of the Native and his Medical Treatment.

Dissemination of Infection. Reduction in size of Compound Huts necessary.

64. That the compound hut is the chief means of spreading infection there can be little doubt. All the conditions which we are accustomed to associate with the spread of infections exist to a high degree in the average compound hut. Pneumonia and Cerebro-spinal meningitis have attacked to a severe extent the tropical natives detained in the compound of the Witwatersrand Native Labour Association before they reached the mines. Equally there can be no doubt that the present large compounds with their large wards, often containing sixty or more inmates, are well calculated to result in widespread infection. Setting aside their unhealthiness due to more or less remediable defects, their great size is a fundamental fault. It needs no argument to show that if say sixty men are aggregated in one ward, there will be a ten times greater chance at any given moment of one of these sixty suffering from tuberculosis or pnemonia than there would be if there were only six men in the ward; and also that, given the occurence of such a case in a ward of sixty inmates, it would have the opportunity of infecting fifty-nine others, instead of only five in a six inmate ward.

Therefore one of the most essential things in compound improvement is the reduction of the size of the huts, so as to contain not more than six inmates each.

Native Locations instead of Native Compounds.

65. The reduction of the size of huts in compounds naturally suggests the possibility of adopting the native hut and the establishment of native locations instead of compounds.

The adoption of the native location in connection with the Rand mines has recently been strongly advocated, but it seems to me without a full appreciation of the difficulties involved in such a proposal. It has been suggested that Locations should be established in which the native mine worker should permanently live, with his wife and family, under ordinary native conditions.

No doubt, if this could be effected, so far as his manner of life is concerned, and without reference to other important considerations, this would be beneficial as regards his general health, but there are serious objections which cannot be overlooked.

In dealing with the Transvaal and Delagoa Bay Colliery, in paragraph 337 of the Main Report, the native location for mine workers on this Colliery was referred to. There appears to be no question that this location has proved a success, but there are reasons why this should be so which would not apply in the case of locations connected with the Rand Gold Mines.

This location was created very slowly, and under the personal—one might almost say paternal—care of Mr. Howard, the late General Manager of the Company. The inmates are nearly all of the same or allied tribes. It is located at a considerable distance from any urban area and its disturbing influences. Also the Company owns a very large tract of land, and is therefore able to give the hut owners the special advantage of allotments of arable land and to assist them with oxen in their ploughing.

At Pilgrim's Rest Gold Mines, which are situated far from any town, the native mine workers are also accommodated in collections of native huts established near the adits to the several mines. But here again there are special circumstances. The mine worker is not recruited, but is drawn from the surrounding kraals, whence he comes to work on and off for short periods. He does not bring his wife or family, but many of the wives come in and stay for a few days at a time.

But on some others of the Coal Mines visited by the Commission, such locations as existed were by no means satisfactory. Also those already existing in connection with some of the Rand Mines appear to be decidedly unsatisfactory, and seem to be chiefly notorious for their immorality and illicit liquor manufacturing.

But apart from locations connected with mines, the experience obtained from the Municipal Native Location is not of a kind to lead to any optimistic expectations as to the advantages of native locations along the Reef.

66. But setting aside general considerations, there are a number of reasons why Native Locations for mines along the Reef would not be likely to succeed. These may be summarised as follows:—

(1) From the health point of view it has a most serious objection in that it would mean that instead of the native working for only short periods at a time he would become more or less of a fixture, working continuously year after year. This no doubt will be commendable from the point of view of the mines, as it would ensure for them a continuous and constant supply of skilled labour; but it would be disastrous to the health of the labourer, by doing away with the intervals of Kraal life, to which allusion has already been made as being at present a most important factor in counteracting the effect of mine work.

(2) Every mine employs members of a great variety of tribes, and it is one of the difficulties of compound management to separate these so as to prevent tribal factions and fights. This difficulty would be likely to be enhanced in the case of mine locations.

(3) Most of the mines are in close relation to urban areas, and only in the case of a few of them would circumstances admit of establishing a native location under proper conditions as regards space, distance from large urban centres, and the setting aside of land for cultivation.

(4) On a number of the Rand mines small native locations already exist. Those that we have inspected have not impressed me as being satisfactory. I have been informed on good authority that they are a source of illicit liquor and are difficult to control.

(5) As the inhabitants of such locations would necessarily break away from their tribes, and few of them would ever return, especially of the women, such locations would have the undesirable effect of creating a large and increasing population of natives no longer under tribal control.

(6) The tendency would be, as at present is the case, for many of the women to become common prostitutes, while from the point of view of the children, it would be difficult to conceive of a worse set of surroundings in which to bring up the rising generation of natives.

Closed Compounds.

67. The closed compound, similar to those in operation on the diamond mines has been advocated for adoption of the Witwatersrand Gold Mines. The closed compound has much to recommend it, but there are two serious drawbacks to it on the Rand from the point of view of health. One of these is that the average mine compound on the reef is much too constricted and in many cases it would be difficult to obtain the space to enlarge it. The other objection is the comparatively long term of average employment on the gold mines as compared with the diamond mines. To confine a native within the narrow limits of a compound for eight, twelve or more months would be injurious to health.

Improvement in Compound huts.

68. What then should be done to improve the condition of the huts in Mine compounds and to improve mine compounds generally? In my opinion the following changes should be carried out :—

(1) Huts should be greatly reduced in size, in building new huts it should be made a rule that they should not be constructed to accommodate more than six men. And as far as possible all existing huts should be reconstructed or reduced so as to accommodate as near as possible a number not exceeding six.

I am aware that objection is made to small huts, on the ground that boys from the same kraal (or so-called "brothers") desire to be accommodated in the same room, but I do not think that such a consideration should be allowed to weigh against this change.

(2) The system of ventilation should be improved. In the Rand mine type of hut laid down by the Native Affairs Department, ventilation through inlets in the walls at the floor level and by louvres over the door, and outlets at the eaves and through louvres in the roof, are provided, But as a matter of fact these have been found to be too draughty, and the department has been compelled successively to authorise the closing up of those in the wall at the floor level, those over the doors and those in the eaves.

In my opinion the ventilation is defective, in that it is not made adaptable to the requirements at the time being, as regards temperature and extent and direction of wind. Under the regulations the huts were often over ventilated, under the later instructions they are insufficiently ventilated.

The means of ventilation should be ample and should be adjustable. An outside arrangement controlled only the compound authorities and not by the native himself, should be devised so as to admit of closing on the side of a prevailing cold wind, or one blowing in sand from the dump. It must, however, be so adjustable to obtain proper cross-ventilation.

(3) Floors should be of impermeable material, preferably granolithic, or some similar material (see paragraph 239 relating to pyrofyngont used in the Pretoria New Location), and sloping regularly from all directions to the door. In the majority of the huts which we inspected the floor was broken and in bad condition. Often full of holes and practically incapable of being kept clean.

(4) As a general rule most compound huts are insufficiently lighted, and few of them receive sufficient sunlight. There should be sufficient window-space of not less than one-tenth of floor area, but preferably more. The windows must be so arranged as to admit direct sunlight during at least two hours of daylight at all seasons of the year.

(5) Not less than forty square feet of floor-space, and preferably more, should be insisted on for each inmate, whether they be disposed in single or double tiers or bunks and not less than 300 cubic feet of air-space ; in calculating which, no height over 14 feet should be allowed to count.

(6) Double tiers of bunks should, whenever possible, be prohibited. If the minimum of forty-square feet of floor-space be insisted on, the inducement to economise space by this means should no longer exist.

The existing regulation under the Native Labour Regulation Act, 1911, prescribes no floor-space, but requires the provision of 200 cubic feet of air-space per inmate, and allows this to be calculated, when there are two tiers of bunks, to an average room height of 14 feet, which would allow for each inmate a floor-space of only 14.3 square feet, or an area of about 6 feet by 2 feet 4½ inches, which would be overcrowding to an aggravated degree.

And as the window area required by the regulations is calculated as one-tenth of the floor-space, each individual would receive less than one and a-half square feet of window space.

(7) The minimum height of any hut should not be less than 10 feet. If bunks are fitted there should be a space of at least two feet between the bottom of the bunk and the floor to admit of daily sweeping out beneath it.

If two tiers of bunks are allowed, then there should be at least five feet between their respective floors ; and the distance between the roof and the top of the bunk should be nowhere less than six feet.

In the arrangement of bunks, under no circumstances should they be placed side to side, so that whichever way the sleeper turns he has to inhale the breath of his neighbour ; but they should be placed end to end parallel with the wall.

The preferable plan from the health point of view is a raised solid platform of impermeable material, the same as the floor, on which are placed bed boards, each board resting on two or more cross strips of wood to raise it slightly off the cement. The strip at the head can be made thicker than that at the feet so as to slightly raise the head end of the board above the level of the feet. These boards should be re-

moved *daily*, and stood outside in the sun, the hut being meanwhile cleaned out. This is the practice in the convict stations and prisons.

All boards should be immersed in disinfectant solution or in boiling water or steamed once in each week. Suitable tanks for this purpose should be required to be provided for every compound.

The regulation prohibiting sacking and screens round bunks should be enforced. In most huts visited by the Commission, the practice existed to a bad degree.

(8) All compound huts and rooms should be thoroughly swept out daily, and if necessary washed out. They would at any rate be washed out at least once a week, and the walls should be limewash sprayed at least once a month.

Whenever a case of pneumonia, tuberculosis, or other infectious disease is discovered in a room or hut, it should be thoroughly cleansed and disinfected after the removal of the case.

At the present time rooms are not generally cleaned out oftener than about once a month, the staff of cleaners maintained for this purpose in most compounds not being large enough to get round the compound oftener than this. There should be a regulation enforcing the more often cleaning, in accordance with the above recommendations.

(9) Connected with every compound there should be an efficient steam disinfecting apparatus of sufficient size to admit of the blankets and disinfectable kit of every inmate being passed through at least once in each month.

The blankets, clothing and kit of native mine labourers is hardly ever washed. It would be difficult to enforce periodical washing, but its regular disinfection will answer all purposes.

Uncleanly condition of Huts.

69. Without exception, huts in the Mine Compounds are in a very uncleanly condition, mainly due to three causes. These are :—

(*a*) The great accumulation, especially among some tribes, of dirty kit. A general kit room with separate lockers for each boy should be provided. I would allude to the arrangement for the disposal of kit in the Transvaal and Delegoa Bay Compound, where no kit is allowed to be kept in the rooms. (Paragraph 337).

It is a common practice for boys to keep a tin trunk with their belongings at the store of some storekeeper. Although this sometimes works out unsatisfactorily for the native, there seems, therefore, no reason why he should not make use of such a kit room, if the rule be made *general* and compulsory.

(*b*) The practice of making marewu in the rooms This is fermented mealie pap. The fermentation is carried out in old tins, generally kerosine tins, in the process it is spilled all over the outsides of the tins and the floor. Every little group of boys has two or three or more of these tins going at once, so that it generally happens that the floor of the hut is strewn with these tins and their contents often in an offensive condition.

With regard to the manufacture of marewu, it should not be allowed in the rooms at all, but the compound authorities should either manufacture it and supply it to the native, or, which would probably work better, provide a place where all marewu must be made by the boys themselves, and kept.

(*c*) The practice of cooking and eating in the huts. Suitable cooking places should be provided in the compound in proximity to the rooms, as at the Premier and some other mines.

Heating arrangements. The prohibition of open fires in Sleeping Huts.

70. The practice of allowing fire braziers in the sleeping rooms should not be continued.

The Government regulations issued under the Native Labour Regulations Act, 1911, require in connection with "Housing accommodation" "Warming stoves surmounted by chimneys and canopies ; alternative methods may be suggested, and will be considered on their merits."

As a fact, in nearly all of the huts the heating is provided by a movable brazier burning coal. There may or may not be a canopy with pipe leading through the roof, under which the brazier is supposed to stand, but more often than not the fire brazier is not placed under this and frequently more than one fire bucket is in use in a room. We were informed that the natives did not like sitting round the brazier under these hoods.

The result is that the huts are filled with the products of combustion and partial combustion of coal, and are rendered most unhealthy. The corrosive effect of these fumes is often evident in the destruction of the galvanised iron forming the roof of

the huts. There have also been deaths from asphixiation in the huts from these fumes, although such a case is said not to have occurred of late years.

We were told by compound managers that boys would not stay in a compound where these fire buckets are not allowed, but on the other hand, at the Premier Diamond Mine, the Transvaal and Delagoa Bay Colliery (at Witbank), and at Kimberley Diamond Mines, all cold places in winter, and, as far as Witbank is concerned, colder than Johannesburg, we were told that they experienced no difficulty in the matter and that the natives did not complain. The position does not appear to be affected by race, as on the first two of the above-mentioned mines there are a large number of East Coast, and on the Premier Mine tropicals have been employed.

In my opinion, fire buckets or open fires should not be allowed in the sleeping huts. From the health point of view they would be better without artificial heating, extra blankets being used instead, but if heating is absolutely necessary then it should preferably be by hot air or steam pipes, supplied from the main boiler which exists in every compound yard for the purpose of supplying steam for steam cooking.

The provision of Day or Living Rooms or Shelters.

71. There should be provided day rooms, or shelters in which boys can foregather for their meals and social purposes instead of in the sleeping huts. As far as possible the use of these as living rooms should be prevented. They should be allowed open fires, tables and benches, and any other conveniences in these living rooms or shelters, and a private locker for each boy or group of "brothers" should be provided. This measure would go a very long way towards keeping the sleeping huts sweet and clean.

Separate Quarters for Day and Night Shifts.

72. I would direct attention to the practice in operation on all mines of housing the day and night shifts in the same sleeping huts. This is very unsatisfactory from two points of view. In the first place it means that the hut is never clear of occupants and sleepers, hence it is never afforded an opportunity of purifying itself. For some hours daily every hut should be vacated, opened up, and thoroughly aired.

Also the night shift boys suffer from disturbance, by the day shift, who start coming up from eleven or twelve onwards. The apportionment of inmates to the various huts should be so arranged that night and day shift boys are kept separate.

Sanitary arrangements in compounds.

73. (*a*) Whenever possible a water borne system of latrine should be provided instead of buckets.

(*b*) All latrines and urinals should have water laid on to them to admit of being flushed down regularly.

(*c*) All latrines should be efficiently fly proofed.

(*d*) Urinals should be provided within easy access of all sleeping huts, at present in many cases these are some distance away from the huts and at nights the inmates shirk using them.

(*e*) A sufficient number of iron receptables with lids should be provided for refuse at suitable places in every compound.

(*f*) Water taps at suitable distances apart should be provided in every compound so as to admit of flushing out huts with a hose-pipe.

(*g*) The ground of every compound should be gravelled or otherwise rendered smooth and hard so as to admit of daily sweeping, and with a sufficient fall to allow water to run off quickly.

Feeding.

74. In my opinion the meat ration is insufficient, it being fixed by regulation at 3 lbs. (including bone) per week for underground labourers, considering the nature of the work. A minimum of three quarters of a pound, free of bone, or one pound with bone per diem should be provided. This should not be issued raw, but should be properly cooked with the daily allowance of vegetable. On the other hand care should be taken not to over cook the ration, the practice which obtains in some compounds of cooking the meal ration for several hours should not be allowed.

Coincident with the increase in the meat ration some of the carbo-hydrate elements in the present ration might be reduced.

Hospital Accommodation.

75. In many cases the native hospital accommodation on mines is in need of improvement, both as regards construction of wards and as regards equipment.

Some of the accommodation is inadequate in every respect. Also there is reason to believe that in some the nursing arrangements are inadequate and defective.

I would suggest the advisability of establishing large well appointed fully staffed group hospitals, in lieu of the present inferior units.

Every such hospital should be planned on up-to-date hospital lines, and be well equipped with separate isolation block, proper day rooms, sufficient airing grounds, disinfection, operating rooms, and a patients' kit room.

In my opinion it is uneconomical and inefficient to have a separate hospital for each mine. Large district hospitals should be established at convenient distances along the Reef. These might well be placed under one hospital authority.

Treatment of minor casualties.

76. At the entrance to every compound from the mine there should be placed a small surgical dressing room, and all natives, as they come up from work, should be inspected by a European hospital orderly, for the purpose of detecting minor wounds and abrasions, especially on the feet or legs, and the application to them of antiseptic treatment. Such wounds, if not attended to, are apt to become septic and to suppurate, with the result that the boy eventually has to go into hospital for treatment. On those mines where this system has been brought into operation, it has been found to reduce the admission into hospital by fifty or more per cent.

Necessity for Proper Statistics.

77. In conclusion I would urge the necessity for establishing a proper system of mine vital statistics, on a uniform basis and devised so as to furnish information on all necessary subjects. Properly arranged, this would prove invaluable and cost less than is at present wasted on futile masses of figures.

All of which are submitted for your Excellency's gracious consideration this 18th day of May, 1914.

A. JOHN GREGORY,

Chairman.

SUPPLEMENTARY STATEMENT BY DRS. PORTER AND TURNER IN REFERENCE TO DR. GREGORY'S MINORITY REPORT ON THE FUTURE CONTROL OF THE HEALTH OF MINE WORKERS AND MINE SANITATION ON THE WITWATERSRAND MINES.

Johannesburg, 30th May, 1914.

May it please Your Excellency,—

1. In Chapter XIII, Section V of the Main Report, a majority of your Commissioners have objected to Dr. Gregory's proposal to create a special Health Board for the Witwatersrand Mines on the grounds (shortly) that an extension and co-ordination of the present methods of supervision will meet all requirements: that the services of an inexpensive and highly expert consultative body—the Miner's Phthisis Standing Committee—are already continuously at the disposal of the Government; and that the proposed divorce of the industrial from the residential portions of one community is opposed to modern local government practice.

Dr. Gregory in his Minority Report seeks to traverse the first and third (not the second) of these arguments.

We are not, however, now concerned with his criticisms in respect of the systems and principles in question, but with his misstatements and personal attacks upon ourselves.

2. Dr. Gregory begins by stating that none of the paragraphs in which the Majority views on this subject are recorded were considered or voted on by the Commission as a body, they having been introduced in the Report subject to the final sitting of the Commission.

The facts are as follows: In February, 1914, the Commission was relieved by Government of the necessity of reporting at all on the subject; on 24th March, Dr. Gregory nevertheless issued to members a memorandum embodying his proposals thereon; on 7th April these proposals were considered and negatived by

a majority (3 to 1) of your Commissioners; that Dr. Gregory deferred to the last minutes of the Commission's penultimate meeting (24th April) the announcement of his definite decision to write a Minority Report on the question; that thereupon the Majority intimated their consequent intention to state their views in the Majority Report; that on 25th April Dr. Gregory refused, with extraordinary violence of manner and language, to receive or record this decision; *that he threatened to forward the Report as it then stood to Your Excellency over his own signature alone* (*vide Annexure*); that he left the same night for Cape Town; that a draft of the Majority views was thereupon prepared and circulated to the remaining members of the Commission; that Dr. Te Water suggested certain amendments and definitely associated himself with the amended draft; while Mr. Jameson expressed a general view in favour of the general principle of municipal sanitary control within municipal areas.

3. On 19th February, 1912, the Commission, by unanimous resolution duly minuted, fixed its headquarters in Johannesburg. On 25th April, 1914, Dr. Gregory (for private reasons) left finally for Cape Town, and the Commission's work of clear copying proceeded smoothly and rapidly at the office in Johannesburg. Suddenly, however, Dr. Gregory, ignoring the Secretary (Dr. Turner), wired our Chief Clerk (Mr. Lyne) on 4th and 5th May, directing the closure of the office and the instant removal to Cape Town of Minutes, all drafts and copies of the Report and all related documents. This we declined to permit, subject to the Minister's direction, till we found it necessary to proceed to Cape Town ourselves to show that Dr. Gregory's allegation that documents were being withheld from him was misleading: for while any individual documents reasonably required by him would have been sent at once, the demand that the Commission's office and all documents should, without any sort of reference to other members, be removed to Cape Town solely for his purposes, was quite another proposition, especially as he had on 25th April (*vide* paragraph 2 *supra*) intimated that he would present the Report to Your Excellency over his own signature alone.

It had also become necessary to demonstrate personally the undernoted occurrence to the Department of the Interior.

4. On 25th April, 1914, the wording of the whole draft of our Report on Tuberculosis, with the exception of a portion of Chapter XIII., had been carefully considered and "settled" by your Commissioners, and a "fair copy" of Chapters I. to V. had been circulated. Further instalments of what also purported to be "fair copy" were issued on and after 25th April, on which date Dr. Gregory left finally for Cape Town. On 27th April, he wired therefrom as follows: "Take notice no alteration whatever can now be made in report as agreed to by Commission . ." In the meantime, however, we had, to our utter astonishment, discovered that whereas "no alteration whatever could now be made," Dr. Gregory had previously, quite unknown to any other Commissioner, inserted a number of new paragraphs in the alleged "fair copy" of Chapters VI., VIII. and IX., while in Chapter XII., twenty-three pages of details in reference to municipal revenues from locations, which had, against Dr. Gregory's wish, been expressly relegated by the Commission to an Appendix, were actually re-inserted by him in the text. Finally, in the text of Chapter XIII., a sentence was interpolated by Dr. Gregory, which largely stultified, in our opinion, an important dissent-note made by ourselves at a later stage of the Report, in respect to certain deductions by Dr. Gregory as to the effect on health of compound betterment at Kimberley.

All these unauthorised interpolations were demonstrated by us to the Department of the Interior and reported personally to the Minister. Dr. Gregory, in afterwards admitting them, claimed the right to "*edit*" the Report in this manner

Dr. Gregory subsequently received from ourselves on behalf of the Majority of Your Commissioners, unsolicited assistance in this task of "*editing*," and each page of the Report was thereafter initialled by us.

Dr. Gregory's Minority Report, with its attack upon ourselves, was completed seven days after this occurrence.

5. We observe that Dr. Gregory, in his paragraph 10, derides Dr. Porter's answer before a Select Committee of the Provincial Council that the Johannesburg Municipality was (in 1903) the first authority, Municipal or Government in the world, to appoint mines sanitation inspectors. This is possibly because Dr. Gregory, previous to his arrival in Johannesburg, had enjoyed no opportunity of acquaintance with the subject; but this fact does not explain his omission to quote the remainder of the same answer by Dr. Porter:—"That is a big statement, but it is true—except possibly in certain parts of Westphalia, in regard to Miners' Worm."

Similarly, lack of actual practical experience of such work, either in Johannesburg or elsewhere, will sufficiently account for his incredulous reference to Dr. Porter's evidence as to the readiness of the Johannesburg mining authorities to meet, without legal compulsion, the reasonable requirements of the sanitary authorities, and to interest themselves therein. This readiness and interest are, nevertheless, easily capable of proof.

6. Dr. Gregory, in his paragraph 12, alleges that Dr. te Water and ourselves contend that the most important national duty of safeguarding the health and lives of those engaged in the mining industry should be left in the hands of the local authorities along the Reef. This is quite untrue and seriously misleading. Our recommendation (*vide* p. 216, par. 378, and p. 217, par. 380) is *that the continuation, careful co-ordination and extension of the present relations and functions of the Government Departments already concerned, in collaboration with the local authorities (as in regard to factory supervision in England) together with the co-opertion of a staff of mine sanitation inspectors appointed by the local authority*, will satisfactorily meet the requirements of the case.

7. In paragraph 24, Dr. Gregory refers to two compounds as "most insanitary" and of a "disgraceful character," and states that Dr. Porter refused to condemn them, but, after the Commission's visit, ordered the entire reconstruction of one of them, thus perpetrating a complete *volte face*. It suffices here to state that while both compounds are old in structure and design, the deathrates from sickness for each amongst the natives housed therein, compared more than favourably (especially in one case) with the corresponding rate for the same class of native employed at "at mines in the Labour Districts of the Transvaal": that in each case certain "*alterations and additions*" had been required by Dr. Porter before any suggestion of inspection by the Commission: that thereafter, when dictating a request for immediate completion of these requirements, Dr. Porter referred by mistake to "*completion of reconstruction*" instead of "*completion of alterations and additions*," and that this mistake was at once corrected when discovered. No *volte face* was either attempted or perpetrated.

8. Dr. Gregory (in his paragraph 34) alleges that the Kimberley Board of Health is "very analogous" to his proposed Health Board for the Mines. This is untrue in the important respects that it is the only health authority for Kimberley and District, that it comprises two representatives of the Mines and two of the Municipality, and that it does not divorce the residential from the industrial portion of the population, but exercises sanitary jurisdiction over both, and by the same officers.

9. Finally, we have to refer briefly to Dr. Gregory's implication in paragraph 3, that our action, on account of our individual official activities in connection with the Mines, has been such as to render it a matter of the greatest difficulty to pursue satisfactorily the inquiry into the health of the Mines. This suggestion might conceivably be ignored if the distribution of the Report were limited to South Africa, where your Commissioners (including Dr. Gregory) are, to some extent, known. Having regard, however, to its probable much wider circulation, is is here necessary for us to state that this suggestion is absolutely untrue. Apart from any personal feeling which may have prompted it, it is, in our opinion, merely intended to discredit the views recorded by the Majority of your Commissioners, and we are happy to know that Dr. te Water, our remaining colleague (Mr. Jameson being laid aside by illness) entirely dissociates himself from it. But we decline to descend to Dr. Gregory's methods of personal attack by replying with imputation of *mala fides* and questionable personal motives and aspirations, not only because we feel (irrespective of evidence at our disposal) that to do so would be unbecoming in a public document of this kind, but also because it is quite unnecessary.

We much regret, however, to have to state that, at a comparatively early stage, the nature of Dr. Gregory's idiosyncrasies and methods—as exemplified in this Statement—rendered extremely difficult if not impracticable as regards himself, that friendly co-operation which existed between your other Commissioners and which was also unreservedly extended by us to General Gorgas and his assistants during their recent Inquiry.

10. This difficulty, and the dilatory and therefore costly conduct of certain stages of the Commission's work, as well as other matters, led to repeated personal protests by members to the Department of the Interior: while as early as October, 1912, Dr. Porter personally tendered his resignation to the Hon'ble the Minister, who refused to accept it.

All of which is submitted for Your Excellency's gracious consideration this 30th day of May, 1914.

CHARLES PORTER,
Member.

G. A. TURNER,
Member and Secretary.

ANNEXURE.

Telegrams—26th April, 1914.

From Secretary,
Tuberculosis Commission,
Johannesburg.

To Secretary of Interior,
Cape Town.

Urgent.

Towards end March Chairman notwithstanding your previous withdrawal second reference submitted memorandum on future health control mines stop About middle April Te Water Porter Self being present chairman moved recommendation on lines memorandum but not seconded. Chaiman thereupon reserved right make independent minority report or addendum but only declared intention to do so about 8 p.m. on 24th when Te Water leaving for Graaff-Reinet train. At final meeting 25th April Chairman was informed with Te Water's knowledge that majority would consequently be forced to exercise their obvious right to include in main report section embodying their views this subject and would not otherwise sign. Chairman refused to record this decision and announced his intention to forward whole report to Governor-General over Chairman's signature only. Other Commissioners protest strongly against Chairman's conduct and threat and ask you to defer discussion pending letter presenting case of majority. Kindly communicate this telegram to Minister and if you approve to Governor-General also. Porter concurs.

ADDENDUM TO THE FINAL REPORT OF THE TUBERCULOSIS COMMISSION.

Graaff-Reinet,
3rd June, 1914.

The Honourable the Minister for the Interior,
Cape Town.

SIR,

From a copy of the Minority Report on "Tuberculosis" by the Chairman of the Commission received by me, I greatly regret to note, in paragraph 2, latter portion, and 3 of the Report, some remarks by Doctor Gregory casting grave reflection on the *bona fides* in the Commission of Enquiry, on the part of two of the members, Doctors Porter and Turner. The suggestion is so directly the reverse of my own experience of them on the Commission that, in justice to my colleagues, I feel it incumbent on myself to address you on the subject, and prevent a wrong impression being created, if allowed to pass uncontroverted. Instead of "inconvenience" resulting from their appointment by the Government, their presence on the Commission, with their thorough and accurate acquaintance with the conditions of the Witwatersrand Mines and their needs, knowledge which would ordinarily reuqire prolonged residence in the place before even the most superficial acquaintance could be acquired, proved of the greatest possible value to the other Commissioners, who began the enquiry into the health of the Mines with practically no knowledge of mine conditions and with many of the prejudices which are created by the hostile criticism of health conditions of the mines, which led to the enquiry being instituted.

I desire to express my full appreciation of the very courteous and able assistance at all times willingly afforded both to the Commission itself whenever desired and to me personally. Without their guidance and help, I fear it would have been exceedingly difficult to secure the valuable evidence about health conditions on the mines, and chiefly among the native employees in the compounds.

I wish most distinctly to dissociate myself from the suggestion against our two Johannesburg colleagues, which is unjust and without any foundation.

Begging you to include this as an addendum to the Commission's Report for the information of His Excellency the Governor-General.

I have the honour to be,

Sir,

Your obedient Servant,

(Sgd.) T. TE WATER.

ADDENDUM "A."

MEMORANDUM BY DR. PORTER AND DR. TURNER ON THE INFECTIVITY OF TUBERCULOSIS.

