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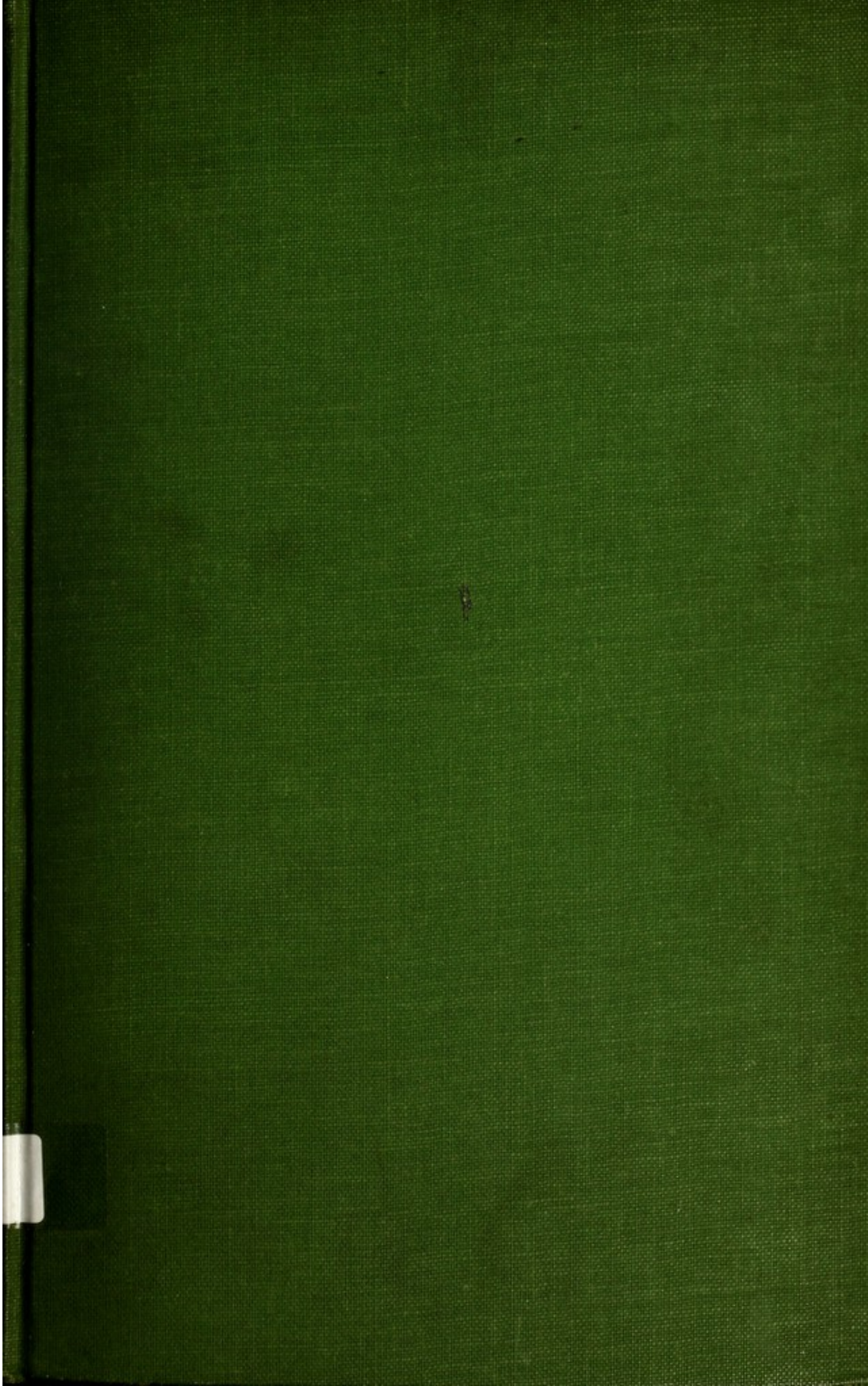
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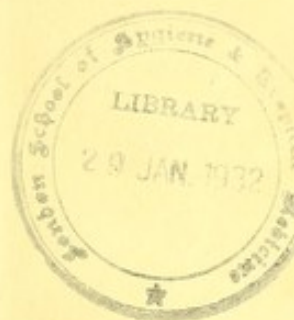
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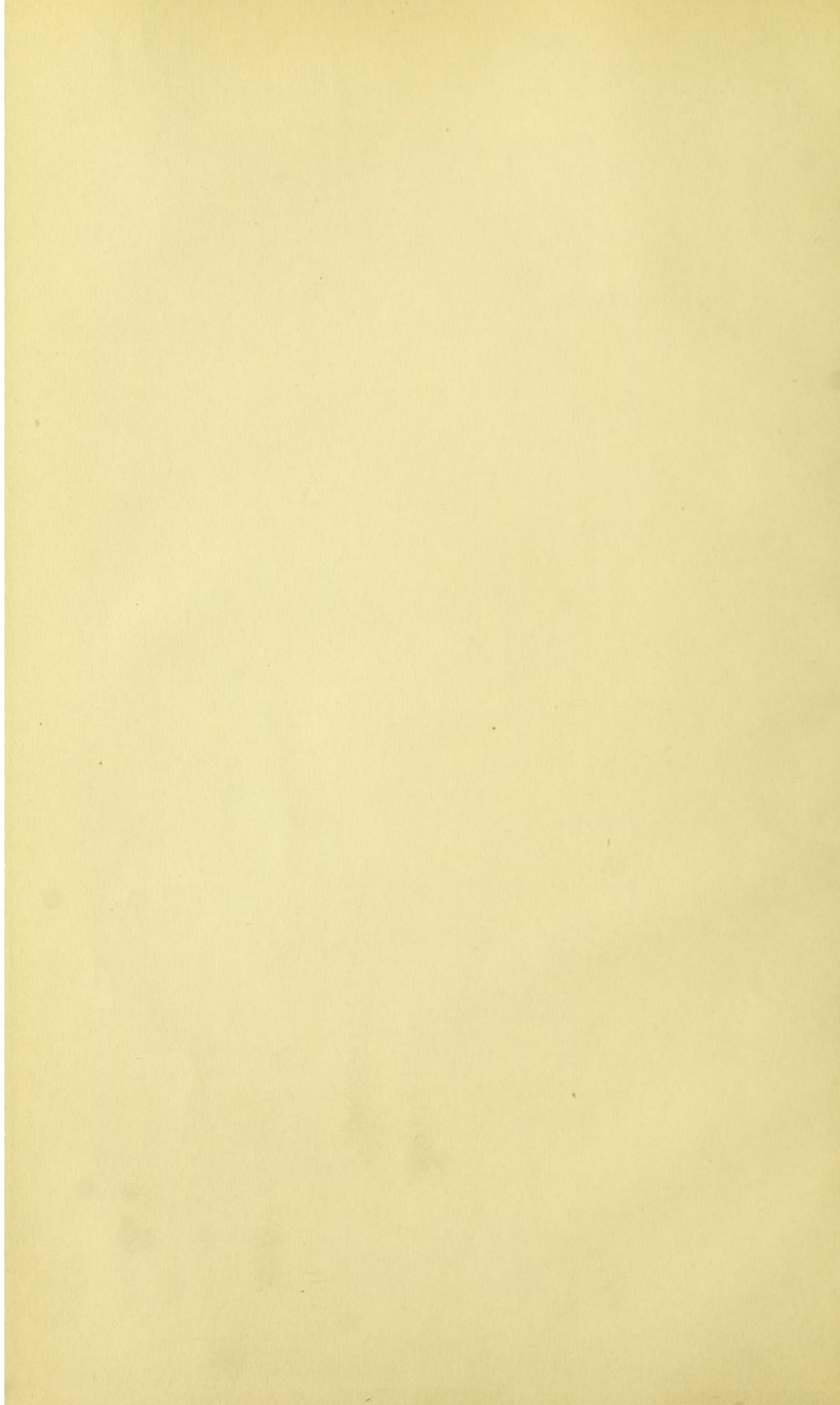
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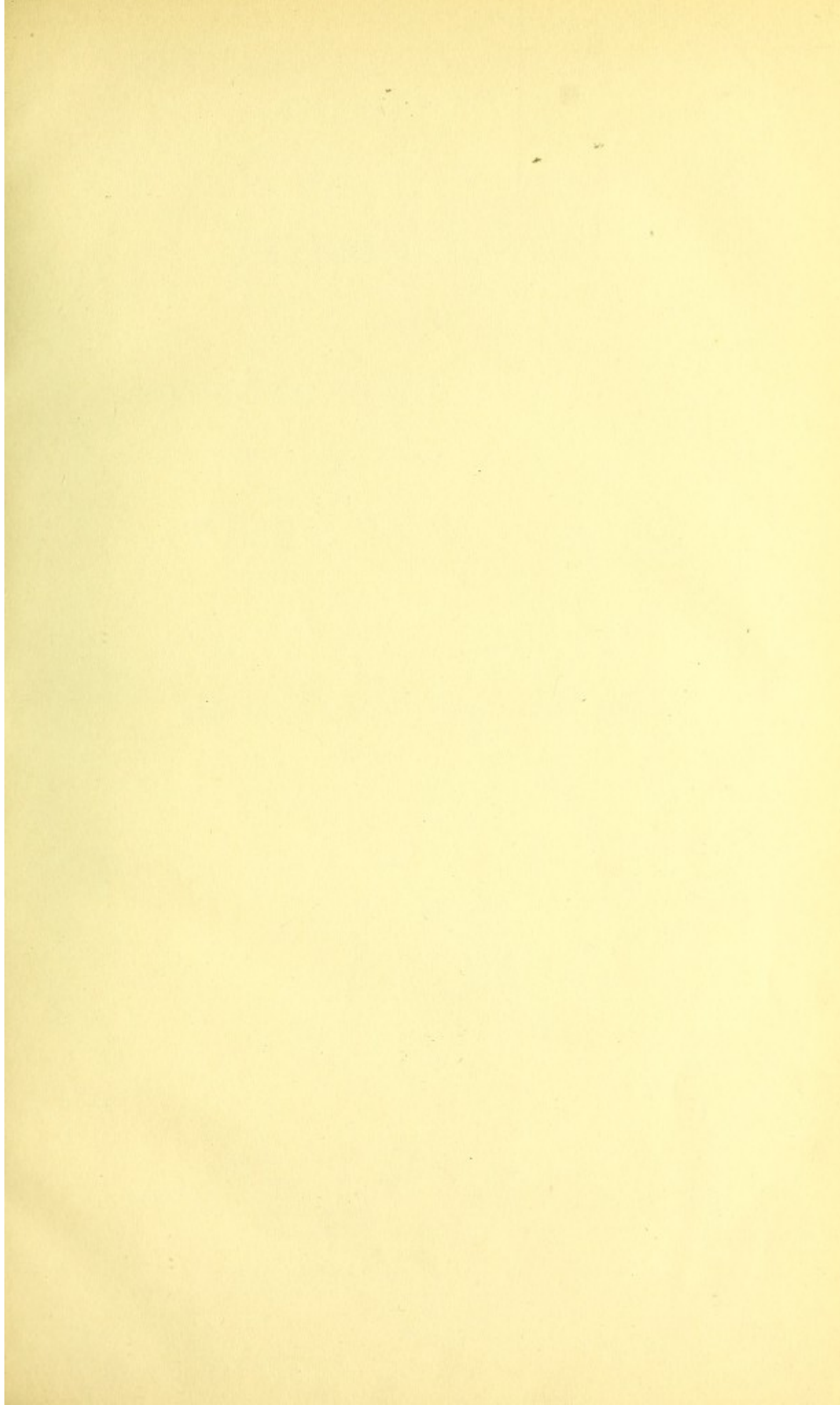


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Great Britain.

DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

P. 8911.

INTERIM REPORT

OF THE

DEPARTMENTAL COMMITTEE

ON

TUBERCULOSIS.

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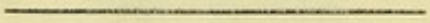
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DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

TERMS OF REFERENCE.

To report at an early date upon the consideration 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.

CONSTITUTION OF THE COMMITTEE.

By Minute of 22nd February 1912 the following members were appointed:—

WALDORF ASTOR, Esq., M.P. (Chairman.)
CHRISTOPHER ADDISON, Esq., M.P., M.D.
N. D. BARDSWELL, Esq., M.D.
DAVID DAVIES, Esq., M.P.
A. MEARNS FRASER, Esq., M.D.
ARTHUR LATHAM, Esq., M.D.
W. LESLIE MACKENZIE, Esq., LL.D., M.D.
JOHN C. McVAIL, Esq., LL.D., M.D.
W. J. MAGUIRE, Esq., M.D.
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ARTHUR NEWSHOLME, Esq., C.B., M.D.
JAMES NIVEN, Esq., LL.D., M.B.
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R. W. PHILIP, Esq., M.D.
H. MEREDITH RICHARDS, Esq., M.D.
T. J. STAFFORD, Esq., C.B., F.R.C.S.I.
Miss JANE WALKER, M.D.
J. SMITH WHITAKER, Esq.
F. J. WILLIS, Esq. (Secretary).

On 18th March ARTHUR HENDERSON, Esq., M.P. and F. J. WILLIS, Esq., were appointed members of the Committee, and O. B. CLARKE, Esq., was appointed Secretary.



DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

TO THE LORDS COMMISSIONERS OF HIS MAJESTY'S TREASURY.

INTRODUCTION.

1. The Committee appointed by your minute of 22nd February 1912, "to report at an early date 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," desire to submit the following observations and recommendations as an Interim Report.

The object of the Committee has been to take into consideration the existing machinery and funds available, and to indicate the lines upon which, in their view, a national and comprehensive scheme for combating tuberculosis in all its forms may be established and developed.

2. The production of such a scheme needs much inquiry and deliberation, and the Committee desire that this report should not be taken as the final expression of their views upon the problem in all its details. This is an Interim Report, rendered necessary by the fact that the National Insurance Act, 1911, with its important provisions with regard to tuberculosis, comes into operation on July 15, 1912. Preliminary arrangements will have shortly to be made, both centrally and locally, and the Committee deem it of great importance that any steps taken under that Act by any of the authorities or bodies concerned should be in general harmony with the scheme which they desire to recommend. This report will, therefore, deal mainly with the essential features and broad lines of a comprehensive scheme, with special reference to the practical steps which should be taken in the near future, for the provision of immediate treatment for the existing tuberculous population according to our present knowledge.

3. In order that the field of inquiry of the Committee may properly be appreciated, it is necessary to indicate briefly a few general aspects of the problem with which the Committee is called upon to deal. The facts as to the prevalence of tuberculosis in the United Kingdom, the mortality due to the disease, and the general suffering and economic waste which it causes, have become so far matters of common knowledge that it would be out of place in a report of this nature to furnish statistics. It is sufficient to say that the disease has a wide prevalence, and that a large proportion of the population has, at some time or other, developed tuberculosis, although it may have remained latent and unrecognised. The seeds of the disease have been present, but in many cases the dose of infective material has been too small to produce active disease or the resisting power of the body into which they have been introduced has been sufficient to protect it from a well-defined attack. The problem of the prevention and treatment of the disease presents, therefore, two aspects, that of the seed of the disease, and that of the soil in which the seed may be planted.

With regard to the seed of the disease, it is now generally accepted that both the human and bovine types of the bacillus of tuberculosis are capable of giving rise to the disease in human beings. The question whether the introduction of these bacilli into the human body, will result in the production of definite disease depends largely upon the amount and virulence of the infective material invading the vulnerable tissues of the body and the condition and degree of activity of the defensive forces of the body. Certain factors tend to weaken those defensive forces and thus to render the body less able to resist the infecting organisms. Among these factors may be cited (1) the constitution of the individual; (2) the surroundings in which he lives; (3) his standard, habits, and method of life; (4) the nature of his occupation or employment; (5) the diseases and accidents to which he has been subjected. It should be added that the disease has its own peculiar age incidence in regard to which there are, of course, a considerable variety of operative factors.

A discussion as to the origin, and possible elimination, of the seeds of the disease, or of the relation of the several factors aforesaid to the general problem of

tuberculosis, is not within the scope of this Report. The Committee, however, desire it to be understood that these matters have not been overlooked in preparing the scheme which is hereinafter described, and that they hope to deal with them as may be required when their Final Report is submitted.

4. Any scheme which is to form the basis of an attempt to deal with the problem of tuberculosis should provide—

- (1) That it should be available for the whole community.
- (2) That those means which experience has proved to be most effective should be adopted for the *prevention* of the disease.
- (3) That a definite organization should exist for the *detection* of the disease at the earliest possible moment.
- (4) That, within practicable limits, the best methods of *treatment* should be available for all those suffering from the disease.
- (5) That, concurrently with the measures for prevention, detection, and treatment, provision should be made for increasing the existing knowledge of the disease and of the methods for its prevention, detection, and cure by way of *research*.

5. In view of the particular circumstances which necessitate the submission of this Interim Report the Committee trust that it will be recognised that the present recommendations must deal with certain aspects of prevention, and with detection, and treatment rather than with research. The latter subject, on the importance of which the Committee wish to lay stress, will be dealt with in greater detail in the Final Report, after the Committee have had further opportunity of obtaining and studying the views of various experts whom they are consulting. The Committee desire, however, to express their opinion that the scheme which they recommend in this report, for assistance in the formation of which they desire to express their indebtedness to those who have placed suggestions and information before them, will be calculated to afford material assistance to the cause of research.

6. The Committee have endeavoured to devise a scheme in which may be united or correlated the activities of the various bodies, authorities, and persons concerned, so as to ensure that adequate provision for the prevention and treatment of the disease should be made available on a systematic basis, as far as possible uniform in character, but not necessarily identical in detail, throughout the United Kingdom.

They recognise that a reasonable measure of latitude and elasticity is necessary in order to suit the varying local conditions in each of the four countries, especially having regard to the existing agencies available for dealing with tuberculosis.

POWERS OF EXISTING LOCAL AUTHORITIES IN ENGLAND AND WALES.

7. In addition to the medical profession and to voluntary societies, the existing bodies at present engaged, in greater or less degree, in dealing with tuberculosis in England and Wales are—

- County Councils.
- Sanitary Authorities and Joint Hospital Boards.
- Local Education Authorities.
- Poor Law Authorities.
- The Metropolitan Asylums Board.

The powers of local authorities in Scotland and Ireland are set out in the separate sections dealing with these countries.

County Councils.

8. The county councils have jurisdiction over the whole administrative county (which does not include the county boroughs), for various public health purposes, and in particular, under the Isolation Hospitals Act, 1893, have power to provide hospitals for infectious diseases, among which tuberculosis may, after compliance with the terms of section 7 of the Infectious Disease (Notification) Act, 1889, be included. This power has not been exercised by any county council as regards tuberculosis, but certain councils have established bacteriological laboratories, in which they carry out the examination of sputum for medical practitioners in the area. Every county council under the Housing, Town Planning, &c., Act, 1909, is required to appoint a medical officer of health, and several county medical officers of health have already drawn up schemes for dealing with tuberculosis in their county in anticipation of the work which may devolve on county councils under the National Insurance Act.

Sanitary Authorities.

9. The sanitary authorities are, in London, the Common Council, and the metropolitan borough councils, outside London, the county borough councils, borough councils, and urban and rural district councils. They exercise in their several jurisdictions the powers of the Public Health Acts and regulations made under them, as to infectious diseases, hospital provision, housing, the milk and meat supply, &c., and since pulmonary tuberculosis has been recognised as an infectious disease, a number of authorities have taken additional steps to combat it from this point of view. Pulmonary tuberculosis has been made a compulsorily notifiable disease for the whole of England and Wales, and under regulations issued by the Local Government Board definite powers and duties are imposed upon sanitary authorities and their officers, for the administrative control of tuberculosis. The scope of these powers and duties can be gathered from Articles VIII. and IX. of the Public Health (Tuberculosis) Regulations, 1911, given below. These should be read in conjunction with all the clauses of the Public Health Acts relating to sanitation and to the control of infectious diseases.

Article VIII.—Upon the receipt of a notification under these Regulations or under the Poor Law Regulations or under the Hospital Regulations the Medical Officer of Health, or an Officer acting under the instructions of the Medical Officer of Health, shall make such inquiries and take such steps as may appear to him to be necessary or desirable for preventing the spread of infection and for removing conditions favourable to infection.

Article IX.—(1) For the purposes of these Regulations and of the Poor Law Regulations and of the Hospital Regulations a Council, on the advice of their Medical Officer of Health, may supply all such medical or other assistance, and all such facilities and articles as may reasonably be required for the detection of Pulmonary Tuberculosis, and for preventing the spread of infection and for removing conditions favourable to infection, and for that purpose may appoint such officers, do such acts and make such arrangements as may be necessary.

(2) A Council, on the advice of their Medical Officer of Health, may provide and publish or distribute in the form of placards, handbills, or leaflets, suitable summaries of information and instruction respecting Pulmonary Tuberculosis, and the precautions to be taken against the spread of infection from that disease.

It will be observed that by these regulations sanitary authorities have had conferred upon them the power of treating pulmonary tuberculosis in their homes in addition to their already existing powers of treating this disease in dispensaries and other institutions. Under these powers much work has already been done by sanitary authorities in the provision of hospital or sanatorium accommodation or of dispensaries and shelters by the authorities themselves, or, more generally, by a subscription to a sanatorium, or to a dispensary erected by a voluntary society, inspection of houses occupied by patients suffering from tuberculosis, examination of patients and "contacts," together with advice as to the prevention of the spread of infection, the provision of treatment by tuberculin, the bacteriological examination of sputum, the disinfection of premises and bedding, the making of byelaws for the prevention of spitting, the provision of other necessary appliances, and the distribution of leaflets and handbills giving instruction and advice with regard to the management of tuberculosis. The sanitary authorities have power to deal with overcrowding and insanitary conditions of dwellings, to control the milk supply and to stop the supply of tuberculous milk, and to seize and condemn tuberculous meat exposed for sale. These powers they exercise through their medical officers of health, sanitary inspectors, and health visitors.

Local Education Authorities.

10. The local education authorities are the councils of boroughs which had a population of over 10,000 and of urban districts which had a population of over 20,000 at the census of 1901, and for the rest of the administrative county, the county council. The local education authorities are required by statute to undertake the periodical medical inspection of the children attending the public elementary schools in their districts. They have also powers of treatment under sanction of the Board of Education. Under this power some 50 local education authorities have now established school clinics at which treatment and advice is given, and several have established day or residential sanatorium schools for children suffering from tuberculosis. There are also open-air day schools for debilitated children, and numerous day schools for cripples and other physically defective children, many of whom

are tuberculous. It should be added that the Education (Provision of Meals) Act, 1906, is administered by the local education authorities, which thus may provide for the treatment of children suffering from malnutrition, one of the chief predisposing conditions of tuberculosis.

Poor Law Authorities.

11. The poor law authorities are the boards of guardians for the poor law unions into which England and Wales are divided, areas consisting of parishes or groups of parishes and not necessarily coterminous with the boundaries of counties or sanitary districts. It is their duty to provide medical relief for persons who are necessitous, and as destitution is frequently associated with tuberculosis, a large number of cases of tuberculosis are to be found in their infirmaries and sanatoria. The majority of the cases found in poor law infirmaries and sanatoria are of the advanced and incurable type, but some earlier cases are also treated. The guardians also have power in certain circumstances to give out-relief to sufferers from tuberculosis and to their dependants.

Metropolitan Asylums Board.

12. Considerable provision for London children chargeable to the guardians of the poor suffering from various forms of tuberculous diseases has been made in recent years by the Metropolitan Asylums Board.

VOLUNTARY SOCIETIES.

13. A great deal has been done by voluntary societies and bodies for the treatment and prevention of tuberculosis. Most of the sanatoria and some of the dispensaries now existing for this disease have been provided out of private charity and many are still maintained by voluntary contributions. In several of these institutions, beds have been subscribed for by local authorities for the use of patients from their districts whom it is desirable to send to sanatoria. Voluntary societies also provide health visitors and nurses, often in co-operation with the sanitary authority, to visit and attend tuberculous patients, and afford assistance to families that have become impoverished through tuberculosis. They also endeavour to educate public opinion with regard to tuberculosis by the distribution of leaflets and placards, and by lectures, exhibitions, etc.

THE NATIONAL INSURANCE ACT, 1911.

14. The resources for attacking the problem of tuberculosis have been strongly reinforced by the passing of the National Insurance Act. The Act, which applies throughout the United Kingdom, deals with (1) treatment; (2) erection of sanatoria and other institutions; (3) research; (4) education.

(1) *Treatment.*

Section 59 creates an Insurance Committee for every county and county borough. Regulations to be made by the Insurance Commissioners must require the Insurance Committee of every county to prepare after consultation with the county council and submit for the approval of the Commissioners a scheme for the appointment of district insurance committees for the county, and prescribing the area to be assigned to each such committee.

This scheme must in any case provide for the appointment of a district insurance committee for each borough (including the City of London and a metropolitan borough) within the county having a population of not less than 10,000 and for each urban district within the county with a population of not less than 20,000, subject to any arrangements for grouping with adjoining districts.

Section 16 requires Insurance Committees 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 (other than poor law authorities) having the management of sanatoria or other institutions approved by the Local Government Board; (b) otherwise than in sanatoria or other institutions, with persons and local authorities (other than poor law authorities) undertaking such treatment in a manner approved by the Local Government Board. The arrangements made by the Committees must be to the satisfaction of the Insurance Commissioners.

The same section provides, for the purpose of defraying the expense of providing this treatment, the sum of 1s. 3d. per annum in respect of each insured person payable out of the insurance fund. A further sum of one penny in respect of each insured person is available from the Exchequer, but may be allocated by the Insurance Commissioners to research.

It is estimated that the number of persons in the United Kingdom who will become insured will be a little over 14,000,000. The income of Insurance Committees for this purpose should, therefore, be about 880,000*l.* per annum (excluding the sum which may be appropriated to research). This figure will, of course, rise in proportion to the natural increase of the insured population.

The section further provides that insured persons cannot claim treatment as a matter of right, but must be recommended for sanatorium benefit by the appropriate Insurance Committee.

Section 17 enables Insurance Committees, if they think fit, to extend similar treatment to the dependants of insured persons or to any class of such dependants. It further provides that if the sums made available by section 16 are not sufficient to provide for the treatment of such dependants the deficit may be made up in equal shares out of moneys provided by Parliament and out of moneys derived from the county or borough rates, provided that the expenditure occasioning the deficit has received the sanction both of the Treasury and of the council of the county or county borough.

Section 22 enables borough, or urban, or rural district councils to agree to repay to the county council the whole or any part of the sums payable by the county council under section 17, so far as such sums are properly attributable to the borough or district.

Section 64 (4) enables Insurance Committees to enter into agreements with any person or authority (other than a poor law authority) that, in consideration of such person or authority providing treatment in a sanatorium or other institution or otherwise, the Committees will make annual or other payments, subject to such conditions and for such period as may be agreed, towards the maintenance of the institution or provision of treatment.

(2) *Finance, Erection of Sanatoria, &c.*

Section 64 (1), read in connection with section 16 (1) (b) of the Finance Act, 1911, makes available a sum of 1,500,000*l.* for the purpose of the provision of and making grants in aid to sanatoria and other institutions in the United Kingdom. These grants are to be distributed in England, Scotland, and Ireland by the Local Government Board, with the consent of the Treasury, who, in turn, are to consult the Insurance Commissioners before giving their consent. In Wales the distribution is in the hands of the Welsh Insurance Commission subject to the consent of the Treasury. It is to be observed that the institutions to which grants may be made are not confined to institutions for the use of insured persons. The money is available for the provision of institutions for the use of the whole population. The 1,500,000*l.* is to be apportioned between England, Wales, Scotland, and Ireland in proportion to their respective populations, according to the census of 1911. Thus, roughly, about 1,116,000*l.* will be apportioned to England, 81,000*l.* to Wales, 158,000*l.* to Scotland, and 145,000*l.* to Ireland.

Provision is also made in this section for the Local Government Board (1) to authorise county councils to provide, manage, and maintain institutions, and (2) to make orders for the constitution of joint committees, joint boards, &c., between county councils, county borough councils, and other local authorities for the purpose of facilitating co-operation.

By section 77 the Local Government Board may, for the purposes of their powers and duties under Part I. of the Act, hold such local inquiries and investigations as they may think fit. The section further provides (1) that any approval given by the Local Government Board may be given for such term and subject to such conditions as the Board may think fit, and that the Board shall have power to withdraw any approval which they have given, (2) that the Board may make it a condition of any approval given or grant of money to be made, that the Board shall have such powers of inspection as may be agreed.

Research.

By section 16 (2), as has already been stated, a sum of one penny per annum per insured person is provided by the Exchequer, and may be retained by the Insurance Commissioners for research. This sum should amount to about 58,800*l.* per annum, increasing in proportion to the natural increase in the number of persons insured.

Education (by means of the spread of Information).

By section 60 a duty is cast upon Insurance Committees to make such reports as to the health of insured persons as the Insurance Commissioners, after consultation with

the Local Government Board, may prescribe, and to furnish statistical and other returns, &c., which in turn are to be forwarded by the Insurance Commissioners to the local authorities affected or interested. Insurance Committees must also make provision for lectures and the publication of information on questions relating to health, either directly or through existing local education authorities, universities, or other institutions.

It must, of course, be borne in mind that the duties of Insurance Committees under this section, so far as they relate to matters of health, are not confined to tuberculosis.

Insurance Committees and Medical Officers of Health.

By section 60 (2) Insurance Committees are authorised to obtain the advice and assistance of any Medical Officer of Health, with the consent of his council, in the exercise and performance of their powers and duties under the Act.

GENERAL PRINCIPLES OF TREATMENT.

15. Before entering upon a detailed examination of the scheme to be recommended, the Committee desire to offer some observations of a general character as to the nature and meaning of sanatorium treatment.

"Sanatorium benefit" in the National Insurance Act, 1911, means treatment in sanatoria or other institutions or otherwise. The expression is not used in the restricted sense of a course of treatment carried out in an institution called a sanatorium. Similarly the expression "sanatorium treatment" has an equally wide significance. The principles of treatment, which have been elaborated for the most part in sanatoria, have a wide application outside these special institutions. The advantages of this form of treatment can, in many instances, be given to patients who are living in their own homes or in shelters. In some of these cases it may be desirable to secure that the patient should be provided with additional food, or a separate room or bed, in order to ensure efficient treatment. Under suitable conditions, especially if the treatment is being carried out under the advice of a medical man with special knowledge of modern methods, home treatment may be, in all essentials, sanatorium treatment.

Sanatorium treatment may be considered from the points of view of (1) education and (2) therapeutics, though in practice they should be complementary to each other, and are, indeed, inseparable.

The therapeutic measures employed are, broadly, those which tend to diminish infection and to increase the patient's resistance. To this end, the patient should be protected, as far as practicable, from continued infection and should be freed from all debilitating conditions, such as impure air, insufficient food, &c. He should be provided with an abundance of pure air and light. He should have a sufficient amount of nourishing food. The amount of exercise and rest, the time that may be given to employment and recreation, the nature of the employment and recreation, in short, every detail of the daily life, must be inquired into carefully, and regulated according to the requirements of each individual patient. To these general measures of treatment may be added the use of tuberculin and other remedies.

From the preventive side it is necessary that the patient should receive a sound education in what may be called the hygiene of the treatment, and this can best be obtained by a course of institutional treatment. During the course of his treatment the patient should be taught the meaning and reason of the advice given, and at the same time should be instructed in the chief facts relating to his disease, its dangers, and the means of their prevention, and the rules of life necessary for the maintenance of his own health and for the safety of those with whom he is brought into contact. In a sanatorium frequent lectures should be given by the resident staff on these points. Similar information should be given in leaflet form to patients attending dispensaries or other institutions.

From the curative side of the question, there can be no doubt that the more constant the medical supervision exercised, the better are the results obtained.

Sanatorium treatment must be taken as a whole, and due weight must be given to each detail, whether it be included under the heading of education, hygiene, medical supervision, &c.