Following the discovery of the bacillus by Koch in 1882, the teaching of the older physicians that Tuberculosis was an hereditary disease has been to a large extent abandoned and replaced by a theory of infection, which received notable official confirmation at the International Congress on Tuberculosis held in Rome in April, 1912, where it was agreed "that the prevention of Tuberculosis must be centered on the prevention from man to man, especially the infection of the family"; and the vast amount of effort which is being made throughout the civilized world to combat the disease is the outcome of this widespread belief. Opinion as to the method of transference of Phthisis from man to man differs. By one School—that of Koch and Cornet—it is held to be due in the main to the drying of infected sputum and to the inhalation of dust thus infected. Cornet found that dust taken from rooms in houses occupied by consumptives, careless as regards their sputum, when inoculated into guinea-pigs, produced Tuberculosis in 67 per cent. of the houses examined; and similar experiments carried out in Manchester between November, 1899, and September, 1900, by Dr. Coates* (now M.O.H. for Hornsey) under the guidance of Professor Delépine, showed that in 61 per cent. of like houses examined, the dust collected from ledges, skirting boards, etc., contained tubercle bacilli. The effect of elevation above the floor was carefully noted. The influence of light and ventilation was assessed, and the experiments were controlled by samples of dust taken from dirty houses, carefully ascertained not to have been occupied by consumptives within three years. It was thus shown that though the infective dust was most abundant near the ground, it was also to be found at a height of from three to six feet. It was, moreover, shown that the infectiveness of the dust was diminished in well-lighted rooms, but not in all of these destroyed.

As against this view has been adduced the results of certain previous experiments by Ransome and Delépine, who found that the time necessary to bring about the death of the bacillus when exposed to light and air was in every case less than would be necessary to reduce the sputum to dust. But in these experiments the sputum rendered sterile by exposure was in each instance exposed to *direct sunlight*. These results, therefore, afford no indication as to the influence of light in a living room, *under every-day conditions*, on the duration of vitality of the tubercle bacillus.

Sputum kept in the draught closet for three days in a current of air (about 1,000 cubic feet per hour) in darkness at the ordinary temperature, gave well marked Tuberculosis in thirty-two days. Sputum kept under the same conditions, *i.e.* in a closed dark cupboard, after drying on paper but exposed to a little air for thirty-five days, produced distinct Tuberculosis in twenty-three days.

Flügge and his collaborators hold that under circumstances of continuous and rather long exposure, infection will ensue in rooms in which phthisical sputum has dried on the floor or articles of furniture, and where from any cause, such as the result of dry-cleaning or continued mechanical vibrations, the air is visibly filled with rather coarse dust. They consider, however, that infection is chiefly conveyed in the numerous drops of saliva thrown off from the respiratory tract during expulsive efforts of the phthisical patient, such as coughing, sneezing and loud or excited speaking. This view is based largely on the ease with which guinea pigs are infected when exposed to the spray of a watery emulsion of tubercle bacilli, as contrasted with the difficulty experienced in infecting them with dried and powdered sputum blown into their cages. These results were, moreover, confirmed by Heymann's experiments to determine the direct effect of coughing. Guinea-pigs were coughed at by suitably selected patients every second day for three hours for "periods lasting from several weeks to a month," the distance between the patient and the head of the animal being from 20 to 45 centimetres. The result was that out of 25 guinea-pigs which survived, six showed symptoms of inhalation tuberculosis.

In 1903, however, Professor von Behring of Marburg, expressed his belief that there has nowhere been brought forward an unassailable proof of consumption in the case of an adult arising from tubercular infection originating epidemiologically, *i.e.*, under the conditions of infection existing in nature. In his view, consumption

* "Report on an Investigation into the Infective Power of the Dust in Houses inhabited by Consumptive Persons," by Harold Coates, M.B., Ch.B., D.P.H., Manchester. 1900.

is usually communicated to the child through the bovine milk on which it is nourished, the bacilli which thus enter the system remaining in a large number of cases latent until health-depression of one or another type renders the host extra susceptible.

More recently, the eminent eugenist and statisticion, Professor Karl Pearson, F.R.S., has on biometric grounds definitely challenged the very general belief that infection from person to person, however affected, is an important factor in the spread of Tuberculosis; and we are indebted to Dr. G. D. Maynard, Statistician to the South African Institute of Medical Research, for a lucid exposition of the views of the Biometric School, in a Memorandum which is appended hereto (Annexure E) and which was also published in substantially the same form in The *Transvaal Medical Journal* of October, 1912. Dr. Maynard defines an *infective disease* as " one in which some micro-organism is concerned as the causal agent," and remarks that "in this sense Tuberculosis is undoubtedly an infective disease." By the term "*infectious disease*" he refers to " a pathological condition which can be spread from the affected to the healthy, either by a comparatively brief contact, or through the medium of soiled clothes, etc." the question of practical importance being " Does close association with the diseased constitute a serious risk to the healthy?" To clear the ground, Dr. Maynard admits that " It would be idle to deny that Tuberculosis may not be spread from the diseased to the healthy," but adds " the questions of administrative importance are, does this occur sufficiently frequently to justify legislative and restrictive measures being applied to the sick, and can we hope to modify the spread of the disease by measures based on its supposed infectious nature?" The evidence adduced by him consists mainly of biometric analyses of the obtainable data by methods which are the practical monopoly of the skilled biometrician, and the correctness of which we therefore, for argument's sake, accept without question. This evidence, based upon European data only, leads logically, Dr. Maynard contends, so far as inhabitants of Europe are concerned, to the following conclusions:—

(1) That among the inhabitants of Europe the great majority are during the course of their life the subjects of tuberculous lesions; and thus we may assume that *all adults have been exposed to frequent infections with the bacillus tuberculosis.*
(2) Tuberculosis *is not an infectious disease*, *i.e.*, close contact with the sick does not materially increase the risk to the healthy.
(3) Tuberculosis is *undoubtedly an hereditary disease* in the sense that the tubercular diathesis, *i.e.*, the liability to serious manifestations of the disease, is inherited.
(4) The decreasing death-rate from Tuberculosis, *e.g.*, in England, is not due to sanitary or hygienic improvements, or to more efficient public health control; but is an evolutionary phenomenon in the life history of these races.
(5) If the above statements are correct, then the money spent on many of the modern attempts at prevntion might be better expended on further research into the factors which are producing the falling death-rates, thus enabling us to turn our energies and financial resources into more profitable channels.

In the following discussion, we have drawn freely upon the late Dr. Bulstrode's monumental Report on Sanatoria, which is a veritable mine of information, and also upon the very able ,incisive and courteous criticism of that report, published in 1908 by Dr. James Niven*, the distinguished M.O.H. for Manchester, whose work in connection with Tuberculosis is well known.

We accept *Conclusion* (1).

With regard to Conclusion (2), namely, that Tuberculosis is not an infectious disease in the sense that close contact with the sick does not materially increase the risk to the healthy, we admit at once that the infectiousness of phthisis in any significant degree has not been statistically proved; but, as has been elsewhere remarked,† this by no means involves the further admission that its non-infectiousness has been demonstrated. Dr. Maynard's grounds for his conclusion are, shortly—(*a*) there is little or no evidence that married couples spread the disease the one to the other; (*b*) that though parental phthisis markedly lowers the age of

* " Public Health," Vol. XXI., Nos. 2 and 3, April and May, 1908, pp. 52-59 and 101-113.
† " Transvaal Medical Journal," Vol. VIII., No. 3, October, 1912, p. 58.

onset, the phthisis of brothers and sisters does not, though it ought to do so if infection really plays a large part in the liability; (*c*) that the falling Tuberculosis death-rates in the United States of America has been associated with a *stationary* average age at death of persons dying from Tuberculosis and *not* with an *increased* age at death; (*d*) that children of infected mothers are not, to the extent that might be expected, affected in larger numbers than those of infected fathers; (*e*) that in consumptive hospitals since 1846 there has been no material evidence of spread from person to person.

With regard to (*a*) the alleged infrequency of marital infection, which has been emphasized by Longstaff and Pearson, Dr. Niven questions, for various reasons, the equity of Longstaff's statistical conclusion that marital infection is probable only in 1 in 34 cases, and adduces the observations of Leudet (of Rouen) that out of 77 marriages in which one of the partners was tuberculous, marital contagion was probable in 7, "or 1 in 11 against 1 in 34 asked for by Dr. Longstaff." It is to be noted, however, that if we are correct in assuming with Pearson and Maynard* that 1 in 10 of the general population suffer from obvious Tuberculosis, then clearly, out of 77 partners about 8 of them might be expected to be sufferers from the disease, quite apart from any question of marital infection.

Dr. Niven also tabulates the figures for Manchester for the year 1900—1907 "showing the histories of infection more or less probable between man and wife." Of 11,220 notified cases of Tuberculosis, the proportion of ascertained couples was 4,784, and the proportion of histories of marital infection to all known couples was 1 in 12·6.

With respect to (*e*) (*supra*) the behaviour of Tuberculosis towards the staffs of consumptive hospitals, Dr. Niven (quoting from Strauss *La Tuberculose et son Bacille*, Paris, 1895) instances the very different recorded experience of Debove, Trousseau, Charcot and Peter as regards the hospitals of Paris; of Laveran (1879) as regards the hospital attendants of the French Army; of Kirchner (1894) as to the same class in the Prussian Army, and contends that English hospital immunity in this respect "is conditional and that under unfavourable circumstances, such as doubtless frequently occur in private houses, this immunity disappears." No evidence is, however, offered by Dr. Niven of any such actual disappearance. In connection, too, with the contention that Tuberculosis is not an infectious disease in the sense that close contact with the sick does not materially increase the risk to the healthy, we must consider the account (quoted by Niven) in Koch's original communication in the *Mittheilungen ausdem Kaiserlichen Gesundheitsamte* of the spontaneous occurrence of Tuberculosis in guinea pigs and rabbits:—

of Tuberculosis in guinea pigs and rabbits:—

"Among many hundreds," says Koch, "of rabbits and guinea pigs which were purchased for experimental purposes, were so used and finally dissected, there never occurred one single animal which was tuberculous. Only after the infection experiments had begun and a considerable number of tuberculous animals were being kept in separate cages but in the same room with other experimental animals, did isolated cases of spontaneous tuberculosis occur amongst the latter. Yet distinct symptoms of tuberculosis almost never presented themselves in these until they had been for three to four months in the same room with tuberculous animals. It was, moreover, very significant that when the number of the artificially infected animals decreased the cases of spontaneous tuberculosis declined also and inversely. For a considerable period during which very few tuberculous animals were kept in the cages for experimental animals, spontaneous tuberculosis entirely ceased among the remaining very numerous guinea pigs and rabbits. The changes found in the animals dead from spontaneous tuberculosis are distinguished from those arising from artificial infection by very characteristic features, so that the different kinds and manners of the infection could be recognised with entire certainty."

Further, if the theory of infection from person to person or animal to animal is to be practically abandoned, how can the ravages of this disease, when introduced amongst newly exposed peoples, such as South African natives, or amongst a hitherto healthy herd, be accounted for?

As the claim that improved sanitary conditions, segregation and other features of the battle against Tuberculosis have been followed by a marked fall in the disease, has, in the words of Dr. Maynard, been used as an argument "in favour of the importance of infection in determining the prevalence of Tuberculosis," we may at this point conveniently consider his fourth conclusion, and deal subsequently with the question of heredity.

Conclusion (4), namely, "that the decreasing death-rate from Tuberculosis, *e.g.*, in England, is not due to sanitary or hygienic improvements or to more effi-

* "Transvaal Medical Journal," Vol. VIII., No. 3, October, 1912, p. 60.

cient public health control, but is an evolutionary phenomenon" (presumably natural selection) "in the life history of these races," Dr. Maynard subsequently qualifies to the extent of admitting that "improved conditions of living—housing and feeding—will increase the natural resistance to most infective diseases, including Tuberculosis, and in this sense improved sanitation may be of value in helping to lower the Tuberculosis death-rate." But he considers that the factor mainly concerned is an "increasing power of resistance, due either to hereditary or environmental influences, or a combination of both." Against this it has been urged (1) that no proof is furnished that the fall is due to natural selection; obviously, however, in the absence of any indisputable and sufficient cause, natural selection affords a not unreasonable, though perhaps incomplete, explanation; (2) that the apparent fall is due to a transference of deaths from the group Phthisis to that of Bronchitis, a contention which is open to serious question*; (3) that rates of mortality and their rise and fall, being the resultant of many most complex factors, are futile as an indication of the effect of any single factor. But this argument is obviously double-edged, for, if it be true, a decline in the death-rate is also futile as an indication of the effect of hygienic improvements.

Drs. Bulstrode and Niven, in discussing this question, look for an explanation to the increase in well-being of the English working classes, and with the operation of similar causes in Germany they couple the influences of the Insurance Laws. As, however, it is admitted, rightly, to our thinking, that improved conditions of housing and feeding will increase the natural resistance to Tuberculosis, no great advantage, from the point of view of practical administration, is, in our opinion, with the time and data presently at our disposal, to be gained from the further pursuit of this question.

In support of *Conclusion* (3), namely, that Tuberculosis is undoubtedly an hereditary disease in the sense that the tubercular diathesis (*ie.*, the liability to serious manifestations of the disease) is inherited, Dr. Maynard adduces the independent statistical studies by Karl Pearson and Dr. Goring of material obtained respectively from the Crossley Sanatorium and elsewhere, as indicating that the coefficient of correlation for intensity of parental heredity is approximately the same as those for certain inherited characters, *e.g.*, insanity, hereditary deafness, statute, span, forearm and eye-colour, and that the correlation for fraternal heredity is also sensible. Reference is also made to the occurrence and effect of "assortative mating," which appears to have been first suggested by Dr. Longstaff nearly thirty years ago, and for which correlation values have in recent years been worked out in Professor Pearson's Laboratory. With regard to the conclusions of Pearson and Goring, it is urged, apparently with some reason, that in the nature of things there can be no precision in the history of disease in the parents of consumptives of a remote date; that errors must necessarily be numerous and large; that the data are small, and the assumptions extensive; that only the grosser elements of the question are brought under review; and, generally, that it does not yet admit of effective biometric treatment; also, that instead of assortative mating of the tuberculous, the selection is probably the other way—the strong man sheltering the weak woman, and *vice versa*. But no evidence of such opposite selection is offered, and in many cases there may be at the time of mating no obvious evidence of weakness in either partner. The relatively rare occurrence of inherited Tuberculosis in calves is also cited, and the still more significant fact that calves of tuberculous cows, when reared under suitable conditions, remain free from Tuberculosis, and become valuable members of non-tuberculous herds. On the other hand, though the day is past for the unqualified acceptance of anyone's *ipse dixit*, we cannot ignore the considerable volume of weighty medical opinion (including that of Koch) cited by Dr. Bulstrode, as to the existence of family predisposition to tubercular disease, nor the conclusion (as quoted by Dr. Maynard) of Sir Douglas Powell and Dr. Horton-Smith Hartley in "Diseases of the Lung," Fifth Edition, 1911:—

> "The evidence therefore seems to show us that, in spite of what modern critics may urge, the hereditary factor in consumption is one that may not be gainsaid, and that it manifests itself in a special idiosyncrasy of the tissues in certain families and races, whereby they became more than usually favourable to the growth of the tubercle bacillus."

It appears to us that the term "heredity" in this connection may refer to the transmission of either *natural* or of *acquired* characteristics. In the sense that every one is born with, *i.e.*, inherits, a certain degree (high or low) of *natural* resistance, the existence of heredity cannot be denied. But that Tuberculosis is

* "Transvaal Medical Journal," Vol. III., No. 3, October, 1912, Dr. Maynard's Table, top of p. 67.

hereditary in the sense that it is the result of a positive "predisposition" or "taint," transmitted as an acquired characteristic from an infected stock, is another matter. Obviously, it can have little to do with the incidence of the disease amongst certain native races, the immediate descendants of a practically uninfected stock.

As regards Europeans and persons of mixed races, the effect of heredity in this sense is a controversial question upon which, in the present state of our knowledge, we are not prepared to dogmatize, especially as we believe that serious Tuberculosis in any given instance is probably not solely due to one cause, whether it be heredity, infection or environment, but is more likely the result of several interacting factors.

With reference generally to the various questions discussed under "The Infectivity of Tuberculosis," the search for truth "through the mazes of experiment and speculation" is not an easy one. But, in the presence of a serious and increasing prevalence of the disease amongst certain sections of the South African native and coloured communities, it is impracticable for us to content ourselves with an attitude of "academic agnosticism" to these disputed questions. In reference to the conclusions of the Biometric School, it has been quite fairly said that "the validity of an assumption based upon mathematical investigations can only be tested mathematically," and from this point of view the conclusions in question have not been convincingly demonstrated to be unsound, though in the case of heredity we consider the value of the data from which this deduction is made, open to serious question. These biometric conclusions are, however, based upon data which relate only to "inhabitants of Europe." To quote Dr. Niven once again "healthy people do not contract phthisis except after long exposure to a well-marked source of infection," and as regards "inhabitants of Europe" we think it probable that the degree of infectiousness from person to person is a factor which has been materially exaggerated. We are not prepared, however, to extend this statement to South African natives and coloured persons, nor, without further evidence, to European Africanders; though we recognise that a patient and careful collection and analysis of facts will be necessary before we can dogmatize or adduce mathematical proof of the faith that is in us, that amongst South African natives and coloured persons, and to a less extent amongst European-Africanders, Tuberculosis is, under certain conditions, a distinctly infectious disease.

From a review of the evidence we have obtained, and of our own experience and observation, we are satisfied that there is a marked difference in the immunity or degree of resistance to Tuberculosis possessed by the various races of South Africa. We believe it to be lowest amongst natives and coloured persons living under circumstances of overcrowding, strenuous physical work, bad or unsuitable feeding, and misuse of European clothing and habits. Under such conditions, the return of infected natives to their homes has been followed (as in the Cape Province) by the appearance of the disease amongst their women folk, but this has not been observed to any marked extent where the Kaffir at his kraal does not live in close association with Europeans, as in the Northern Transvaal, Rhodesia and Portuguese East Africa.

We think it probable, too, that a similar lessened power of resistance may manifest itself in the child of parents who are unhealthy from other causes, such as syphilis or malaria, especially the latter. Further, the effect of environment on this resistance is very evident; thus both in this country and in England we find that it is a rare occurrence for the tubercular miner to infect his wife or family, that is to say, the disease does not spread readily from person to person in a community which is well paid, and therefore well fed, and fairly well housed and clothed. On the other hand, as already pointed out, an unfavourable environment, as in the case of certain natives and the coloured population of the Cape Province, appears to have an opposite and disastrous result. There is also, we think, some ground for the belief that the degree of immunity possessed by South African-born Europeans, while greater than that of native and coloured persons, is in certain cases less than that enjoyed by white persons of oversea birth.

Our conclusions in reference to the propositions formulated by Dr. Maynard at pages 5 and 6 hereof, may therefore be summarized as follows:—

1. We accept the assumption that amongst the inhabitants of Europe all adults have been exposed to frequent infections with the bacillus tuberculosis.

We believe:—

2. (*a*) That amongst *inhabitants of Europe* the degree of infection of Tuberculosis from person to person is a factor which has been materially exaggerated;

(*b*) That amongst South African natives and coloured, and to less degree amongst European-Africanders, Tuberculosis is, under certain conditions, a distinctly infectious disease.

3. (*a*) That the existence of heredity, in the sense that everyone is born with, *i.e.*, inherits, a certain degree (high or low) of natural resistance to Tuberculosis (and other diseases) cannot be denied;

(*b*) That "heredity" in the sense of transmission of a positive "predisposition" or "taint" as an acquired characteristic from an infected stock, can have obviously little to do with the incidence of the disease amongst natives immediately descended from practically uninfected stock.

(*c*) That as regards Europeans and persons of mixed race, the effect of heredity in this sense is a speculative question upon which, in the present state of our knowledge, we do not propose to dogmatize.

4. That the phenomenon of "natural selection" or gradual elimination of the unfit, as well as "increased well-being" and improved conditions of housing and feedings which raise the natural resistance of the individual, have contributed, in degrees which we are not prepared to define, to the fall of the Tuberculosis death-rate in England.

5. That it is undoubtedly desirable that further research be made into the factors which produce the fall in this death-rate; and that reasonable and well-considered expenditure with the object of improving conditions of housing, feeding and well-being of the community, is both justifiable and necessary.

CHARLES PORTER.

G. A. TURNER.

31st December, 1913.

ADDENDUM "B."

MEMORANDUM ON THE REGISTRATION OF BIRTHS AND DEATHS IN THE SEVERAL PROVINCES.

(Prepared by the Commission to supplement Chapter V.)

Paragraphs 91 to 94 of the Report.

The following memorandum has been prepared by the Commission to illustrate the divergencies of the existing provisions of the laws relating to the registration of births and deaths in the Union.

Laws in force for the Registration of Births and Deaths.

The registration of births and deaths is effected in the Cape Province under the provisions of Act No. 7 of 1894. In Natal under Law No. 16 of 1867, as amended by Acts No. 17 of 1894, No. 5 of 1896 and No. 38 of 1899, and under Act No. 25 of 1902. In the Orange Free State under Deputy Administrators' Proclamation No. 15 of 1902; and in the Transvaal under Ordinance No. 19 of 1906, which, however, was not put into force until the 1st January, 1908, up to which date registration was effected under Lord Roberts' Proclamation No. 27 of 1900.

Both in the Cape and the Orange Free State a certain amount of voluntary registration was effected prior to the operation of the above mentioned laws, under other enactments for purpose of civil record, and in certain municipalities by means of local bye-laws.

Provisions for the appointment of Registrars.

All the above mentioned registration laws make provision for the appointment of a central registry under a Registrar, in the Cape and Orange Free State, and a Registrar-General in Natal and the Transvaal, respectively, and for the appointment of deputy (termed in Natal and the Transvaal, District) Registrars, with Assistants. In practice these officers are nearly always Government Officials and except sometimes in the Cape, the deputy registrar is the Resident Magistrate of the District or someone in his office.

Duty of Registrars.

It is in the Cape, the Transvaal and the Orange Free State the duty of Deputy Registrars and their assistants to inform themselves of all births and deaths occurring in their districts, and they are empowered to require by written notice any person on whom the law places the duty of notifying such occurrences to attend at their office or elsewhere to furnish particulars thereof. In Natal, however, the Registrars have no such powers and they are only required in every case to inform themselves carefully of all particulars that have to be registered.

Distinction between Urban and Rural Areas.

In the Cape, the Orange Free State and the Transvaal a distinction is made between Urban Areas and the remainder of the Province (termed in the Cape, Rural Areas), but not so in Natal where each County and Division is constituted a registration Area and there is no distinction between urban and rural.

In the Cape and the Orange Free State, an Urban area is defined to be the area under the jurisdiction of a Municipality or a Village Management Board, or such other area as, from time to time, may be proclaimed to be an urban area for the purpose of registration. In the Transvaal the term only applies to such areas as may from time to time be defined by proclamation, and most of the larger towns in the province have been so proclaimed.

In all provinces, except Natal, the law as to registration is different for the urban and the extra-urban areas, respectively.

Procedure in Urban Areas.

Who to notify deaths, and when

In the Urban areas of the Cape and the Orange Free State, every death has to be notified to the registering officer within thirty-six hours of its occurrence, by the adult relatives of the deceased present at the death or in attendance during the last illness, or, failing them, by every person present at death, and by the householder and failing him, by every adult inmate of the house, and by the person causing the body to be buried.

In the Transvaal the notification has to be given by practically the like persons, but within a period of only twenty-four hours after death.

While, in Natal the occupier of the house or some person present at the death or in attendance during the last illness must notify within thirty days of death to the Registrar or, if living more than three miles from the latter's residence, to a Justice of the Peace, who must pass it on to the Registrar.

Medical Certification of the Cause of Death.

With regard to the very important matter of medical certification to the cause of death, in the Cape Province, the Transvaal and the Free State it is provided that in the case of the death in an urban area of a person who was attended during his last illness by a medical practitioner, such practitioner shall, unless he shall believe that such death was not due to natural causes, forthwith sign and give to one of the statutory informants a certificate stating to the best of his ability and belief the cause of death, and on receipt of such certificate by the Registrar he is bound to issue an order authorising burial. But if such medical attendant be unable to give such certificate he must forthwith report such inability to the Resident Magistrate and to the Registrar of the district.

In the Transvaal and the Orange Free State the law specifies that such certificate shall be given without fee or reward, but the Cape law contains no such conditions, although it is interpretated as having the same intention.

Only in the Orange Free State statute is it specified that "Medical Practitioner" shall mean a person lawfully entitled to practise medicine in the Province.

Neither in the Cape nor the Transvaal is any medical certificate of the cause of death required in the case of deaths in extra-urban areas, nor, even though a medical practitioner was in attendance during the last illness, is he required to give a certificate, but the Orange Free State law is in advance of this, it being made the duty of every medical practitioner who has attended during the last illness, outside the boundary of any urban area, to send to the Registrar of the district a certificate of the cause of death or a notice of his inability to certify to the cause.

In Natal no medical certificate of the cause of death is required at all, and, except that in a schedule laying down the form of the death registrar, a column is provided for the cause of death, the law makes no reference to the matter.

Necessity for Burial order before interment.

No dead body can be buried in any urban area in the Cape, the Transvaal or the Orange Free State, except in cases of urgent necessity as shall have been defined by regulation, without a burial order to be issued by the registering officer, or in the case of an inquiry or inquest, by the Magistrate or person holding such enquiry or inquest; and any person burying, or performing any religious service in connection with the burial of a body without such order must give notice of the fact to the Registrar within thirty-six hours after the burial.

In the Cape the registering officer can only give such order if he is satisfied that death was due to natural causes, and in the Transvaal and Orange Free State only if a certificate by a registered medical practitioner of the cause of death be produced.

In the Transvaal if such certificate is not forthcoming, or if the Registrar is not satisfied that death was due to natural causes, he must report the fact to the Resident Magistrate, who is required to instruct the District Surgeon to investigate the cause of death, and if the latter is satisfied that death was due to natural causes then the Magistrate must grant a burial order. In the Free State the same procedure is laid down except that there the Registrar himself is required to immediately call upon the District Surgeon or other medical practitioner to proceed at once to inspect the body and investigate the cause of death, on whose report

he may issue the burial order, but if unsatisfactory it must be referred to the Magistrate or a Justice of the Peace to investigate the death, who thereupon becomes responsible for the issue of the burial order.

In the Cape, in the absence of a medical certificate, the registering officer makes his own enquiries, and, if satisfied, he must issue a burial order, and if not, or if there has been a medical practitioner in attendance who cannot certify, he must report to the Magistrate who may hold an inquest.

In Natal, irrespective of the place of death, the Registrar has to give, on registration or when asked for it, a certificate of registration to the informant, relative or undertaker by whom it must be handed to the officiating minister. Any person conducting a burial without the delivery of such a certificate, must report the fact to the Registrar within two months thereof.

In the Orange Free State an additional safeguard is introduced by requiring the person conducting the burial to endorse particulars concerning the burial upon the order and thereafter to return it to the officer who first issued it.

Procedure in Rural Areas.

As has been said, in Natal no distinction is made between urban and rural Areas, but in rural areas in the Cape, the Orange Free State and the Transvaal, notification of a death has to be made in rural areas by the same persons as in urban areas, but they are here allowed a period of three months in which to do it and it may be made to the nearest Field Cornet or Police Officer, who has to pass the particulars on to the Registrar. No burial order is required, nor could such be of any use with such a long interval allowed before notification. Nor need the body be interred in an authorised burial ground. As we have seen, only in the Orange Free State is any certificate required of a medical man if in attendance.

Extent to which Registration Laws apply to other than Europeans.

In the Cape Province.

In the Cape all of the provisions of the law relating to registration apply throughout the Province, including the Native Territories, and equally to all races, whether European, Coloured or Native, except that the Governor may, by regulation prescribe and define different forms of notices to be used, and define the persons by whom and the time and manner in which they are to be given, in respect of native locations in the Colony or any of the Territories. And such modifications, placing the duty of notifying on the headmen of locations, have been so issued.

In the Orange Free State.

In the Orange Free State the registration law does not extend or apply to aboriginal natives or other Coloured persons, unless and until the Government shall declare such natives and other persons, within any specified area, to be subject to all or any of its provisions.

Up to the present none of its provisions have been so extended, and not even in Bloemfontein are the births or deaths of Coloured persons or natives recorded. [J. J. Erlank. Question 15741. D. M. Tomory. Questions 97187-97220.]

In the Transvaal.

Nothing contained in the Transvaal Ordinance is to apply to the notification of births or deaths of natives: a native being defined as a person both of whose parents belong to an aboriginal race or tribe of Africa. But the Governor may by regulation prescribe special provisions to be in force in any district of the Province for the carrying out of such notifications.

Only in towns and in gold, diamond, base metal and coal mining areas of the Province have such regulations been proclaimed. In the towns the same machinery as for Europeans and others is applied to natives, but in the mining areas deaths have to be notified only within seven days of occurrence. [J. J. Erlank. Questions 15781-15863, 15743.]

Also the Commission was informed by the Registrar-General that the law is not enforced as regards the registration of births and deaths of Coloured persons outside of the towns. [Question 15742.]

In Natal.

In Natal ordinary registration applies equally to Coloured or half-castes as to Europeans, but as the race or birthplace is not recorded it is quite impossible to ascertain from the register which are coloured and which are Europeans. Its provisions do not apply to any natives except those to whom have been granted letters of exemption from the operation of Native law, and to their offspring, and to the offspring of natives married by Christian rites, under Law No. 46 of 1887. As a matter of fact no means are taken, nor can very well be taken, to ensure that all occurrences relating to even this small class of natives are actually registered, and if they were properly registered they would be of no statistical value, as there is no means of knowing the numbers of such natives among which the events occur. [H. Millar. Questions 23793-23875-23876-23932.]