The belief that any considerable proportion of consumptives may safely depend on any one factor of the treatment to the exclusion of the others, such, for instance, as satisfactory housing, adequate nutrition, the sanatorium, or tuberculin, is a mistake, and, if acted upon, is likely to diminish the value which may be expected to accrue

from each and all of these when used in proper conjunction. In a large number of instances of pulmonary tuberculosis it is impossible to estimate the probable effect of treatment in a sanatorium without an opportunity of observing each individual case. Without prejudging the question as to whether sanatorium treatment should be carried out at the patient's home, in a hospital, or in a sanatorium, it may be said that under existing conditions most patients suffering from pulmonary tuberculosis would be given their best chance by a period of treatment in a sanatorium. It should, however, be borne in mind that a short stay in an institution in which the patient may be educated, followed by a course of home treatment, in shelters, &c., under close medical supervision, is a form of sanatorium treatment which has certain advantages and which may successfully be adopted in a large number of cases.

The success of treatment in sanatoria has, no doubt, been adversely influenced in the past by—(1) the ignorance of the public concerning the significance of early symptoms; (2) the lack of facilities for early diagnosis; (3) the admission to and continued treatment in sanatoria of unsuitable cases; (4) ineffective or insufficient after-care; (5) the fact that so many sanatoria have been unable to attract the services of medical officers possessing an expert knowledge of the work, and that in consequence, many sanatoria have been conducted as convalescent homes rather than as institutions in which efficient treatment has been given.

Classification of Patients.

16. For the purposes of this Report cases of pulmonary tuberculosis may roughly be divided into six classes:—

- (1) Cases in which the disease can be diagnosed or is strongly suspected, but in which there is no evident impairment of the working capacity.
- (2) Cases of recent onset with some impairment of the working capacity, but without marked evidence of ill-health.
- (3) Cases of recent onset with evidence of acute illness.
- (4) Cases of a longer history of illness. In some of these cases permanent arrest of the disease may be hoped for, but in the majority, restoration to full working capacity for more than a comparatively short period is not to be looked for.
- (5) Cases in which there is permanent loss of working capacity. Many of these patients live for a considerable period in a condition of chronic ill-health.
- (6) Cases in which a fatal termination within six months is probable.

This classification is necessarily imperfect, as some cases may undergo rapid change, and may subsequently have to be transferred from one class to another. The classification is a broad one, and forms a sufficiently practical basis for exemplifying the manner in which the tuberculosis dispensary may, as explained later on, exercise its functions as a clearing house.

Different arrangements will be required for the treatment of these different types of case. Treatment in sanatoria will chiefly be necessary for cases falling within classes 2, 3 and 4 and for a small proportion of cases falling within classes 1 and 5. It is, however, impossible to lay down a hard-and-fast rule on this point. The broad lines only can be suggested, and it must be remembered that the ultimate success of any scheme of treatment must depend to a large extent on its elasticity.

The Committee desire to recommend that the selection of cases for treatment in a sanatorium should be made, as far as possible, in association with the medical superintendent of the sanatorium.

BASIS OF THE SCHEME RECOMMENDED FOR THE UNITED KINGDOM.

17. The scheme which the Committee desire to recommend for the prevention, detection and treatment of the disease is intended to complete existing public health administration in respect of tuberculosis, and is based on the establishment and equipment of two units related to the general public health and medical work carried on by the Medical Officers of Health as described later and working in harmony with the general practitioner. The first unit consists of the tuberculosis dispensary, or an equivalent staff as set out in this Report. The second unit consists of the sanatoria, hospitals, etc., in which institutional treatment is given. The precise functions of the tuberculosis dispensary are dealt with in the next succeeding section.

of the report. The Committee are of opinion that the tuberculosis dispensary should be the common centre for the diagnosis and for the organisation of treatment of tuberculosis in each area, at which the various bodies and persons connected with the campaign against tuberculosis will be brought together. The aim should be that no single case of tuberculosis should remain uncared for in the community, and that whatever services the scheme provides should be available for all cases of the disease. Next to the tuberculosis dispensary should stand the second unit, consisting of a system of Sanatoria, Hospitals, Farm Colonies, Open-air Schools, etc. The tuberculosis dispensary should be linked up to these institutions for which it will act as a clearing-house.

THE FIRST UNIT IN THE SCHEME.

FUNCTIONS OF THE TUBERCULOSIS DISPENSARY.

18. In a general way, the function of the tuberculosis dispensary should be to serve as:—

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

(1) *Receiving House and Centre of Diagnosis.*

To the tuberculosis officer patients will come or be sent in every stage of illness. This means not only patients with definite tuberculosis, but patients in a delicate state of health, regarding whom there may be suspicion. As the work of the dispensary becomes better understood in any area, it will be found that persons will come or be sent to it with comparatively slight symptoms in order to ascertain whether or not they are tuberculous. In this way, the possibility of early detection is much increased.

(2) *Clearing House and Centre for Observation.*

When the diagnosis has been made the tuberculosis dispensary should serve as a "clearing house" through which persons suffering from the various types of tuberculosis should be passed, whatever the form of the disease and whatever the authority or person responsible for meeting the expense of the treatment. These persons will be classified by the tuberculosis officer connected with the dispensary, who should have some beds at his disposal for the purpose of observation, and sent on to the person or institution providing the treatment appropriate to the individual case. Thus the tuberculosis officer must necessarily be in the closest touch with the general practitioners and with the responsible officials of institutions providing treatment.

The success of the dispensary in this respect will depend largely on how far it is the effective centre of anti-tuberculosis operations and on the extent to which it is co-ordinated with the other elements in the scheme.

(3) *Centre of Curative Treatment.*

A large proportion of cases of pulmonary tuberculosis, and some cases of other forms of tuberculosis, can be adequately treated in the patient's own home. For many of these cases the tuberculosis dispensary will be the centre of treatment. The cases so treated will usually be persons who may safely continue at their several occupations, whether at home or elsewhere. Treatment provided by the dispensary will include not only general "sanatorium treatment," whether in a patient's home or in a shelter, but also more special methods of sanatorium treatment, for example, treatment by tuberculin. Those cases in which home treatment does not yield satisfactory results will need to be reclassified and drafted to the appropriate institution.

Reference may here not inappropriately be made to the importance of having the teeth and mouths of patients in a satisfactory condition. The Committee are of opinion, that it will be advisable to make arrangements with dental practitioners for providing treatment for certain cases.

(4) *Centre for Examination of "Contacts."*

The information coming to the dispensary may lead to the discovery of tuberculosis in persons living in close contact with those suffering from the disease. This possibility of discovery of other cases is a very valuable part of the machinery of control and prevention, as it leads to the detection of a large number of cases (otherwise neglected) at such an early stage of the disease that suitable treatment may readily and successfully be applied. The cases thus discovered should be classified, and distributed from the "clearing house" as already detailed.

Where clinical examination in the home results in the discovery of insanitary conditions of environment, the information obtained will be referred to the appropriate department of the sanitary authority.

(5) *After-care.*

The dispensary should likewise be of considerable service in relation to patients who have been under treatment at home or for varying periods at a sanatorium or other institution, and for whom "after-care" is desirable. For this purpose, patients, on discharge from the several institutions, should be referred again to the dispensary, which, in conjunction with the general medical practitioners and voluntary care committees, should secure such medical supervision as may be necessary to ensure that the benefit obtained from institutional treatment should be as permanent as possible.

The importance of after-care cannot be exaggerated. Unless after-care is efficient and systematic, cases of relapse will be more frequent, with the result that large and unnecessary calls will be made on the funds available. After-care should be undertaken with discretion, and should, so far as possible, avoid publicity until the prejudice against discharged patients created by the exaggerated view taken by the public of their infectivity has been overcome.

It may be advisable at some time to establish machinery whereby suitable employment might be provided for selected cases after discharge from treatment, for whom an immediate return to their previous occupation might involve risk of relapse and consequent economic waste. The Committee hope to refer to this matter in the Final Report.

(6) *Centre of Information and Education.*

The tuberculosis dispensary should constitute a centre towards which persons interested may turn for information and guidance. In course of time, by careful records on the case sheets and schedules, the accumulation of clinical facts and statistics at the tuberculosis dispensary should prove of great service in investigation connected with tuberculosis. These facts and statistics, which should be collected upon a uniform system, and should be related to the information obtained by the Medical Officer of Health in connection with the compulsory notification of all cases of pulmonary tuberculosis and in connection with the general death and sickness reports of the community, should also be at the service of those who are engaged in research, and should be of considerable value as *data* in that connection. The information so obtained, together with the systematic training of individual patients in the measures necessary for their own treatment, should materially assist in the education of the community generally, and thus serve to promote the prevention of the disease.

In addition, the dispensary should become a valuable centre of medical education. This should prove of importance in the special training of medical practitioners and nurses.

CONSTITUTION OF THE TUBERCULOSIS DISPENSARY.

19. In making the observations which follow as to the constitution of the dispensary, the Committee do not wish to be understood to be laying down hard-and-fast lines. It should be borne in mind that the one essential is a skilled tuberculosis officer with capacity for organisation. The Committee recognise that in many instances the local conditions will render the accommodation described unnecessary.

Urban Dispensaries.

Accommodation.

In most instances it will probably be found that existing buildings can readily be adapted for the purpose of a dispensary; in other cases it may be necessary to build a dispensary; or, again, it may be convenient that the dispensary should form a department of an existing hospital or infirmary. In a few large centres, more especially in centres where medical training is given, it may be advisable to have a special building on a larger scale. The dispensaries should be easy of access to the working-class population. In some of the largest cities, especially in those in which the districts occupied by the working-classes are widely separated from one another, it will be desirable to establish one or more sub-centres as branch dispensaries.

The Committee wish to express the opinion that there is no danger of infection being conveyed from the dispensaries to the occupants of neighbouring houses.

The following accommodation is generally desirable: an office, general waiting-room, committee-room, consulting-rooms (one or more) and dressing-rooms. There should also be facilities for laryngoscopy and bacteriological examination and for the provision of drugs.

Cost.

Capital.—The capital outlay will vary according to the type of building selected. The adaptation and equipment of an existing house should not cost more than 250*l.*, and often might cost considerably less than this sum. When a building has to be erected the cost will, of course, be much greater.

Staff.—The following staff would generally be required; Medical, Nursing, Secretarial, Dispensing.

Medical.—This will include a whole-time Chief Tuberculosis Officer, responsible for the general conduct and administration of the dispensary. He should be a first-class clinician, with special training in tuberculosis. The duties and relationships of this officer are described in section 27. Associated with him, when necessary, should be one or more whole-time assistant tuberculosis officers, according to the size of the area served by the dispensary.

Nursing.—There should be nurses on the staff of the dispensary. It is an advantage that these nurses should have had special training in tuberculosis work. Well-trained nurses help very much in the education of patients in the principles of sanatorium treatment, and by their periodic visits assist both the tuberculosis officers and the general practitioners in supervising home treatment.

District and other voluntary nursing associations might be utilised.

Clerical.—A clerk, qualified in shorthand and typewriting, to attend to correspondence and statistical records, will be found advantageous.

Dispensing.—In the larger centres, the services of a whole or part time dispenser will be needed. Where there are several sub-centres, one dispenser may have charge of the drug department at each of these branches. In many cases it may be possible to combine the offices of clerk and dispenser in one individual. Again, it may often be found better and more economical to make arrangements with local chemists for the necessary dispensing.

Maintenance.—The salaries should be such as to secure men of the requisite ability. In order to attract the right type of men as chief tuberculosis officers, it will usually be found necessary to offer a salary of not less than 500*l.* with prospects of increase. The salaries of the rest of the staff will depend on local circumstances. In addition to salaries, some of the chief items of expenditure will be rent, rates, taxes, &c., drugs, including tuberculin, stationery, &c.

Rural Dispensaries.

The problem presented by the rural districts is very different from that of the urban centres.

In some rural districts branch dispensaries, with a simpler equipment, closely linked with a central dispensary, might be established in one or more of the principal small towns of the area. Local sub-centres should also be established, to

which the tuberculosis officer and nurse of the dispensary should make periodical visits. These sub-centres should be placed in small towns or large villages, and efforts should be made, by attendance on stated days, to get into touch with as large a number of persons as possible. In other rural neighbourhoods no accommodation will be found necessary, as the tuberculosis officer will himself call upon patients in their own homes.

Cost.

Capital.—As previously stated, most rural areas will probably be served by a main dispensary, situated in the most convenient available town, associated with branch dispensaries in different parts of the area. The capital outlay required for the main dispensary will be similar to that required for the establishment of urban dispensaries, the necessary accommodation being the same in both cases. A very small sum should be required for the establishment and equipment of each branch dispensary. The sputum examinations of patients attending the branch dispensaries will generally be made at the main dispensary. In most rural areas there will be need for several branch dispensaries, but it would seem that an additional sum of 100*l.* should be sufficient for each rural area, for capital outlay, on this head.

Maintenance.—The salaries and cost of maintenance of a rural dispensary unit, with its branches, appears to be very similar to the cost of maintenance of an urban dispensary. The additional expenditure on each sub-centre should be quite a small sum, the chief items being the travelling expenses of the visiting staff from the main dispensary.

Care Committees.

The effectiveness of the work of the dispensary can be greatly increased by the organisation of voluntary care committees formed of representatives from the Local Authorities, Boards of Guardians, Insurance Committees and from all charitable and social work organisations in the district. In this way all available agencies can be linked up and any extra assistance—such as additional food, change of air, clothing, better home conditions, more suitable occupation, &c. that may be needed to enable patients to benefit to the fullest extent from the treatment provided—may often be readily secured. The secretary of the care committee may conveniently be a member of the dispensary staff, and it is desirable that the chief tuberculosis officer of the dispensary should attend the meetings of the committee, to advise its members as to the particular form of assistance necessary for each individual patient. In connection with this part of dispensary work in rural districts it may be found of assistance, where the patients are willing, to have a system of voluntary correspondents who report from time to time with regard to patients in the several districts served by the dispensary.

20. On reviewing as a whole the foregoing description of the proposed constitution and working of the tuberculosis dispensary and its position in the general scheme of provision for the treatment of tuberculosis, the Committee desire to emphasize again the fact that the "dispensary" as herein contemplated is essentially not a building but an organism. The Committee have advisedly so framed their suggestions under this head as to be capable of the widest application to the varying local conditions to which it will be necessary to have regard. The essential element which must always be present is the chief tuberculosis officer, appointed by the local authority, standing in such relation to the Medical Officer of Health and the general scheme of public health administration as may be defined by the regulations of the local authority, acting as expert adviser to the local authority and Insurance Committee, in matters of diagnosis and treatment, controlling, supervising or acting in consultation with, as circumstances may determine, the whole time subordinate medical officers and private medical practitioners by whom treatment is given, and himself treating cases for which special skill and experience are required.

NUMBER OF TUBERCULOSIS DISPENSARIES REQUIRED.

21. The Committee are of opinion, without committing themselves too definitely to a figure, that one tuberculosis dispensary will be required in the immediate future for every 150,000 to 200,000, or even more, of the population in an urban neighbourhood. In rural neighbourhoods where the population is scattered it could usually only serve a smaller number. Much will, however, depend upon the character of the neighbourhood. The Committee consider that, so far as possible, centralisation of effort should be aimed at.

SECOND UNIT OF THE SCHEME.

Sanatoria, Hospitals, and other Institutions.

22. A large proportion of cases, both of pulmonary and non-pulmonary tuberculosis, require treatment for a longer or shorter period in an institution.

A certain proportion of the cases in which the working capacity is likely to be restored require treatment in a sanatorium.

Hospital accommodation is required for a large number of persons: (a) for treatment and education; (b) in emergencies; (c) in acute disease for the purposes of observation until the character of treatment required can be ascertained; and (d) for patients with advanced disease not able to be nursed at home, under conditions that will ensure the patient's comfort and the safety of those about them.

Patients will be transferred to this second unit from the tuberculosis dispensary in its capacity of a clearing-house. The Committee will deal more fully with the various questions as to the character of the accommodation required and other particulars in their Final Report, but wish to draw attention now to certain matters of immediate importance.

SANATORIA.

23. The general question of sanatoria, including construction, will be dealt with more fully in the Final Report. The buildings should consist of (1) the sanatorium proper; (2) a hospital section for cases with acute symptoms (say 20 per cent. of the beds); (3) an administrative block. The buildings should be built with a view to expansion and should be so arranged that treatment can be provided for both men and women. It is desirable that distinct institutions, or at least separate pavilions, should be provided for children.

The Size of Individual Institutions.

It is difficult to fix a maximum number of beds, but, other things being equal, the larger institutions have obvious economic advantages. It is strongly recommended that an individual sanatorium should contain not less than 100 beds.

Capital and Maintenance Cost.

The capital cost must vary with the number of beds, the cost of land, the material used, and local conditions. It should probably not, as a rule, exceed 150*l.* a bed, inclusive of cost of site and equipment. The cost of maintenance per bed will probably be from 25*s.* to 30*s.* a week.

Site.

Treatment can be and has been carried out satisfactorily in sanatoria situated close to large cities, but such a situation tends to increase the cost of the site. A more isolated position is usually advisable. Speaking generally, a sanatorium should be on a somewhat elevated and sloping site, well sheltered from the prevailing winds, with a sunny exposure, a dry and permeable soil, an abundant water supply, and facilities for drainage. A low rainfall is desirable where practicable. For convenience of transport, haulage and accessibility, the sanatorium should be within a convenient distance of the railway station.

The extent of the site should be sufficiently large to allow facilities to be provided for graduated work, the erection of workshops, the making of a kitchen garden, farm, &c. Half an acre per patient is a fair allowance, but less may suffice.

Medical Staff.

In addition to a medical superintendent, there should be two resident medical officers for an institution of 200 beds and one resident medical officer for an institution of 100 beds. The salaries should be such as to secure men possessing the requisite ability. It must be remembered that the proper performance of their duties requires high and varied qualifications, and the Committee are of opinion that, in order to attract the right type of men as medical superintendents, it will usually be found

necessary to offer a salary of not less than 500*l.* a year with house, and with prospects of increase.

At the present time, owing to the lack of facilities for obtaining experience in the institutional treatment of tuberculosis, there are comparatively few medical men and nurses who possess the necessary qualifications for posts in sanatoria. If a number of sanatoria are to be established, this deficiency must be borne in mind. It will take some months to give medical men and nurses the necessary training. A certain number of appointments should therefore be made in the near future, on the understanding that those selected should at once make adequate arrangements to secure the necessary training and experience.

Number of Sanatorium Beds required.

As it is impossible to give an accurate estimate on this subject, the sanatorium accommodation to be provided now should be less than what may seem to be the probable requirements for the immediate present and for the future. Experience alone can determine what these requirements actually are and will be, and by waiting better use will be made of the available funds.

Subject to the qualifications as to figures expressed in section 41, in the opinion of the Committee it is advisable to provide in the immediate future one bed per 5,000 population in the United Kingdom.

Sanatoria should be complementary to each other in respect of the reception of patients, so that an overflow of cases from the area of one sanatorium should be received by another having vacant accommodation at the time. Arrangements to this end should be made by the Local Government Board.

HOSPITAL ACCOMMODATION.

24. The amount of hospital accommodation required, and to a less extent its character, must depend upon local conditions. Existing accommodation should be utilised as far as may be feasible. A certain number of Poor Law institutions might possibly be taken over and beds in isolation hospitals might be adapted and utilised for this purpose. Provided that ventilation is adequate it is not necessary to provide as large a cubic space per patient as for other infectious diseases. Where the accommodation is insufficient it is a better plan to provide the additional beds required by enlargement of existing institutions rather than by the erection of new and special buildings. The treatment of advanced cases of tuberculosis does not call for hospitals of a special type, and so far as may be possible the accommodation should be in connection with hospitals in which other diseases are treated. If this policy is adopted the danger of the treatment of tuberculosis becoming a special and separate thing will be lessened, the needs of medical education will be met to a greater extent than they are at present, and administration will be more economical. The segregation of advanced cases in institutions separate from those for other diseases is undesirable and unnecessary so long as it is possible to ensure adequate protection against the spread of infection. The accommodation made for advanced cases should be, so far as possible, in districts easy of access to the friends of the patients.

Number of Hospital Beds required.

The number of beds required is problematical, and is dealt with in section 41.

NON-PULMONARY TUBERCULOSIS.

25. This includes tuberculosis of the skin, glands, spine, joints, and peritoneum. Modern experience shows that treatment of these cases, in children at least, should be essentially conservative in character, and that the best results are obtained in institutions in the country. The number of beds required cannot be correctly estimated on the available data. The capital cost per bed may probably be put at 150*l.*, on an average, and the maintenance charge per bed per week at from 25*s.* to 30*s.*

The Committee do not consider it necessary to deal more fully in this Report with the question of non-pulmonary tuberculosis.

POSITION OF EXISTING VOLUNTARY INSTITUTIONS.

26. So far as possible, existing voluntary institutions such as sanatoria, &c., should be utilised, provided that they fulfil the following conditions :—

- (1) That they be approved as suitable by the Local Government Board.
- (2) That they fall into the general scheme for the prevention and treatment of tuberculosis.
- (3) That they be subject to inspection by the Local Government Board whenever considered necessary.

DUTIES AND QUALIFICATIONS OF HEADS OF DISPENSARIES AND SANATORIA.

27. The chief tuberculosis officer of the dispensary should be independent of control by any other medical man so far as his clinical duties are concerned, and should, subject to his relationship to other officers as defined by the local authorities' regulations, be responsible for the management of these institutions. He should be in intimate relationship not only with Medical Officers of Health, but also with the general practitioners in the locality, and the medical officers of the several institutions (sanatoria, hospitals, &c.), which constitute elements in the co-ordinated scheme. He should decide as to the suitability of patients for the sanatorium, the hospital for advanced cases, &c., in co-operation, so far as is possible, with the general practitioners and with the medical officers of these institutions. He should also be in close touch with other authorities (including those responsible for Poor Law institutions), charity organisation societies, and all agencies, voluntary or otherwise, which have an interest in tuberculous persons.

The Committee desire to lay emphasis upon the necessity of having suitably qualified and experienced medical men for the senior appointments in connection with the dispensaries and sanatoria. Indeed, the effectiveness and economy of the administration of the scheme suggested by the Committee will be dependent, in a large degree, upon the judicious selection of these officers.

With a view to securing desirable officers the Committee recommend that, in giving or withholding approval, the Local Government Board should take into consideration the whole management and staffing of these institutions (including the tenure and other conditions of appointment of the staff), not only from the point of view of the advantage to the patients concerned, but in order to command the confidence and co-operation of the medical practitioners within the area.

Whilst not desiring to lay down any hard-and-fast conditions, the Committee are of opinion that preference should be given to registered medical practitioners of suitable qualifications and experience and not less than twenty-five years of age, who have held house appointments for at least six months in a general hospital, in addition to a similar period of attendance at a special institution for the treatment of tuberculosis. They should also be competent to supervise such laboratory work as may be necessary.

POSITION OF THE GENERAL MEDICAL PRACTITIONER.

28. The Committee are of opinion that it is of primary importance to the lasting success of any scheme for dealing with tuberculosis that it should enlist the hearty co-operation and stimulate the interest of the general medical practitioners of the country. Their intimate personal relations with patients and their influence in the homes of the people are forces which should be actively enlisted in the campaign against the disease as aids to securing its early recognition and methodical treatment, as well as in promoting the effective after-care of cases of tuberculosis and in encouraging those healthy habits of life which are so essential to building up the powers of resistance to the disease.

For these reasons the practice of the tuberculosis dispensary should be so arranged as to encourage general medical practitioners to seek the help and instruction which it affords both by consultation with its special medical officer in the homes of the patients and at the dispensary. Wherever practicable, the practitioners of an area, or some of them, should be engaged to serve as assistant medical officers to the dispensary, in rotation or by some other agreed method.

In order to secure these ends the Committee believe that, as a rule, the following conditions are essential :—

- (1) The chief tuberculosis officer of the dispensary should be a whole-time officer whose duties will be such as will not bring him into competition with the other medical men of the district. He should be of suitable age and attainment and enough of an expert on the subject of tuberculosis to command general confidence.
- (2) The chief tuberculosis officer of the dispensary should, wherever practicable, act as the adviser to the Insurance Committee as to the character of the treatment of cases that are recommended for sanatorium benefit. The chief tuberculosis officer of the dispensary in such cases should act in an advisory and consultative capacity, his aim being to avoid unnecessary interference and to establish such relations with the general medical practitioners that his advice and help will be gladly sought.
- (3) In the case, at all events, of insured persons, patients living at home who are treated at or under the supervision of the dispensary should generally be placed, where they are willing, under the care of some general practitioner who will carry out the necessary home treatment in consultation with the chief tuberculosis officer of the dispensary, and who will, where the patients are insured persons, be paid out of the funds available for Sanatorium Benefit.
- (4) Arrangements should be made for the provision of expert advice in surgical, dental, and in other cases where difficulties may arise.

CHILDREN.

General.

29. Childhood affords an excellent opportunity for detecting and dealing with tuberculosis. The more the resistant power of children is increased, the lighter will be the burden of tuberculous disease in the adults of the next generation. The factors which tend to weaken the defensive powers of children can be brought under control easily and at an early stage. Among these factors the Committee desire to lay stress on the deleterious effects of malnutrition.

It is also of great importance that adequate measures should be taken to limit infection.

Institutions available and needed for England and Wales.

30. There is a certain amount of accommodation in voluntary and other institutions already existing for cases of pulmonary tuberculosis in children and also a large number of beds for non-pulmonary tuberculosis. There are also about 180 places in open-air schools for tuberculous children and 750 places in general open-air schools. In addition there is a certain amount of miscellaneous provision in general and special hospitals.

With regard to new accommodation required, it may be convenient to consider provision for cases of—

- (a) Pulmonary tuberculosis.
- (b) Tuberculosis of the bones and joints.
- (c) Glandular and other forms of tuberculosis.

(a) Children suffering from pulmonary tuberculosis should, whenever practicable, be sent to residential sanatorium schools. The Committee are advised that some 250 additional beds for this class of case should be provided at the outset.

(b) Children affected with osseous tuberculosis should be sent to residential sanatorium schools equipped with all necessary appliances for conservative surgical treatment. At present the accommodation for these cases is very inadequate. To begin with, at least 2,000 additional beds are needed.

(c) Glandular and other forms of tuberculosis should mainly be dealt with by means of open-air schools, playground classes, night camps, &c. It is urgently necessary that accommodation of this character should be considerably extended and made available throughout the country. Such institutions should also deal with the

large number of children who are suffering as a result of conditions and from ailments which, if neglected, are likely to lead to the development of tuberculosis.

The nature of the residential institutions which should be provided should, in the main, follow the general lines, laid down in this report, for such institutions for the use of adults. The Committee consider that separate institutions or, at least, separate pavilions or departments, should be provided for children.

Correlation of Children's Institutions with the General Scheme.

31. Children of school age in attendance at elementary schools are under the supervision of the local education authority. They are subject to a periodical medical examination as part of the routine of their school life. It is obvious, therefore, that local education authorities have the opportunity of playing a very important and, indeed, essential part in the detection, prevention, and treatment of tuberculosis. In order to link up the local education authority with the scheme already indicated it is desirable that the school medical officer should be closely in touch with the tuberculosis dispensary. The dispensary should provide, as far as possible, the same services for children as for adults.

ADMINISTRATION IN ENGLAND AND WALES.

32. It is the opinion of the members of the Committee present and voting,* that, with a view to securing prompt and effective concerted action and a common trend of effort, the Government departments concerned, such as the Local Government Board and the National Health Insurance Commissions, should make, as has been done by other Government departments, mutual arrangements in some convenient form whereby important questions arising under the Insurance Act affecting the administration as to tuberculosis should first be considered jointly by representatives of the departments concerned.

33. The Committee have already indicated the lines upon which, and the areas within which, the system which they recommend should be established. The question then arises as to how, and by whom, this system should be organised in order to secure (a) that every person suffering from tuberculosis, whatever the form of his disease, and whatever authority or body may be liable, or may have undertaken, to bear the cost of its treatment, should receive the treatment appropriate to his condition; and (b) that in the interests both of economy and efficiency unnecessary multiplication of offices and institutions, and overlapping and conflict of authorities, should be as far as possible avoided.

County and County Borough Councils to be Primarily Responsible.

34. In previous paragraphs of the Report the parts have been described which are, or may be, played in the provision of institutions (1) by various public authorities, including County Councils, County Borough Councils, and other Sanitary Authorities; and (2) by charitable and other private bodies and persons. It is clear that some public authorities, in the exercise either of powers conferred by the Insurance Act, or powers previously held, could both (a) undertake the independent provision of necessary institutions of all kinds, and (b) themselves defray the entire cost of maintenance and treatment in such institutions of persons resident within their respective areas who were suffering from tuberculosis in any form. An authority, whether a County Council, a County Borough Council or a local Sanitary Authority might thus provide separate institutions under its own sole control for the treatment of persons, the cost of whose maintenance and treatment therein, it entirely defrayed. If, however, a policy of independent provision of this kind were widely pursued, it would obviously result in unnecessary multiplication of institutions, many of which would be too small for economical and efficient management. Some combination of authorities for the purpose is, therefore, clearly desirable, and is specifically provided for in the Insurance Act.

Having regard to the different classes of institutions which are required, to the variety of the cases to be dealt with, and to the proper organisation of comprehensive efficient and economical schemes, the Committee are of opinion that the unit area should generally be that of the County, County Borough, or in some cases a group of

* Mr. Astor in his capacity as Chairman, Mr. Willis, Dr. Newsholme, Dr. Leslie Mackenzie, Dr. McVail, Dr. Smith Whitaker, Dr. Niven, and Mr. Stafford abstained from voting. Sir George Newman and Dr. Meredith Richards were absent.

Counties and County Boroughs, and that the organisation of schemes will best be carried out if undertaken by the County or County Borough Council or in cases of combinations by a Joint Committee of these bodies (or possibly of one or more of such bodies with other local authorities). While the Council or Joint Committee should be the body legally responsible for the provision and maintenance of the institutions required, the Committee consider that in formulating a complete scheme for an area, they should consult in reference thereto the other Sanitary Authorities and also the Insurance Committees which are interested. The Committee are of opinion that these bodies, recognising the services that have been rendered in the past by voluntary effort should encourage the continuance of such services by making the utmost use of the provision which private liberality has made available. Every endeavour should be made to include in the local scheme institutions and associations which are carried on by private effort.

As regards London, it seems desirable to the Committee that it should be considered whether some of the sanatoria and hospitals required should not be provided by the Metropolitan Asylums Board, and whether dispensaries should not be provided by the Metropolitan Borough Councils.

Relation of Sanitary Authorities other than County Boroughs to the Scheme.

35. Sanitary authorities are the bodies primarily concerned in the administration of the public health laws of this country, and they must occupy an important position in any general scheme dealing with tuberculosis.

It is they who receive notifications of cases of pulmonary tuberculosis, and it is the duty of their medical officers of health, on receiving notifications, to take such steps as may appear to them to be necessary or desirable for preventing the spread of infection and for removing conditions favourable to infection.

Some sanitary authorities have already provided beds or hospitals which are being utilised as sanatoria for consumptives, and in this and in many other ways these bodies are actively engaged in assisting in the control of tuberculosis.

It is, therefore, clearly desirable that the schemes which are to be organised by county councils should be so framed as to secure the co-operation of sanitary authorities to the fullest extent.

It is not possible to lay down in precise detail how such co-operation should be secured. The circumstances of different counties vary, and the formulation of particular schemes must take account of such variation. But it will probably be found expedient, when any of the larger sanitary authorities are already providing or are prepared to provide any of the institutions or other parts of the contemplated machinery, that those authorities should be given due place in the committee controlling or advising the arrangements.

As a general rule the formulation of a county scheme will rest, in the first instance, with the county medical officer of health, and he will no doubt ascertain what are the needs of the county, and what existing arrangements, whether those of sanitary authorities or the voluntary organisations, can properly be incorporated in the scheme.

The Committee are inclined to think that, subject to proper arrangements being made with such sanitary authorities as are prepared to carry out, as above indicated, any portion of the scheme, it will generally be desirable that the County Council should be responsible for the provision and maintenance of institutions, including tuberculosis dispensaries, and that any accommodation which is provided by other authorities, and which is utilised as part of the county scheme, should be so utilised under the responsibility and direction of the County Council.

One distinct advantage from the use of the county rate would be that so much of the expenditure as was thus met could be made to fall equally over the whole county.

Relation of Insurance Committees to the Scheme.

36. Insurance Committees will have the following duties:—

- (a) That of securing prompt official notice whenever suspicion arises that an insured person (or possibly a dependent) is suffering from tuberculosis.
- (b) That of obtaining proper evidence as to whether such person is in fact suffering from tuberculosis.
- (c) That of deciding whether such person, if found to be suffering from tuberculosis, shall receive "sanatorium benefit."