For the raw native, registration of births and deaths is provided for under Act No. 25 of 1902, which amends the Code of Native law, and requires every "Kraal head" to report every birth and death to the "Official Witness" in charge of the district within three days of its occurrence. The latter, who is paid one shilling for each event, has to report the same to the Resident Magistrate within thirty days, who registers the event and annually transmits his registers to the Secretary for Native Affairs "to be filed in his office." The Governor may frame regulations for the purpose of the Act; under these the age at death and the cause of death are also required to be reported. It is stated that this act has not been put into force in Zululand. It is believed by officials that in the rest of the province most events are reported on account of the incentive of the shilling fee.

Natal Indentured Indians.

As regards the large Indian population in Natal, the provisions of the general registration law only apply to those Asiatics or Arabs who have not been introduced into the Province under the laws providing for the introduction of emigrants from India to Natal. [Miller. Questions 23817-23-24, 23908-14.]

Indentured Indians and Free Indians* and their descendents fall under the jurisdiction of the Protector of Indian Immigrants, who is appointed Registrar of Births and Deaths of Indian Immigrants by Section 61 of the "Indian Immigration Law, 1891," and to whom, under Section 62, all deaths among them have to be notified by the employer or the occupier of the estate or house or tenement in which the death occurred, within thirty days of its occurrence. Every such notice must be accompanied, in the case of Indentured Indians, by a proper medical certificate to the cause of death; or by other proof to the satisfaction of the Protector, in the case of Free Indians.

The records of the Protector appear to be accurate. [J. A. Polkinghorne. Questions. 17702-17707. 17721-17731.]

* A Free Indian is one who has completed his term of service for which he was indentured on leaving India, and remains in the Province, paying an annual licence of three pounds or serving under voluntary contract or indenture, and the adult child of an indentured or free Indian.

ANNEXURE "A."

COPIES OF REPORTS MADE TO THE COMMISSION CONCERNING TUBERCULOSIS IN NYASALAND.

I.—Extract from letter addressed by the Chairman of the Commission to medical men practising in Nyasaland.
II.—Reply by Dr. H. Hearsey, Principal Medical Officer, Zomba.
III.—Reply by Dr. Hugh S. Stannus, Medical Officer, Zomba.
IV.—Reply by Dr. R. M. Macfarlane, The Mission, Blantyre.
V.—Reply by Dr. Robert Laws, Overtoun Institution, Livingstonia.

I.—Extract from letter addressed by the Chairman of the Commission to medical men practising in Nyasaland.

"The Commission would very much like to obtain from you, your experience on the whole matter of Tuberculosis in your area, and more especially on the following points:—

(1) The extent to which the disease prevails amongst the Natives.
(2) If frequent, how long approximately it has been in existence in the Territory.
(3) What are the causes of its present prevalence, and in what manner is it chiefly spread.
(4) Are males, females, adults and children equally affected, and with the same form of disease, or if there be differences, what are they.
(5) What is the course of the disease in the Native and what is the ultimate ending.
Has the native any special proclivity to the disease, and if so to what do you attribute this.
(6) Has the recruiting of natives for labour on the mines any effect in spreading the disease in the Territory, and if so to what extent.
(7) Have you any experience of natives returning with the disease from the mines and other labour centres. If they do, do they spread it at their kraals.
(8) Do any of the following diseases prevail among the natives in your Territory, and if so do any of them, in your opinion, predispose to Tuberculosis:—
Pneumonia.
Malaria.
Bilharzia.
Intestinal Worms.
Enteric.
Measles.
Syphilis.
(9) If pneumonia is prevalent of what type is it, and does it show any seasonal variation.
(10) What is the type of hut and manner of living of the natives in your Territory.
Are his habits and customs being affected by European influence, and if so is this change affecting adversely his general physique and predisposition to disease.
(11 Have you observed any differences in regard to Tuberculosis in educated or school Kaffirs as compared with the raw native.
(12) Are there any suggestions which you are prepared to make as to the best means of combating the disease amongst natives."

II.—Reply by Dr. H. Hearsey, Principal Medical Officer, Zomba.

Office of the Principal Medical Officer, Zomba,
Nyasaland Protectorate,

13th August, 1913.

SIR,

With reference to your letter No. 1696/13 of the 22nd of July, I have the honour to inform you that I have only recently returned from my tour of

inspection, and have therefore not been in a position to acknowledge its receipt at an earlier date.

2. I note that you have addressed similar communications to the above to Drs. Laws, Stannus and MacFarlane. As Dr. Stannus is one of the Protectorate Medical Officers, and moreover has access to the Departmental Archives, the reply he has forwarded you may be taken to represent such information as is available.

I have, etc.,

(Signed), H. HEARSEY, P.M.O.

III.—Reply by Dr. Hugh S. Stannus, Medical Officer, Zomba.

Office of the Medical Officer, Zomba,
Nyasaland Protectorate.

DEAR SIR,

Every medical man working in Africa must feel that your Commission is doing very valuable work and that any small amount of information he may be able to give, is given willingly.

May I first explain that while I am an M.O. here I have travelled over possibly more country and seen more natives than most Medical Officers in Nyasaland.

In most cases what I shall say is more of the nature of an impression gained than facts depending on statistics as up till the present time it has not been possible to carry out systematic medical inspection of the native population with the exception of areas which have been searched for Trypanosomiasis.

I may add that in reference to the last paragraph of your letter Dr. H. Hearsey is P.M.O. in Nyasaland and later I shall quote from his Annual Medical Report for 1912-13.

Since 1905 when I entered this country I have seen on outstations some two or three cases of Phthisis each year. They came casually under my notice and the only fact I have to record of them is that they were all rapidly fatal. At the same time I saw a few cases of bone disease, all caries of spine. In 1910 I examined 16,000 natives belonging to the Atonga tribe, a riparian population of Lake Nyasa (alt. 12,000 circ.) and kept a record of all cases of illness. Among these I saw no case of Phthisis but nine cases of tubercular bone disease, seven of whom were cases of spinal caries; some active, some non-active, with kyphosis.

In an adjoining district (Momberas) (alt. 3-400,) among another 1,600 I saw no case. I noted that about the same figures for leprosy were found; both are cattle keeping tribes and both leave this country to work elsewhere. I am unable to give previous histories of cases.

Since I have been in Zomba, some three years, I have seen more numerous cases owing probably to greater facilities (Native Hospital, etc.).

From the fewness of the observations I am unable to give very definite categorical replies to your questions:

(1) Uncertain but found in most districts.
(2) It is uncertain for how long the disease has been in existence in this country.
(3) Unknown. It is suspected that a number of cases have gained their infection in South Africa but whether spread from such foci has taken place is unproved.
(4) Male adults are certainly more frequently seen suffering from the disease (females less often seek treatment at the hands of Europeans).
(5) Course of pulmonary disease rapid and invariably fatal. There appears to be no degree of immunity to the disease.
(6) This has been asserted but spread in this country is unproved.
(7) P.M.O.'s Annual Report 1912-13:—1,274 repatriates from S.A. Mines examined: 39 or 3·01% were found to be phthisical and 122 or 9·5% in addition were returned as suspicious. It is unknown to me whether spread in the villages occurs.
(8) *Pneumonia*: very common especially in the cold season (May, June, July).

Malaria (subtertian) very prevalent.

Enteric Fever: I believe I have shown for the first time this year in this country, definite evidence of the occurrence of enteric fever among natives by clinical and pathological evidence and serum reaction

but I have only seen four definite cases. I suppose it is to be really not uncommon but rarely seen.

Measles: Outbreaks are common in the village population but comparatively seldom come under the notice of Medical Officers.

Syphilis: The increase of syphilis among the native population especially in the more civilized districts I have recently called attention to.

Helminthic infections: Last year I showed how prevalent such were in all the districts in this Protectorate.

District Medical Officers following up these investigations have more than confirmed my own observations.

P.M.O. Annual Report 1912-13, following figures given:—

	Ankylostomiasis.	Intestinal Schistosomiasis.	Strongyloides.	Tricocephalus.	Taenia.	Bothriocephalus.	Ascaris.
N. Nyasa, Koranga	40·4	32·3	..	1·54	..	..	9
S. Nyasa, Ft. Johnston ..	44·0	6·1	2·3	..	4·0	..	..
Ruo, Chiromo	16·8	4·9	..	1·9	..	..	2·9
Zomba, Goal	22·1	3·8	3·2	2·6	·8	·16	..

Both A. duodenale and N. americanus are found. I have also found in a few cases Triodontophorus diminuts.

In the majority of cases the infection with ankylostomes is not a heavy one, judging by the number of ova in the stools and the number of worms found post-mortem. Urinary Bilharziasis is very common but I have no definite figures as for Intestinal Bilharziasis, but from post-mortem observations I think the infection is much more frequent than supposed as I seldom fail to find evidence of it.

I may here add that I have shown that Pellagra is rife in the Central Gaol and there is evidence to believe that it exists scattered all over the country. If this is the case it may play some part in predisposing to tuberculosis.

(9) *Pneumonia* very protean, I have been struck (1) by the large proportion of cases ending by lysis instead of crisis; (2) by large number of abortive attacks; (3) large number in which both lungs are affected; (4) by the number of cases of Pleurisy with no signs of consolidation which end by crisis and are evidenfly of Pneumococcal origin.

(10) Hut, circular, of grass, with mudded walls and grass roof, very poorly ventilated and no sunlight admitted; one family to each hut, man and wife sleep on same mat on ground.

In and around townships and elsewhere where European influence is felt, large huts are built with little windows which is a good thing but the more civilized native affects European clothing and I think is more easily affected by cold: he ruins his teeth and digestion by eating biscuits and sweets and by drinking tea. The missions are largely responsible for this, I think. A raw native may be covered with dust, but the mission boy is too often covered by clothes saturated with decomposing sweat.

Mission influence is, too, I think partly responsible by loosing the old grip of native custom, for the spread of venereal disease.

(11) I cannot offer any direct evidence but I believe the Missions have found an increased incidence among their pupils.

(12) I am of opinion that as far as a country like this is concerned the points about prevention of spread are in the main summed up in "Segregation" of cases of open tuberculosis. Inspection of natives returning to this country for cases of Tuberculosis. Inspection of all districts for

similar cases. Segregation of all cases of Phthisis into camps where proper supervision can be given to ensure best conditions for patients and best means of preventing spread of the virus.

Attempts should be made as far as possible to ensure the best possible health of the native population by prevention and treatment of ankylostomiasis, etc. We are making such an experiment in one district of this Protectorate where a campaign against Ankylostomiasis and Bilharziasis incidentally, is to be made.

In conclusion, if there is any further information that you consider I might be able to give you on any point arising out of this communication I trust will not hesitate to write to me again.

I am, etc.,

(Signed), HUGH S. STANNUS, M.D. Lond.
Medical Officer, Zomba.

IV.—Reply by Dr. R. M. Macfarlane, The Mission, Blantyre.

The Mission, Blantyre,
Nyasaland, Africa,
14*th July*, 1913.

DEAR SIR,

With reference to your letter, No. 1474/13, of 11th June, I have pleasure in giving you all the information I can on the subject of Tuberculosis among the natives of Nyasaland.

For the sake of being systematic I shall take your points *seriatim*, and make any remarks which may be necessary under each heading.

(1) Tuberculosis prevails to a somewhat limited, but rapidly increasing extent among the natives of Nyasaland. One gets perhaps eight or sixteen cases among the 350 to 400 in-patients in the Blantyre Mission Hospital during the year, and sees probably as many more as out-patients who are not admitted to the wards. The number has increased quite noticeably in my seven years' experience of the country. During the earlier days of the Mission tuberculosis was, I believe, rarely, if ever, seen.

(2) It has been in existence probably for about twelve years, in the Blantyre district. Dr. Macvicar, now of Lovedale, states that during the four years, 1896 to 1900, he was in charge of the medical work at the Blantyre Mission he saw not a single case of any form of tuberculosis among the hill people. Of course I can only speak of the Blanytyre district from my own experience.

(3) The general cause of its present prevalence is the opening up of the country to communication with outside Territories. The chief source of infection I consider to be natives returned from work of various kinds in South Africa. There have been many instances in proof of this. The influx of Indian traders into the country has also doubtless had an influence, for phthisis is fairly common among them, and they associate a good deal with the natives.

It is chiefly spread through the insanitary habits of the natives. The native hut is very small, very dark, and has almost no ventilation, while at nights it is very overcrowded and has every possible aperture sealed as securely as possible. The native, moreover, spits all over the floor, or wherever he happens to be; and the native house therefore makes an ideal incubator for the tubercle bacillus.

(4) Males and females appear to be equally affected. A large proportion of my cases has been among women, and one must take into consideration that men come more readily to the hospital for treatment. I have not seen so many cases in children, even of gland or bone disease. Phthisis is the commonest form of the disease, but the bone and gland forms seem to be commoner in some tribes, *e.g.*, the Angoni and Achipeta, who are, on the whole, of poorer physique than the Yaos of the Shire Highlands.

(5) The course of the disease is generally very rapid (in the case of phthisis) though in many cases it is difficult to estimate the duration as patients come to us only when they are far advanced in the disease. I have not known of any cases of phthisis recover, though I have heard of one apparently genuine case.

I do not consider that the native has any special proclivity to the disease, but his insanitary habits of life to which I have referred make him extremely liable to infection once the bacillus is introduced. I think that this fully accounts for the increase of phthisis among the natives here. I think that early cases might be arrested if the patient came under treatment in time, and if he adhered to the advice given him as to the care of his health. He has as yet, however, no faith in such methods of treatment as fresh air, etc., and if he does not get from the doctor medicine to drink or inhale of which he feels the benefit at once he goes away disappointed with the European, to seek treatment at the hands of one of his own medicine men.

(6) As mentioned under No. 3, I consider South Africa, and the mines especially to be the chief source of infection. Some of my own cases have shown this, and, as a recent concrete example, an examination of 50 repatriates last year by one of the Government Medical Officers revealed four advanced cases and two suspicious cases of phthisis. There can be no doubt that these people spread the disease in their villages.

(8) Pneumonia, Malaria, Bilharzia, Intestinal Worms, Enteric and Measles all prevail in Nyasaland, though Enteric is known only to a small extent. None of these diseases has ever appeared to me to predispose to Tuberculosis.

(9) Pneumonia is very common. Cases occur at all times of the year, but it is especially frequent during the cold months, May to July. It is generally of the acute lobal variety.

(10) I have answered the first part of this enquiry under No. 3. Among the educated natives there is a tendency to forsake partly the native diet of maize flour and beans, and to go in for such European delicacies as tea (generally much over-infused), bread and fancy biscuits which they can buy from the European or Indian stores. This is bound in time to affect adversely the physique and resistence to disease of the natives, though it is not yet noticeable. There is also a tendency to the wearing of excessive European clothing, which is, in many cases, filthy.

(11) I have not observed any difference between educated and raw natives as regards tuberculosis. My cases have been about equally divided between the two classes.

(12) As regards means of combating disease amongst natives, I can only suggest for conditions such as are at present in Nyasaland. Here it might be possible to segregate actual cases under supervision in good hygienic conditions. The stopping of organised recruiting for the mines is an obvious measure, and individual emigration should be discouraged as much as possible. A great deal can be done in the way of educating the natives. A weekly lesson in hygiene has been given for the last five or six years in the Blantyre Mission School by the mission doctors, accompanied by demonstrations with diagrams, the microscope, the lantern and actual specimens. We are now finding that the pupils are beginning to take a very intelligent interest in the diseases which are prevalent among themselves and to be convinceed that there may be something in the European theories as to the cause of disease and their methods of treatment. I am convinced that by pursuing this method a great deal can be done to arrest the spread of tuberculosis in Nyasaland, and doubtless it would have a place in any measures which might be adopted for the South African Union.

I must apologise for having been so long in replying to your letter. I was away in Portuguese East Africa when your letter arrived, and have only now found time (26th August) to finish what I began to write on 14th July. I hope the information I have given may be of some assistance to you in your enquiry. Dr. Caverhill is now in charge of the Blantyre Mission Hospital, and I am sure he will be pleased to answer any further enquiries which you may wish to make. I am to be stationed at a new station which our Mission has just opened in Portuguese East Africa.

I am, etc.,

(Signed) R. M. MACFARLANE.

V.—Reply by Dr. Robert Laws, Overtoun Institution, Livingstonia.

Overtoun Institution,
Livingstonia, Nyasaland,
23rd October, 1913.

Dear Sir,

I have to acknowledge receipt of your letter No. 1475/13 of 11th June, 1913.

I am deeply impressed with the importance of the subject of Tuberculosis, especially as affecting the natives of the country, and in answering your letter I shall take up the points on which you ask information and may supplement this by further details if necessary.

As you mention having written to Dr. Stannus of Zomba, and Dr. Macfarlane of Blantyre, I shall confine my answers chiefly to the Lake Nyasa district, on its western side.

1. Speaking broadly the disease, as yet, is not widely prevalent among the natives, but its incidence varies in different districts. As a rule it is not so prevalent on the high lands as on the lake shore villages; while I have heard, that it is rather common in the hot, humid Luangwa Valley west of Lake Nyasa, and I was surprised to find in 1905, when on a journey west to Lake Mweru and the Congo south of it, it was more common and widely scattered there than I had anticipated. Dr. MacFarlane had four cases in his hospital at Mberethe (I refer to Dr. Wilfrid MacFarlane of the London Missionary Society, not the Dr. Macfarlane of Blantyre). You will understand that statistics not being available, I can only give you impressions from my experience.

2. The first case of Phthisis I had to deal with in the country was a native who came from South Africa in 1876 and died in 1877. This occurred at Cape MacClear on the south end of Lake Nyasa. In 1881 I moved further up the west side of Lake Nyasa to Bandawe, and found the disease there, but confined then to one or two families. In 1894 I moved to this place about 60 miles from Karonga which is near the north end of Lake Nyasa. Here our station is five miles due west of the lake shore, but 3,000 feet above it. Since coming here I have heard of several cases from the neighbourhood of the families at Bandawe already alluded to.

Within the last ten years it has been increasing in this district, which may partly be accounted for by more cases becoming known, and cases due to importation from South Africa.

3. A number of cases have been natives who went to South Africa, chiefly working in the mines, and who have returned infected by the disease. Some thus infected died on their way home. Its spread I think is chiefly due to the dissemination of the bacilli in the spufum, drying on the floors and walls of huts occupied by patients, and also when expectorated outside the houses, being disseminated by flies and in the dust.

4. Hitherto all the patients I have had to deal with have been males, but it is quite likely some women and children have been affected, but they have not been brought to me for treatment.

5. Tuberculosis in the form of Phthisis runs an extremely rapid and fatal course. I have known no case of final recovery among the natives, but in connection with this it has to be borne in mind that the disease is often far advanced before patients are brought for treatment. Two cases of tuberculous disease of the bone came back infected from South Africa, and both proved fatal.

It is not easy to say whether there is a great proclivity of the disease among the natives because of the fewness of the cases dealt with. I am inclined to think that there is such a proclivity and look to two tendencies as bringing this about: (*a*) the general tendency of a race to be liable to a new disease in a severe form; (*b*) the dark huts, often dirty and unventilated, in which the natives spend their nights.

6. More natives have come back from the mines infected by Tuberculosis than have been found among those who have not left their homes. The numbers from the lake district have not been great, but one of these, when the sputum was examined by the microscope showed the heaviest infection of tubercle bacilli I have ever seen. He was brought to the hospital here, and quickly succumbed to the disease. Another one said to be equally ill, I heard of as being in another village, but did not get him to come for treatment. As these cases in the south were increasing in number, I reported the danger to Zomba, and I understand, the first batch of natives who arrived after that from South Africa were examined and eight found to be infected. The man referred to above was fortunately in a hut by himself; whether others in his village became infected I do not know.

7. This has been answered under 6.

8. Pneumonia and Malaria (including Blackwater fever) were quite common. In certain districts Tick fever due to the infection carried by *Ornithodorus moubata* is very prevalent, while in others it is unknown.

Bilharzia is quite common, and I have known it since 1875.

Intestinal worms. Of these there is a great variety, including Tape worm and the other worms common at home. In addition to these our greatest danger at present is probably due to the Ankylostome, of which we have two varieties. Three years ago a case of Dysentery brought from Karonga puzzled me greatly till examination of the man's fæces showed vast numbers of Ankylostome Ova. This led to an outlook for other patients suffering in the same way, and at length to Government investigation, resulting in an estimate of between 7,000 and 8,000 cases within a radius of 25 miles of Karonga, and also that the disease is widely spread throughout Nyasaland Protectorate, and may prove serious for South Africa, by natives from the north of the Zambesi carrying it there. That this is not mere fancy is shown by a native going south, finding his strength failing him returned home, and was found to be heavily infected, and of course had been scattering ankylostome ova along the course of his journey.

Enteric fever appeared for the first time about 15 years ago among the Europeans at Blantyre, and there have been four or five European cases on the lake the first of which proved fatal. I have never seen real enteric fever among the natives, although a typhoid condition is at times seen along with malaria and tick fevers. Measles, German measles and whooping cough all occur in epidemics, and another disease curiously like a cross between scarlet fever and measles, so far as symptoms are concerned, also occur in epidemica. One attack, however, affords no immunity from other attacks of the same disease.

9. Pneumonia is common enough and specially frequent about the end of the rains, and the beginning of the cold season, say here from April to June. It is usually of the ordinary type, but at times the cardiac variety breaks out and is seldom limited to a single case when it appears. To my mind this is a most treacherous form of the disease, as I have had cases where the most careful examination of the lungs showed no dulness or other symptoms of pneumonia, though the temperature made one suspicious. Dulness and rusty sputum appeared only a few hours before death.

10. Circular huts are the common type of native huts throughout the country, although in these there is great variety as to structure and internal arrangements. Food is chiefly vegetable, supplemented by fish at the lake shore, and to some extent, there and on the hills by meat. One hill tribe of capital physique depends largely on beans and peas. European influence is affecting the natives, in some ways adversely, but on the whole decidedly to their advantage. In many places the round hut is giving place to oblong houses of several rooms, sometimes with chimney and fire places, usually with windows which can open, and hinged doors. With regard to ventilation, light, air space and cleanliness these show a vast improvement on the dark native hut. Where there is risk to the native, is chiefly in his abuse of clothing. Having acquired extra clothes, it looks as if he felt he must show them by putting on as much as possible, and that, too, in the heat of the day. Naturally this makes him uncomfortable, and in the evening he often strips himself and sits down in a draughty place with the result of catarrh, bronchitis or other more serious lung trouble following.

11. Though this question cannot be answered by me satisfactorily, if confined to Tuberculosis in its present limited extent, it has a wide significance when applied to disease as a whole, and in this way has a bearing on the Tuberculosis of the future. I think that perhaps the greatest advance between the result of education and Christianity on the natives, as compared with the raw native, lies in the reduction of infant mortality. Between 1875 and 1880, I was very much struck by the difference in this respect on comparing the village where the houses were built with plenty of light and air and kept under European supervision, with several other native villages left to follow out their own plans. The little graves in the cemetery showed a very much higher percentage from the raw native hut as compared with the improved dwelling. Regular habits and adequate provision of food, from steady work and forethought, do much to build up a good physique.

12. In answering this question I must ask you to excuse what may appear egotistical in the remarks I have to make. In preparing for my work as a medical missionary, I was very much struck in my studies of the incidence of civilisation upon native tribes and of the very dangerous character for the native of the transition period between barbarism and civilisation. In some cases I found it had led practically to the annihilation of the tribe, in other

cases to the disappearance of a great many of its members. From 1875 onwards, my endeavour has been to arrange the work of our schools, institution, and industrial departments so as to avoid these dangers as far as possible. All our village schools have a maximum of four hours or less per day of work in school, while the rest of the day is usually spent by the pupils in the open air. Indeed, very often to begin with, our schools are held in the open air, under the shade of a tree. In our Institution, where study becomes more intense, there has always been two and a half hours per day given to manual training. This is conducted to a large extent out of doors. Exercises and drill form part of our regular work, in all our schools, and special games are engaged in at the Institution. We look upon the playground as one of the most valuable classrooms. For many years we had not a single death among the pupils gathered at our Institution.

We have urged upon the adult Christians the necessity to have better ventilation, and better lighted houses, and in some districts such have been largely adopted. A house, with a fire place and its chimney, and window which will open, and a door through which one can walk upright, means physical advance for the community.

In looking at the habits of the natives as a whole, we find that their life here is practically spent in the open air, a house being to them simply a bedroom to sleep in at night, and a shelter from rain or wind during the day, when such prevails. To this open air life I attribute largely the reason why Tuberculosis has not spread more than it has done from known foci of infection.

On the other hand, a patient suffering from Tuberculosis and living in a dirty dark house, expectorating on the walls and floor, can readily become a source of gravest danger to sympathetic friends sitting at his side as visitors, and the dust from such a house, when swept, can readily spread the infection. The custom of a hut being pulled down, burned, or allowed to fall to pieces, without occupation after the person has died in it, has proved a source of safety from the infection of tuberculosis.

With civilization there is arising much more indoor life. Tailors, clerks, storekeepers and others spend a good deal of their time inside the house, where the work cannot be done, or is not done, on an open verandah. Moreover, infants and young people who would have succumbed to the perils of childhood now reach maturity, and though better food and conditions of life generally improve their physique, a low percentage of the non-robust survive.

One danger I should point out, and that is the tendency among some tribes to too early marriages, especially among girls. The effect of maternity on immature girls is seen not only as a cause to infant mortality, but of puny, weakly children, ill-fitted for the strain of future life. On the mother herself, the nursing of children, while she herself is immature, tends to a low state of vitality, and a poor resistence to the attack of disease or accident. Frequent pregnancies, in such individuals, make the women prematurely aged, and infirm, while their children are apt to be stunted in their growth.

At the Institution here, in the training of our teachers, we have regular classes for hygiene, and in addition to the common facts of physiology with regard to health, special attention is given to their instruction in the nature and cause of the most prevalent diseases of the country such as Malaria, Dysentery, Tuberculosis, Ankylostomiasis, Tape worm and the like. We try to impress upon these teachers the necessity of their becoming leaders of their fellow countrymen in matters of sanitation and public health. This teaching is supplemented by demonstrations with the magic lantern, miscroscope, and actual specimens of intestinal worms, and when possible they get instructions in village sanitation. When they go out to village schools they have to see to their sanitary conditions.

Such lads have a hard task before them in meeting the *vis inertia* and prejudice of the people in the villages where they go to teach. Often these villagers not only laugh at the teachers, but upbraid them, as simply being subservient to the Europeans, by imbibing such foolish notions. Such uphill work and opposition is more than many teachers can stand, nevertheless the truths they teach are gladly finding a lodgment, and a better public opinion is gradually rising, which will make sanitary legislation possible of execution, instead of being merely a dead letter of the law.

As to suggestions, I think working through schools always, and through the grown up people where possible, by the dissemination of knowledge as to the causes and spread of disease, together with the necessity of improved light and ventilation in houses, and instructions on sanitation, seems to afford the best means of preventing the spread of such diseases.

I may mention that later in the year 1877 a Scotsman died of phthisis at Cape MacClear. His case was a typical example of "Galloping Consumption." He was a boatman, and on a voyage round the lake was wrecked and suffered considerable exposure. He was carried ashore to our station at Cape MacClear, and died in a few weeks time. I may mention he had not been in contact with the natives referred to above, and the interesting question is raised, whether the same rapid and fatal course may not follow in European infection by Tuberculosis, as is seen in the natives, and what, if any, climatic influences has to do with this increased virulence.

I am sorry I cannot throw my notes into more definite statistical form, but your experience of South Africa will enable you to understand the reason for this better than those working in old civilized countries.

Wishing you every success in the labours of your Commission, and in the practical outcome of this in the prevention of human suffering, and in the saving of human life.

I am, etc.,

(Signed) ROBERT LAWS.

ANNEXURE "B."

RETURN OF PLACES VISITED, INSPECTIONS MADE, AND WITNESSES EXAMINED BY THE COMMISSION.

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
Cape Town ..	18th March to 4th April, 1912.	Cousins, Mr. C. W., Chief Immigration Officer (Cape)	Old Somerset Hospital.
		Marais, Dr. D. P.	Free Dispensary.
		Mitchell, Dr. J. A., Assistant Medical Officer of Health for Union.	Dr. Marais' Sanatorium.
		Thornton, Dr. E. N., Medical Adviser to Cape Provincial Administration.	Native Compound, Harbour Board Area.
		Cox, Dr. J. H., Medical Supt., Old Somerset Hospital	Convict Station.
		Morris, Dr. F. M.	City Infectious Diseases Hospital.
		Borthwick, Mr. J. D., P.V.O., Cape	Relief Camp, Oude Moelen.
		Anderson, Dr. J., M.O.H., Cape Town	Native Location, Maitland.
		Thomas, Dr., Port Health Officer	—
		Bruce-Bays, Dr.	—
		Smit, C. W., Registrar of Births, Deaths and Marriages	—
		Wood, Dr., M.O.H., Kalk Bay	—
		Watkins, Dr. A. (M.L.A.)	—
		Hewat, Dr. Bennie	—
		Robertson, Dr., Govt. Bacteriologist (Cape)	—
		Lester, Dr. J. B.	—
		Englebach, Dr., Govt. Police Surgeon	—
		Eyre, Dr.	—
		Hazell, Dr.	—
		Muir, Dr. J., Supt.-General Education (Cape) ..	—
		Roux, Dr., District Surgeon, Malmesbury	—
		Waterston, Dr. Jane	—
		Hewat, Dr. M., President British Medical Association (W.P. Branch).	—
		Abdurhman, Dr.	—
		Reid, Mr. A. H., Chairman, Society Prevention of Consumption.	—
Johannesburg	15th April to 13th May, 1912.	Fleming, Dr. A. M., Medical Director, S. Rhodesia	Hospital, Compounds and Change Houses, Simmer and Jack.
		Van Niekerk, Dr. S. V., Mines Medical Inspector ..	Johannesburg Hospital.
		Chamney, M., Immigration Officer for Transvaal and Registrar of Asiatics.	—
		Mackenzie, Dr. R. P., Medical Supt., Johannesburg Hospital.	—
		Murray, Dr. G. A. E.	—
		Pritchard, S. A. M., Director, Government Native Labour.	—
		Russell, Dr. W. M., Chief District Surgeon, Johannesburg.	—
		Baumann, Dr. Emil.	—
		Heberden, Dr. S., District Surgeon, Johannesburg ..	—
		Bensusan, Dr. A.	Miners' Phthisis Sanatorium.
		Rogers, Dr. W. A.	—
		Visser, Dr. T. C., Medical Visiting Officer, Gaol ..	Government Lazaretto.
		Smith, J. Irvine, Director, Johannesburg Abattoirs ..	Chronic Sick Home, Reitfontein.
		Arnold, Dr., M.O.H. for Union	Hospitals and Compounds, Crown Mines.
		Wille, Dr. F. A.	Municipal Abattoirs.
		Mehliss, Dr. Max, Supt., Lazaretto and Chronic Sick Home.	Crown Mines.
		Moll, Dr. A. M.	Government Native Labour Compound, Driehoek.
		Brock, Dr., Medical Supt., Government Native Labour Compound, Driehoek.	Jupiter Mine Hospital.
		Mangold, Dr. Gustav	Nourse Mines Hospital and Compound.
		Rigby, Dr., Senior Medical Officer, Premier Diamond Mining Co.	City Deep Hospital.
		Watts, Dr. A. F., Senior Medical Officer, Goldfields Group.	Premier Mine Hospital and Compounds.
		Honey, Dr. J. A.	Compounds, Hospitals, Underground and Surface Workings, Simmer and Jack.
		Irvine, Dr. L. G., Joint Medical Officer, Crown Mines	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Frew, Dr., Medical Officer, Wit Deep and Knights Central Gold Mines ..	Joint Hospital and Compounds Witwatersrand Deep.
		Dairymen's Association Representatives	—
		Watkins Pitchford, Dr., Govt. Pathologist and Bacteriologist.	Knights Central Compound.
Pretoria ..	14th May to 21st May, 1912.	Boyd, Dr. J. B., M.O.H., Pretoria	W.N.L.A. Compound.
		Theiler, Sir A., Director of Veterinary Research for Union.	Pretoria Native Location.
		Representatives, Dairymen's Association	Municipal Sewage Works.
		Kay, Dr., District Medical Officer, N. Transvaal ..	Infectious Diseases Hospital.
		Savage, Dr. S. R., Railway Medical Officer.. ..	Railway Compound.
		King, W. A., Sub-Native Commissioner, Pretoria ..	Lunatic Asylum.
		Sanders, Dr., District Surgeon, Pretoria	—
		Erlank, J. J., Registrar-General Births and Deaths	—
		Dunstan, Dr. J. T., Medical Supt., Pretoria Asylum	—
		Johnston, Andrew, Mayor of Pretoria	—
Lydenburg ..	25th May, 1912	Manning, Dr. Carl, District Surgeon..	Berlin Mission Station.
		McVea, Dr.	—
		Hunt, D. R., Sub Native Commissioner, Seccoconiland	—
Pilgrim's Rest	27th May to 28th May, 1912.	Gibson, Dr. W., Medical Officer, T.G.M. Estates ..	Clewer Mine.
		Ball, Dr. W., Add. District Surgeon..	Peach Tree Mine.
Sabie ..	30th May, 1912	Dixon, Dr. W. H., Medical Officer, Glynn Lydenburg Mine.	Belvedere Power Station.
		Seccombe, Dr. C., Medical Officer, Buchanan and Bettylangriffwith Mines.	—
Witbank ..	1st June, 1912	Allen, Dr., Medical Officer, Witbank and T. & D.B. Collieries	Witbank Colliery, Native Compounds, Hospital Quarters, Underground Workings.
			T. & D.B. Colliery, Native Hospital and Married Quarters.
			T. & D.B. Colliery Underground Workings.
Durban ..	7th June, 1912, to 25th June, 1913.	Haydon, Dr. L. G., Assistant M.O.H. for Union. ..	Municipal Native Eating House
		Adams, Dr. Basil, M.O., Tuberculosis Bureau, Municipality.	Municipal Kaffir Beer House.
		Park Ross, D. W., Govt. Bacteriologist and Pathologist (Natal).	Hostel for Native Women.
		Polkinghorne, J. A., Protector, Indian Immigrants	Native Barracks.
		Balfe, Dr., Supt., Addington Hospital	Addington Hospital.
		Fernandez, Dr., Port Health Officer	Rose Hill Brickworks.
		Smith, Mr. H., Immigration Restriction Officer ..	Avoca Hospital.
		Birtwell, Dr., District Surgeon	Storm Bros. Brickworks.
		Hiene, Mr., Togt Inspector	Natal Sugar Estates, Mount Edgecumbe.
		Campbell, Dr. S. G.	Wilkinson's Sugar Estate, Verulam.
		Addison, Dr., District Surgeon, Durban Co.. ..	Railway Coolie Barracks.
		Brunner, Mr. (Eshowe)	African Boating Cos. Barracks.
		McCord, Dr. J., American Mission	Indian Immigration Board Depot and Hospitals.
		Bridgman, Revd. F. B., Secretary, American Zulu Mission.	Trappist Monastery, Pinetown Schools, Native Quarters, Hospitals and Industrial Estates.
		Peverley, Dr.	Indian Immigration Depot.
		Harber, A. F., Govt. Veterinary Surgeon	Durban Central Gaol and Hospital.
		Gray, Dr. Murray	Point Convict Station and Hospital.
		Walters, Rev. W., District Surgeon, Nogom ..	Railway Native and Indian Compounds.
		Gibson, J. Y., Magistrate, Durban	Municipal Native and Indian Compounds.
		Gordon, W. R., Retired Resident Magistrate ..	—
		Murison, Dr., M.O.H., Durban	—
		Burton Nicol, Dr., late Medical Supt., Indian Immigration Board.	—
		Hollander, F. C., Mayor of Durban	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Nanje, Dr.	—
Eshowe ..	27th June to 29th June, 1912.	Wildish, Mrs.	Eshowe Hospital.
		Wildish, Dr., District Surgeon	Eshowe Mission Station.
		Rodseth, Mrs.	Entumeni Mission Station.
		Steniburg, Mrs.	Eshowe Kraals.
		Hignett, C. F., Resident Magistrate and Native Commissioner.	Eshowe Kraals. Eshowe Gaol.
Pietermaritzburg.	1st July to 4th July, 1912.	Ward, Dr., District Surgeon	Grey Hospital.
		Millar, P., Registrar-General (Natal)..	Maritzburg Asylum.
		Woods, Dr., M.O.H., Pietermaritzburg	Indian Circle Hospital.
		Mudie, Mr., Supt.-General, Education	Railway Hospital.
		Loverock, J. A.	Railway Indian Barracks.
		Samuelson, S. D., late Secretary for Native Affairs..	Wesleyan Native Mission Station, Edendale.
		Allan, Dr.	—
		Watt, Dr. Campbell, District Surgeon, Extra City Area.	—
		Birt, Dr., Medical Supt., Grey Hospital	—
		Sanders, Mr., Mayor of Maritzburg	—
		Hyslop, Dr., Medical Supt., Asylum..	—
		Oddin Taylor, Dr.	—
		Niven, Mr., Borough Engineer	—
Durban ..	5th July to 15th July, 1912.	Sanders, E., Managing Director, Tongaat Sugar Estates and Chairman, Indian Immigration Board	Dr. McCord's American Mission Hospital.
		Hollander, F. C., Mayor of Durban	Phœnix Mission Station.
		Bray, Dr. J. A., President, Medical Council.. ..	Inanda American Mission.
		Thornton, Dr., District Surgeon, Kokstad	Isipingo.
		Polkinghorne, J. A., Protector, Indian Immigrants	Amanzimtoti American Mission
		Haydon, Dr., Assistant M.O.H. (Union)	—
		Shepstone, Hon. Mr. Justice	—
		Knight, Dr., District Surgeon, Pinetown	—
		Shepstone, Mr. A. J., Acting Chief Native Commissioner, Natal.	—
		Oliver, Mr., Assistant Managing Director, Jos. Bayne's, Ltd.	—
		Hill, Dr., District Surgeon, Verulam	—
		Chapman, A., Secretary, Ancient Order of Foresters	—
		Baker, W. J. H., Secretary, Ancient Order of Oddfellows.	—
		Fisher, Dr., District Surgeon, Umzimkulu	—
		Hoare, F., Director, Durban Rickshaw Co... ..	—
Umzinto ..	15th July, 1912	Bonfa, Dr. A., District Surgeon	Umkomas Native Reserve.
		McKenzie, Mr., Assistant Magistrate	Smith Farm and Native Kraals.
			Examined number of Natives.
Malenge Valley	17th July to 18th July, 1912.	.. ..	Examined Natives Kraal near Station.
			Kokstad Hospital.
Kokstad ..	18th July to 20th July, 1912.	Richardson, R. A., Field Cornet	—
		Duncan, Dr. J., Acting District Surgeon	Examined 4 Griquas.
		Harley, Mr. W., Field Cornet	Roman Catholic Convent.
		Evans, Mr. H. F., Field Cornet	Certain Griqua Dwellings.
		Barclay, Mr., Mayor	—
		McAlister, Mr., Town Clerk	—
		Howlett, Rev. Father, in charge Roman Catholic Convent.	—
		De Bruin, Cornelius, Headman	—
		Werner, Fred	—
		Goodall, A., Govt. Veterinary Surgeon	—
		Clarence, W., Field Cornet	—
		Gunter, Carl, Field Cornet	—
		Scott, J. H., late Chief Magistrate, E. Griqualand ..	—
		Leary, W. Power, Resident Magistrate	—
Mount Ayliff	20th July, 1912	Hunter, Rev., Gillespie Mission Station	Examined number of Natives.
		Nicol, Dr., District Surgeon	Gaol and Magistrate's Office.
		Farrant, Mr., Resident Magistrate	Gillespie Mission Station.
Brookes Nek	20th July to 31st July, 1912.	.. ..	Examined number of Natives.
Bizana ..	21st to 22nd July, 1912.	Thompson, Dr., District Surgeon	—
		Hughes, Mr., Labour Agent	—
		Clarke, Rev.	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Antill, Mr., Labour Agent	Examined number of Natives.
		Hargreaves, Mr., Resident Magistrate	—
Emfundisweni	22nd July to 23 July, 1912.	Curnick, Rev., in charge of Mission	Emfundisweni Mission.
		Stuart, Mr. J., Trader	Examined number of Natives.
Flagstaff	23rd July to 24th July, 1912.	Hunt, Mr., Labour Agent	Examined number of Natives.
		Marwick, Mr., Labour Agent	—
		Burmester, Mr., Scab Inspector	—
		Meth, Mr., Labour Agent	—
		Tucker, Mr., Scab Inspector	—
		Eckhardt, Mr., Active Resident Magistrate	—
Lusikisiki	24th July to 25th July, 1912.	Behr, Mr., Labour Agent	Examined number of Natives.
		Cooper, Dr., District Surgeon	—
		Gladwan, Mr., Resident Magistrate	—
Port St. John's	25th July to 1st August, 1912.	Querney, Dr., District Surgeon	Examined number of Natives.
		Roberts, Mr. C. H.	—
		Conry, Dr. J.	—
		Le Roux, Dr. H. G. F. E.	—
		Gregory, Mr. F., Labour Agent	—
		Hlamana, Ed.	—
		Majombe	—
		Alfred	—
		Brownlee, Mr. F., Resident Magistrate	—
Libode	1st August, 1912	Bunn, Mr., Resident Magistrate	—
		Heathcote, Mr., Labour Agent	—
Umtata	1st August to 4th August, 1912.	Welsh, Dr. R. H., District Surgeon	—
		Walker, Dr. P. H., District Surgeon, Nqunduli	Que Que Location.
		Spreull, Mr. J., Govt. Veterinary Officer	Umtata Hospital.
		Welsh, Surg. Capt., C.M.R.	—
		Stanford, A. H. B., Chief Magistrate	—
		Melville, Dr. D.	—
		Dalin Dyebo, Chief	—
		Funanee, Rev.	—
		Marseve, John	—
		Brownlee, Mr. W. T., Magistrate	—
Qumbu	4th August, 1912	Everall, Dr., Acting District Surgeon	—
		Shaw, Mr., Resident Magistrate	—
Mount Frere	4th August to 5th August, 1912.	Herries, Mr., Resident Magistrate	—
		Tebb, Dr. Virtue, District Surgeon, Tabankulu	—
		Hoare, Dr. Morley, District Surgeon, Mount Frere	—
		Loch, Rev., in charge Osborne Mission	Osborne Mission Station.
		Millar, Dr., District Surgeon, Flagstaff	—
Shawbury	6th August, 1912	Mears, Rev., in charge of Mission	—
St. Cuthbert's	7th August, 1912	McMurtrie, Dr.	St. Cuthbert's Hospital and Mission Station.
		Ley, Rev. Father	Examined number of Natives.
Tsitsa Bridge	7th August to 8th August, 1912.	Bowen, Dr., District Surgeon, Libode	—
Tsolo	8th August, 1912	Young, Mr. J. D., Resident Magistrate	—
		Leslie, Dr. L. H., District Surgeon	—
		Payn, Mr. P. B., Trader	—
Umtata	9th August to 10th August, 1912.	Lowry, Mr. H. T., Mayor	Examined two Natives.
		Ramsay, Mr. E. J., Town Clerk	Moravian Mission, Tabase.
		Mot.s, Rev., Tabase Mission	—
Idutywa	10th August to 11th August, 1912.	Lumley, Dr. C. A., District Surgeon	—
		Douglas, Mr. C., Labour Agent	—
Willowvale	11th August,	Liefeldt, Mr. M. W., late Resident Magistrate	—
		Knapman, Dr. H. L., District Surgeon	—
		Mamba, Mr. Enoch	—
		Manxiwa, B.	—
Idutywa	11th August to 12th August,	Aitken, Dr. C. J. H.	—
		Davies, Mr. T. R. G., Labour Agent	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Heaton, Mr. F. S., Resident Magistrate	—
Clarkebury ..	12th August, 1912.	Lennard, Rev. A. J., Gen. Supt., Wesleyan Church	Natives examined Mtsindas Kraal.
		Underwood, Mr. C., Headmaster, Wesleyan Training Institute.	Addressed Meeting.
		Weir, Dr. J. W., District Surgeon, Engcobo ..	Examined number of Natives.
		Norton, Mr. T. W. C., Resident Magistrate, Engcobo	—
Butterworth	13th August to 14th August, 1912.	Wall, Dr. C. P. B., District Surgeon	—
		Daly, Mr. M. H., Labour Agent	—
		Petrie, Mr. D., Station Master	—
Kentani ..	14th August, 1912.	Thompson, Mr. M., Resident Magistrate	—
		Auld, Dr. C., District Surgeon	One Native examined.
		Auld, Rev. J. M., Wesleyan Missionary	—
		Macready, W. B.	—
		Soga, Rev.	—
		Somona	—
		Rukani.	—
		Cegani	—
Butterworth ..	14th August to 16th August, 1912.	Warner, Mr. C. J., Resident Magistrate	Examined two Natives.
		Fennell, Dr. A. P. R.	Butterworth Wesleyan Mission.
		Trow, Mr. G., Labour Agent	Lamplough Institute.
		Fennell, Mr. Fred, Trader	Butterworth Hospital.
		Baker, Rev., Missionary	Transkeian Training Institute.
Blytheswood	16th August, 1912.	Stormont, Rev., Principal, Blytheswood	Inspected Institute, Blytheswood.
Ngamakwe ..	16th August to 17th August, 1912.	Gilfillan, Mr. F. W. B. Resident Magistrate ..	—
		Struthers, Dr., District Surgeon	—
Tsomo ..	17th August, 1912.	Hartley, Dr. J. V., District Surgeon	—
		Macleod, R. J., Resident Magistrate	—
Cofimvaba ..	17th August to 18th August, 1912.	Arnott, Dr. W. O. H., District Surgeon	Examined number of Natives.
		Herbst, Mr. J. F., Resident Magistrate	—
St. Mark's ..	18th August, 1912.	Coake, Rev. Lloyd	Inspected St. Mark's Mission.
Johannesburg	4th Sept. to 5th Dec., 1912.	Adamson, Mr. J. E., Director-General Education (Transvaal).	Group Hospital and Compounds.
			Underground Workings, Jumper's Deep.
		Macaulay, Dr. D. (M.L.A.), Chief Medical Officer, Geldenhuis Deep and New Heriot.	Compound, Geldenhuis Deep
		Maynard, Dr. G. D., Assistant Medical Officer, W.N.L.A.	Driefontein Native Compound and Hospital.
		Hawarden, Dr. S., Medical Officer, New Modderfontein and Van Rhyn; M.O.H., Benoni.	Angelo and Driefontein Mines.
			New Goch Compounds.
		Morgan, Dr. Parry, 1st Assistant to Sir Almroth Wright.	Wolhuter Compounds.
		Millar, Dr. A. E., District Surgeon, Boksburg; Medical Officer to E.R.P.M.	Ferguson's Compounds, Northern Division, Native Hospital, Randfontein.
		Fehrsen, Dr. F. J., M.O. Pretoria, Central Prison ..	Underground by No. 5 Shaft, Randfontein.
		Adam, Dr. W., M.O. for Natives, Randfontein Group of Mines.	Hospital and Compounds, Princess Estate.
		Moller, Dr. C. T., District Surgeon, Germiston ..	Hospital and Change Houses, Vogelstruis Estate.
		Moses, W. W., Chief Inspector of Mines	Compounds and Hospital, Bantjes Mine.
		Smith, W. W., Senior Protector of Natives	Compounds and Hospital, Durban, Roodeport Deep.
		Griffith, J. I., Protector of Natives, Joh. Western District.	Hospitals and Compounds, Roodepoort United Main Reef.
		De Jager, Mr., Protector of Natives, Roodepoort District.	Kimberley Compounds.
		Terry, W. A., Protector of Natives, Boksburg District	—
		Transvaal Agricultural Union	—
		Lawrence, W. E., Protector of Natives, Roodepoort District.	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Gray, C. E., Prncipal Veterinary Officer (Union) ..	—
		Cowie, A., Mines Sanitation Officer, Johannesburg Municipality.	—
		Mitchell, Dr. J. C., late Govt. Bacteriologist, Transvaal.	—
		Falwasser, H. G., Protector of Natives, Germiston District.	—
		Lautre, E. P., Natives Affairs Inspector for Contractors' Natives.	Spes Bona Native Compound, S.A.H. Compound, Germiston.
		Layman, C., in charge G.N.L. Compound, Driehoek	Municipal Compounds.
		Smith, Mr. T., Compound Manager, Simmer and Jack Group.	Old Native Location, Indian Location, New Native Location and Abattoirs, Germiston.
		Devenish, G., Compound Manager, Robinson Deep Mines.	—
		Sthamer, Dr. Ed., District Surgeon, Roodepoort, and M.O., Princess Estate and Roodepoort Central.	Crown Mines, Langlaagte Deep, Crown Reef, Crown Deep and Bonanza Compounds and Change Houses.
		Robertson, W., Assistant Director of Veterinary Research (Union).	—
		Anderson, C., Chief Sanitary Inspector, Germiston ..	New Primrose Hospital and Compounds.
		Parfit, C., Chief Sanitary Inspector, Boksburg ..	Rose Deep Hospital and Compounds.
		Van der Merwe, Dr. W. J., M.O., Champ D'Or Mine	May Consolidated Hospital and Compounds.
		Dodds, Dr. A., M.O., New Primrose, Rose Deep and Glencairn Mines.	—
		Warriner, R. C., General Manager, Crown Mines, and President, Assoc. of Mine Managers.	—
		Brown, F. W. G., General Manager, Cinderella Deep	—
		Satorius, K. K. H., General Manager, May Consolidated.	—
		Hook, B., Joint Compound Manager, E.R.P.M. ..	—
		Stanwell, Dr. St. J., Assistant Medical Officer to Joh. Pass Office.	—
		Kerr, Dr. E., M.O., Native Hospitals, Wolhuter, and M.O. Benefit for Wolhuter, New Goch, Nourse City Deep Mines.	—
		Borle, Dr.	—
		Norton, A. P., Joint Compound Manager, E.R.P.M.	—
		Muir, Dr. J., Chemist to Mines Dept.	—
		Kotze, R. N., Govt. Mining Engineer (Union) ..	—
		Van Niekerk, Dr. S. V., Mines Medical Inspector ..	—
		Lund, Dr. T., Acting M.O.H., Germiston, and M.O., May Consolidated.	—
		Mackenzie, Mr., Chief Compound Manager, Crown Mines.	—
		Loesser, Dr., Joint Medical Officer, Crown Mines ..	—
		Leenhoff, Mr., Chief Sanitary Inspector, Roodepoort and Marnisburg.	Compound, Native Hospital and Change House, Married Location, Cinderella Deep. Underground Workings, Cinderella Deep. Robinson Deep Mine.
Dannhauser ..	6th Dec., 1912	Smith, A., Manager, Natal Cambrian Colliery ..	Native Quarters, Compound, Indian Quarters, Hospital and Underground Workings, Natal Cambrian Collieries.
		Payn, Mr., Compound Manager, Natal Cambrian Colliery.	—
		Sneddon, Mr., Manager, Durban Navigation Colliery	Native Compound, Indian Quarters and Hospital, Durban Navigation Collieries.
		Chambers, Dr., Mine Med. Officer, Durban Navigation	—
		Leggatt, Mr., Compound Manager, Durban Navigation	—
Hatting Spruit	7th Dec., 1912	Coulter, J., Gen. Manager, Natal Navigation Colliery	Native Compound, Indian Quarters and Underground Workings, Natal Navigation Colliery.
		Macdonald, Dr., M.O., Natal Navigation Colliery ..	—
		Smith, Mr. Robt., Compound Manager, Natal Navigation.	—
Dundee ..	7th Dec. to 10th Dec., 1912.	Galbraith, Dr., Indian Medical Officer, Glencoe Circle and M.O., Glencoe and Hatting Spruit Collieries.	Indian Immigration Board Hospital.