- (d) If it be decided that he shall receive "sanatorium benefit," that of deciding what form of treatment he shall receive, and with what person or authority the Committee shall make arrangements with a view to his receiving suitable treatment, and of making the necessary arrangements.

The duties of the Committee under (a) and (b) are chiefly medical, and must be discharged by making suitable arrangements with medical practitioners for reporting cases to the Committee, and for making the confirmatory diagnosis when required.

The duties under (c) involve both medical and financial considerations. If the necessary funds are available the Committee may be able to act upon the principle that all cases of tuberculosis occurring in insured persons shall receive "sanatorium benefit." If the funds are insufficient for this, some discrimination must be made, and such discrimination must be based chiefly upon medical grounds. In other words, the Committee must be advised by a medical expert in its exercise of this discrimination.

The Committee must also act under medical advice in deciding to what kind of institution, if any, a given patient should be referred, or whether he should be treated in a dispensary or at home.

When a Council has established a scheme in full working order, a large proportion of the patients to be treated by and in the institutions it has established will consist of persons referred to it by the Insurance Committee, for the cost of whose treatment that Committee is responsible.

When an Insurance Committee is performing its duties under the Insurance Act it will look mainly to the county or county borough scheme for the provision of institutional and dispensary treatment for those whom it recommends for sanatorium benefit.

37. The Committee are of opinion that the point of contact between the two bodies should be the tuberculosis dispensary. The chief tuberculosis officer of the dispensary would seem to be the person best qualified to advise Insurance Committees in the discharge of such of their duties relating to persons suffering from tuberculosis as involve medical considerations. When institutional treatment is necessary he would be able to take or advise the right steps, since he would be in close touch with the available institutions in the County scheme; where treatment other than in an institution is necessary, he would be able to assist in giving it efficaciously through the dispensary.

The Committee recognise that the disposition of Insurance Committees to make full use of the medical staff of the dispensary in the manner which is above indicated may be largely dependent upon some measure of control being given to them over the personnel and working of the dispensary.

It appears to the Committee, however, that satisfactory arrangements for the combined use and control of the dispensary might well be made by arrangement between the two parties concerned.

The Committee are of opinion that, for the reasons above stated, the bodies legally responsible for the establishment and maintenance of the tuberculosis dispensary should be the Councils, but they suggest that arrangements should be made whereby, in view of the payments that would be made by Insurance Committees (under agreements for a term of years) towards the expenses incurred in connection with the dispensary in respect of the Committees' patients, the Councils might agree to be guided, in matters appertaining to the staffing and internal management of the dispensary, by the advice of a consultative committee consisting of members of the two bodies appointed by the respective parties in some agreed proportion.

Voluntary bodies of an approved character specially interested in tuberculosis might suitably be given representation on this consultative committee.

WALES.

38. The position of Wales differs from that obtaining in England in the following respects:—

Section 82 (3) of the National Insurance Act enacts that the power of the Local Government Board with respect to the distribution of any sum available for the purpose of the provision of or making grants in aid to sanatoria and other institutions shall, as respects the part thereof apportioned to Wales, be exercised by the Welsh Insurance Commissioners. Section 77 (3) also gives the Welsh Insurance Commissioners power

to inspect institutions towards which grants have been made. Section 82 (4) of the Insurance Act requires the Welsh Insurance Commissioners in making, and the Treasury in approving, grants in aid of providing sanatoria and other institutions to have regard to the provision of such institutions which may have been made or may be proposed to be made by any association established for Wales by Royal Charter before or within 12 months after the commencement of this Act. The King Edward VII. Welsh National Memorial Association, which has a fund exceeding 200,000*l.* at its disposal, has recently taken the necessary steps to obtain a Charter.

The constitution of this Association provides for the representation of every County and County Borough Council, and Insurance Committee in Wales and Monmouthshire. It is, therefore, a national institution, and aims at placing the campaign upon a national basis. The Committee consider, therefore, that all the recommendations contained in sections 20 and 33 to 37 of this report need not apply in the case of Wales.

Furthermore, the Welsh problem presents certain special difficulties. Many of the counties are entirely rural, sparsely populated, and difficult of access from any one centre. Thus, no less than six of the thirteen counties have less than 60,000 population, while even in Glamorganshire, which contains nearly half the population of Wales, special difficulties arise from the geographical features of the district. At the same time, it is precisely in some of the sparsely-populated areas that the need for activity in respect to the prevention and treatment of tuberculosis is most acute. For these reasons Wales is fortunate in having the National Memorial Fund available for supplementing either capital expenditure or revenue derived from other sources.

The Committee desire to point out that in any national scheme for Wales particular attention should be paid to the training of county and district nurses in the treatment of tuberculosis and in securing the co-operation of existing nursing associations.

SCOTLAND.

39. The Committee consider that certain of their recommendations may not be applicable or suited to Scotland owing to the different position (legal and otherwise) existing in that country. In the following statement it is shown how, by the exercise of the powers of the Public Health Acts and of the National Insurance Act, it is practicable in Scotland: (a) To make extensive use of existing authorities; (b) To correlate the activities of public health authorities and insurance committees; (c) To provide a method whereby the central authorities may work in perfect co-ordination in the execution of their respective statutory duties; (d) To arrange that voluntary institutions, whether sanatoria, hospitals, dispensaries, or colonies, can, without undue sacrifice of autonomy, form an effective part of the official administration.

Legal Powers of Local Authorities.

The local authorities for the administration of the Public Health Acts in Scotland are:—

- (a) For burghs—the town council.
- (b) For counties divided into districts—the district committee.
- (c) For counties not divided into districts—the county council.

The district committee is composed partly of county councillors and partly of members representing the Poor Law Authority (parish council). The county council controls the finance of the district Committee.

The central authority is the Local Government Board for Scotland.

The principal Public Health Acts are (a) the Public Health (Scotland) Act, 1897; (b) the Infectious Disease (Notification) Act, 1889.

1. *Notification.*

(a) Pulmonary Tuberculosis is an infectious disease within the meaning of the Public Health (Scotland) Act, 1897.

(b) Accordingly, any local authority may do in respect of pulmonary tuberculosis whatever it is entitled to do for any ordinary infectious disease, e.g., enteric fever.

(c) In addition to the usual methods of obtaining information, the local authority may extend the Notification Act of 1889 to pulmonary tuberculosis.

(d) This extension has been made by local authorities representing over 60 per cent. of the population of Scotland.

(e) Whether the disease is compulsorily notifiable in any district or not, the local authority is entitled and obliged to apply the Public Health Act to pulmonary tuberculosis.

2. Powers of Enquiry.

(a) The medical officer of health may "enter and inspect any house in which he has reason to believe that any infectious disease exists or has recently existed." This enables him to deal with all insanitary conditions of housing, *e.g.*, overcrowding, dampness, darkness, &c.

(b) He "may examine any person found on such premises with a view to ascertaining whether such person is suffering or has recently suffered from any infectious disease." This authorises him to examine both actual patients and "contacts."

(c) These powers cover everything necessary for the full personal and environmental investigation of cases of pulmonary tuberculosis.

(d) There are in the Act full powers of dealing with any insanitary conditions discovered.

3. Disinfection and Cleansing.

The local authority may, and when required by the Local Government Board, shall provide means for disinfecting clothing, bedding, &c., and has full powers itself, at its own expense, to disinfect and cleanse houses and clothing, or to require the householder to do so. These powers are very fully exercised.

4. Removal to Hospital.

Any person suffering from an infectious disease who is (1) without proper lodging or accommodation; (2) lodged where precautions cannot be taken against the spread of the disease; (3) lodged in a tent or van; (4) lodged in a room occupied by others; (5) on board ship, may be removed to a hospital at the instance and cost of the local authority, on medical certificate by order of a sheriff, magistrate, or justice.

Instead of ordering the removal of a patient, the sheriff or magistrate may order removal of other inmates to houses provided by the local authority. These powers are applicable to pulmonary tuberculosis; but, meanwhile, more patients ask for admission than the existing institutions can accommodate, and the exercise of the powers has been practically unnecessary. There is power in a proper case to detain a patient in hospital.

5. School Clause.

No infected child may be sent or admitted to school, and no child from an infected house can be sent or admitted to school, unless the medical officer or medical attendant certifies that "proper precautions" against the spread of infection have been taken, and that the child can attend school without risk.

Medical inspection of school children is now established all over Scotland.

6. Infected Persons carrying on Business.

There are sections giving powers to control infected persons in the exercise of business—*e.g.*, milking of animals, and other occupations connected with food—but these are too well known to need summarising.

7. Hospitals (including Sanatoria), Convalescent Homes, Reception Houses.

(a) Any local authority may, and, if required by the Board, shall, provide, furnish, and maintain for the use of inhabitants of their districts suffering from infectious disease, hospitals, temporary or permanent, and houses of reception for convalescents from infectious diseases, or for persons who have been exposed to infection.

(b) Thus the Board may require local authorities to provide: (1) hospitals, temporary or permanent, including sanatoria, shelters, and any other form of hospital; (2) houses for convalescents; (3) houses of reception for contacts.

(c) These powers cover every variety of house or hospital for the isolation and treatment of tuberculosis—*e.g.*, sanatorium, isolation hospital, tents, shelters, open-air schools, holiday homes, colonies, day camps, night camps, &c.

(d) Such institutions are "for the use of inhabitants of their district."

(e) In order to realise these powers, the local authorities may: (1) themselves build hospitals or houses; (2) contract for the use of such hospital or house or part thereof; (3) enter into agreement with any person having the management of the same. This covers all ordinary methods of providing hospitals or convalescent houses or reception houses. But there is a further power: (4) The local authority may, with the consent of the board, also, or in place of, providing such hospitals or houses, (a) employ nurses to attend persons in their own houses, (b) supply medicines, (c) supply medical attendance. This covers all that is involved either in dispensary or in domiciliary treatment; (5) the local authority may also "provide and maintain one or more portable hospitals for the use of their districts." This includes portable shelters.

(f) Two or more local authorities may combine for all these purposes, and, if required by the Board, they must combine. Failing agreement, the Board can fix terms, and their determination is final. The site and plans of all such hospitals or houses must be approved by the Board. The site may be within the district or within a convenient distance of the district. No contract for the use of a hospital or house can be entered into by the local authority without the sanction of the Board.

The above powers enable the Local Government Board for Scotland to require local authorities to provide out of rates for practically every variety of treatment included under the term "sanatorium benefit." With special reference to tuberculosis, the powers of the Public Health Acts are supported and extended by the provisions of the National Insurance Act, sections 16, 17 and 64, and the additional funds made available will facilitate the extension of the activities of the public health authorities both of town and county.

In a circular issued in 1906, on the Administrative Control of Pulmonary Tuberculosis, the Board expounded fully the obligations of local authorities and the various methods of developing, in a comprehensive scheme, their powers of prevention and treatment, including the provision of dispensaries in populous places, sanatoria, hospitals, day-camps, night-camps, health-colonies, &c. The response to the suggestions made in that and in subsequent circulars has been very wide-spread, and the official interest in tuberculosis all over Scotland has attained to a very high level.

To voluntary effort, both in town and country, has been due a great deal of valuable work in the prevention and treatment of tuberculosis. The Committee desire to express their great appreciation of this work and their hope that it may all be duly correlated with the scheme recommended.

In view of this recital of fact and law, it is obvious that the problem in Scotland has important aspects of its own. The Committee do not propose to enter into details as to arrangements to be made or measures taken or to be taken by the Scottish central and local authorities. The Committee, however, desire to recommend that the establishment of the two main units, viz. (1) Dispensaries (including domiciliary treatment), and (2) Sanatoria, &c., should continue to be the basis of action in Scotland on the same main lines as in the other three countries. They desire further to indicate that the Highlands and islands raise, however, exceptionally difficult administrative and financial questions which it is not within the scope of this report to discuss in detail.

IRELAND.

Powers of Local Authorities.

40. With regard to the legal powers of local authorities to provide sanatoria, hospitals, and dispensaries, the following provisions are in force in Ireland:—

Section 155 of the Public Health (Ireland) Act, 1878, and section 4 of the Tuberculosis Prevention (Ireland) Act, 1908. Section 155 of the Act of 1878 is as follows:—"Any sanitary authority may, with the sanction of the Local Government Board, provide for the use of the inhabitants of its district hospitals or temporary places for the reception of the sick or convalescent, and for that purpose may itself build such hospitals or places of reception, or contract for the use of any existing hospital, or part of a hospital, or place for the reception of the sick or convalescent, or may enter into an agreement with any person or body of persons, having the management of any hospital for the reception of the sick or convalescent inhabitants of the district, on payment of such annual or other sum as may be agreed upon."

Part I. of the Tuberculosis (Ireland) Act provides, where adopted, for the notification of certain forms of tuberculosis. Part II., section 4, of the same Act enacts that:— (1) A county council may, if they think fit, provide hospitals and dispensaries for the treatment of inhabitants of their county suffering from tuberculosis, and for that purpose may—(a) themselves establish and maintain such hospitals and dispensaries, or (b) enter into an agreement with any person having the management of any hospital or dispensary for the reception, maintenance, and treatment in the hospital, or for treatment in the dispensary, as the case may be, of any such inhabitants of their county, as aforesaid. (2) Two or more county councils may combine in providing a common hospital or dispensary for the purpose of this section.

Present Position.

With the exception of the beds provided by boards of guardians, very little provision has been made by local sanitary authorities for the treatment of tuberculosis, and no dispensaries or sanatoria have been provided by county councils under the Tuberculosis Act, 1908. A certain number of beds have been provided, and one dispensary through the enterprise of the Women's National Health Association, and a few hospitals for the treatment of early cases have also been provided by voluntary effort. Altogether the provision available in institutions outside the poor law for the treatment of cases of tuberculosis is extremely small, having regard to the large death-rate from the disease. The Committee desire to express their appreciation of the work done in Ireland by the Women's National Health Association. They are of opinion that every effort should be made to assist and develop the work of the Association.

Ireland as compared with Great Britain.

The conditions in Ireland are very different from those in England. For instance, the Irish population is largely rural, whilst the English is largely urban. The number of deaths from tuberculosis per 1,000 of the Irish population is much higher than in the rest of the United Kingdom. The law, in many respects, is different. In Ireland the county councils have no public health functions, and there are no county medical officers of health; the notification of tuberculosis is not universally adopted. The schools are not rate-aided, and there is no system of medical inspection or treatment of school children.

The infectious disease hospitals are, for the most part, in the hands of the poor law boards.

Recommendations for Ireland.

It is clear that some of the recommendations which the Committee have made in the other section of the report would either not be applicable to Ireland, or might require to be considerably modified. In view, therefore, of the more complex conditions existing in Ireland, the Committee desires merely to express the opinion that the same general principles as regards treatment and the class of institution to be established which are indicated in this report are applicable to Ireland, and that the authorities administering the grants should, in the main, be guided by those general principles.

The areas of administration should, as far as practicable, be those of borough and county councils or combination of counties.

The Committee consider that it is necessary, in order to deal effectively with tuberculosis in Ireland, to provide without delay for:—

- (a) The compulsory notification of pulmonary tuberculosis in all districts in Ireland.
- (b) Entrusting county councils with administrative functions for dealing with public health and for the appointment of county medical officers of health.
- (c) The medical inspection and treatment of school children, which should be provided by means of a Government grant.

The Committee consider that a fixed proportion of the grant of 145,000*l.* to Ireland should be earmarked for providing for the institutional treatment of tuberculous children. The higher incidence of tuberculosis in Ireland amongst children of the school age renders it imperative that adequate provision should be made for dealing with this aspect of the question, for if this matter is not adequately dealt with, it may result in throwing upon the insured ages a large number of medically unfit persons, and thus upset the actuarial calculations upon which the finance of the National Insurance Act is founded.

The Committee are also of opinion that, so far as it may be found practicable, aid from the grant may be afforded to those voluntary institutions which are found to be doing good work in the treatment and prevention of tuberculosis, and which are willing to provide further accommodation for the treatment of tuberculous patients.

FINANCE FOR THE UNITED KINGDOM.

41. In dealing with the question of finance in relation to the provision of new and additional accommodation, the Committee desire to state that any figures which are given in this Report must be taken to be extremely tentative and provisional.