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Kempe, A. R., Supt., Swedish Mission	Swedish Mission.
		Norenius, L. P., late Supt., Swedish Mission ..	Government Hospital.
		Cross, J. W., Resident Magistrate	—
		Marshall, Major, Inspector, Natal Police	—
		Mate, Dr. R. A., M.O., South African and Wallsend Collieries.	—
		Richardson, C. E. H., Labour Agent	—
Vryheid ..	11th Dec., 1912	Wynn, W. E., Native Recruiting Corporation ..	—
		Jones, R. P., Labour Agent	—
		Wood, Dr. J. B., District Surgeon, M.O., Hoblane Colliery.	—
		Nchlovu, Mr.	—
		Colenbrander, Mr. B. Resident Magistrate ..	—
		Davey, Dr. C. J.	—
Hlobane ..	12th Dec., 1912	Duboissee, J. B. P., Compound Manager, Hlobane Colliery.	Compound Married Quarters, Mine Hospital and Underground Workings, Hlobane Colliery.
		Smith, Mr. Hyde, Manager, Hlobane Colliery ..	—
		Burn Wood, Dr., M.O., Hlobane Colliery	—
Dundee ..	13th Dec., 1912	Lloyd, Dr. J. A., District Surgeon; M.O., Natal Navigation and St. George's Colliery ..	—
		Mackay, Sgt. Chas., Dundee Borough Police ..	—
Hatting Spruit	14th Dec., 1912	Teasdale, R., Underground Manager, St. George's Colliery.	Native Quarters and Indian Compounds, St. George's Colliery.
		Shum, W. N., Compound Manager, St. George's Colliery.	Native Compound and Indian and Native Location and Quarters, Hattingh Spruit Colliery.
		Macdonald, Dr., Assistant M.O., St. George's Colliery	—
		Sneddon, Mr. Richard, Manager, Hatting Spruit Colliery.	—
		Hudson, Mr. Ar., Compound Manager, Hatting Spruit Colliery.	—
Newcastle ..	15th and 16th Dec., 1912.	Breary, Mr., Manager, Newcastle Colliery	Native and Indian Quarters, Newcastle Colliery.
		Walker, F. C., Compound Manager, Newcastle Colliery	—
		Nolan, Dr. J. A., District Health Officer, M.O., Newcastle and Ballengeich Collieries and Railway M.O.	—
		Adamson, G. W., Resident Magistrate	—
		Cooper, Dr. C., District Surgeon	—
Burnside	17th Dec., 1912	Sokehill, B., Manager, Burnside Colliery	Indian and Native Quarters and Mine Hospital, Burnside Colliery.
		Gordon, Dr. H., M.O., Burnside Colliery	—
		Hestie, Mr. S., Compound Manager, Burnside Colliery	—
Elandslaagte	18th Dec., 1912	Harrison, Dr. S. N., M.O., Elandslaagte Colliery; Indian Medical Officer.	Indian and Native Quarters and Indian Hospital, Elandslaagte Colliery.
		Harris, D., Manager, Elandslaagte Colliery	—
Ladysmith ..	18th Dec., 1912	Hugo, F., Resident Magistrate	—
		Platt, Dr. H. T., District Surgeon, Indian M.O. ..	—
Cape Town ..	13th Jan. to 16th Jan., 1913.	Guillemard, Dr. B. J., President, Assoc. Prevention of Consumption.	Inspection at Cape Town station, method of disinfection of boiling stock and bedding.
Paarl ..	17th Jan., 1913	Wolfe, Dr. R. L., District Surgeon	Inspection of certain dwellings in Jubilee Street.
		De Jager, Dr. A. L. (M.L.A.)	—
		Heyne, Dr. J. O., M.O.H., Paarl	—
		Joubert, C. J., Town Clerk	—
		Theron, D. N., Sanitary Inspector, Paarl	—
Stellenbosch	20th Jan., 1913	Weber, Rev. Jacob	Stellenbosch Hospital.
		Wildt, W.	Certain Coloured Dwellings.
		Neethling, Dr. J. H., District Surgeon	—
		Golightly, Rev., Wesleyan Coloured Mission ..	—
		Macpherson, Dr. J. W. C.	—
		Hewitt, H. F. O., Resident Magistrate	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Louw, H. J., Town Clerk	—
		Cluver, P. D., Secretary, Divisional Council ..	—
Malmesbury ..	21st Jan., 1913	Wrench, F., Resident Magistrate. ..	—
		Werdmiller, Dr. V. V. L., M.O.H., Municipality ..	—
		Hayman, Dr. A. W.	—
		Marais, J. H., Municipal Sanitary Inspector ..	—
		Hoffman, B. W., District Sanitary Inspector ..	—
Mamre Mission	22nd Jan., 1913	Nieuwoudt, Dr. C. (Darling)	Inspected Nazre Mission and Schools.
		Schultz, Rev. R. J., Missionary in charge	—
		Brindeau, Mr. P.	—
		Brindeau, Mrs.	—
		Will, C., Missionary Elim.	—
		Jonker, J., in charge Native Schools	—
Cape Town ..	23rd Jan. to 10th Feb., 1913 ..	Smith, Sir Fred, Ex-Mayor, Cape Town	—
		Hands, H., Mayor of Cape Town	—
		Finch, J. R., Town Clerk	—
East London ..	7th March to 10th March, 1913.	Lowns, Dr. C. J.	East and West Bank, Municipal Locations.
		Anderson, Dr. J. B., District Surgeon	—
		Tremble, Dr. J., M.O., Frere Hospital	Government Convict Station.
		Rolston, Dr. R. J., M.O.H., East London	Gaol.
		Beetham, Mr. T., Chief Sanitary Inspector	Frere Hospital.
		Skinner, Mr., Railway Medical Officer	—
		Lloyd, Mr., Supt. of Locations	—
		Goldschmidt, J. A., Mayor of East London	—
		Dowling, Mr., Town Clerk	—
Queenstown ..	11th March to 13th March, 1913.	Clark, Dr., District Surgeon	Municipal Locations.
		Tannahill, Dr. F., M.O.H., Municipal	Frere Hospital.
		Lamont, J., Mayor of Queenstown	Bongola Water Supply.
		Mazwi, Rev. B. S.	—
		Lamont, C. B., Labour Agent	—
		Robertson, C. B., Additional District Surgeon, Sterkstroom.	—
		Darke, T., Location Inspector	—
		Thomas, Dr. A. C., Additional District Surgeon, Whittlesea.	—
		Kirkman, Mr. A. H. H.	—
		Ritchie, Dr. J. H.	—
		Drs. Grieve and Mann	—
Grahamstown	20th March, 1913.	Turpin, Very Rev. Archdeacon	Grahamstown Municipal Location.
		Stead, Rev. W. Y.	Portion of Government Location.
		Van der Riet, T. J. B., Mayor of Grahamstown ..	—
		Berghagge, Rev. Father F., Roman Catholic Missionary.	—
		Cowper, Dr. A., Supt., Asylum	—
		Saunders, Dr. F. A.	—
		Harrison, Dr. B. T.	—
		Becker, Dr. H. F.	—
		Dr. Drury, Dr. E. J., District Surgeon	—
		Purvis, Dr., M.O.H., Municipality	—
Port Elizabeth	21st March to 22nd March, 1913.	Grattan, E., Supt., New Brighton Reserve Location	New Brighton Reserve Location.
		Wright, Dr. R., M.O., New Brighton Reserve Location	Norston Location.
		Baxter, C., Sanitary Foreman, E.P.R. Location ..	P.E. Provincial Hospital.
		Rees, Dr. D. C., District Surgeon	—
Humansdorp	24th March to 25th March, 1913.	Coulton, Dr. J. J., District Surgeon and M.O.H. ..	Olivier's Boarding House for Consumptives.
		Hanau, Dr. I.	Municipal Location.
		Olivier, Mr. J. J.	Kraisfontein Location.
		Holtzer, J. J., Special J.P.	Hankey Location.
		Colling, T., Mayor of Hankey	—
		Goodhart, J., Town Clerk, Hankey	—
		Wentzel, Dr. C. J., Railway Medical Officer ..	—
Port Elizabeth	26th March to 27th March, 1913.	Philips, Mrs. A. E., President, Ministering Children's League.	—
		Bagshaw, Miss, Hon. Sec., Ministering Children's League.	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Edwards, Miss, Ministering Children's League ..	—
		Guthrie, A. W., Mayor of Port Elizabeth	—
		How, Mr., Town Clerk	—
		Gilbert, Dr., R.M.O., Provincial Hospital	—
		Galloway, Dr. J., M.O.H., Municipality, and Railway Medical Officer.	—
		Wright, Dr., Medical Officer, New Brighton Location	—
		Kemp, R. H., Chief Sanitary Inspector	—
Uitenhage ..	27th and 28th March, 1913.	Chaubaud, C. W., Resident Magistrate	Oaklands Coloured Location.
		Lamb, Dr. R. G., District Surgeon	Gubbs Kaffir Location.
		Ward, H. W., Mayor of Uitenhage	The Kabah Coloured Location.
		Yeomans, J. T., Town Clerk	—
		Freer, G. W., Govt. Veterinary Surgeon	—
		Douglas, Dr., R.D.A.	—
		Bull, Dr. J. E.	—
		Pote, Mr. Chas.	—
		Hardy, Mr., Location Inspector	—
Cradock ..	29th and 30th March, 1913.	De Wet, Dr. P. C., District Surgeon and M.O.H., Municipality.	Municipal Location.
		Ireland, Dr. A., Mayor of Cradock and Railway Medical Officer.	Cradock Gaol.
		Patterson, B. A., Town Clerk..	Queen's Central Hospital.
		Butler, J., Editor, "Midland News"	—
		Tonkin, W., District Engineer, P.W.D.	—
		Reinecke, Rev. J. C.	—
		M'tyobo, Rev. T. P.	—
		Mdolomba, Rev. J.	—
		O'Connor, M. J., Sanitary Inspector	—
		Uric, A., Location Supt.	—
		Magaba, Miss M., Municipal Native Nurse	—
Graaff-Reinet	31st March and 1st April, 1913.	Liebenberg, C. J. T., Mayro of Graaff-Reinet ..	Municipal Locations.
		Meyer, Mr., Town Clerk	Certain Hire Houses in Hare Street.
		Keegan, Dr. J. M., M.O.H., Municipality	Graaff-Reinet Hospital.
		Hudson, Dr. H., District Surgeon	Black Horse District.
		Erlank, Mr. A. J., Deputy Mayor	—
		Gilmour, Dr. W. McN.	—
		Campaan, Rev. A.	—
Oudtshoorn ..	2nd, 3rd and 4th April, 1913.	Blazey, Rev. H. J., Dyselldorp	Feather Sorting Warehouses.
		Stusser, Dr. I., District Surgeon	Certain Dwellings in St. John's Street and George Street.
		Jacobsohn, Dr. I., M.O.H. and Railway Medical Officer.	New Municipal Washhouses.
		Swemmer, J. H. K., Mayor of Oudtshoorn	Royal South Western Hospital
		Powrie, W., Town Clerk	—
		Dwyer, T. J., Chief Sanitary Inspector	—
		Truter, Dr. R. M.	—
Knysna ..	5th, 6th and 7th April, 1913	Haw, Dr. W. H., District Surgeon	—
		Marr, Dr. G.	—
		Mortimer, Rev. B. C.	—
		Squire, H.	—
		Macnamara, Rev. Father	—
		Irving, Rev. W. H.	—
		McLachlan, Rev. P. R.	—
		Henkel, J. H., Conservator of Forests	—
		Stevens, Col. C., late R.M., Knysna	—
		De Smit, A. D., A.R.M., Knysna	—
George ..	8th April, 1913	St. Leger, Dr. R. A., Acting District Surgeon ..	George Convict Station.
		Anderson, Rev. G. B., Pacalsdorp	Certain dwellings occupied by coloured people.
		Parsons, H. W., Mayor of George	—
		Patterson, Dr. T. A.	—
		Sidwell, Rt. Rev., Bishop of George..	—
		Borcherds, J. W., Diocesan Secretary	—
		Swindell, Rev. A. R.	—
Mossel Bay ..	9th April, 1913	Kitchin, Dr. C., District Surgeon	Sunnyside Coloured Location
		Forbes, W., Collector of Customs	Taka Coloured Locations.
		Waldran, Dr. F. T.	No. 10 Barracks.
		McNally, Dr. A.	—
		Mattfield, R. P., Acting Mayor	—
		Pitts, H. D., Town Clerk	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Newsam, Rev. T. W.	—
		Ekker, Rev. F. M.	—
		Allen, F., Sanitary Inspector	—
Swellendam ..	11th April, 1913	Rossouw, Rev. J. P.	Zuurbraak Coloured Settlement.
		Morkel, C.	—
		Jante, D., Pres., Village Management Board ..	—
		Memdo, A., Sec., Village Management Board ..	—
		Chadwick, Dr. G., District Surgeon	—
		White, Dr. Andrew	—
Worcester ..	12th April, 1913	Hugo, Dr. D. de V., District Surgeon and M.O.H. and Railway M.O.	Old and New Locations.
		Faber, Dr. A. H.	Site of New Municipal Slaughterhouse.
		Roux, W. P., Mayor of Worcester	—
		Van Coller, Dr. J. C.	—
		Lindenberg, F. J., Town Clerk	—
Beaufort West	12th and 13th May, 1913.	Wilkinson, Dr. G. B., District Surgeon and M.O.H., Municipality.	Town Location.
		De Villiers, C. J., Mayor of Beaufort West	Slaughter Poles.
		Keulder, W. W., Town Clerk, Beaufort West ..	Railway Camp.
		Bensley, Dr. V. C.	Woods Lane, Beaufort West.
		Trail, Dr. D., Railway Medical Officer	—
		Barnard, Rev. A. J.	—
		Harhoff, H. S., Sanitary Inspector	—
		Roberts, F. M. W., Resident Magistrate	—
		Mocke, F. S., Location Supt.	—
		Whiley, R. F., Field Cornet	—
Kimberley ..	14th to 18th May, 1913.	Reid, Dr. A. W., Medical Officer to Kimberley Health Board and M.O.H., Kimberley.	Compounds and Hospital, Du Toitspan Mine.
		Stoney, Dr. W. W., District Surgeon and Joint R.M.O.	Underground Workings, Du toitspan.
		Symonds, Dr. H., M.O., Du Toitspan and Kimberley Convict Stations.	Compounds and Hospitals, Floors and Pulsator, Bultfontein Mine.
		Ford, T. J., Sec., De Beers Benefit Societies ..	Bultfontein Convict Station.
		Wicks, Dr. S., M.O., Du Toitspan and Bultfontein ..	No. 2 Municipal Location.
		Mackenzie, Dr. J. E., M.O., Wesselton Mine ..	Greenpoint Location.
		Oppenheimer, E. Mayor of Kimberley	Salla's Rooms.
		Thorp, J. H., Town Clerk	—
		Bird, Isaac, Location Inspector	—
		Dunne, J. S., Chief Sanitary Inspector	—
		Dyason, E. C., Supt., De Beers Convict Stations	—
		Scott, Col. R., V.C., Supt., De Beers Compounds ..	—
		Grimmer, I. R., Assistant General Manager, De Beers Cons. Mines.	—
		Fuller, Dr. Ar., M.O., Kimberley Mine	—
		Buck, J., Veterinary Surgeon	—
		Russell, Dr. W., Resident M.O., Kimberley Hospital	—
		Dickinson, H., Assistant General Manager, De Beers Cons. Mines.	—
		Franceys, A. L., Manager, Estates Dept., De Beers Cons. Mines.	—
		Barnes, G. W., Govt. Protector of Natives	—
		Tumbridge, G., Acting Secretary, Kimberley Board of Health.	—
		Morris, W. G., Registrar of Natives	—
Maseru ..	20th to 22nd May, 1913.	Dyke, Dr. H. W., Butha-Buthe	Chief Letlatsa's Village, Maseru
		Wroughton, Dr. J. H., Govt. Medical Officer, Quthing	—
		Macfarlane, Dr. N. M., Govt. Medical Officer, Leribe	—
		Long, Dr. H. C., Principal Medical Officer, Basutoland	—
		Verney, Mr. F. A., Principal Veterinary Officer, Basutoland.	—
		Dutton, F. D., Director of Education, Basutoland, B. Bechuanaland and Swaziland.	—
		Mabille, H. E., Labour Agent	—
		Hobson, G. R., Trader	—
Morija ..	22nd to 23rd May, 1913.	Christeller, Rev. C., President of Missionary Conference.	Wood Working Building, Normal School and Dormitories attached to the French Mission.
		Dubey, S., Bible, School and Book Depot	—

ANNEXURE "B"—*continued.*

Place.	Date of Visit and Duration.	Names of Witnesses and Official Status.	Inspections, etc., made.
		Dyke, Dr. E. J.	—
		Scello, Akim, Post Office Employee	—
Mafeteng ..	23rd to 24th May, 1913.	Scott, Mr., Trader	Mafeteng Hospital.
		Hartnack, F. C., Labour Agent	—
		Smith, S., Labour Agent	—
		Nattle, Dr. H. F., Govt. Medical Officer, Mafeteng..	—
Bloemfontein	25th to 27th May, 1913.	Haarburger, I. H., Mayor of Bloemfontein ..	Waaihoek Location.
		Koller, W. A., Town Clerk	Kaffirfontein Location.
		Vellacott, Dr., Resident M.O., National Hospital..	Cape Coloured Location.
		Viljoen, W. J., Director of Education, O.F.S. ..	Bloemfontein Prison.
		Freer, G. W., Acting Senior Veterinary Officer ..	National Hospital.
		Friedman, Dr. F. G.	Railway Location.
		Tomory, Dr. D. M., District Surgeon and M.O.H., Municipality.	—
		Jacobs, Dr. A. H., District Surgeon, De Wetsdorp..	—
		Manning, Dr. J. V., Railway M.O.	—
		Spooner, Rev. R. S., St. Patrick's Mission ..	—
		Logan, J. P., City Treasurer	—
Jagersfontein	29th May, 1913	Kennedy, Dr. G., Additional District Surgeon ..	Old and New Compounds.
		Van Blommestein, C., Floor Compound Manager, New Jagersfontein D. Mine.	Floor Compound and Underground Workings, New Jagersfontein D. Mine.
		Nesbit, Capt. C. W., Compound Manager, New Jagersfontein D. Mine.	Jagersfontein Location.
		Roberts, Dr. C. D., M.O., New Jagersfontein D. Mine	—
		Brigham, A. F., Mining Engineer, New Jagersfontein D. Mine.	—
		Dickson, H. H., Floor Manager, New Jagersfontein D. Mine.	—
		Melvin, J. D., Mayor of Jagersfontein	—
Potgietersrust	13th June, 1913	McLeod, A., Secretary, Zaaiplaats Tin Mining Co...	Location of Chief Marens Masibi.
		Knothe, C. A. H., Compound Manager, Zaaiplaats T.M. Co.	Zaaiplaats Tin Mine.
		Hook, D. W., Sub-Native Commissioner, Waterberg District.	Underground Workings, Z.T.M. Co.
		Plunkett, R. S., Labour Agent, ...	—
Pietersburg District.	14th to 24th June, 1913.	Lyle, J. C. V., Sub-Native Commissioner, Groot Spelonken.	Chief Mpahlele Location.
		De Ligneris, Dr M. A., Med. Supt., Elim Hospital	Tshenies Location.
		Eberhardt, Rev. A., Director, Lemana Training Institution.	Kameels Location.
		Harries, C. L., S.N.C., Sibasa	Jack Elands Location.
		Stubbs, E. T., A.R.M. and S.N.C., Louis Trichardt..	Ramagaeplis Location.
		Hay, Dr. G. G., Additional District Surgeon ..	Chief Mpefuri's Location.
		Endermann, Rev. C., in charge Gertrudsberg Mission	Elim Hospital and Mission Station.
		Franz, Mrs. D., Matron of Bochim Govt. Hospital..	Elim Native Village.
		Franz, Rev. C. R., Missionary in charge, Bochim Mission.	Chief Sabasa's Location.
		Key, H. A., S.N.C. Sub-District of Mara	Tshakoma Mission Station.
Pietersburg ..	25th June, 1913.	Baker, E. C. K., Labour Agent	Chief Senthumula's Location.
		Green, Dr. P. A., District Surgeon and Res. Med. Officer.	Gertrudsberg Mission Station.
		Edgar, J. I., Govt. Vet. Surgeon	—
		Seelig, H., Labour Agent	Chief Mpefu's Location.
		Makena, Native Police Sergeant	Bochim Govt. Hospital for Natives.
		Manning, C. H., S.N.C., Pietersburg	Pietersburg Hospital.
			Pietersburg Prison.

ANNEXURE "C."

COLONY OF NATAL.

HOUSING REGULATIONS UNDER THE PUBLIC HEALTH ACT.

(Complete set as in March, 1909.)

GOVERNMENT NOTICE 356, 1902.

(As amended by Government Notice 30, 1903, and Government Notice 401, 1908.)

It shall not be lawful for any person after this date to construct for the dwelling of man any buildings or any huts in rows, on the back to back principle, or in any manner such that there is not free perflation of air through the building from side to side, unless the plans of such buildings shall have been first submitted to the Health Officer for the Colony and approved by him.

GOVERNMENT NOTICE 401, 1908.

(As amended by Government Notice 455, 1908.)

17. The Regulations under this part shall have effect in all towns and villages and in respect of all barracks or quarters where ten or more adult males are housed.

18. Every room or hut used as a dwelling or workshop shall be provided with suitable permanent means of ventilation to the approval of the District Health Officer.

(*a*) Every such room or hut shall be provided with one or more glass windows capable of being opened in half the area. The area of window space shall be not less than one-fourteenth of the superficial area of the floor. No penthouse or lean-to of any description shall be erected in such manner as to obstruct in any way the free entry of light and air through door or window, or ventilating aperture. In case of barracks or quarters provided for employees, the employer shall be held to be liable in respect of any contravention of this Regulation.

(*b*) No room or hut shall hereafter be constructed for human occupation of a superficial area of less than 100 square feet, nor of a height less than 9 feet, and no doorway shall be less than six feet in height.

(*c*) The Regulations (*a*) and (*b*) above shall not be applicable to huts made of grass or straw.

(*d*) The flooring of every room or hut shall be raised six inches above the level of the outside ground, and shall be made flat, and composed of suitable materials to prevent any dampness.

(*e*) In every room or hut used by man as a sleeping place, the floor space for each individual, whether adult or child, shall be not less than 30 superficial feet, and the cubic space shall be not less than 300 cubic feet. Any occupation of any room or hut by persons in such manner that less than the aforesaid space is available for each individual shall be deemed to be overcrowding. The occupier, lessee, or person renting such room or hut shall be liable to a penalty, and in the case of houses let in lodgings, the person letting the room shall also be liable.

19. The Regulations following shall have effect in such portions of the Colony as may be notified from time to time by the Health Officer for the Colony in the *Government Gazette*.

(*a*) Any person employing ten or more labourers, who reside on the property under his management, and any persons providing habitations for labourers, whether the occupants pay rent or not, shall, before the erection of any barracks, huts or quarters for the occupation of such persons be commenced, first submit to the District Health Officer a plan or a full and sufficient description of all details, showing the materials which it is proposed to use, the dimensions, lighting, ventilation, flooring, and all other necessary particulars. He shall also submit a plain statement of the site on which it is proposed to erect the barracks or quarters, and shall specify the distance therefrom and the source of any water which it is proposed to use for domestic purposes.

(*b*) Whensoever any person as aforesaid shall intend to effect any substantial repairs or make any alteration in any existing barracks, huts, or quarters, he shall be subject in regard to them to the requirements of the preceding Regulations.

(*c*) No person shall commence, or permit to be commenced, the erection of substantial repair or alteration of any barracks, huts or quarters for labourers until the District Health Officer has signified, in writing, his approval of the proposed habitations and the sites; and no alteration in the proposed plan or the site shall be made without the approval of the District Health Officer given over his signature.

GOVERNMENT NOTICE 111, 1909.

1. The requirements of Section 18 and 19 of Government Notice 401, 1908, or the following, shall not, excepting in respect of 5 (*d*), be taken to apply to any rooms or huts used as a temporary habitation, during the construction or repair of any roads, railroads, bridges, reservoirs, dams, or other works; the erection of any factory or other buildings; the development of any property, or any like purposes. Provided that such rooms or huts shall be demolished as soon as the purpose for which they were erected has been completed, and provided that, in any case, the duration of occupation shall not exceed twelve months.

2. And any temporary dwellings shall be situated in as healthy a position as practicable, shall be adequately ventilated, shall afford reasonable protection against cold, and shall be kept dry, clean and impervious to rain.

3. In all dwellings, whether temporary or permanent, in which a chimney flue is not provided, wherever coal is used or is supplied by the employer, or is readily obtainable for fuel, there shall be adequate aperture in the roof for escape of smoke, which shall at all times be kept open, and shall be protected from entry of water running down the roofing from above.

4. Whether in permanent or temporary dwellings, bunks shall not be placed in tiers one above another.

5. Wherever fifty male adults and upwards are housed on the one site, in addition to the foregoing, the following requirements shall be complied with by the owner or manager:—

(*a*) On all mining properties and elsewhere where the occupation of the persons is of a particularly dusty character.

In connection with every compound or group of dwellings there shall be provided a proper ablution chamber, separate for native or Indian employees and men and women respectively, which shall have a flooring of concrete cement not less than six inches in depth, asphalte, or flags rendered in cement, graded to carry off water. The Health Officer for the Colony may by order direct that warm water be supplied during the colder months, on any property or properties. Such ablution chamber may be constructed of corrugated iron, and shall be enclosed on all sides and roofed.

(*b*) The interior of every room shall be washed with hot lime wash at least once in each quarter of every year, unless the walls are papered, painted or varnished.

(*c*) The roof of every building used as a human habitation shall, unless guttering be fixed, project at the least nine inches, measured in a straight line parallel to the floor, from the wall to the outer surface of the roofing material.

(*d*) Whenever such persons are engaged in occupations other than field labour, suitable and adequate latrines shall be provided, and maintained in clean and sanitary condition. Any person failing or neglecting to make use of such latrines when provided shall be guilty of an offence against these Regulations.

6. Whenever one hundred male adults and upwards are housed on the one site in addition to the foregoing, the following requirements shall be complied with by the owner or manager of the dwellings:—

(*a*) The distance between the nearest parts of any two rows of buildings shall be not less than 40 feet.

(*b*) The flooring shall be of good cement laid over concrete not less than six inches thick or over brick set on edge and floated in cement with a slight inclination towards the door, and shall be at all times maintained in good order. Other materials may be substituted with consent of the Health Officer of the Colony.

(*c*) Bunks or suitable covering over cement or brick floors shall be provided for sleeping purposes.

(*d*) Every room or apartment in quarters situated on the property and used or intended for the use of coloured labourers, or their dependents, shall be marked with a number painted clearly on the door. The numbers shall be in series.

(*e*) The owner or person responsible for the management of the property shall cause a register to be kept, and at all times correctly maintained, in which shall be entered the names of all persons to whose use each room as numbered is allotted. In the case of married men with families it shall be sufficient that the name of the man with the addition "wife and ..... children" be entered.

(*f*) The requirements of Regulation 19, Government Notice 401, 1908, shall have effect without notification in the *Government Gazette*.

7. In the County of Klip River, and in the Magisterial Divisions of Paulpietersburg, Utrecht, Vryheid, Nqutu, Babanango, Nkandhla, Upper Tugela, Estcourt, Impendhle, Lion's River, Underberg, Polela, Ixopo and in any other parts of the Colony, proclaimed from time to time by the Minister, in addition to the foregoing, the following Regulations shall take effect, wherever 50 or more adult persons are employed by the same employer and housed on one site, and the owner of the buildings shall be responsible for their due observance. In regard to (*f*) the manager of the property shall be responsible.

(*a*) Complete and properly drawn plans in duplicate and adequate specifications for all new buildings shall be submitted to the Health Officer for the Colony, and *mutatis mutandis* all the requirements of Regulation 19 of Government Notice 401, 1908, shall apply in respect of habitations. In every application for approval of buildings or sites, it shall be stated how many rooms and how many blocks it is intended to erect, and the number of persons to be accommodated in each room, and the approval granted will apply to no more than the number of each specified.

(*b*) Any of the following materials or combinations may be used for walls:

1. Burnt brick.
2. Stone with smooth face on interior side.
3. Concrete cement, or like material approved by Health Officer for the Colony.
4. Iron lined with burnt brick or with green brick plastered with cement or tarred inside and outside.
5. Iron laid on wood, lined with boarding, asbestos, or other material approved by the Health Officer for the Colony. But boarding shall not be permitted for quarters for natives or Indians.
6. Grass (except on coal mining properties, and where coal is readily obtainable).

All outside walls, excepting 5 and 6, shall be of minimum thickness nine inches.

All materials, excepting 5 and 6, shall be set in good mortar.

(*c*) One of the following materials shall be used in roofing:—

1. Thatch.
2. Iron.
3. Tiles.
4. Asbestos, or a like material approved by Health Officer for the Colony.

(*d*) In every room or apartment shall be provided a ceiling beneath the roof of boards, sheet iron, asbestos, or other material approved by the Health Officer for the Colony. The ceiling may be laid along the roof timbers, or parallel to the floor.

(*e*) On all coal mining properties and on all other properties on which coal is used or supplied by the employer or readily obtainable for fuel, in each room or in one of two or more rooms used as one tenement, there shall be provided a fire place furnished with a grate suitable for cooking the food of the inmates, and with a proper chimney flue, so that at all ordinary times the products of combustion shall be drawn up the chimney and not thrown down into the room. The superficial area of the interior of the chimney shall be not less than eighty inches at the narrowest point, exclusive of a cowl or like termination. The fact that the plan for any building has been approved shall not relieve the

owner from the responsibility of devising means whereby each chimney flue shall properly serve its purpose. Every chimney shall be carried above the level of the ridge, or above the highest point of the roof of that part of any building in which it is placed.

(*f*) No employee shall use or take or be permitted to take into his sleeping room any brazier or like article containing lighted coal.

(*g*) In each room or hut there shall be provided permanent openings for ventilation of an aggregate unobstructed area of not less than 80 square inches for each 30 superficial feet of floor space, which shall at all times be maintained in good order. The maximum limit shall be determined in the permission to erect. Apertures shall be in part at or near the eaves, and partly through the ceiling; they shall be evenly distributed through the room, and screened to prevent direct draught.

Where ceilings are horizontal, and the block does not exceed 100 feet in length, and there is no party wall or obstruction, the space above the ceiling may be ventilated from the gables; under other conditions there shall be ventilation at the ridge. In either case the aggregate unobstructed aperture in the two gables or the ridge shall not be less than the aggregate unobstructed aperture in the ceilings of all rooms in the row or block.

8. None of the Regulations under this Notice or Notice 401, 1908, shall have retrospective effect in regard to buildings already erected in accordance with requirements of Regulations at the time in force, excepting 19 (*b*), (*c*), of Government Notice 401, 1908, and 6 (*c*) (*d*) and (*e*) of this Notice, and 7 (*g*) of this Notice when alteration is considered advisable by the Health Officer for the Colony.

9. Exceptions:—

Grass huts are exempted from Regulations 5 (*b*), 7 (*d*), (*e*), (*g*).

Thatched huts are exempted from Regulation 7 (*d*).

ANNEXURE "D."

PROCESS AND INGREDIENTS USED IN THE MANUFACTURE OF NATIVE BEER.

Malting of Kaffir Corn.

The first process is the preparing of the malted Kaffir Corn which takes from six to eight days.

First Process.

Take a bag of Kaffir Corn and thoroughly wash it in two waters, so that the grains may be clean and free from all husks, etc., then put into a cask and cover with cold water and allow it to soak about twenty hours. Drain water off and put about 50 lbs. of the soaked grain into a sack, tying it low down, and leave to germinate. As this proceeds and heat increases gradually loosen string, tying higher up. The bag must be turned over several times daily so that it may not get overheated. To get the best results, the Mycelia should not be allowed to sprout longer than the grain itself. When all the corn has germinated, turn it out on a floor to dry. Small quantities can be dried in the sun very much quicker. When dry the corn can be ground coarsely; it is best, however, spread out, as it is liable to heat if kept in a bag.

Brewing.

Second Process.

Into a fifty gallon cask pour four gallons cold water and add twenty-five lbs. mealie meal, twenty lbs. Kaffir corn meal, after thoroughly mixing add twenty-four gallons boiling water.

About one hour after scalding meals, then add fifteen lbs. malted and ground Kaffir corn, and pour into mash with five gallons tepid water. This scalded meal (Inhlama) is left to stand ten or twelve hours before being boiled.

Third Process.

Boil two and a half gallons fresh water, then pour the scalded meal into it, this is boiled for about twenty-five or thirty minutes, until thoroughly cooked, when it is poured out into a vat to cool.

Fourth Process.

Take three twelve gallon tins (thirty-six gallons) of cool brew and pour into a fermenting cask and stir in twelve lbs. raw malted ground Kaffir corn, and for every thirty-six gallons brew required, add twelve lbs. malted corn, and this will produce about twenty gallons beer when strained.

The beer is strained first through a twenty mesh, and then through a thirty-six mesh brass wire sieve.

In cool weather it takes about twelve hours to ferment the brew, before it is ready to strain. In hot weather six to eight hours.

The brew, if not disturbed in cooling vats, should keep good for quite a week.

Plant, etc., for Brewing.

1 only 20 gallon Boiler, 22 inches in height, 20 inches diameter.
2 only 12 gallon Boilers, 15 inches in height, 13 inches diameter.
1 only wooden cooling vat, 6 feet x 4 feet x 1½ feet deep.
1 54 gallon cask for scalding.
1 70 gallon cask for fermenting.

ANNEXURE "E."

THE RELATIVE IMPORTANCE OF INFECTION AND HEREDITY IN THE SPREAD OF TUBERCULOSIS.

By G. D. Maynard, F.R.C.S., E.

It may assist the reader in following a somewhat involved argument if, at the outset, the conclusions drawn from the data here dealt with, be briefly stated. This method, while a departure from the orthodox procedure, has the advantage of enabling the reader to follow the various stages of the argument more critically.

As the terms *infective* and *infectious* occur frequently throughout this paper, it is necessary to state definitely what is here meant by them. An *infective* disease is one in which some micro-organism is concerned as the casual agent, in this sense tuberculosis is undoubtedly an infective disease. By an *infectious* disease is generally meant a pathological condition which can be spread from the affected to the healthy, either by a comparatively brief contact, or through the medium of soiled clothes, etc. Now it may be argued that in all diseases of microbic origin, a transference of the organism from the diseased to the healthy is required; and with the exception of organisms which are saprophytic and only facultatively pathogenic, this is no doubt true;* this, however, does not necessitate the immediate and direct transference of the organisms from the affected to the unaffected. To extend the meaning of the word infectious to include cases where direct transference is not concerned, would be to alter the usual sense of the word. The question of practical importance is, does close association with the diseased constitute a serious risk to the healthy?

There is no doubt that in diseases like smallpox, scarlet fever, and similar fevers, this is so. On the other hand, pneumonia is a disease of microbic origin, yet all the evidence seems to point to the fact that close association with patients suffering from pneumonia does not serve to spread the disease to the healthy. To apply the term infectious, therefore, to pneumonia would, using the word in the sense defined above, be misleading and incorrect. The same remarks are also true of some forms of bronchitis and many other diseases.

When any organism is so widely spread that practically every one comes into constant contact with it, the determination of the disease depends not so much, if at all, on the introduction of a few more organisms from a new source, as on conditions which determine the resistance of the body. If, therefore, it can be shown that the tubercle bacillus is so ubiquitous that practically every one is brought into constant contact with it, and that close contact, *i.e.*, living in the same house or room, with tuberculous persons does not increase the risk of attack, then surely it is not legitimate to speak of tuberculosis as an infectious disease. But to disclaim its infectious nature is not to deny the causal importance of the bacillus of Koch.

In this paper it is proposed to show, that the *evidence discussed* leads logically to the following conclusions:—

(1) That among the inhabitants of Europe the great majority are during the course of their life the subjects of tuberculous lesions; and thus we may assume that *all adults have been exposed to frequent infections* with the bacillus tuberculosis.

(2) Tuberculosis is *not an infectious disease*, *i.e.*, close contact with the sick does not materially increase the risk to the healthy.

(3) Tuberculosis is *undoubtedly a hereditary disease*, in the sense that the tubercular diathesis, *i.e.*, the liability to serious manifestations of the disease, is inherited.

(4) The decreasing death-rate from tuberculosis, *e.g.*, in England, is not mainly due to sanitary and hygienic improvements, or to more efficient public health control; but is an evolutionary phenomenon in the life history of these races.

(5) If the above statements are correct, then the money spent on many of the modern attempts at prevention might be better expended on further research into the factors which are producing the falling death-rates; thus enabling us to turn our energies and financial resources into more profitable channels.

The public health legislation, of the last 10 or 15 years, in respect to tuberculosis, has been based almost entirely on the assumption that this disease is highly infectious, *i.e.*, the disease is spread directly from the sick to the

* The question, as to whether a non-pathogenic organism can give rise to a race of pathogenic organisms, with apparently new morphological and cultural characters, is one which probably need not necessarily arise in this connection.

healthy. The teaching of the older physicians, that tuberculosis was a hereditary disease, has been to a large extent abandoned and replaced by a theory of infection, following the discovery of the tubercle bacillus by Koch in 1882.

At the present time a large amount of money is being spent in many European countries, both publicly and privately, in the endeavour to stamp out this disease; and in South Africa a Commission is now sitting with a view to advising the Union Government as to the necessary steps that should be taken to deal with tuberculosis as it occurs amongst the white and coloured races of this sub-continent.

It seems opportune, therefore, at the present time to discuss what scientific evidence exists as to the infectious nature of the disease. It would be idle to deny that tuberculosis may not be spread directly from the diseased to the healthy; but the questions of administrative importance are, does this occur sufficiently frequently to justify legislative and restrictive measures being applied to the sick, and can we hope to modify the spread of the disease by measures based on its supposed infectious nature?

A good deal of evidence is now available, a study of which may enable us to answer these questions. Much of the so-called evidence in regard to the infectiousness of tuberculosis has been based on examples of infection of husband or wife by the other partner, or on the assumed infection of children by parents. A moment's consideration will be sufficient to show that no number of such examples taken by themselves are of the least use in proving or disproving the question at issue. Before we can form any judgment in the matter, we must first know how many normals are associated with such a group of abnormals. In other words we require to know the size and constitution of the group from which the sample was selected. To take the case of marital infection, if we assume that 10 per cent. of all adults suffer at some time from tuberculosis and that they mate at random, we shall expect that out of every hundred marriages there will be 81 cases where one partner is tuberculous, and 1 case where both partners are affected. It is evident, therefore, that no collection of cases where both partners are tuberculous can be accepted as evidence of the infectiousness of this disease, unless it is accompanied by full details of the population from which it was drawn.

Before we can deal efficiently with the question of infection, we must first consider what part, if any, is played by the inheritance of the tuberculous diathesis. As it will appear later, our views on this question must influence the conclusions we shall draw from the evidence in respect to the occurrence of this disease in families and the consequent assumption of infection.

The term "coefficient of correlation" (with the symbol "r" will constantly appear in the subsequent statistical discussion; a few words, therefore, as to its meaning in the statistical sense may perhaps be permitted. The coefficient of correlation is a mathematical measure of the agreement of two series of events or measurements, and may take any numerical value from plus 1 to minus 1. Thus, if in any series of observations we find the increase or decrease of one variable always associated with a proportional increase or decrease of the other, the numerical value will be plus 1; if on the other hand an increase in the one is associated with a decrease in the other, the coefficient of correlation will have a negative value; if, however, there is no relationship, *i.e.*, an increase in the one variable is associated with a constant value of the other or with an increase or decrease at random, the value will be zero. Thus the degree of association is given a numerical value, which is the measure of the interdependance of the one series on the other.

For example, if we measure both femora on a large number of men, we know that while the length of one pair may vary very considerably from the length of any other, yet the length of the two bones in any pair will be approximately equal. In this case the measure of agreement between the length of the two femora from the same body has been found to be ·96, *i.e.*, a very high degree of correlation. If, however, we correlate the length of say the left humerus with the left femur, we obtain a lower value, viz., ·84. The following table of the correlation values for a few well-known data may be of assistance in helping the reader to interpret the meaning of the numerical values:—

Variables.	Coefficient of Correlation "r."
Weight and stature—English students	·64
Vaccination and freedom from smallpox	·75
Recovery and use of diptheria antitoxin	·45
Length of fore-arm and stature	·37
Breadth of head and ability	·08
Stature and cephalic index	—·08

The intensity of inheritance can be studied mathematically and a numerical value found for the coefficient of correlation between characters in parent and child. Many physical characters have been thus analysed, both in men and the lower animals, and a value approximating to ·5 is obtained in most cases. A table of some of these values is given below.

Parental Heredity.

In regard to tuberculosis, Professor Karl Pearson was, so far as I know, the first to consider this question from a strictly mathematical standpoint. In a memoir entitled "A First Study in the Statistics of Pulmonary Tuberculosis," he discusses the material obtained from the Crossley Sanatorium. Unfortunately, no sanatorium data are sufficient to enable the problem of the heredity factor to be studied without some assumptions being made, firstly as to the number of children who will have developed tuberculosis when the family history is *completed*, and, secondly, as to the number of healthy children of non-tuberculous parents in the population from which the tuberculous sample was drawn. A guide to the appropriate correction in the first case was obtained from 80 *complete* family-histories recorded in Dr. Thomson's book, "Family Phthisis," where it was found that 48 per cent. of the children were eventually tuberculous when one parent was affected, and 67 per cent. when both parents had suffered. Thus, as Professor Pearson remarks, "in stocks in which at least one parent is tuberculous the off-spring are tuberculous and non-tuberculous in the ratio of 175 to 162; in other words when the family history is completed at least 50 per cent. of such stocks will be tuberculous."

The second difficulty was met by making various assumptions as to the percentage of the general population that are attacked. "In the next place an estimate has to be made of the non-tuberculous off-spring of non-tuberculous parents. . . . . This can only be done by judging from the death-rates of pulmonary tuberculosis the number of the population affected; this is certainly more than 8 per cent. and less than 13 per cent. I have taken 10 per cent. as a round number to start with; 1 or 2 per cent. either way will not make a substantial difference in the result. Of course a reduction to 5 per cent. would much intensify the strength of heredity, just as raising to 15 per cent. would weaken the intensity."

It is clear, then, that the data as returned are insufficient, and certain assumptions must be made before a result can be obtained; but by varying the assumptions we can find within what limits the value lies. The coefficients of correlation for parental heredity, as found by Professor K. Pearson in the present case, are as follows:—

The assumptions made are set forth in each case:

I.

(*a*) 50 per cent. of the off-spring will be tuberculous when the family histories are completed.
(*b*) 10 per cent. of the general population are affected with tuberculosis.

*Males	r = ·59
Females	r = ·62
Mean value	·61

*Male pedigrees, *i.e.*, father's condition in respect to tuberculosis under consideration.

II.

(*a*) The 32 per cent. of tuberculous off-spring actually observed in the data under discussion are assumed to be the true value.
(*b*) 10 per cent. as in I.

Males	r = ·33
Females	r = ·44
Mean value	·39

III.

(*a*) 50 per cent. as in I.
(*b*) 13 per cent. of the general population are affected with tuberculosis.

Males	r = ·55
Females	r = ·58
Mean value	·57

Professor Pearson summarises as follows:—

"We may, I think, accordingly conclude with safety that the intensity of the inheritance factor in pulmonary tuberculosis is greater than ·4 and less than ·6."

Closely similar results were obtained by Dr. Goring working with totally different data. He was under no obligation to make any assumptions in regard to the number of non-tuberculous children of non-tuberculous parents, as his data were a random sample—as far as tuberculosis is concerned—of the general population. But the family-histories were not complete, and it was still necessary to make some assumptions as to the percentage of tuberculous children of tuberculous parents in the completed histories. Three assumptions are made: Group I., the correlation is calculated from the incomplete family histories as recorded; Group II., it is assumed that when the histories are complete 33 per cent. of children will be tuberculous, but Dr. Goring gives reasons showing that this value, and therefore that of Group I., are too low; Group II., taking 50 per cent. as used by Pearson as the upper limit.

The results obtained are as follows:—

I.—Incomplete Family Histories.

Males	r = ·44
Females	r = ·49
Mean value	·47

II.—Completed on 33 per cent. basis.

Males	r = ·52
Females	r = ·56
Mean value	·54

III.—Completed on the 50 per cent. basis.

Males	r = ·60
Females	r = ·63
Mean value	·62

We see then how very closely these results, based on totally different material, and freed from any assumptions as to the number of tuberculous persons in the general population, agree with those found some years previously by Pearson; thus giving valuable support to his conclusion already quoted.

Fraternal Heredity.

If the conclusions arrived at, as stated above, viz.: that the tuberculous diathesis is inherited is correct, we may expect to find that the correlation of fraternal heredity is sensible. Professor Pearson, working on Dr. Thompson's female data, finds that on the assumption that 1 in 11 of the community is tuberculous, the fraternal correlation = ·48. Or assuming 1 in 8 to be tuberculous the value becomes = ·43. After fully dealing with the statistical difficulties of this problem, he says: "Thus, although our assumptions appear large, a very considerable latitude in their numerical application does not widely modify the correlation"; and concludes with the statement: "*The tuberculous diathesis is inherited in the same way and with the same intensity as the physical characters are inherited in man.*"

It may be of interest here to table a few of the values found for the coefficients of correlation for inheritance, to serve as a comparison with the values quoted above.

Coefficient of Correlation for Intensity of Inheritance.

Parental.

K. Pearson:	Tuberculous Diathesis	
	Maximum	·60
	Minimum	·40
	Probable	·50
C. Goring:	Tuberculous Diathesis—	
	Maximum	·62
	Minimum	·43
	Probable	·50

C. Goring—

Insanity	·47

Heron—

Insanity	·53

Schusler—

Hereditary deafness	·54

Lee & Pearson—

Stature	·51
Span	·46
Forearm	·42
Eye colour	·50

FRATERNAL.

K. Pearson—

Stature	·55
Span	·53
Cubit	·44
Eye colour	·46
Vivacity	·49
Popularity	·49
Conscientiousness	·63
Ability	·44
Mean of physical characters	·51
Mean of mental characters	·52
Tuberculous diathesis	·43—·48

Similar values have been found for physical characters in animals.

Having demonstrated the probability that the tuberculous diathesis is inherited, and at approximately the same rate as physical and mental characters, and one may add as are certain other pathological characters, *e.g.*, insanity and heredity deafness—into none of which does the question of infection enter, we can now turn to the evidence in regard to the infectiousness of tuberculosis.

INFECTION.

From the Crossley Sanatorium data, Pearson found the mean age of *onset* of the disease was for males 28·1 ± 5 years and for females 25·3 ± ·4. From "Mortality Statistics," U.S.A., 1909, we find the mean age at *death* for tuberculosis of the lungs is stated to be 35 years. It is thus evident that people during early married life are at the most susceptible age; and therefore, if infection from individual to individual plays a prominent part in spreading tuberculosis, evidence of it should be well marked among married people; firstly, because the conditions under which they live favour the spread of infection from one to the other, and, secondly, because a large number of these people are at the optimum age to contract the disease.

One may here, perhaps, repeat the warning already given, that no number of instances of husband and wife, both tuberculous, can be accepted as evidence for or against infection, unless accompanied by a statement as to the number of normal families, and the number where only husband or wife are affected in the population from which such records were obtained.

It is generally admitted that the tuberculous diathesis is correlated with certain physical and mental characters. Most text-books of medicine, and writers on tuberculosis, describe types of persons who are peculiarly liable to tuberculosis. If it be admitted that such exist, it is an important consideration from our present point of view, for it has repeatedly been shown that homagamy, that is the marriage of like with like, is a law operative among the members of the upper and middle classes of European society. The following table gives a few of the correlation values for assortative mating, which have been worked out by members of the Biometric Laboratory:

Character.	Correlation.
Eye colour	·26
Stature	·28
Span	·20
Mean for physical characters	·24
Intelligence	·33
Truthfulness	·22
Temper	·11
Mean for physical characters	·24

Thus, if tuberculosis is associated with physical and psychical characters, we should *a priori* expect to find a marital correlation in respect to tuberculosis, in the middle classes, even if no possibility of infection existed.

The most extensive inquiry into the question of marital infection, on scientific lines, is probably E. G. Pope and K. Pearson's Memoir, entitled "A Second Study of the Statistics of Pulmonary Tuberculosis: Marital Infection." Mr. Pope's data consist of the history of married people who had at least one tuberculous child; and, hence, are not a random sample of the general population, unless the tuberculous diathesis is not inherited. Prof. Pearson, at the commencement of this Memoir, sums up the position in these words: "Now if we start from the standpoint that there is no inheritance of the tuberculous diathesis, we conclude at once that there is no selection in such parents; they would form a mere random sample of the general population. In this assumption the average value of the resemblance between husband and wife for the tuberculous character falls below the value that it takes for general health, for insanity, eye colour, or for intelligence; it is much the same as Miss Elderton has found it to be for temper and some types of temperament. . . . On the other hand, if we assume—as I think we are now justisfied in assuming—that the tuberculous diathesis is inherited, we must treat our parents of tuberculous off-spring as a selected group, and correct for this selection. . . . It appears on the bulk of existing material difficult to reach a definite demonstration of the existence of marital infection, and that demonstration depends on the assumption that the tuberculous diathesis is an inherited character." Thus, odd as it may seem, the advocate for marital infection will strengthen his position by assuming the inheritance of a tuberculous diathesis. If, therefore, the increased liability of children of tuberculous parents to the disease is not, at least in part, due to the inheritance of the tuberculous diathesis, but rather to infection from parent to child, we are faced with the somewhat anomalous position, that it is easier to spread the disease from parent to child than from one parent to the other; and yet, as we have already seen, parents are at a much more susceptible age, and amongst the middle classes live in much closer association with each other than with their children.

In summing up a critical argument on the results found from a fairly long series of data obtained from various sources, Prof. Pearson says: "As a result of this consideration of 'random samples' and of the only slightly selected parents of the non-tuberculous, I think we may say that the correlation in tuberculosis between husband and wife amounts to certainly more than ·2, is very unlikely to be as large as ·4, and might possibly reach ·3 to ·35." And further on: "I think we may safely conclude that the different methods of approaching the problem lead to the ·same result—a marital correlation of about ·30."

Turning now to Dr. Goring's results, obtained from a totally different set of observations, he points out that in the lower classes we may probably assume "mating is far more casual, and any sexual selection is influenced more by the grosser physical, than by the finer physical or any mental affinities." As the result of his investigation he gives the following values for the coefficients of correlation between husband and wife:—

MARITAL CORRELATION.

Character.	Class of Population.	Correlation.
Pulmonary Tuberculosis	All	— ·01
	Well-to-do and prosperous poor	+ ·16
	Very poor and destitute	— ?
Insanity ..	All.	+ ·06
	Well-to-do and prosperous poor	+ ·35
	Very poor and destitute	— ?

These returns show, that amongst the same social classes the marital correlation is at least twice as great for insanity, where infection is excluded, as it is for tuberculosis. It is perhaps well to bear in mind that syphilis and alcoholism are important factors in determining the presence of insanity, and marital correlation for syphilis is probably high, while for alcoholism it is known to be high. These factors may have some influence in the high correlation found for insanity. But to return, it is surely amongst the very poor and destitute, where the housing is bad, that the greatest amount of infection would be expected, and yet we find the coefficient of correlation to be much higher among the well-to-do and prosperous poor, than among the very poor and destitute. Further, a still higher value was found by Pope, Pearson and Greenwood, when dealing with better social classes.

Greenwood's general results, in respect to marital association in pulmonary tuberculosis, confirm those of Pearson and Goring. The data were mainly obtained from German Sanatoria; the histories being classified as tuberculous, non-tuberculous and probably tuberculous. Greenwood, in calculating the coefficients of correlation, groups as follows: A., the tuberculous with the probably tuberculous; B., the probably tuberculous with the non-tuberculous C, excluding altogether the probably tuberculous.

The results are as follows:—

Number of Pairs.	Coefficient of Correlation.		
	A.	B.	C.
14,997	·11	·23	·21
3,927	·12	·22	·19

After a close discussion on the mathematical difficulties encountered, he concludes thus: "My object in troubling you with this long discussion is simply to put forward the suggestion that, in the present state of knowledge, it is difficult to believe that the parental correlation of between ·46 and ·68 for pulmonary tuberculosis is not a measure of inherited predisposition, rather than of parental infection."

We have already seen that the collection of cases where both husband and wife have been tuberculous cannot, without further information, be accepted as evidence of infection. This will be clear if we conider the problem thus; let us suppose 1 in 10 of the population of England suffer from well-marked tuberculosis—and this is prabably a reasonable assumption—and that even if only 8 per cent. of the married population are thus affected; then, if the tuberculous and non-tuberculous mate at random, we may expect that in every hundred married tuberculous, 8 will have a tuberculous mate. As an example of what actually does occur, Pearson quotes the following observation: from a random sample of middle class families there were 86 tuberculous married persons, and amongst this number 6 had a tuberculous mater, he adds: "There is clearly no need in such cases to appeal to infection from husband to wife to account for the small number of cases in which both parents suffered."

Before leaving this question of marital infection, it is of interest to note that some years ago Dr. Longstaff, considering this question of the probability of a phthisical married person having a phthisical mate, wrote as follows: "If the results are anything near the truth they prove that a far greater number of coincidences of deaths of both husband and wife, within a short interval, of phthisis than has yet been brought forward, would be required to prove that the one had contracted the disease from the other by infection."

We may now turn to the question of infection of off-spring by the parent. Again quoting Prof. Pearson in respect of the Crossley Sanatorium data: "An indirect method of measuring the effect of a phthisical environment now arises. If infection really plays a large part, in the liability to phthisis, and common life with parents or brethren suffering from phthisis, explains the apparent running of the disease in stocks, we ought, I think, to find subjects belonging to families in which one or more members (parents or brethren) were affected by phthisis attacked at an earlier age than cases in which there are no such members. Actually, I reach the following results:—

MEAN AGE OF ONSET.

Sex.	All Classes.	Cases of Immediate Family History.
Males	29·1±·5	27·7±·9
Females	25·3±·4	25·7±·7

"The results, considering the numbers dealt with, cannot be considered conclusive. At any rate no significant difference in the average age of onset can be deduced from these figures."

Again, Prof. Pearson found that out of 1,000 cases of "acquired" phthisis given in Dr. R. E. Thompson's "Family Phthisis," the average age of onset was, for males 29·5, and for females 25·9. But in hereditary phthisis the following results were found:—

MEAN AGE OF ONSET.

Person Affected.	Males.	Females.
Mother only	26·0	23·8
Father only	26·6	24·1
Mother and one child	26·6	26·3
Both parents	24·9	22·6
Brothers and sisters, not parents	29·0	26·1

From these results we see that the age of onset is markedly lowered when both parents are affected; but the infection of brothers and sisters does not lower the age of infection, and it is practically the same as that of the acquired cases. As Prof Pearson states, "It would seem that parental phthisis lowers the age of onset, but this cannot at present be asserted to be due to infection."

In "Mortality Statistics," U.S.A., 1909, it is stated: "Now, the approximate average age at death of persons dying from tuberculosis of the lungs in the United States is practically about thirty-five, *a figure which has been curiously stationary* for each year for which the statistics are available since 1860, although the average age at death from all causes has increased from 22·7 years in 1860 to 38·1 years in 1907." This statement is very striking, especially in view of the falling death-rate from tuberculosis. If the falling rates are due to the diminished chance of infection, then one would naturally expect the average age at death to have increased.

Further, if infection from person to person is a factor of great importance in the spread of tuberculosis, one would expect that children of infected mothers would be affected in larger numbers than those with infected fathers. Goring gives the following table dealing with this question:—

	Percentage of Children Affected.		Intensity of Inheritance.		Difference with Mothers.	
	Of Tubercular Fathers.	Of Tubercular Mothers.	Male Pedigree.	Female Pedigree.	%	r.
Total offspring ..	16·8	20·9	·44	·49	+ 4·1	+ ·05
Offspring surviving to 14 years ..	24·8	24·5	·50	·50	— 0·3	·00
Offspring surviving to 23 years ..	25·5	27·3	·50	·52	+ 1·8	+ ·02

And he adds: "On the whole, there is a slight excess with mothers over fathers, and this excess expresses the intensity of the infection—if so small a difference can be considered significant." Even if the difference can be significant, there may be other explanations, for instance the maternal inheritance might be slightly stronger than the paternal. Examination of the table, however, leads one to believe that the differences shown are not significant. For example, the intensity of inheritance for male pedigrees, total off-spring, is below what we have reason to believe is correct and curiously out of agreement with that for off-spring surviving 14 and 23 years; also the group "surviving to 14 years" shows no bias towards the mother, while in the group "surviving to 23 years" the bias again appears, whereas the older the off-spring the less the effect of maternal infection should be.

Before considering some objections which may be raised to the above figures and the deductions which have been drawn from them, let us re-state the problem before us. What we wish to determine is whether from an administrative point of

view tuberculosis is an infectious disease, *i.e.*, whether it is spread from case to case —whether the propinquity of the sick is baneful to the healthy. On the one hand, we have a school of opinion, which has been growing in numerical importance during the last decade, which considers that infection from the diseased to the healthy is the most important, the overwhelmingly important, factor in the spread of tuberculosis, and as the corollary to this view, direct all attention to the prevention of infection by the sick. The extreme position, on the other hand, is the belief that the inheritance of the tuberculous diathesis is all important; and that in Northern Europe given a suitable soil by birth few individuals can escape the disease, so ubiquitous is the tubercle bacillus under modern civilised conditions.

That the presence of the tubercle bacillus is a necessary factor in the production of this disease, and consequently that if the bacillus could be eliminated the disease would cease to exist, will be readily conceded by all, but in practice the problem is this:—Is the spread of tuberculosis due to case to case infection to such an extent as to make it desirable to introduce legislation to control the movements of tuberculous patients? Before we can answer this question in the affirmative we must be convinced, not alone that tuberculous people do spread the disease, but that any legislative measures will have a reasonable prospect of reducing the incidence of the disease. The advocates for restrictive legislation have based their claims, to a great extent, on the supposed effect of modern sanitary legislation, anti-tuberculosis campaigns, segregation in sanatoria, etc., in reducing the incidence of tuberculosis. We shall presently inquire what evidence exists in support of such claims. But if it can be shown, as we believe it can, that, in civilised communities the tubercle bacillus is so ubiquitous that everyone must come into more or less frequent contact with it, and if in spite of this the death rate from tuberculosis is declining, then we must look elsewhere for the cause of the fall.

To penalise the sick unless a reasonable chance of protecting the healthy follows, is to make them martyrs of a persecution based on a mistaken theory, and we should be entitled to be even more emphatic than the statement made in the appendix to "Mortality Statistics," U.S.A., already quoted from, viz.:—"It is *not* a contagious disease, in the sense that smallpox and scarlet fever are actively contagious or transmissible by mere contact, and it is a cruel injustice to tuberculous people who take proper precautions in regard to the destruction or disinfection of their sputa, to treat them with the abhorrence that is usually associated with leprosy or smallpox."

Now we have seen, if we accept the figures quoted above, that there is little or no evidence in support of the view that married couples spread the disease the one to the other: in fact, where one would on the infective theory expect this to occur most freely, *i.e.*, amongst the poorer classes, there is least evidence of its existence. We may, however, refuse to accept the figures, and reject them on one of two grounds: either that they are incorrect and therefore worthless records, or that the statistical deductions are mathematically unsound. If the latter objection is chosen, then the reader must be referred to the original memoirs and the authors can be safely left to vindicate their positions. But if the former objections is made, which is probably the more likely, let us see what it means. Firstly, in regard to the correlations for paternal and fraternal inheritance, we note that the results found from totally different sources lead to similar values, which further agree with the values found for the inheritance of physical and mental characters in man. Thus, if the records are incorrect these agreements are entirely fortuitous. Secondly, when we come to deal with the marital correlations, we again find that similar results are obtained from data drawn from such varied sources as German, English and Canadian records of Sanatoria. Prisons, etc.; either these returns approximately reflect the truth, or we must assume that this large series of faulty and incorrect records only give similar results by pure chance and that in turn their agreement in value with the correlations for assortive mating in man is a further coincidence. The odds against such a combination of chances are clearly enormous, and this alone might make the most ardent supporter of an adverse theory hesitate to pass these figures by as worthless

Leaving now the question of marital and family infection we may consider whether any evidence of infection can be obtained from institutions where tuberculous patients are congregated. Most of the evidence available is in the nature of opinions from medical officers to such institutions; some of these have been collected by Dr. Bulstrode in his most interesting report on Tuberculosis Sanatoria to the Local Government Board, 1910. I have taken the liberty of extracting freely from this report.

In Dr. Samuel West's words:—"It is fair to say at the outset that if phthisis was eminently contagious the proof of it ought to be overwhelming considering the

frequency of the disease. If phthisis were a contagious malady we should expect to find the clearest proof of it among those who are placed in close relation with the sick, *e.g.*, among married copules, among nurses and doctors, and among the inmates of the same house or institution."

Ransome expresses the same idea when he says: "That if that simple contagion theory were true, hospitals for consumption should have been, at any rate in the past, centres and hot beds of infection; but the universal testimony of physicians to these institutions is that no conveyance of the disease can be traced to any such institution even before the practice of disinfecting the sputum had been carried out."

Dr. Bulstrode points out that the attendants in institutions are at an age of maximum susceptibility to the disease, and he adds: "Now the actual experience of hospitals for consumption, *i.e.*, of institutions where alone the communicability of the disease can be tested in the absence of disturbing factors, is to the effect that, under the conditions which formerly obtained and which obtain now, the disease would appear to possess the lowest communicability of any of the infectious diseases. On this evidence indeed, it might be held that if the communicability or non-communicability of the disease be determined solely by the consumption hospitals and sanatoria in this country, there is difficulty, having regard to the widespread character of the disease, in accepting a proposition that phthisis is in any degree personally communicable."

Dr. Theodore Williams states that Brompton Hospital has been in existence since 1846; in 1856 it contained 200 beds, and in 1873, 240. Much of it was badly ventilated until quite recntly, and no attempt was made to disinfect the sputum; and he adds: "The deficiency of ventilation must have led to a large accumulation in the wards of the products of respiration, and also our friends the bacilli. We consequently ought to have seen an extension of the disease to non-consumptive cases or to the nurses; but nothing of the sort occurred."

"At Falkenstein, during ten years, 225 non-tuberculous friends accompanying patients have stayed at the Sanatorium; many have stayed for six months, and no case of infection has been observed."

"At the Friedrichsheim Hospital at Berlin, out of 459 male nurses only four were phthisical, and two of the four were phthisical before entering the service; and out of 339 female nurses, only two became phthisical, *i.e.*, a rate of only 0·6 per cent."

"As regards American experience, Dr. Trudean states that at Saranac Lake no nurse, attendant, or servant, has ever contracted phthisis."

In 20 years' experience at the Ventnor Hospital for consumption, Dr. P. Robertson reports: "That at least 15,500 tuberculous persons were treated, more than half of this number were what are sometimes spoken of as third-stage cases. Of 62 officers there has never been any suspicion of any of them having contracted phthisis; among 208 nurses there were apparently six cases, but evidence seems to show that at least three suffered from the disease before admission. Of 407 housemaids, none are known to have died of tuberculosis. One, however, who married a phthisical patient was subsequently reported to be consumptive, and there are records among the remainder of two cases of pleurisy and one of phthisis; all three are still alive."

Dr. Goodall states: "For every 100 cases of enteric fever admitted into the hospitals of the Metropolitan Asylums Board, 1·6 persons on the staff contracted the disease; while for scarlet fever and diphtheria the figures are 0·6 and 1·3 respectively." One must remember that the staff are at an unfavourable age to contract diphtheria and scarlet fever, though not enteric fever.

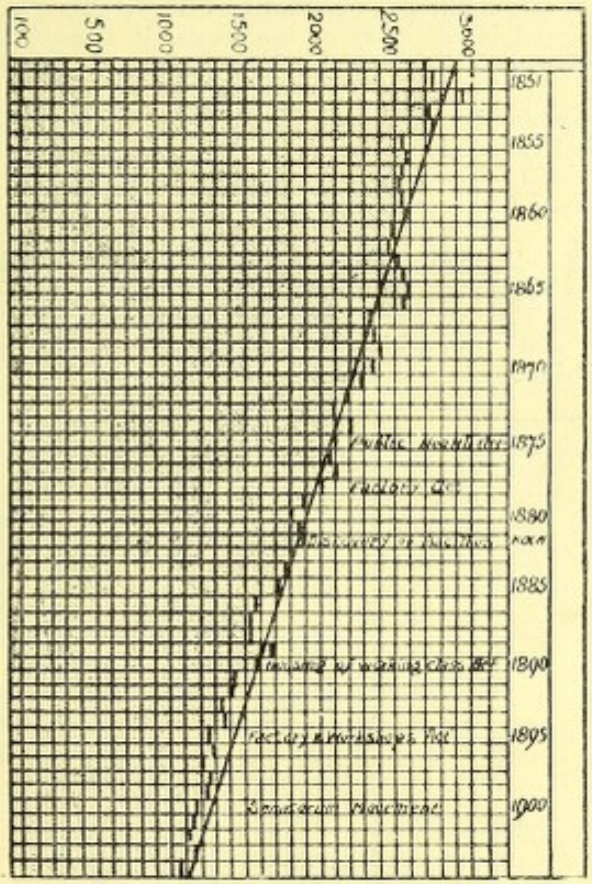
Further, it may be pointed out that all medical students have had exceptional opportunities for contracting the disease, and yet, as shown in the American statistics, the tubercular death-rate for medical men is considerably below the average for all occupied males. The highest rate is 541 for marble and stone cutters; 237 all occupied males; 169 physicans and surgeons. The same is true for nurses. Highest rate for occupied females is: Servants, 320; all occupied females, 173; nurses and midwives, 100. These rates are number of deaths from tuberculosis of lungs of occupied persons ten years af age and over per 100,000 of the population.