The extent to which new and additional accommodation will be required depends upon a number of factors which it has not been possible for the Committee to ascertain with any degree of accuracy. Among these factors are (1) the extent to which existing accommodation is, or may become, available to meet future requirements; (2) the probable number of patients in the different stages of the disease; (3) the degree to which these patients will respond to treatment; (4) the extent to which insurance committees and other bodies may decide or be advised to give institutional as distinguished from other forms of treatment. It has not as yet been found possible to ascertain the first of these factors, nor do the Committee feel in a position to make a reliable forecast as to the remaining three.

The Committee, however, anticipate that, before distributing the capital sum made available by the Finance Act, 1911, and before approving schemes in local areas, the Local Government Board will take such steps as may be necessary to collect information as to existing accommodation.

Tuberculosis Dispensaries.

Subject to the considerations set forth in section 21 of this report, some 225 to 300 (dispensaries or their equivalent staff) will probably be required for the United Kingdom. Allowance must, however, be made for sparsely populated areas for which other and special arrangements may be needed.

As stated earlier, an existing building should, as a general rule, be adapted for a dispensary, and the Committee think that from 250*l.* to 350*l.* should suffice to cover the capital expenditure for the alteration and equipment necessary.

Sanatoria for Adults.

On the basis of the provision of one bed for every 5,000 inhabitants, some 9,000 beds will be necessary at the outset for the United Kingdom, including such existing sanatorium beds as may be suitable and available.

The cost of the additional accommodation necessary may probably be estimated at 150*l.* per bed, on an average, including the cost of the land and of the administrative section.

Hospital Beds.

The Committee cannot at present suggest any figures under this head beyond making a rough estimate that, in addition to Poor Law beds, some 9,000 beds would seem to be required for the purposes of observation, treatment, education and isolation.

How many of these 9,000 beds will require to be provided depends upon the number of available beds already in existence which are not now being utilised for the treatment of tuberculosis.

Beds for Non-pulmonary forms of Tuberculosis.

The Committee propose to deal with non-pulmonary tuberculosis in the Final Report.

Children.

The Committee, realizing the importance of undertaking the systematic treatment of children, propose to recommend in the Final Report that a definite sum should be allocated for the provision of the necessary institutions.

FINANCIAL RECOMMENDATIONS.

Capital.

1. That, with a view to encouraging the early provision and equipment of tuberculosis dispensaries, capital grants should be made up to four-fifths of the amount required, provided that this sum should, generally, not exceed 1*l.* per 750 population, or an average of 240*l.* per dispensary.

2. That, for the provision of the additional sanatorium beds for adults required at the outset, capital grants should be made up to three-fifths of the cost per bed, provided that the total sum does not exceed an average of 90*l.* per bed.

3. That grants should be made for beds other than sanatorium beds. Owing to the lack of information at present at their disposal, the Committee cannot in this Report suggest what amount of capital outlay for these beds should be provided out of the Parliamentary grant. They can only recommend that in the making of these grants the same general principles should be observed as in the case of sanatorium beds.

Maintenance.

(1) That Insurance Committees when they are formed should make agreements with the governing bodies of sanatoria, hospitals, etc., for the maintenance of a fixed number of beds for a term of years.

(2) That the payment of Insurance Committees to the governing body of the dispensary, in consideration of the treatment of patients for whom the Committees are responsible, should take the form of a lump sum paid annually under an agreement for a term of years. In cases in which, under such agreement, the medical staff at the dispensary act as advisers of the Insurance Committee in questions of diagnosis and recommendation for treatment, an additional annual payment should be made in consideration of such services.

(3) That the payment to general practitioners treating persons under the scheme in consultation with the chief tuberculosis officers of the dispensaries should be on a scale agreed upon between the parties concerned, and that in respect of insured persons this payment should be in addition to the sums paid for medical benefit.

SUMMARY OF PRINCIPAL RECOMMENDATIONS.

42.—(1) That schemes dealing with the whole population should be drawn up by councils of counties and county boroughs* or by combinations of these bodies at the earliest possible date on the lines recommended in this report, with due regard to the incidence of the disease and the special conditions and circumstances of the area.†

(2) That the early establishment in working order of an adequate number of tuberculosis dispensaries is essential.

(3) That, so far as possible, grants in aid of tuberculosis dispensaries should only be given where such institutions will eventually form constituent parts of complete schemes.

(4) That, in framing complete schemes, regard should be had to all the existing available authorities, organisations, and institutions with a view to avoiding waste by overlapping and to obtaining their co-operation and inclusion within the schemes proposed.

(5) That special regard should be given to securing the co-operation of medical practitioners in the working of the schemes, particularly in relation to the early detection of the disease and its domiciliary and dispensary treatment.

(6) That special attention should be paid to securing suitably qualified and experienced medical practitioners for the senior appointments in connection with institutions established, as the ultimate result obtained by the treatment recommended must depend to a great extent upon their medical and administrative qualifications.

* In Scotland by the councils of counties and, in burghs with a population of 20,000 and upwards at the census of 1911, by the town councils.

† In its application to Wales this recommendation should be read subject to the modifications which may be rendered necessary owing to the existence of the Welsh National Memorial Association.

(7) That, in erecting or adapting institutions local authorities and other bodies should avoid pretentious and extravagant buildings, and should aim rather at providing institutions of a simple and inexpensive character. It would seem desirable that provisions similar to those of section 3 of the Education Act, 1911, should be made applicable, and that due regard should be had to any Town Planning schemes.

(8) That inasmuch as the opportunities which are now afforded in general hospitals to students of medicine for the observation of the course and treatment of tuberculosis are insufficient to secure provision of an adequate number of expert medical officers, advantage should be taken of the extended opportunities which will be afforded under the proposed scheme to obtain additional instruction.

(Signed) WALDORF ASTOR (Chairman).
CHRISTOPHER ADDISON.
N. D. BARDSWELL.
DAVID DAVIES.
A. MEARNS FRASER.
ARTHUR HENDERSON.
ARTHUR LATHAM.
W. LESLIE MACKENZIE.
JOHN C. McVAIL.
W. J. MAGUIRE.
GEORGE NEWMAN.
ARTHUR NEWSHOLME.
JAMES NIVEN.
MARCUS PATERSON.
R. W. PHILIP.
H. MEREDITH RICHARDS.
T. J. STAFFORD.
JANE WALKER.
J. SMITH WHITAKER.
F. J. WILLIS.

DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

FINAL REPORT

OF THE

DEPARTMENTAL COMMITTEE

ON

TUBERCULOSIS.

VOLUME I.

REPORT.

Presented to Parliament by Command of His Majesty.



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[NOTE.—The memoranda received by the Committee are published in the Appendix to this Report under separate cover.]

DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

TERMS OF REFERENCE.

To report at an early date 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.

CONSTITUTION OF THE COMMITTEE.

By Minute of 22nd February 1912 the following members were appointed :—

WALDORF ASTOR, Esq., M.P. (Chairman.)
CHRISTOPHER ADDISON, Esq., M.P., M.D.
N. D. BARDSWELL, Esq., M.D.
DAVID DAVIES, Esq., M.P.
A. MEARNS FRASER, Esq., M.D.
ARTHUR LATHAM, Esq., M.D.
W. LESLIE MACKENZIE, Esq., LL.D., M.D.
JOHN C. McVAIL, Esq., LL.D., M.D.
W. J. MAGUIRE, Esq., M.D.
SIR GEORGE NEWMAN, M.D.
ARTHUR NEWSHOLME, Esq., C.B., M.D.
JAMES NIVEN, Esq., LL.D., M.B.
MARCUS PATERSON, Esq., M.D.
SIR R. W. PHILIP, M.D.
H. MEREDITH RICHARDS, Esq., M.D.
T. J. STAFFORD, Esq., C.B., F.R.C.S.I.
Miss JANE WALKER, M.D.
J. SMITH WHITAKER, Esq.
F. J. WILLIS, Esq. (Secretary).

On 18th March ARTHUR HENDERSON, Esq., M.P., and F. J. WILLIS, Esq., were appointed members of the Committee, and O. B. CLARKE, Esq., was appointed Secretary.

On 12th June Sir STEWART STOCKMAN, M.R.C.V.S., was appointed a member of the Committee, and on 4th November, ALBERT SMITH, Esq., M.P., was appointed in place of ARTHUR HENDERSON, Esq., M.P., who resigned on that date.

DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

TO THE LORDS COMMISSIONERS OF HIS MAJESTY'S TREASURY.

INTRODUCTION.

1. The Committee appointed by your Minute of the 22nd February 1912, "to report at an early date 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," beg to submit the following Final Report.

2. Before passing to the matters more particularly dealt with in this Report, the Committee desire to refer briefly to their Interim Report presented in April 1912. The circumstances which led to the presentation of an Interim Report were such that it was necessary for the Committee to devote themselves mainly to those parts of a comprehensive scheme for dealing with tuberculosis which it was desirable to establish at an early date in view of the fact that the National Insurance Act, 1911, was due to come into operation on 15th July, 1912, and that sanatorium benefit was due to be given then.

Accordingly the Interim Report was mainly concerned with the machinery for the treatment of the disease. The machinery recommended consisted of two units, viz. :—the dispensary unit, consisting of dispensaries with their staff of specialists, &c., and the institutional unit, consisting of sanatoria, hospitals, &c., which should provide institutional treatment.

The nature of the treatment to be provided by these two units was discussed at some length, and a classification of patients on broad lines was made, and some suggestions were given as to the cases in which institutional or domiciliary treatment might be adopted.

3. The dispensary unit was designed to be the local centre of expert diagnosis and treatment, acting in co-operation with the private practitioners of the district. It was also intended to serve as a clearing-house through which all persons suffering from tuberculosis should be passed, and to have important functions as a centre for the examination of "contacts," the "after-care" of patients discharged from institutions, and for the dissemination of information with regard to tuberculosis.

The Committee were of opinion that, roughly speaking, one dispensary unit would be required for every 150,000 to 200,000 of the population in urban neighbourhoods, but that in rural neighbourhoods only a smaller number of persons could usually be served. They recommended that capital grants should be made up to four-fifths of the amount required for the provision and equipment of dispensaries, provided that this sum should, generally, not exceed *£* 750 per 750 population, or an average of 240*£*. per dispensary.

4. The institutional unit was divided roughly into three main heads: sanatoria, hospital accommodation, and institutions for the treatment of non-pulmonary tuberculosis.

The Committee considered that most probably one sanatorium bed per 5,000 population would be required for the United Kingdom and that, in the interests of economy, an individual sanatorium should contain not less than 100 beds. They recommended that capital grants up to three-fifths of the cost per bed (which was estimated at not exceeding 150*£*.) should be made for the provision of additional sanatorium and hospital beds for adults provided that the total sum should not exceed 90*£*. per bed.

The character and construction of sanatoria were briefly noticed and, in this connection, the Committee now desire to refer for further details to the memorandum on sanatoria (Appendix, p. 3) prepared by a sub-committee of members of the Committee, and to other special memoranda dealing with the cost of construction, maintenance, &c., printed in the Appendix.

In this connection the Committee desire to place on record their opinion that a properly conducted institution is not a source of danger to the neighbourhood.

5. Special attention was paid to the duties and qualifications of the heads of dispensaries and sanatoria. The Committee were of opinion that, for the efficient working of the dispensary, the one essential was a skilled tuberculosis officer with high medical qualifications and with capacity for organisation. This officer should be independent of control by any other medical man so far as his clinical duties are concerned, and should work in close touch with the Medical Officer of Health, the general practitioners, and hospitals of the locality, and the medical officer of the several institutions which constitute elements in the co-ordinated scheme. They also laid special stress on the necessity of obtaining the services of suitably qualified and experienced medical practitioners for the senior appointments in connection with dispensaries and sanatoria, and suggested certain minimum requirements which should guide local authorities in making these appointments.

6. The Committee recommended that comprehensive schemes for the provision of these units should be made locally, as a general rule, by the county councils and county borough councils acting in co-operation with the local sanitary authorities in country areas, with the Insurance Committees, and with the other bodies and persons concerned with the prevention and treatment of tuberculosis. The Committee emphasized the desirability, in certain cases, of combination between local authorities in order that schemes should be made on the most economical and efficient basis. With a view to the promotion of co-operation they recommended the formation of a consultative committee by the County Council or County Borough Council, which should include members nominated by the Insurance Committee and voluntary organisations.

They further recommended that Insurance Committees should agree to contribute annual sums for a term of years to the governing bodies of dispensaries, sanatoria, hospitals, &c., in consideration of treatment to be given at those institutions to patients for whom the Insurance Committees are responsible.

7. The Committee learn with pleasure that the Local Government Boards and the Insurance Commissioners for the different parts of the United Kingdom approved of the recommendations contained in the Interim Report and, in their circulars and memoranda,^o drew the attention of the local authorities and Insurance Committees to the Report, and emphasized the desirability of proceeding on the lines indicated by this Committee.

The Committee also learn with pleasure that a number of complete schemes on the lines suggested have been prepared and that effect has been and is being given to their recommendations. They desire to say that further consideration has not led them to wish to make any modifications in those recommendations which were purposely drawn with sufficient elasticity to admit of the adaptation of their principles to the requirements of different areas. The Committee wish, however, again to emphasize the need for co-ordinated work and for co-operation among the authorities, bodies, and persons concerned.

THE PRESENT POSITION.

8. Since the Interim Report was presented two important changes affecting the funds available for the campaign against tuberculosis have been made.

The first of these changes is the statement made by the Chancellor of the Exchequer, and contained in a letter of the 31st July, from him to Mr. Henry Hobhouse, Chairman of the County Councils Association, to the effect that the Government had decided to place at the disposal of the Local Government Boards (in the case of Wales at the disposal of the Welsh Insurance Commissioners) of the three kingdoms annually, a sum of money which would represent, approximately, half the estimated cost of treating non-insured persons, as well as the dependants of insured persons. This money is to be distributed by the Local Government Boards, in pursuance of regulations made by those departments, to local authorities which undertake schemes to be approved by the Departments, for the general treatment of tuberculosis in their areas.

The Committee have always been strongly of opinion that no campaign against tuberculosis could be instituted with reasonable prospects of success if provision were

^o Local Government Board Circulars, 14 May, 6 July and 6 December 1912; Local Government Board for Scotland Circular, 29 May 1912; Insurance Commission (England) Memorandum No. 112/I.C., 6 July 1912; Insurance Commission (Scotland) Memorandum No. 78, July 1912; Local Government Board for Ireland Circulars, 20 May, 24 July 1912 and 17 January 1913; Insurance Commission (Ireland) Memorandum No. 112/I.C., July 1912, and explanatory pamphlet (undated); Insurance Commission (Wales) Memorandum No. 1, 22 May 1912 and No. 2, 29 June 1912.

made for the treatment of a section only of the population. Recognizing that this was the case, they laid down in their Interim Report that one of the most important conditions of any scheme which might be adopted was that it should apply to the whole community. By the National Insurance Act no financial provision was made to pay for the treatment and maintenance of persons who were not in the category of insured persons or their dependants. A gap was thus left which would certainly have much increased the difficulty of conducting the campaign to a successful issue. In the then existing circumstances, and assuming the adoption of a local basis for schemes, the whole burden of providing treatment for tuberculous persons not dealt with by the National Insurance Act would have fallen upon the rates. The provision of treatment for insured persons and their dependants and the adoption of the local system recommended by the Committee will, in any case, necessitate the expenditure of considerable sums of money by local authorities, and the Committee apprehended that these authorities might be reluctant to face the further expenditure which provision of treatment for other persons would entail, and might be inclined to omit such provision from their schemes.

The Committee, realising the burden which, in the past, has directly or indirectly been thrown on the rates, desire, therefore, respectfully to express their warm approval of the step which the Government contemplate taking, which will materially relieve ratepayers and greatly assist in putting the campaign against tuberculosis on a national basis while preserving the desirable feature of local administration. The Committee venture to express the hope that local authorities will now feel free to proceed with the adoption of schemes which will make provision for dealing with all the tuberculous persons resident in their areas.

9. The second of these changes relates to the finance of sanatorium benefit under the National Insurance Act. The Chancellor of the Exchequer has announced that 6*d.* per insured person out of the 1*s.* 3*d.* provided by Section 16 of that Act for sanatorium benefit will be applied to the remuneration of general practitioners who will be concerned with the domiciliary treatment and supervision of insured persons suffering from tuberculosis.