In Cape Colony many of the towns contain a large population of coloured people, who are apparently very susceptible to tuberculosis, and suffer heavily from this disease, and yet, although their habits are often not particularly cleanly, the disease does not seem to pread to any extent to the European population, in spite of the fact that many of the latter are living in close association with these affected people.

One of the commonest and, at first sight, perhaps, one of the strongest arguments in favour of the importance of infection in determining the prevalence of tuberculosis, is the claim that the introduction of public health legislation, the educative effect of the tuberculosis crusade, and the segregation of tuberculotics in sanatoria and other institutions, has been followed by a marked fall in the death rates from this disease. But *post hoc ergo propter hoc* is a fallacy too well recognised to need elaboration. Reference to the decenual supplement of the Registrar of Births and Deaths, England and Wales, shows that the decline in the phthisis death-rate has been taking place since 1851, and in an approximately even manner; no noticeable drops in the curve have followed or coincided with sanitary or other measures; and an even more marked fall in the rates took place between 1837 and 1851.

PHTHISIS, 1851-1905. ENGLAND AND WALES.

Corrected death-rates per million living at all ages.



A study of the above diagram leads one to endorse Prof. K. Pearson's statement, "that when they studied the fall in the phthisis death-rate, when they noticed this fall taking place alike in urban and rural districts, alike with or without sanatorium or dispensary treatment; when they saw that it started long before the introduction of such treatment, and had not been accelerated by increased medical knowledge, then they were compelled to regard that fall as part of the natural history of man, rather than as a result of his attempts to better environment."

There is one further argument that deserves consideration. It is frequently stated that because any susceptible animal can be artificially inoculated with tubercle bacilli and contracts the disease, we know, therefore, that it is an infectious disease, and should be treated as other such diseases are treated. Few people, I suppose, would doubt that, given a sufficient dose of the bacilli, practically any one might be infected, but this is not the practical problem we are dealing with. If we give many time the minimum fatal dose to an animal it will undoubtedly die, but these experiments are not paralleled in man; and, therefore, arguments from the supposed analogy seem to me beside the mark. Pneumonia and many other diseases are also of bacterial origin, yet these diseases are not regarded as

infectious in the ordinary sense of the word, although the incubation period is often short, and so infection from case to case would be more readily noticed if it occurred than is the case in tuberculosis where a long quiescent period is common, yet no evidence has been produced to show that segregation in such cases would be of value. In these cases we recognise that predisposition, *i.e.*, the lowering of resistance, is the important factor in determining the infection. This view is, I believe, the one we should adopt in regard to tuberculosis. Sir Douglas Powell and Dr. Horton-Smith Hartley, in the Fifth Edition of *Diseases of the Lungs*, 1911, discussing Prof. K. Pearson's statement that he is "inclined to think that the "risk run, especially under urban conditions, are for tuberculosis as for a number of other infectious diseases, so great that the constitution or diathesis means almost everything for the individual whose life cannot be spent in self-protection," write as follows: "Let us ask ourselves how far on clinical grounds Prof. K. Pearson's conclusion seems to be correct. We have no hesitation in answering that it is at one with our clinical experience." And again, in the last paragraph in the Chapter on the Etiology of Pulmonary Tuberculosis, they say: "The evidence, therefore, seems to us to show that, in spite of what modern critics may urge, the hereditary factor in consumption is one that may not be gainsaid, and that it manifests itself in a special idiosyncrasy of the tissues in certain families and races, whereby they became more than usually favourable to the growth of the tubercle bacillus."

In order to explain the fall in the phthisis death-rate in the earlier years, it has been stated that the apparent fall is due to a transference of deaths from the group phthisis to that of bronchitis. A reference to the table below will show how much evidence there is for this contention. It is interesting to note that the alteration in the death-rates from tuberculosis, and pneumonia and bronchitis, are closely similar, but both these groups show totally different values to that of the infectious disease, included as a contrast. The table is compiled from the *Mouvement de Population*, France, 1909. In reference to this table, it must be noted that the period of years over which the fall is taken for the various countries is not in all cases similar.

Pulmonary Tuberculosis.			Pneumonia and Bronchitis.			Scarlet Fever.		
1876–1880.	1896–1900.	% reduction.	1876–1880.	1896–1900.	% reduction.	1876–1880.	1896–1900.	% reduction.
England and Wales— 2,041	1,322	–35	3,382	2,766	–18	680	135	–80
Scotland— 2,293	1,646	–28	3,279	2,738	–28	576	174	–66
Ireland— 2,001	2,132	+ 6	2,638	2,501	– 5	320	91	–72
Denmark— 2,623	1,598	–40	2,426	1,921	–21	562	102	–82
Norway (1881–1885)— 1,395	2,062	+47	(1881-1885) 1,297	1,779	+37	433	75	–83
Switzerland (1881–1885) 2,109	1,911	– 9	3,186	2,607	–18	391	15	–96
Italy (1887–1890)— 1,066	1,060	0	(1887-1890) 4,452	4,333	– 3	313	110	–65
France (1891–1895)— 2,550	2,488	– 2	(1891 1895) 3,620	2,944	–19	50	46	– 8

The data we have been considering are for the most part based on death returns, but all attacks of tuberculosis are not fatal, and the whole story is not told in the mortality statistics. Prof. Francis Harbitz records that out of 558 post-mortem examinations 70 per cent. were found to have, or to have had, a tuberculous lesion. Of this total 22 per cent. were due to active tuberculosis. Forty-two per cent. had latent or obsolete tuberculous lesions, and five to six per cent. developing tuberculosis. In a series of post-mortems on children he found 42 per cent. with tuberculous lesions, and in a second series, when a microscopic examina-

tion of the lymphatic glands was undertaken, the percentage rose to 48·5 per cent. Amongst adults dying of tuberculosis 20 per cent. were found to have latent chronic centres of infection. Adami and McCrae report that in 1,000 post-mortems, 417 showed signs of past or present tuberculosis; they state, however, that this percentage is certainly too low. Some observers find even higher percentages than these, Sir D. Powell and Dr. Hartley, in their book already quoted from, write as follows:

"Phthisis is an exceedingly common complaint, and our opportunities of infection, especially those of us who work in hospitals, are infinite, and yet we do not develop the disease, although the observations of Naegli show that between the ages of 18 and 30, 96 per cent. of autopsies give evidence of infection, and that above thirty no individual is free."

The very widespread nature of the disease is further shown by the results obtained from examinations by von Pirquet's reaction. Amongst adults in European countries, from 70 to 90 per cent. are found to give a positive reaction. Calmette states that among children of from 1 to 5 years old over 55 per cent. give the reaction.

The belief that most Europeans suffer from tuberculosis is widespread and ancient. Dr. Bulstrode writes: "That the opportunities of acquiring tuberculosis are infinite is a belief of old standing. . . . Gideon Harvey, in the second edition of his 'Morbus Anglicus,' 1672, wrote: 'It's a great chance, we find, to arrive at one's grave in this English climate without a smack of consumption, death's direct door to most hard students, divines, physicians, philosophers, deep lovers, zealots in religion.' There is, too, the German saying *jedermann hat am ende ein bischen tuberculose*, a proposition largely supported by post-mortem records."

Thus we see that while only from 10 to 12 per cent. of the population die from tuberculosis, yet the large majority of people have, at some time or other, suffered from a tuberculous infection. It is evident, therefore, that the fall in the death-rate is not due to a diminishing attack rate; since, even at the present day, practically every one becomes infected at some time or other.

Exception may be taken to this view, on the ground that repeated infections predispose to a fatal termination. Such a view, however, receives little support from modern views on immunity. On the other hand Harbitz says: "There is much to support the opinion that tuberculous infections from which recovery has been made . . . . creates a predisposition to tuberculosis." The figures he gives do not seem to support this contention, for in the same paper he informs us that in 20 per cent. of the deaths from tuberculosis, latent or chronic tuberculous lesions were found, but that amongst deaths from all causes 42 per cent. had latent or obsolete tuberculosis. So far then as we can draw any conclusions from these figures, they suggest that previous infection tended rather to protect than predispose to a fatal infection. Calmette says, on what evidence I do not know, that early infections protect against later rapidly fatal infections. In the light of our present knowledge of immunity, and in the absence of definite information to the contrary, I do not think we are entitled to assume that second and subsequent infections are more dangerous than the primary ones. And, further, we must realise that before post-mortem evidences of tuberculosis can be found the bacillus must have obtained a firm footing and have increased considerably in number. If, therefore, the organism can, after having once permitted the growth and multiplication of the tubercle bacillus, regain or acquire a protective power, a new infection is surely not more difficult to cope with, and it is unnecessary to assume that repeated infections are required to account for the fatal cases.

Evidence in respect to the spread and fatality of this disease in new countries is also against this view. That we do not all die of tuberculosis is not due to the want of infection, nor to the size of the dose, as most of us have not only harboured the bacilli but allowed it to multiply in our bodies, and have thus provided the necessary focus for a general infection were our tissues unable to acquire an immunity. Von Behring, after having drawn attention to the enormous prevalence of tuberculosis, as evidenced by post-mortem records upon the human species, states: "I must confess to you that hitherto according to my opinion there has nowhere been brought forward an unassailable proof of consumption in the case of an adult arising from tubercular infection originating epidemiologically, *i.e.*, under the conditions of infection existing in nature."

If then we are right in excluding repeated infections as a necessary factor in accounting for the prevalence of this disease, it becomes evident that, since practically every one in European countries has been, not only infected, but has had a tuberculous centre develop in his body, we must look for some explanation, other

than the assumed diminution in the prevalence of the bacillus to account for the falling death-rate. An increasing power of resistance, due either to hereditary or environmental influences, or a combination of both, must, I think, be the factor mainly concerned. As Prof. Osler says: "There are tissue soils in which the bacilli are, in all probability killed at once—*the seed has fallen by the wayside.* There are others in which a lodgment is gained and more or less damage is done, but finally the day is with the conservative protecting force—*the seed has fallen upon stony ground.* There are tissue soils in which the bacilli grow luxuriantly; caseation and softening, not limitation and selerosis, prevail, and the day is with the invader—*the seed has fallen upon good ground.*"

In favour of environment playing the major role in the diminution of the death-rate, it may be claimed that this has occurred *pari passu* with improved methods of living, that in times of famine the death-rate from phthisis rises, and that the rate is higher amongst those who are below the mean weight, and, therefore, presumably, under-fed—this latter argument, however, must be used with great caution, even if it is permissible at all. It would, I think, be foolish to deny that improved conditions of living—housing and feeding—will increase the natural resistance to most infective diseases, including tuberculosis, and in this sense improved sanitation may be of value in helping to lower the tuberculosis death-rate. But in regard to housing, it must be remembered, that women who are much more confined to the house and are therefore more affected by ill-ventilation, have, nevertheless, in most countries, a considerably lower death-rate from phthisis than men.

In considering the question of environment the importance of occupation must not be lost sight of, for many reasons. The conditions of work may be unfavourable to the general health, or may be instrumental in directly injuring certain tissues, *e.g.*, tin mining, in producing silicosis. Again, the wages in different trades vary considerably and so the home conditions will vary in accordance; and, further, the neighbourhood in which many factories are situated is unhealthy, but the operatives are compelled to live near their work. And again the most unskilled employments tend to attract the physical degenerates to their ranks. It is evident then that the effect of occupation on disease is not a simple problem. There is, however, one question in relation to tuberculosis and occupation that requires further consideration. At the present time it is frequently claimed that dusty occupations are of peculiar danger owing to the dissemination and subsequent respiration of the dust carrying the tubercle bacillus obtained from dried sputum. Evidence in favour of this theory has been derived chiefly from experiments on animals, where the conditions are in no way parallel and are not therefore admissible. We have here two factors to consider; first, is infection by the respiratory tract common? and, second, are the bacilli occurring in dried sputum still virulent? In regard to both these points opinions are divided. Prof. Calmette states that infection through the digestive organs is the principal source of tuberculosis at all ages. In regard to the second point, I will quote again from Dr. Bulstrode's report: "In reference to this phase of the question, it may be pointed out that the ability of the tubercle bacillus to retain its virulence under ordinary every day conditions until the sputum containing it becomes so dried as to render practicable its diffusion as dust is, according to a large amount of experimental work, an impossible event." He refers to experiments on this matter by Dr. Ransome and Prof. Delapine, and continues: "These experiments of Ransome and Delapine, carried out several years ago, hardly seem to-day to be receiving the attention they deserve. They have, however, recently been confirmed in a remarkable manner by Prof. Cádeac, of the Veterinary School of Lyons. The whole of Cádeac's researches are, he claims, very far from supporting the view that tuberculosis spreads by the inhalation of tuberculous dust. He concludes that drying and loss of virulence of tuberculous sputum proceeds side by side, and that removable dust is inert dust." It is evident then that the effect of occupation may not be the simple matter of infection it is frequently assumed to be.

Environment and occupation may lower the natural resistance so that an individual who might have escaped in one set of circumstances becomes a victim under others; and just as we must admit that direct infection *may* in certain cases be the cause of the disease, so we must admit that environment may also be a factor of importance. The questions of practical importance, however, are: can we materially reduce the incidence of this disease (1) by directing our energies to the suppression of the bacillus, or (2) by our efforts to alter and improve the environment? I believe for reasons already given that the answer to the first is—No! The answer to the second must be postponed until we have considered the effect of a selective death-rate in modifying hereditary characteristics.

Since the publication of the "Origin of Species" the scientific world has become acquainted with the possible effects of a selective death-rate. If tuberculous persons, or people with a marked tuberculous diathesis do not reproduce their kind so freely as the non-tuberculous, then each succeeding generation would *ceteris paribus* show a diminished proportion of tuberculous persons. Now Professor Pearson has shown that potentially tuberculous parents have as large families as the non-tuberculous; but, since tuberculosis is a disease of early and adult life a smaller proportion of tuberculous people will marry, and of those that do, fewer will live to complete their married life than of the non-tuberculous. That is to say, that while there is no evidence of a selective birth-rate we have undoubted evidence of a selective death-rate. As Professor Pearson puts it: "It would thus appear that fewer offspring are not born to stocks tainted with pulmonary tuberculosis. The fact, however, that tuberculosis is a disease of youth and early middle life distinctly lowers the marriage rate of such stocks and thus reduces the total number of off-spring born to them. From the Crossely Sanatorium records we find:—

"Both parents tuberculous: Mean size of family, 3·50.
"One parent tuberculous: Mean size of family, 5·42.
"Neither parent tuberculous: Mean size of family, 5·82.

"Thus, to use Mendelian terminology, it is the (DR's) and not the (RR's) which constitute from the Eugenic standpoint the gravest source of danger to the community."

As one-half of the deaths from tuberculosis occur before the age of 35, it will be seen that many—and possibly the most susceptible—will not live to marry; and this, if we admit the inheritance of the diathesis, must be an important factor in determining the number of susceptible persons in the succeeding generation. This factor will become more and more operative the later the mean age of marriage becomes. The tendency for some time past has been to postpone the age of marriage, more particular in the higher social classes, and this fact should not be lost sight of when the prevalence of tuberculosis in relation to social class is being considered. Unfortunately there is even here a complicating factor, for Professor Pearson has shown that the earlier children of a family are more prone to inherit the tuberculous diathesis than the later; and thus, if this is true irrespective of the age of the mother at the birth of the offspring, the postponement of marriage may have a contrary effect, in so far as the limitation of the size of the family is due to the postponement of marriage. The intensity of the inheritance of the tuberculous diathesis, however, may not be a function of the place in the family, but of the age of the mother, in which case the increase of the mean age of marriage will not have the drawback referred to.

Sanatoria.—The importance of segregating those suffering from tuberculosis, in order to prevent the infection of the healthy, has been maintained by many writers on tuberculosis. Newsholme attaches a great value to institutions—such as sanatoria—on these grounds. He writes: "Segregation in general institutions is the only factor which has varied constantly with the phthisis death-rate in the countries that have been examined. It must, therefore,, be regarded as having exerted a more powerful influence on the prevention of phthisis than any of the other factors of which none has varied constantly with the phthisis rate."

Now we have already seen that the phthisis death-rate has been steadily falling since 1837—*i.e.*, for as long as we have records—and no increase in the rate of fall is shown in the English mortality curve coinciding with the introduction and spread of sanatoria. It is, therefore, difficult to see on what statistical data the above assertion is made. A reference to the diagrams of death-rates in some English counties—given in Dr. Bulstrode's report—divided into those with and without sanatoria, shows that there is no evidence in support of the contention that sanatoria are instrumental in lowering the death-rate from phthisis.

From the statistical evidence available, therefore, it does not seem that there is any justification for the claim—in England at any rate—that institutional treatment has been instrumental in diminishing the spread of tuberculosis. This, however, is not the only claim made on behalf of sanatoria. There is a current belief that patients treated in sanatoria live longer, have an increased working capacity, and have a better chance of cure than similar patients not so treated.

This contention, if it be true, might justify on economic grounds the money spent on sanatoria, even if no other benefit accrued to the general public; as the financial gain, brought about by the increased working life of the patients, might constitute a sufficient return on the investments. Unfortunately, however, there is no satisfactory evidence that a gain in working life does follow sanatorium

treatment. Very few of the sanatoria publish their returns in a satisfactory manner, and it is often impossible, from the statistics published, to furnish an answer to this question. From some available records, W. P. Elderton and S. J. Perry have however in "A Third Study of the Statistics of Pulmonary Tuberculosis the Mortality of the Tuberculous and Sanatorium Treatment," shown that there is not any marked improvement in the mortality of any class of phthisical patient who has undergone the sanatorium treatment over the same class in the pre-sanatorium days. At the end of their Memoir they write as follows:—

"This table shows no appreciable improvement in the mortality of the tuberculous, but on the other hand it must be borne in mind that,

"(1) We may have under-estimated the time from onset to treatment in William's cases (though we do not think it likely that this exceeded two years on the average).

"(2) Williams and Pollack may have had a larger proportion of incipient cases;

and on the other hand

"(1) The general mortality has improved, so that the comparison with the modern English life table is rather more severe on the older statistics;

"(2) Diagnosis has, we understand, improved, so that the disease can now be detected at an earlier stage, if this be true, treatment may be taking credit for what is due to diagnosis. Or, in other words, it is possible that treatment, owing to better diagnosis, takes credit for some cures that nature formerly effected unaided."

They conclude their Memoir as follows: "The mortality among sanatorium patients does not show any improvement on that of Williams' and Pollack's cases. The comparison is, however, rendered difficult by the way the older figures were given."

If the above conclusions are correct then the justification for sanatoria must rest on humanitarian grounds, in the same way as public hospitals and infirmaries; and cannot by the present evidence be justified on economic principles.

If the fall in the phthisis death-rate be not due to the introduction of sanitary laws, better housing, segregation of the sick, disinfection or destruction of infected suputum, or in short, to any of the conditions which may be summed up as improved hygiene, it is necessary to discuss what factor or factors will satisfactorily account for the falling death-rate.

The explanation that seems most in accordance with the known facts is, that the falling rate is due to the breeding of a mere resistant stock, owing to the selective death-rate, which we have seen exists. The mortality diagram shows an approximate fall of from 3 to 1·5 per 1,000 living for the 50 years 1850 to 1900. If this decrease represented a uniform rate that had been operative for 500 years, the death-rate from phthisis in 1400 would have been 16·5 per 1,000, perhaps improbably high. It may, therefore, be objected that this rate did not occur in previous years; and, therefore, the explanation that the fall is due to a selective process is not tenable.

To go fully into all the factors that might have influenced the selective process is impossible. But it will be conceded that, while a straight line may quite well represent approximately a small portion of a curve, it will not necessarily even approximately represent the distribution beyond the observed limits. The old caution as to the danger of exterpolation, even at small distances, must be borne in mind. Further, it does not seem reasonable to suppose that the same factors would have been uniformly in operation for long periods, some of the factors which were in operation may have ceased to be effective, while new factors doubtless have been introduced.

When we consider the social conditions of the middle ages, it is easy to see that a totally different set of circumstances would have been in operation as compared with those of the present day. For instance, the weakling child would have received much less care, and, therefore, have had less chance to arrive at maturity; many of the physically unfit, of all except the lower classes, would probably have drifted into the monasteries where marriage was not countenanced. When strength, and the ability to fight, was the chief manly virtue, a sexual selection on totally different lines to that of the present day may have prevailed. Nevertheless, all these factors would have tended to reduce the phthisical stock; but when civilisation became more advanced, and the physically unfit had a better chance of survival, the phthisical death-rate may quite conceivably have taken on

an upward tendency, rising to a certain point only to fall again when the new set of selective factors became effective. Enough has, perhaps, been said to show that even if natural selection is the true explanation of the observed fall in the death-rate, we cannot assume that this fall has been continuous throughout the period during which tuberculosis has existed. It may be pointed out that, as Professor Pearson has shown, the rate of fall in the phthisis death-rate in England is tending to asymptote, *i.e.*, the present rate of fall is slightly less marked than that of a decade or two ago.

There is a point to which, although of the greatest importance, but passing reference can be made here. If tuberculosis is not in the main spread from man to man, how do the majority of people become infected? It is unlikely that a final answer to this question can be given at the present time; and some of the money which is now being spent on trying to prevent what apparently does not occur—namely, the endeavour to stop infection from man to man—might well be spent on an investigation into the real cause of the disease. It may, however, be permissible to suggest a mode of infection which is of greater importance than is often realised, and may account for many of the adult cases of tuberculosis.

We know that the curve, which represents the phthisis death-rate at different age periods, starts at birth, and gradually increases and attains a maximum before the age of 35. There is good reason to believe that by the age of fourteen the great majority of children have been infected with the tubercle bacillus; therefore, the increasing death-rate does not necessarily, nor, as we have already seen, probably indicate re-infections. If, then, many of the deaths among adults are due to the recrudescence of old centres of infection, the real spread of this disease may have to be sought in childhood, and be due to the ingestion of tuberculous food, such as milk or meat. It may be objected that, while we know that a large number of cases in children are due to the bovine type of bacillus, yet it is comparatively rare to find this type in the adult. From modern writings of bacteriologists it seems fairly well recognised that these two types of the bacillus may be distinguished, although some leading bacteriologists still deny that there is any essential difference; nevertheless, it is by no means certain that the bovine type may not take on the characters of the human type after residence in the human body. If this is so, then the above objection will disappear. In support of this contention, I may quote from Dr. Baldwin's article in Osler and McCrae's *System of Medicine*: "The conclusions of von Behring that the varying types and transition forms depends solely upon the animal host, and that the virulence of a given strain of bacilli furnishes no criterion as to its original source, is practically concurred in by the British Royal Commission on Tuberculosis, whose report of extensive experiments with bovine and human cultures speaks for the essential unity of these two forms."

Whether the administrative control of diseased foodstuffs can be expected to result in a diminished prevalence of tuberculosis, is a question on which there is too little evidence as yet to enable us to form an opinion. We do not at present know whether there may not be sources of infection other than those directly arising from either man or animals. There is no doubt that the tubercle bacillus is ubiquitous, but this does not entitle us to assume that it is always conveyed directly from the diseased to the healthy. For instance, the facultative saprophitic organisms are even more widely spread; tetanus germs are found apart from any known source of infection; with these and other similar facts before us, should we not hesitate to dogmatise about tuberculosis. Real progress can only be made by a careful observation of *all* the facts; theories must be abandoned without hesitation as soon as they are shown to be fallacious; to wait for some new theory to replace the old before admitting its insufficiency is unscientific, and retards progress.

It is conceivable that those in constant relationship with the tuberculous might develop an immunity owing to repeated small infections, while a single larger infection in the unaccustomed might be of considerable danger. At first sight, it may be thought, such a suggestion would account for the comparative immunity of wives and husbands; on the other hand, however, we must remember that children of infected parents suffer much more heavily than the general population, and, further, the healthy partner of the tuberculous mate does not suffer less than the general population.

Tuberculosis amongst East Coast and Tropical Natives.

The onset of active tuberculosis in the adult may clearly be due to either a recent or an old infection. Either an old and latent infection becomes, from one

cause or another, active; or an individual free from any tuberculous focus becomes infected, and almost immediately develops symptoms of the disease. It seems reasonable to suppose—bearing in mind what we know concerning acquired immunity—that an individual infected for the first time in adult life and succumbing to the infection, will exhibit a different clinical picture to that of the patient who has for a considerable period harboured the bacilli before developing symptoms of tuberculosis. The immunity which must have been acquired in the latter case has probably been only partially lost, and the fight against the spread of the disease, even if not ultimately successful, is likely to be longer and the damage to tissues more limited in extent.

There seems to be a current belief that the adult South African native is more susceptible to tuberculosis than the European; and the illustration usually offered in support of this belief is that a native attacked with tuberculosis rapidly succumbs to the disease. It does not, however, of necessity follow that because tuberculosis runs a more rapid course in an adult native than in a European of a similar age that the native constitution is therefore more susceptible to this disease. The European may, and probably has, been infected in childhood, and has therefore acquired a partial immunity; while the native may not have had any previous chance of so acquiring immunity. It would appear from the evidence in respect to the model age for attack and death from tuberculosis that the chance of resisting infection is considerably less when the attacked is between twenty and forty years of age, than when the infection first occurs in childhood. Before, therefore, we assert that the native is more prone to tuberculosis than the European, let us examine the facts at our disposal in regard to native infection.

Calmette found that about 18 per cent. of apparently healthy adult Europeans gave a positive reaction to his ophthalmic tuberculin test. He considers that a positive reaction in apparently healthy people indicates a latent but not a healed lesion. Amongst the clinically tuberculous he found that 92 per cent. gave the reaction (*Lancet*, 1909, Vol. II., p. 469), and similar results have been observed by others. Before quoting the results of this test on natives, a short description of the technique adopted must be given, as the rates vary to some extent according to the method used. A drop of a 1 per cent. tuberculin (Kock's old tuberculin, Pasteur Institute) was instilled into the lower fornix of the conjunctival sac, the eye being held open for half a minute and the head kept with the face upwards for one minute. The patient was examined after twenty hours, and again at the end of forty-four hours. It was found that 5 per cent. of the cases showing a positive result at the first examination had lost all conjunctival irritation at the time of the second, but that their number had been made up by a similar proportion of delayed reactions. The method of recording the observations was to mark all cases in which the conjunctiva of the instilled eye showed a slight blush with a (?), when a definite injection was observed they were marked (*), when an intense conjunctivitis was present, but unaccompanied by exudate (**), and when accompanied by exudate (***).

The results of this reaction on natives arriving in compound prior to being sent to the Witwatersrand mines to work is as follows: these "boys" must, however, be divided into two groups according as to whether they have worked on the Reef previously or are new comers. For the sake of convenience we shall use the term "new boys" for those natives who have never worked on the Reef and "old boys" for those natives who are arriving for the second or third time.

Out of 128 New Nyassa's 6, or 4 per cent., gave a positive reaction; and of 415 Mozambiques 7, or 1·7 per cent. reacted. Thus, out of a total of 544 tropical natives, who had never been on the mines, only 13 or 2·4 per cent. reacted to the Calmette test. The results were as follows:—

	Total.	0	?	*	**	***	Positive.
Nyassa	129	123	3	3	0	0	(4·0%.)
Mozambiques	415	408	3	3	1	0	(1·7%.)
Total	544	531	6	6	1	0	(2·4%.)

The number of tropical natives available for examination, who had been on the Reef previously, was unfortunately small; the figures, nevertheless, are of considerable interest.

Old Tropical Mine-Boys on arrival in Compound from Home for re-allotment.

	Total.	0	?	*	**	***	Positive.
Nyassa	52	42	6	4	0	0	(19·0%.)
Mozambiques	63	52	6	4	1	0	(17·5%.)
Total	115	94	12	8	1	0	(18·0%.)

It will be noticed that 18 per cent. gave a positive reaction, which is exactly the percentage found by Calmette in the European adult population. These results for natives are based on small numbers, and therefore subject to a large probable error, which in the last example is approximately 2·6 per cent. We can, however, say with certainty that a much higher percentage of "boys" who have worked previously on the mines, give a positive reaction than is the case amongst those tropical natives from the same districts—who are arriving for the first time.

Tropical Natives Returning Home after only one trip to Johannesburg.

	Total.	0	?	*	**	***	Positive.
Total	131	105	11	13	2	0	(19·8%.)

It is interesting to note that although a considerable number of natives are constantly returning home suffering from tuberculosis, yet the percentage of "new boys" reacting to Calmette is very low when compared with that found amongst "boys" who have worked previously on the Reef.

Another point of considerable interest in reltaion to tuberculosis amongst mine natives is brought out by a study of the post-mortem records. Any one who has systematically carried out post-mortem examinations on natives from the mines, dying from tuberculosis, cannot but have been struck with the frequency of abdominal lesions. I have been able to construct the following tables from 201 consecutive post-mortems of natives dying from tuberculosis.