In their Interim Report the Committee laid stress on the importance of enlisting the hearty co-operation and of stimulating the interest of the general medical practitioners of the country in the schemes for dealing with tuberculosis, and suggested that they should receive some remuneration out of the funds available for sanatorium benefit. The Committee are of opinion that they have in no way over-estimated the importance of securing the support of the general practitioner, and they welcome any financial arrangement which facilitates the attainment of that object. At the same time they regard with some anxiety the smallness of the funds available under the National Insurance Act for the maintenance of dispensaries and institutions. They hope that the funds available will prove sufficient to enable the work of the dispensaries and institutions to be carried out in a thorough and efficacious manner.

PRINCIPAL OBJECTS OF THE PRESENT REPORT.

10. Having regard to the nature of their Interim Report the Committee are of opinion that they cannot usefully add much to their recommendations with reference to the treatment of persons suffering from tuberculosis.

In the circumstances, the Committee propose to deal in this Report mainly with the measures which should, in their opinion, be taken for the prevention of tuberculosis in general with special reference to the questions relating to bovine tuberculosis and tuberculosis in children, and to a scheme for dealing with the annual sum of money available in the hands of the Insurance Commissioners under section 16 (2) of the National Insurance Act for the purposes of research.

At the same time the Committee do not wish to be understood to mean that the question of treatment can be wholly divorced from that of prevention. It is desirable to state at once that, in their opinion, the two questions are very closely interrelated. Effective treatment leads to prevention and effective prevention leads to diminished need for treatment.

PREVENTION.

11. Methods of prevention may be divided into two classes :—

- (1) Those whose object is to prevent the entrance of tubercle bacilli into the human system.
- (2) Those whose object is to prevent persons into whose system tubercle bacilli have entered from developing active disease.

These two classes of measures are not mutually exclusive, and it is highly undesirable that one class should be adopted to the exclusion of the other. The Committee are of opinion that it is idle to hope either that infection can be entirely eliminated, or that, apart from the discovery of some special process of immunization, the resistant powers of human beings can be developed to such an extent that infection may be ignored. But there is good reason to believe that much may be done to reduce the incidence of tuberculosis on the lines of diminishing the existing amount of infective material, and of increasing the powers of resistance in those who are exposed to infection. These two methods of preventing the disease should, therefore, be employed simultaneously.

Methods of diminishing Infection.

12. Under this heading may be grouped all the measures which tend to diminish the sources of supply of infective material and those which prevent its dissemination. Broadly speaking, the most important of these measures are the elimination of tubercle bacilli from food, and the prevention of the spread of infection by persons already suffering from the disease.

Food.

13. The Committee deem it of great importance that every effort should be made to secure that the food of the country should be free from tubercle bacilli.

The principal classes of food in which those bacilli are at present found are meat, milk and milk products.

With regard to the sale of tuberculous meat, the existing powers of local authorities, to which reference was made in the Interim Report, are probably adequate for the protection of the community against the dangers of infection from this source, and, provided those powers are effectively put into force, no further legislation may be necessary in that direction. With regard to the supply of milk and milk products, the Committee consider the question of such importance that they have devoted a part of this Report exclusively to its discussion.

Infection by Tuberculous Persons.

14. The prevention of the spread of tubercle bacilli by persons already suffering from the disease is a question which is most intimately related to the treatment of those persons. One of the principal sources of danger at the present time is the existence of a number of persons in the more acute and advanced stage of the disease living in the intimate contact with their families and neighbours which is necessitated by the ordinary conditions of their lives. The danger is frequently increased by the carelessness of the persons affected and of those living in contact with them. The Committee are of opinion that by means of treatment and education the risk of infection by such persons can be very largely diminished. But they do not think that treatment and education will be sufficient to eliminate all dangers from this source, as they recognize that some of these persons are apt to neglect, or are unable to carry out the necessary hygienic precautions. It is true that most tuberculous patients who have been taught to live as much as possible in fresh air, to dispose in a proper manner of their sputum, and generally to observe the necessary hygienic precautions, are in a position to minimize or even to eliminate the risk to which their continued presence among uninfected persons may give rise. But there may be a danger in leaving such a person in his existing surroundings, particularly where, as is often the case, the person is living in crowded conditions which necessitate very intimate contact with the members of his family and others. Infection is frequently disseminated by persons suffering from advanced pulmonary tuberculosis who are in the habit of entering and leaving Poor Law Institutions, having regard merely to their own convenience, and not to the interests of their family or of the community in which they live.

15. The Committee desire, therefore, to recommend, as an effective means of preventing the spread of the disease, the compulsory isolation of certain cases which are in a state of high infectivity, particularly in those instances where the patients' surroundings are such as to increase the risk of other persons becoming infected. At the same time they desire to recommend that isolation should be carried out with all possible regard to the feelings of the patients and of their families and friends, and that any powers of compulsory isolation and detention possessed by or hereafter to be conferred upon local authorities should be exercised with discrimination and only after those authorities are satisfied on thorough inquiry that the public interest requires them to be enforced in the particular instances under consideration. So far as may be practicable patients should not be removed to places difficult of access from their homes, and arrangements should be made to facilitate visits from their families and friends.

While recommending isolation in certain cases, the Committee do not wish it to be inferred that they desire in any way to minimise the importance of education and supervision as a means of preventing the spread of tuberculosis. There are many cases where isolation is quite unnecessary and all that is needed is that the patient should observe certain comparatively simple precautions. But it is of the greatest importance that the patient should be properly taught what those precautions are, and, further, that some steps should be taken to ensure that those precautions, after being learned, are not forgotten or neglected. It is in this connection that much valuable work may be done by voluntary care committees and visits from trained nurses or properly qualified health visitors working in close touch with the Medical Officer of Health and the tuberculosis officer, and by lectures and the dissemination of literature on the subject.

16. The Committee think it most desirable to secure the systematic and thorough disinfection of premises which, there is reason to believe, harbour tubercle bacilli. They are aware that many local authorities are fully alive to their responsibilities in this connection, but they think it well to emphasize the importance of this work as a factor which will lead to the diminution of risk of infection. Steps should be taken to secure that all houses, in which it is known that persons suffering from tuberculosis live, should be thoroughly disinfected at frequent and regular intervals. It is only by these means that the danger arising from desiccated tuberculous expectoration can be reduced to a minimum.

17. In connection with the prevention of the spread of the disease by means of infection from one human being to another, the Committee wish to lay stress on the importance of early diagnosis of the disease. Quite apart from the fact that early diagnosis greatly increases the chance of ultimate recovery, there is no doubt that the detection of the disease in its early stages is an important factor in decreasing the danger of infection. In the early stages of the disease the infectivity of the patient is very much less than in the later stages. Patients whose disease has been diagnosed early can, in many instances, be prevented from becoming a serious source of danger to their neighbours.

The Committee are of opinion that the establishment of the dispensary system recommended in their Interim Report will do much to facilitate the early recognition of the disease. No effort should be spared, whether by way of research with a view to discovering new methods of diagnosis, or by the encouragement of the systematic and intelligent use of existing methods, especially in connection with the observation and examination of contacts, to ensure that the existence of the disease should be recognised in its earliest stages.

Methods of increasing Powers of Resistance.

18. Under this heading may be placed all measures which tend to raise the standard of living and environment of the community and thus to render the defensive forces of the body as strong as possible. *Ceteris paribus*, a healthy, sober, well-fed, well-clothed, and well-housed community is far less liable to infection from tuberculosis than one in which disease and drinking habits are prevalent, whose members are inadequately fed and clothed, and in which houses are crowded and insanitary. It may broadly be said that an advance in material prosperity of the community as a whole will be reflected in a decreased incidence of tuberculosis.

It must not, however, be supposed that an improvement of material conditions would immediately result in the elimination of tuberculosis. Though the prevalence of tuberculosis is at the present time less among the well-to-do classes than among the poorer classes, the well-to-do classes are very far from being immune. Many other factors exist which have the effect of weakening the defensive forces of the body and of rendering it an easier prey to the invading bacilli. The Committee have already said in their Interim Report that constitution, habits and methods of life, the nature of an individual's occupation, and the diseases and accidents to which he may have been subjected are all factors which cannot be neglected in considering the incidence of tuberculosis, and these factors need not necessarily be in any way connected with the poverty or wealth of the individual.

At the same time it remains true that any measures which result in a general improvement in the standard and condition of life are of the greatest importance in the prevention of tuberculosis.

How to effect this improvement is a question of difficulty and complexity that is exercising the minds of many people at the present time. To attempt to deal with it would be to step beyond this Committee's functions. They propose merely to touch briefly on one or two salient points which are intimately connected with the incidence of tuberculosis.

Housing.

19. The Committee believe that much may be done to assist in preventing tuberculosis by improvement of the housing conditions in this country. There is no doubt that dirty, ill-ventilated, dark, damp, and otherwise insanitary houses are provocative of the disease. There is equally no doubt that the incidence of the disease is greater where families are crowded into one or two dirty and ill-ventilated rooms, than where better conditions are obtainable, or where the rooms are kept clean and ventilated. The air of an overcrowded room rapidly becomes and usually remains foul, lowering the vitality of the occupants. Light, fresh air (or at least movement of air), and space are the conditions which it is most desirable to obtain. The Committee are aware that light and fresh air are more difficult to obtain in cities, and that, even where fresh air is obtainable, the poorer classes are often driven to keeping their rooms stuffy and ill-ventilated, owing to the expense of providing sufficient clothing and artificial heat to maintain adequate warmth. The Committee fully realise the difficulties surrounding the housing question, but they consider improvement in the present state of affairs both desirable and possible, and that, even amongst the poorest, an increased appreciation of the importance of cleanliness and ventilation, &c., would tend to decrease the ravages of the disease.

The Committee hope that much improvement may be effected by means of schemes for town planning and garden cities.

The Committee also note with satisfaction that a Royal Commission on Housing in Scotland has been appointed, and they have no doubt that the Commission will keep constantly in view the intimate relation between housing and disease.

Social and Economic Causes of Tuberculosis.

20. There is great need for research work in connection with the social and economic causes of tuberculosis. The present knowledge on the subject, though increasing rapidly, is inadequate, and it is highly desirable that more information should be obtained, and that the information, when obtained, should be sifted and co-ordinated so as to serve as a reliable basis for the preparation of remedial measures. Inquiries should be made into the causes which operate so as to give rise to the existing occupational incidence of tuberculosis, and into local and other factors which have a bearing on the problem of the distribution of the disease. In another part of this Report the Committee have indicated the lines upon which a scheme for research work might be instituted, and provision is made to facilitate the making of such inquiries.

BOVINE TUBERCULOSIS.

21. The Committee, having regard to the findings and reports of the Royal Commission on Tuberculosis and to other investigations, are of opinion that the

bacillus of bovine tuberculosis is a cause of tuberculosis in man, and, to a greater extent, in children. In a few cases the source of infection has apparently been traced to a particular milk supply.

It is also clear that the farming and dairy industries suffer, and will continue to suffer, heavy annual financial loss so long as tuberculosis continues to prevail among bovines and pigs.

They consider it, therefore, very important that steps should be taken with a view to the ultimate eradication of tuberculosis from animals and to rendering milk and milk products as far as possible free from tubercle bacilli.

The Committee are of opinion that the best way to attain complete security from the danger of bovine infection is entirely to eradicate tuberculosis from the cattle of this country, and to take such measures as will secure, so far as possible, the absolute innocuity of imported milk and milk products. They do not propose to discuss the details of prospective legislative measures or orders which may be necessary in order to attain this object, but merely to state a few conclusions and recommendations to which they are agreed and which have a bearing on the problem.

The Committee are of opinion that the ultimate eradication of animal tuberculosis is not impossible of achievement, but is likely to be a slow process, and must depend upon co-ordinated and continuous effort. No single or purely local effort will suffice to eliminate such tuberculosis.

During the time that must elapse before bovine tuberculosis can be eliminated, special attention should be paid to the milk supply of the country with a view to rendering it as safe as possible and a great deal can be done towards securing this object.

Milk.

22. Milk can become infected with tubercle bacilli in various ways. The most usual case is where the milk is the product of a tuberculous cow, particularly when the cow is suffering from generalised tuberculosis or udder disease. Milk which is non-tuberculous in its origin may also become infected on the farm, during transit and distribution, in the shop where it is sold, and in the house of a consumptive person. The Committee recommend that additional measures should be taken and existing and proposed regulations strictly enforced so as to diminish the risk of such contamination from human and bovine sources.

23. The Committee welcome the proposed legislation dealing with the question of milk supply, but they do not desire to discuss in detail or to criticise any proposals that have been made. They wish, however, to propound certain broad general principles, which they have arrived at independently, and which they consider should form the basis of any scheme for dealing with milk.

They are of opinion that such legislation should be upon the widest possible basis, should include the whole country, and should include provisions whereby special powers might be conferred by regulation upon local authorities where such special powers are required. The central authority should have adequate powers and should be required to enforce the carrying out of such legislation in the event of default by local authorities.

24. The Committee are of opinion that tuberculous milk can be rendered innocuous, so far as infection from tuberculosis is concerned, by sterilization or pasteurization carried out under proper supervision and conditions. There is, however, difference of opinion in the medical profession as to whether milk that has been so treated is wholly satisfactory upon other grounds. The Committee have had neither the time nor the means to go into this question with a view to giving a considered opinion.

Tuberculous Cattle.

25. The Committee desire to state that they have come to the following conclusions with regard to tuberculous cattle :—

- (1) That the presence of tuberculosis in a herd exposes the non-tuberculous cows to infection.
- (2) That there are satisfactory tests available for the detection of tuberculosis in cattle.

- (3) That a sound herd living in hygienic surroundings should remain sound, provided that it is periodically tested, and reacting animals are weeded out, provided also that, after any such removals, the premises are thoroughly disinfected, and that no tuberculosis animals are added to the herd.
- (4) That the slaughter of cows with tuberculosis of the udder or in the advanced stages of the disease will diminish the risk of infection to human beings by milk.

26. The Committee do not propose to enter into the question of how public money (whatever its source or amount) could be most usefully spent for the purpose of eradicating tuberculosis from animals. They are, however, of opinion that, in the preparation of any scheme for the eradication of bovine tuberculosis, the following points require careful consideration and should, so far as possible, be provided for:—

- (1) County Councils and County Borough Councils should have powers and be required to inspect herds, dairies, and farm buildings and to administer all enactments relating thereto, their work being subject to adequate supervision by a central authority. As regards the local inspecting authorities, this recommendation may require some modification in Scotland where local government is somewhat differently organised.
- (2) Only guaranteed tuberculin should be used, and facilities should be given, subject to such conditions as may be thought desirable, for the free testing of cows by qualified and authorised persons.
- (3) Certain cows should be slaughtered, both in the interest of the public and of the dairy industry.
- (4) Measures should be uniform in character and the same principles should be applied to the whole country.
- (5) The public should be educated so as to appreciate the greater value of pure tubercle-free milk and milk products.
- (6) Farmers should be taught that tuberculosis in cattle is infectious and not hereditary.

27. There are problems connected with the relation between tuberculosis in cattle and tuberculosis in human beings which are still unsolved. The Committee understand that some of these are being investigated at the present moment. They believe it to be of the greatest importance, with a view to dealing with tuberculosis in human beings that further research into these and other similar problems should continue to be carried out.

CHILDREN.

28. Tuberculosis, in one form or another, is widely prevalent among children, and the Committee consider the evidence convincing that children are infected through tuberculous milk, as well as from other sources.

They recognise the importance of early diagnosis of tuberculosis in children before pronounced symptoms have developed, and are anxious that measures for securing the early detection of the disease in children should be adopted.

29. The Committee are of opinion that additional provision is required for the treatment of children suffering from the disease, including cases of pulmonary tuberculosis, tuberculosis in the bones and joints, and glandular and other forms of tuberculosis.

In addition to the provision of treatment at sanatoria and hospitals for tuberculous children mentioned in the Interim Report, there is urgent need for a wide application of the principle of open-air treatment and education by means of open-air schools (day and residential), open-air classes, &c. Such institutions should deal not only with tuberculous children, but also with the large number of children who are suffering from ailments which, if neglected, would be likely to increase their susceptibility to tuberculosis. It is also desirable that these institutions should be utilised, as far as possible, to teach the advisability of the adoption of a practically open-air life in the homes of the children.