These tables give the distribution of the organs affected with macroscopic tuberculosis:—

Cause of Death, as certified to Register.	Organs Affected.							
	Cases.	Lungs.	Lungs and some abdominal organ.	Liver.	Spleen.	Mesenteric Glands.	Peritoneum.	Kidney.
Silicosis and Pulmonary Tuberculosis	37	37	20	7	8	15	2	—
Pulmonary Tuberculosis	88	88	60	17	26	49	9	1
General Tuberculosis ..	39	39	39	28	31	29	13	5
All Deaths from Tuberculosis other than those complicated by Silicosis (percentage).	164	141	113	62	80	108	38	11
	100	86	69	38	49	66	23	7

Out of the 27 cases complicated by silicosis the lung was the only organ found affected in 17, or 46 per cent. of the post-mortems. This group forms a class by itself, for all the natives composing it must have spent some, and possibly many years on the Rand; and are not, therefore, comparable wtih those who have been only a comparatively short time exposed to the influences of life on the mines. Out of the 88 natives certified as dying from pulmonary tuberculosis, 68 per cent. had some obvious abdominal lesion. Out of the total number of deaths from tuberculosis uncomplicated with silicosis, only in 28 cases were the lungs the only organ found affected, and in 23 of the total cases the lungs were not apparently involved. That is to say in rather over 80 per cent. of the cases some abdominal organ as well as the lung was tuberculous; and in 14 per cent. of all the cases the lung was not diseased.

Out of 1,000 post-mortems referred to by Sir W. Osler, 275 showed active tuberculous lesions, in 272 cases the lungs were affected, and the percentage of cases in which the abdominal organs were diseased was as follows: Liver, 4·3 per cent.; spleen, 8·4 per cent.; peritoneum, 13 per cent.; kidneys, 11·6 per cent.; and the intestines 23 per cent. The infection of the intestines was probably chiefly due to a secondary tuberculosis ulceration, caused by the swallowing of tuberculous sputum. This condition is very rarely found in native post-mortems, and no case occurred in the 201 cases here dealt with. If these figures can be taken as representative of European tuberculosis post-mortems, it is apparent that the East Coast and tropical native is much more prone to exhibit abdominal lesions, especially if we exclude intestinal ulceration as due to a late secondary infection.

It is generally admitted that, in the adult, the lung is the seat of election for tuberculous processes, and perhaps owing to this it has been assumed that infection must have taken place through the respiratory passages. No such assumption as the latter is necessary. Any tuberculous centre, such, for instance, as a breaking down lymphatic gland, may infect the blood stream with tubercle bacilli, these being arrested in the fine capiliary network in the lung. That infection through the blood stream must almost certainly be the route of infection, whether the bacillus gains an entrance by the alimentary canal or by the respiratory passages, will be clear when we remember the physiology of respiration. The alveoli are aerated by a process of diffusion; no direct air current entering the alveolus. Any bacilli, therefore, carried through the trachea will get caught on the mucous membrane of the wall of the bronchi or larger bronchioles, or else be expelled by expiration. The ciliated epithelium of the bronchial mucous membrane tends to sweep the organism out of the lungs, not to drive them into the alveoli. But primary tuberculosis of a bronchus is exceedingly rare, even if it occurs at all. The site of the early lesions in the lungs is usually just under the viceral pleura, it would appear likely, then, that the organism must be conveyed to this site through the blood stream. Two portals of entry are, therefore, conceivable (*a*) through the alimentary mucous membrane (including the tonsils and salivary glands) to the mesenteric glands and abdominal organs and thence to the lungs, or (*b*) through a bronchus to the bronchial glands and so through the blood stream to the lung. In view of recent experimental observations and of the statistical evidence now before us in regard to native tuberculosis, it would seem probable that the former route is by far the more common. In the European in Europe, infection probably takes place in early childhood, at which period the lymphatic glands are physiologically more active, and therefore presumably a better protection. Assuming that the bacillus gains a footing in the child—and only a quiescent focus remains, when this at some later period serves as the centre from which a pulmonary infection starts, no sign of the route of original infection remains to be found. If, however, no chance of infection occurs until adult life—the period of greatest susceptibility—has been reached, and the patient succumbs to this infection, the portal of entry will probably be more easily observed. From the evidence in regard to the result of Calmette's reaction in natives on their first trip to Johannesburg it is reasonable to suppose that many more escape infection in childhood than is the case among Europeans in Europe; and this may account for the large number of cases in which the abdominal lesion is clearly the primary— that is to say, the older or more advanced, and also for the acute nature of so many of the cases.

The hypothesis which I would suggest as best fitting the facts in regard to tuberculosis is this: Fatal cases of tuberculosis in adults in Europe are often due to auto-infection from some latent focus, acquired in youth or childhood through the alimentary canal. When infection has not occurred in childhood—as is probably often the case amongst the tropical natives—the route of infection is usually evident at the post-mortem examination, and in the large majority of case is undoubtedly alimentary. For physiological and bacteriological reasons it is difficult to conceive how living bacilli can gain access to the alveolus except through the blood stream or lymphatics; if this is so, our views on the relative importance of air-borne and food-borne infection require considerable modification.

The chief points raised in this paper may be summarised as follows:—

(*a*) If pulmonary tuberculosis be an infectious disease—using the term as originally defined—we should expect undoubted evidence of marital infection to be forthcoming. We find, however, little or no evidence of its existence; and amongst the very poor and destitute where, if infection is a factor of importance it should be most marked—absolutely no evidence of its existence is found.

(*b*) The correlation in regard to tuberculosis which is found to exist between children and parents cannot be explained by a theory of infection; an adequate explanation is, however, provided by the theory of the inheritance of the tuberculosis diathesis.

(*c*) Just as we have failed to find any definite evidence of infection between husband and wife, or from parents to children; so we fail to find any evidence of the infectious nature of this disease from the histories of the institutions for tuberculous patients.

(*d*) The common argument namely, that the falling death-rate from Tuberculosis in England is due to improved hygiene, the segregation of the tuberculous, and a recognition of the infectious nature of the disease, is not supported by the facts.

(*e*) As practically every resident in northern Europe even at the present day is attacked before the age of 30, the tubercle bacillus must be very widely spread; the falling death-rate, therefore, cannot be due to a diminished risk of infection, but may be explained on the assumption of an increased constitutional resistance of the population. This is an inherited characteristic.

(*f*) The falling death-rate from tuberculosis that is occurring in England is due in part, at least, to a selective death-rate possibly aided, in recent years, by the progressively increasing mean age of marriage.

(*g*) Modern bacteriological research tends to show that infection by the respiratory passages is not nearly so common as was theretofore believed; and that at all ages, infection by the alimentary tract is of great importance.

(*h*) That amongst African natives who have, presumably, escaped infection in childhood, the amount of primary abdominal tuberculosis is very large; indicating the frequency with which the bacillus is introduced through the alimentary canal.

(*i*) If these deductions are correct, much of the money which is now being spent on the "tuberculosis campaign" is being wasted; the proposed stringent legislative control of the movements of the affected would be needlessly cruel; in short, our efforts are being directed into wrong channels. The erection of sanatoria must be regarded not as of economic value, but solely as a humanitarian effort to relieve the sufferings of those attacked by this disease.

No attempt has been made to provide an explanation of all the facts in regard to tuberculosis; progress can only be made by a careful sifting of the available evidence and by ruthlessly discarding any theories which are not supported by all the facts at our disposal. If we are to keep medicine on a scientific plane, we must "be able to give a reason of the faith that is in us." But while we have for many years past preached the infectious nature of tuberculosis to such an extent that it has become one of the articles of faith of orthodox medicine, yet how many medical men could adduce a single incontrovertible fact in support of this doctrine.

Finally, it may again be pointed out that the data here discussed in relation to the problem of the infectious nature of this disease are entirely European in origin, and it does not therefore follow that the conclusions deduced are necessarily applicable to a population under different conditions for instance the natives of Africa.

[U.G. 34—'14.]

ANNEXURE "F."

UNDERGROUND SANITATION ON MINES: RULES AND RECOMMENDATIONS FOR THE GUIDANCE OF MINE MANAGERS.

Rules for Underground Mines Sanitation.

In order to establish and maintain satisfactory underground sanitary conditions at any mine, the following rules and recommendations must receive strict and careful attention:—

1. *Sanitary Conveniences.*

(*a*) *Number.*—A sufficient number of latrines for all employees must be provided on each working level. Latrine accommodation for white men must be distinct and separate from that provided for coloured employees.

(*b*) *Position.*—Latrines must be situated so as to be convenient to and easily accessible from working places. The position must also be such as to afford means of efficient cross ventilation; recesses and dead-ends must be avoided.

(*c*) *Construction.*—(1) Each latrine should be made large enough, in the first instance, to accommodate the probable maximum number of sanitary buckets required thereat.

(2) The floor space must be paved out with a thickness of at least four inches of good cement concrete, and the whole surface of same sloped so as to drain any liquid excrement escaping the bucket to a suitable water-tight catchpit.

(3) The woodwork in connection with latrine seats should be reduced to the necessary minimum requirement. The underside of seats must not be more than two inches above the top of the placed sanitary bucket.

(4) The sanitary buckets must be screened off so as to afford a decent amount of privacy. The wood-iron screens must be erected so as to be at least six inches above and below the floor level and the hanging wall, respectively, as well as being provided with other suitable openings, if required for the purpose of securing efficient cross ventilation.

(5) All latrines must be kept constantly well lighted.

(6) Suitable boxes or receptacles, with close-fitting lids or covers should be provided at each latrine for the purpose of storing at hand ready for use *a small quantity of sawdust* and disinfectant.

(7) Temporary and movable latrines must be of an approved form.

2. *Scavenging.*

(*a*) *At and around latrines.*—(1) The seats, floors, and drainage catchpits at all latrines must be thoroughly cleaned, scrubbed, and disinfected at least once in every twenty-four hours, and all filth, liquid and solid, swept up, must be carefully deposited in the sanitary buckets for transmission to the surface.

(2) Each latrine to be supplied, at least every alternate day, with clean empty buckets. Tipping of the contents of one bucket into another and replacing of the dirty empty bucket for use will not be allowed under any circumstances.

(3) Full sanitary buckets, when withdrawn from a latrine, must have their contents immediately covered up with a sufficient layer of mixed sawdust and disinfectant, irrespective of any bucket lid that may be provided.

(4) The drainage catchpits at each latrine to be supplied daily with a sufficient quantity of fresh sawdust, for the purpose of absorbing and deoderizing the urine intercepted therein. The saturated sawdust to be daily carefully scooped out and deposited in the sanitary buckets for transmission to the surface. The surface of latrine floors should also be sprinkled daily with fresh sawdust.

(5) The face of the rock surrounding and overhanging a latrine floor, together with both sides of the wood-iron screens, must be thoroughly limewashed at regular and frequent intervals.

(6) The immediate approaches to latrines must be kept clean and free from nuisance by careful daily scavenging.

(*b*) *At stations.*—The face of the rock at shaft stations should be periodically limewashed, and the station floors thoroughly swept and disinfected at short regular intervals.

(*c*) *Throughout the mine generally.*—(1) The floors of all drives and cross-cuts must be kept clean and free from pools of dirty and stagnant water.

(2) By means of regular and systematic inspection, scavenging, and disinfection on the part of the mine scavengers, steps must be taken to keep the workings generally (new and old) clean and free from nuisance. In this connection entrances to old and disused workings should, as far as practicable, be barricaded, and vigilant measures taken to detect those responsible for any persistent breaches of sanitary rules.

(*d*) *Aids to securing cleanliness, etc.*—(1) The compound manager should occasionally round up the natives, and impress upon them the seriousness of depositing excreta underground, except at the latrines provided. This precaution is especially necessary in the case of new arrivals.

(2) Underground officials should be particularly vigilant in the matter of reporting any employee found committing a nuisance.

(3) The compound manager, as well as the underground officials, should take special pains to warn all natives, and particularly new arrivals, against the danger attached to drinking underground mine water.

(*e*) *Scavenging staff.*—In order to secure the necessary measure of cleanliness underground, it is imperative that a sufficient number of native scavengers should be employed. These natives should be under the control of a capable, energetic, and conscientious white man, acting as sanitary overseer, and devoting all his time to the work, while, at the same time, strict supervision should be exercised by the mine captain and his shift bosses. In this way alone can regular systematic and satisfactory scavenging be carried out, as experience has fully shown that sole supervision by the underground mine officials, which supervision at best can only be of a casual nature, falls very short of requirements.

RECOMMENDATIONS IN REGARD TO SURFACE SANITATION ON MINES.

Note.—These "Recommendations" have been prepared with the invaluable assistance of Mr. Alexander Cowie, C.E. (Chief Mines Sanitation Inspector, Johannesburg) and the friendly criticism of Mr. Samuel Evans (Chairman, Crown Mines), for the guidance of Mine Managers, Compound Managers and others responsible for surface sanitation on mines. They should be read in conjunction with similar "Recommendations in regard to Underground Sanitation," drawn up in this Office in August, 1910, and obtainable from the Government Mining Engineer.

Further copies of this pamphlet will be forwarded on application.

CHARLES PORTER, M.D.,

Medical Officer of Health, and Medical Officer (for Johannesburg) under "Coloured Labourers' Health Regulations, 1911."

Public Health Department, Johannesburg,
20th November, 1913.

RECOMMENDATIONS IN REGARD TO SURFACE SANITATION ON MINES.

In order to establish and maintain satisfactory surface sanitary conditions at any mine, the following rules and recommendations should receive careful attention:—

I.—Housing Accommodation.

All buildings and additions and alterations thereto, sanitary conveniences, drainage arrangements and water supply must conform, so far as native housing is concerned, to the Native Labour Regulations framed under Act 15 of 1911, and generally, as regards both white and native housing accommodation, etc., to the Municipal Building, Drainage and Public Health By-laws.

In connection with housing accommodation generally, the buildings should be so constructed that—

(*a*) the floors are impermeable to vermin and insects;
(*b*) the walls, ceilings, floors, etc., contain no crevices where rats, mice, cockroaches, bugs, etc., can take cover;

(*c*) each room and the whole of the building can be easily fumigated, if necessary; and

(*d*) each room and the whole of the building, including verandahs, can be easily screened against mosquitoes and flies without structural alterations. It is important that the screening everywhere, excepting on doors, should be a fixture; consequently the windows should open inwards, so that they can be readily cleaned and opened irrespective of the fixed screens.

When existing premises of a more or less dilapidated and insanitary nature are required to be put in order, it is often possible so to repair and alter them as to make them reasonably habitable. It is questionable, however, whether this course is always the wisest one, as these old buildings, sooner or later, again fall into disrepair, and, therefore, no permanent improvement is effected. To pull down and rebuild these premises entirely is, apart from the undoubted improvement, frequently the more economical course in the long run.

It is the owner's duty, of course, to keep premises in repair, and much expense would be saved on some mines if, instead of waiting until called upon by the Government or Local Authority to carry out this duty, repairs were effected on the principle that "a stitch in time saves nine." In addition to the ordinary upkeep of old buildings, however, it is desirable that such premises should, so far as is reasonably practicable, be brought into conformity with modern ideas and requirements.

II.—Native Quarters.

Assuming that all buildings are of approved construction, well lighted, ventilated and warmed, and provided with suitable and sufficient sanitary conveniences and a plentiful supply of pure water for drinking and cooking purposes, the following matters in connection with the native quarters call for close attention, namely:—

(*a*) *Mine Compounds.*

1. All cleaning up and scavenging should be carried out under the close and constant supervision of a capable, energetic and conscientious man responsible to the Compound Manager.
2. Daily attention should be paid to the thorough sweeping up and removal of all refuse, rubbish and dirt from rooms, kitchen, store-rooms, channel drains, catchpits and yards, and also the cleaning and disinfection of latrines, urinals, baths, wash-houses and drains.
3. Covered galvanised iron refuse receptacles, of an approved type, with close-fitting covers, should be provided in the compound yards for the temporary storage of refuse and waste scraps of food awaiting removal by the carts.
4. All yards should be cleared of refuse at least once a day, and the refuse disposed of by means of a suitable destructor or incinerator.
5. The internal surfaces of walls and roofs of rooms should be thoroughly disinfected and limewashed about once a month, especially during the summer; the floors scrubbed, flushed and disinfected; the bed-boards dipped, scrubbed and disinfected in a suitable tank to which steam or hot water is laid on; and the fixed supports for bunks scrubbed and disinfected.
6. Internal surfaces of walls and roofs of kitchens, store-rooms, baths, wash-houses, latrines and urinals should be thoroughly disinfected and limewashed at frequent and regular intervals.
7. All windows should be kept clean.
8. Windows should be kept open whenever the state of the weather permits.
9. The rooms should be kept free from all superfluous *bedsteads and drapings*, as these tend to obstruct light and ventilation and harbour dust, dirt and vermin.
10. Closed stoves should be used in preference to open fires or braziers, in order to keep the rooms free from smoke.
11. An arrangement which promotes general tidiness in the sleeping rooms is the provision of suitable shelving for the storage of boots, boxes and other belongings of the inmates, which belongings are, in the absence of such shelving, invariably strewn over floors and below bed bunks, interfering greatly with the proper sweeping of room floors.

12. The provision of clothes-drying-lines in the yards of some compounds seems to be greatly appreciated by the natives. This enables them to hang out wet clothing in the yard to be dried by direct sunlight, instead of having such clothing dried in the rooms.
13. Every effort should be made to induce all natives to wash their blankets and other clothing regularly. This is very important.
14. Overcrowding of rooms should be guarded against by proper distribution of the natives.
15. Suitable, sufficient and convenient urinal accommodation should be provided in the compound yards, otherwise the natives will commit nuisances by urinating in the channel drains or on the yard surfaces.
16. Fly-screening should be provided for store-rooms for butcher meat and other foodstuffs, and, in addition, these store-rooms should be rendered rat-proof.
17. Latrines and urinals should be provided with self-closing cleansing-flaps, fly-proof-doors, and fly-gauze fitted over all ventilating and other openings.
18. Due care, of course, must be exercised to ensure that all food, fish, meat and vegetable supplies sent to the compound are sound, fresh and wholesome.

(b) Locations and Contractors' Compounds.

The scavenging arrangements detailed above in connection with mine compounds are more or less generally applicable to locations and contractors' compounds.

Housing accommodation and sanitary conveniences for married mine natives and natives employed on the tailings dump contracts should conform to the broad lines laid down for mine native compounds. Failing this, all contractors' natives should be housed in the mines' compound.

(c) Native Hospitals.

All door, window, ventilating or other openings in the various buildings at these establishments, including all sanitary conveniences, should be fitted or protected with wire fly-gauze.

The scavenging arrangements should be generally as at the compound. *Vide* II. (*a*) 1, 2, 3, 4, 6.

III.—Works, Shafts, Change Houses, Etc.

To prevent the commission of nuisances on the ground at and around the various surface works, it is important that the pail-closet, latrine and urinal accommodation should be suitable, sufficient and so located as to be conveniently situated for the different centres of work. Employees should be warned against urinating on the ground in the vicinity of the works.

All the sanitary conveniences should be fly-proof screened.

The baths, wash-hand basins and the premises generally at the change houses should be kept thoroughly clean by the attendants in charge.

IV.—White Married Quarters.

At present the more or less general practice is that the pail-closets at these quarters are cleaned and disinfected daily, and limewashed periodically by the mine scavengers. This practice should be assiduously continued.

The Municipal type of portable galvanised iron dust-bin with cover should be installed at these quarters. On some mines this provision has already been made.

All pail-closets should be fly-proof screened, and have self-closing cleansing-flap-doors.

V.—Single Men's Quarters.

Pail-closet and urinal accommodation should be conveniently situated for these quarters. This applies particularly to urinals, as, in the absence of a convenient urinal, nuisances will be committed on the ground in close proximity to the rooms. Men should be warned against urinating on the ground in the vicinity of the quarters.

Bath and wash-hand-basin accommodation is necessary at these quarters if, as is frequently the case, the change house is not sufficiently convenient.

Daily sweeping of floors and weekly scrubbing out and disinfecting of same by the mine natives, under the supervision of the white caretaker, is a very usual practice on the Reef, and its general adoption is recommended.

The Municipal type of portable galvanised iron dust-bin with cover should also be installed at these quarters.

All closets and urinals should be fly-screened, and have self-closing cleansing flap-doors.

VI.—Mine Boarding Houses.

All door, window, ventilating or other openings at boarding house premises, including sanitary conveniences, should be fly-proof screened.

Municipal type of galvanised iron refuse receptacle with cover should be provided.

Particular attention should be paid to the satisfactory disposal of waste-water from these premises.

VII.—General Scavenging and Refuse Disposal.

In order to secure cleanliness and freedom from nuisance, very particular attention must be given to the following points:—

(1) *Scavenging Outside the Native Compound.*

The Surface Overseer of the mine should, by means of a sufficient and properly organised staff of native scavengers,

(*a*) remove at regular intervals during the week all dry refuse from the white quarters, mine boarding houses and native hospital, etc.;

(*b*) daily cleanse and disinfect thoroughly the floors, seats, troughs, etc., of all pail-closets, latrines and urinals at quarters and works, and also limewash at frequent and regular intervals the internal surfaces of walls and roofs of such conveniences;

(*c*) periodically, at short intervals, thoroughly clean out and disinfect all surface channels, sluits and trench drains;

(*d*) by regular inspection, take measures to abate and, as far as possible, prevent recurrence of nuisances caused by natives depositing excreta on vacant and outlying ground and in sheltered or less generally frequented spots on the property;

(*e*) abate and, as far as possible, prevent recurrence of any nuisance caused by employees urinating on ground in the vicinity of the single quarters and workshops, etc.;

(*f*) keep the surface generally free from refuse and rubbish by a periodical scavenging and removal of rags, old clothing, paper, etc., blown or scattered over the property;

(*g*) generally make sure that the removal of refuse, and especially stable refuse, takes place at such frequent intervals as will render impossible the breeding of flies in such refuse.

(2) *Solid Refuse Disposal.*

The existing method of disposal of solid refuse on most of the mines is very unsatisfactory. The refuse is tipped on the surface, and the tendency is for rats, vermin and flies to feed and breed on the tips. Suitable destructors or incinerators should be erected to deal with all refuse and garbage, and the existing tips, where exposed, covered up with a sufficient depth of clean soil or ashes or tailings. All meat, fish, jam or syrup tins and such-like should be passed through the incinerators to destroy the remains of food and help to prevent flies from gathering and breeding. All tins should be buried or flattened out, otherwise, if left lying exposed on the surface, most of them collect water, and then form ideal breeding grounds for mosquitoes. Vigilance should be exercised to prevent outsiders dumping manure and all kinds of refuse and rubbish in a haphazard manner on the mine property.

(3) *Liquid Refuse Disposal.*

It is, of course, generally recognised that a very far-reaching improvement would be effected in the sanitary conditions on the mines by the installation throughout of water-borne systems of sewage removal, preferably by connection to the public sewer. At some mines, however, even under existing conditions, much has been done towards at least minimising nuisance from waste water by having, in the vicinity of compounds, dwellings, works and roadways, etc., all

surface channels properly paved and graded or piped in; the ultimate disposal of such water in most cases being in the mine dams, where purification by dilution is depended on. Again, in many instances, and more especially at the white quarters, satisfactory disposl of waste water has been carried out by means of French drains, by surface distribution over prepared ground, or by conservation in tanks, the contents of which are removed by the mine scavengers.

(4) *Night Soil Removal.*

As far as conveniently possible, a daily stercus removal service should be instituted.

VIII.—Kaffir Eating Houses and Stores.

There is apt to be, from time to time, a good deal of slackness as regards refuse-disposal and general cleanliness at these places, and it is impracticable to keep them under daily official supervision. It is, therefore, recommended that it be made the duty of the Compound Manager to cause a frequent, if not daily, inspection to be made of such premises, and to report at once (*e.g.*, by 'phone) to the Office of the Medical Officer of Health, any irregularity observed, time of inspection, etc. Prosecution would follow, where justifiable, and, in addition, such supervision would "tune up" the condition of these places, and probably benefit the health of the natives.

IX.—Destruction and Prevention of Flies and Mosquitos.

See attached circulars (*Annexures "A" and "B"*).

ANNEXURE "A."

MUNICIPAL COUNCIL OF JOHANNESBURG.

The Danger of Flies.

Don't allow flies in your house.
Don't permit them near your food—especially milk.
Don't buy foodstuffs where flies are tolerated.
Don't eat where flies have access to the food.

Flies are amongst the most dangerous insects known to man. Flies are the filthiest of all vermin. They are born on filth, and carry filth around with them. They are maggots before they are flies.

Flies are known to be carriers of millions of death-dealing disease germs. They leave some of these germs wherever they alight.

Flies may infect the food you eat. They come to the kitchen or dinner table fresh from ashpits, privies, manure heaps, decaying animal or vegetable matter, from the sick room and elsewhere, with all sorts of filth on their feet, and they deposit it on food, so that you may be constantly eating filth from these places.

All food, especially milk, should be screened from flies. When germs are deposited on milk they multiply at an enormous rate. The careful housekeeper must never buy food which has been exposed to flies or dust from the street.

Do not eat food that has been contaminated by flies. Flies may infect you with typhoid fever, and other infectious diseases. After feasting on the discharges from natives and others suffering from infectious diseases, flies may go direct to your food or drink, to the lips of your sleeping child, or to a small open wound on your hands or face.

How to Get Rid of Flies.

Catch the flies as fast as they appear. Use liquid poisons, sticky fly-papers and traps.

Place the following fly poison in shallow dishes or soup plates throughout the house:—Two teaspoonfuls of formaldehyde solution to a pint of water, sweetened with sugar.

Do not allow dirt to accumulate in corners, behind doors, on ledges, etc. Allow no decaying matter to accumulate near your house.

Ashbins and ashpits should be covered, and, after being emptied, should be sprinkled with a disinfectant.

Closets should be provided with top-hinged flaps, and with a self-closing cover for seat; also with fly door, and fly-netting guards to other openings. The contents of privies and of privy pails should be kept well covered with earth. Flies appear to be especially attracted to human excrement.

Manure should be removed frequently from the proximity of dwelling-houses, and at least once a week.

The great secret of getting rid of flies is cleanliness first, and by screening all openings of the home, especially to kitchen, dining-room and closets.

Flies in the home indicate a careless housekeeper.

Remember:—No dirt, no manure, no uncovered food, no flies!

By Order of

THE PUBLIC HEALTH COMMITTEE.

Public Health Department,
Municipal Offices,
Johannesburg.

ANNEXURE "B."

MUNICIPAL COUNCIL OF JOHANNESBURG.

Destruction and Prevention of Mosquitos.

I.—The life history of the mosquito or gnat is briefly as follows:—

The female deposits her eggs in water, without which they cannot hatch-out. The eggs hatch-out as worm-like larvæ or "wrigglers," from which, after further changes, the adult insect develops. About 10 to 14 days elapse from the time the eggs are laid until the mosquito appears.

II.—Every locality breeds its own mosquitos. Under natural conditions, mosquitos cannot fly far. Few ever stray more than a quarter-mile from the pool in which they were bred.

III.—*Destruction of Mosquitos.* The time at which it is easiest to destroy mosquitos is during the portion of their life (the larval stage) which they pass in water.

Mosquitos may be destroyed in various ways, namely:—

(*a*) By stocking any large accumulation of water with small fish, which eat the larvæ or "wrigglers."

(*b*) By brushing out small puddles with a broom, the larvæ being killed by drying in the sun.

(*c*) By coating the surface of collections of water in tanks, pools or elsewhere, with a thin film of oil. The oil prevents the larvæ rising to the surface to breathe, which quickly kills them. It is sufficient if this coating of oil is applied once a fortnight.

In the case of water tanks, this can be done by soaking in paraffin a rag fixed on a stick, and then painting the water therewith, enough oil being used to make a fairly permanent film. Olive oil mixed with a small proportion of turpentine has also been recommended for this purpose.

The easiest way to deal with a small open collection of water is to sprinkle the oil over the surface by one or two sweeps of a fine-rosed watering pot. The use of tar has also been found beneficial in such cases. When placed in water, tar constantly gives off a film like kerosene oil, but more permanent, and is said by some observers to destroy larvæ in a more efficient manner than oil does.

IV.—*Prevention of Mosquitos.*—See that no places are allowed in which mosquitos can breed. With this object:—

(*a*) Prevent collections of water, either by draining or filling in depressions or low-lying land, taking care to leave no excavation where the earth has been removed for filling-in purposes. If draining or filling in is

impossible, trial may be made of hiding the surface of pools by close vegetation. In India the "Jalkunie"—a floating water-plant—has been most successful in this respect.

(*b*) See that old tins, bottles, tubs or other receptacles in which water can lodge, are stored bottom upwards or removed from the premises and neighbourhood.

(*c*) Protect by mosquito-proof roofing all means of access (*e.g.*, manholes, ventilating or overflow pipes) to rain-water tanks, septic tanks or other places in which water is stored about houses. This will prevent the female insect gaining access to the water and depositing her eggs therein.

(*d*) Carefully straighten out any sagging of, or depressions in, the house-guttering, which may give lodgment to water in which mosquitos can breed.

(*e*) Keep all guttering clear from mud, leaves, or other rubbish.

Note.—Mosquitos are delicate insects and require shelter from the heat of the sun.

Excessive vegetation, therefore, by affording cover, tends to protect them. For this reason the removal of brushwood and undergrowth has been found beneficial in districts where mosquitos are especially numerous.

V. Dragon flies are the natural enemies of the mosquito. Do not kill them.

VI.—Render houses mosquito-proof by means of wire blinds. The use of mosquito nets adds greatly to personal comfort.

By Order of

THE PUBLIC HEALTH COMMITTEE.

Public Health Department,
Municipal Offices,
Johannesburg.

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