Local Education Authorities.

30. It is obvious that local education authorities or school boards have the opportunity of playing an important and, indeed, an essential part in the detection,

prevention, and treatment of tuberculosis. In order to link up the local education authorities and school boards with the general scheme for the prevention and treatment of tuberculosis, it is desirable that the School Medical Officer should be closely in touch with the family medical attendant and with the tuberculosis dispensary, and that the dispensary or tuberculosis officer should provide, as far as possible, the same services for children as for adults.

Correlation.

31. There should not only be a correlation between the dispensary and the various institutions for children, but the institutions for children, such as the school clinic, the open-air school, and the sanatorium, should be correlated one with another in order to ensure the easy transference of children from one institution to another.

All appropriate cases should be referred to the tuberculosis dispensary as a clearing house for the confirmation of diagnosis in doubtful cases, for the purpose of clinical record and for treatment where required. Children of school age fit, or likely to become fit, to receive education, even in modified form, should be referred to the school medical officer for education in open-air schools, sanatorium schools, or other special schools, or in ordinary public elementary schools under special care and supervision. The arrangements should be such as to secure the co-operation of the general practitioner.

Nature of Institutions.

32. Separate institutions, or at least separate pavilions or departments for children, should be provided.

Cases of non-pulmonary tuberculosis should generally be treated in separate institutions or departments or under special administration, because of the different equipment and treatment required for these cases.

Finance.

33. The Committee consider that a sum of about 200,000*l.* is required for the provision of institutions for children, and recommend that, if the 1,500,000*l.* made available by the Finance Act 1911 is insufficient to provide this sum, additional funds should be provided by Parliament.

NON-PULMONARY TUBERCULOSIS.

34. The Committee observe that, the Local Government Board, acting under the powers conferred upon them by the Public Health Act, 1875, the Public Health (London) Act, 1891, and the Public Health Act, 1896, have issued regulations making it compulsory to notify cases of tuberculosis of all kinds, and repealing the regulations of 1911 under which only pulmonary tuberculosis was notifiable. They understand that the issue of similar regulations is now under consideration by the Local Government Board for Scotland.

It had been the intention of the Committee to recommend the compulsory notification of all cases which had been diagnosed by clinical methods, and they are glad to find that they have been anticipated by the action of the Local Government Board and that it is no longer necessary to make this recommendation.

The regulations provide for the notification by every medical practitioner within 48 hours after first becoming aware that a person on whom he is attending is suffering from tuberculosis, and for weekly notification by School Medical Inspectors and by medical officers of poor-law institutions and sanatoria. A medical practitioner is deemed to have become aware that a person is suffering from tuberculosis when he has arrived at this conclusion from evidence other than that derived solely from tuberculin tests applied to that person.

The powers and duties of sanitary authorities and their officers on receipt of notification are expressed in the same terms as those contained in the regulations of 1911. These latter regulations were referred to and the powers and duties in question were set out in the Interim Report.

The Committee are of opinion that this step will be of material assistance in the prevention of tuberculosis, particularly if sanitary authorities and their officers make effective use of the powers conferred upon them.

35. Non-pulmonary tuberculosis, though found to some extent in adults, occurs mainly in children. The Committee have already dealt with the provisions necessary for children in the preceding sections of this Report.

Most of the cases of non-pulmonary tuberculosis in adults can probably be dealt with in existing hospitals, and the Committee have not been able to form any reliable estimate as to the extent to which new institutional provision (if any) may be required. They stated in the Interim Report that the capital cost per bed might be put at about 150*l.* on an average, and the maintenance charge per bed per week at from 25*s.* to 30*s.*

COMPULSORY NOTIFICATION IN IRELAND.

36. The Committee regret that power to make tuberculosis compulsorily notifiable has not been conferred on the Local Government Board for Ireland, and they trust that the matter will receive the serious consideration of the Government since they regard compulsory notification as essential to any satisfactory scheme for dealing with the disease.

RESEARCH.

37. In the Interim Report the Committee laid down the principle that any scheme which should form the basis of an attempt to deal with the problem of tuberculosis should provide (*inter alia*) that concurrently with measures for prevention, detection and treatment, provision should be made for increasing the existing knowledge of the disease and of the methods for its prevention, detection, and treatment by way of research.

Existing knowledge of tuberculosis, though sufficiently advanced to justify the expenditure of large sums of money in order to provide treatment and to prevent the spread of the disease, is far from complete, and further discoveries of an important character may be anticipated. The Committee consider, therefore, that further research work should be undertaken on subjects affecting the prevention of tuberculosis, its diagnosis and efficient treatment. This was realised by the Committee when they laid stress in the Interim Report on the importance of research.

The Committee have been at pains to obtain the view of experts on this question, and they desire to express their indebtedness to those who have done so much to assist them in coming to their conclusions.

38. By Sec. 16 (2) of the National Insurance Act the sum of one penny per insured person payable out of moneys provided by Parliament may be retained by the Insurance Commissioners, in whole or in part, to be applied in accordance with regulations made by them for the purpose of research.

According to the latest available returns this sum should amount at present to about 57,000*l.* per annum. It will probably show a small increase in future years in proportion to the natural increase in the number of insured persons.

This provision marks a most important development in the attitude of the State towards scientific research into the causes, treatment and prevention of disease. Hitherto, apart from a small annual sum expended by the Local Government Board and occasional grants for particular objects, the State has, in the main, left research to voluntary agencies. The Committee welcome the fact that by the National Insurance Act a considerable sum of money is now permanently available for the purpose of research.

At the same time the Committee wish to express their high appreciation of the valuable work which has been rendered possible by voluntary effort in the past, and their opinion that research under the National Insurance Act should be organised in such a way as not to discourage either voluntary contributions or voluntary research towards the same ends. The aim should rather be to stimulate and co-operate with voluntary agencies.

The Committee are of opinion that the whole of the moneys made available by the National Insurance Act could usefully be spent on research in connection with tuberculosis. They understand, however, that the Insurance Commissioners have been advised that the moneys in question may properly be applied to research in connection with any disease which may affect insured persons. The Committee anticipate that for the present, at any rate, the moneys will be applied mainly to research in connection with tuberculosis and its allied problems, but, in view of the possibility of extension of research to other diseases, they consider that any scheme for dealing with these moneys, and any machinery which may be established for that purpose, should, as far as possible, be on lines which will be applicable to and facilitate such an extension.

While primarily considering the question in relation to research in connection with tuberculosis, the Committee have kept this object in view in making their proposals for dealing with the money.

General.

39. Before proceeding to a detailed consideration of the scheme which they wish to propose, the Committee desire to make certain observations of a general character.

The inquiries which should be carried out must necessarily cover a wide field, and should include inquiries (amongst others) of a clinical, pathological, experimental, statistical and sociological character.

A more rapid advance in our knowledge and better and more practical results are likely to be obtained if a comprehensive scheme of research is carried out on a definitely and carefully organised plan, and if all inquiries of whatever nature are as far as possible, correlated and co-ordinated.

In order to avoid unnecessary overlapping, the results of all research work, whether apparently barren or fruitful, should be collected by one body and published periodically. Hitherto work which has at the time appeared to lead only to a negative result has seldom been published. It is of importance that a change should be made in this respect, firstly, because its publication may prevent other workers from spending unnecessary time and money on precisely the same work, and, secondly, because it is impossible to say whether work which appears to be barren at the moment may not afterwards, in light of increased knowledge, prove to be of considerable value.

It is also desirable that arrangements should be made whereby workers in this country should be kept in touch with the results of research work in other countries.

Every sanatorium, dispensary and other institution for the treatment of tuberculosis and other diseases should have access to laboratory facilities for carrying out routine work and for the collection of data.

Many of these institutions should have complete laboratories of their own.

At the same time problems will arise in these institutions which the medical practitioners connected with them may not have the means or time to investigate, and which they should be able to refer to a central body.

The boundaries between the different parts of the United Kingdom which it may be necessary or desirable to observe for political or administrative reasons are not necessarily applicable to a scheme for scientific investigation. The work of research should be carried on in places having the best facilities for the particular investigation contemplated without being limited by consideration of geographical situation, provided that every part of the United Kingdom has the advantage of close association with the work of scientific investigators.

Central organisation and direction mean economy of time and money.

These and other considerations of a similar nature have led the Committee to make the proposals for administration which are more particularly described in the next succeeding section of this Report.

Administration.

40. The Committee are of opinion that a Minister or a Government Department could not make the best possible use of this money without having the advantage of the advice of a number of different persons, and obtaining the assistance of experts in the carrying out of the work.

For these reasons the Committee recommend the establishment of an Advisory Council and an Executive Committee.

The Advisory Council should include representatives from different parts of the United Kingdom, of the various Government Departments concerned, of medical, scientific and teaching bodies interested in the question of research, together with scientific persons of distinction, and men of business capacity and proved ability with, in most cases, experience of public work. The representatives of Government Departments should be in a minority and should be members *ex officio*.

It will probably be necessary for the Advisory Council to consist of not fewer than 25 members, and preferably not more than 30 members.

The Executive Committee should consist of not fewer than five nor more than ten members. The majority, but not all of these members, should be experts.

The members of both these bodies should be appointed by the Government. It is advisable that the Advisory Council should be afforded the opportunity of making representations to the Government as to appointments to the Executive Committee.

41. It is important from time to time to change the personnel of these bodies, while preserving a certain measure of continuity.

The Committee recommend, therefore, that the members other than those representing Government Departments should not be appointed for more than five years, but should be eligible for re-appointment. A system of retiring by rotation should be adopted and after the first few years, retiring members should not be eligible for re-appointment, save in exceptional circumstances, until an interval of twelve months has elapsed.

The members of the Executive Committee should be remunerated for their services, and the members of both bodies should receive the usual travelling expenses and subsistence allowances.

42. It is obvious that the Executive Committee will need a permanent whole-time Secretary in order to assist them in carrying out their duties. In view of the character and importance of these duties, he should be an expert of high standing in research, possess administrative capacity, and be paid a salary of 1,200*l.* to 1,500*l.* per annum. If practicable, he should also act as Secretary to the Advisory Council.

Duties of the Advisory Council and Executive Committee.

43. The duties of the Advisory Council should be to advise, make suggestions and submit the Executive Committee's budget to the Government, and to advise, criticise and make suggestions to the Executive Committee.

The duties of the Executive Committee should be to frame a budget which should be discussed and considered with the Advisory Council before being submitted by the Council to the Government; to determine, after consultation with the Advisory Council, the scheme of research work; to make periodic reports to be transmitted by the Advisory Council to the Government; and generally to organise and supervise the research work wherever carried on.

It is evident that when first organising the scheme both bodies will have to meet frequently, but that when the scheme is in operation there will be less demand on their time.

44. It is impossible to forecast accurately whether research work will produce positive or negative results, the exact length of time required to carry out a particular piece of work, the amount of money required to complete it, or what further work the results obtained may necessitate. Accordingly the Executive Committee will find it difficult to frame any hard and fast estimates of expenditure, or lay down with accuracy what sum of money will need to be spent in a given year. The balances unexpended in a given year should, therefore, be carried forward to the next.

Methods of expending money on Research.

45. The Committee have received evidence indicating the following (amongst other) ways in which the funds available for research might be expended:—on a central bureau, on special institutes, in grants to approved institutions, in grants to individuals, in making special inquiries and in scholarships and fellowships.

These methods of expending the funds are not mutually exclusive.

The Committee are of opinion that the work of research could advantageously be carried out on the following (amongst other) lines:—

- (a) A central bureau should be established and should be the headquarters of the Advisory Council and Executive Committee. The central bureau should have a statistical and sociological department, in the work of which should be included the co-ordination and correlation of results. With regard to statistical investigations, every effort should be made to utilise, where possible, and co-operate with the statistical departments of the different Government Departments. Statistics should be so collected and framed as to be comparable with the existing statistics of mortality.
There should also be a library and publishing department. The Central bureau should be under the immediate control of the Executive Committee.
- (b) Clinical, pathological, bacteriological, chemical, and other scientific researches should be carried out by competent investigators employed by the Executive Committee in institutions approved by them.
- (c) When the Government, on the recommendation of the Executive Committee, and after consulting the Advisory Council, deem such arrangements desirable, researches of the same nature as those referred to in the preceding paragraph should be carried out in an institution or institutions (including laboratories and hospital wards) which should be under the immediate control of the Executive Committee to the extent and for the purpose in question.
- (d) Money should be available in order that special inquiries, *e.g.*, of a statistical and sociological nature, should be carried out by the Executive Committee if necessary, independently of any particular institution.
- (e) The question whether a sum of money, not exceeding 1,000*l.* per annum, should be available as a prize or prizes for the best original research work done should be considered. The money should only be awarded if the discovery is of sufficient importance and utility.

Research workers.

46. The Committee are of opinion that some workers of proved and exceptional ability should be enabled to devote their whole time to research work, and should be given a definite and adequate salary and be entitled to a pension.

Efforts should also be made to retain for research work young and talented investigators who would otherwise tend to drift into other lines.

Additional Laboratory Facilities.

47. In the opinion of the Committee the value to the community of the scheme of research recommended in this Report will not be fully secured unless it is accompanied by a general extension throughout the United Kingdom of clinical laboratories for the better diagnosis and treatment of the disease provided out of funds other than those available under Section 16 (2) of the National Insurance Act.

MEDICAL EDUCATION.

48. The Committee are of opinion that additional facilities should be afforded to medical students and practitioners to acquire familiarity with the methods of diagnosis of tuberculosis, more especially in its earlier manifestations, and with the methods of treatment. They desire, therefore, to make the following recommendations:—

- (1) Medical students and practitioners should be afforded facilities to attend the practice at tuberculosis dispensaries, sanatoria, and other institutions.
- (2) It is advisable that tuberculosis dispensaries should, where possible, be directly associated with schools of medicine.

- (3) Every tuberculosis officer appointed after January 1915 should be required to give satisfactory evidence that he has, subsequently to qualification, devoted at least six months to special training in tuberculosis, and at least 18 months to general clinical work, of which six months should have been spent as resident in a hospital for general diseases or other hospital not confined to the treatment of tuberculosis.
- (4) Tuberculosis officers should be afforded special facilities by the authorities by whom they are appointed enabling them to spend not less than one month every three years in attending post-graduate instruction.

The Committee note that tuberculosis dispensaries have in some cases, with the approval and support of local and other authorities, been recently established in connection with out-patient departments of general hospitals associated with medical schools. This step should prove of the greatest value both to the public and to the medical profession.

CONCLUSION.

49. The Committee are anxious to express their appreciation of the help that has been afforded them by the various gentlemen who have taken so much trouble to give them the benefit of their views. Their assistance has greatly facilitated the preparation of both this and the Interim Report.

The Committee desire to place on record their appreciation of the unfailing courtesy, the industry, and the ability of their Secretary, to whom they offer their best thanks for the assistance he has rendered them in the performance of their task.

(Signed) WALDORF ASTOR (Chairman).
 CHRISTOPHER ADDISON.
 N. D. BARDSWELL.
 DAVID DAVIES.
 A. MEARNS FRASER.
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 W. LESLIE MACKENZIE.
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 T. J. STAFFORD.
 S. STOCKMAN.
 JANE WALKER.
 J. SMITH WHITAKER.
 F. J. WILLIS.

O. B. CLARKE (Secretary),
 March, 1913.

The Commission... (faint text)

The Commission... (faint text)

The Commission... (faint text)

- WALDORE ASTOR (Chairman)
- GIBSTON P. ANDERSON
- Y. D. BENTLEY
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- S. STOKMAN
- JANE WALKER
- J. KEITH WHITTAKER
- F. J. WILKINSON

(Signed) G. H. H. H. H. H.
June 1913

DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

FINAL REPORT
OF THE
DEPARTMENTAL COMMITTEE
ON
TUBERCULOSIS

Volume II.

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DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

FINAL REPORT

OF THE

DEPARTMENTAL COMMITTEE

ON

TUBERCULOSIS.

Volume II.

APPENDIX.



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MEMORANDA SUBMITTED TO THE DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

MEMORANDUM submitted by SUB-COMMITTEE WITH REGARD TO SANATORIA.

In making suggestions for the construction of sanatoria for the treatment of pulmonary tuberculosis, as wide a latitude has been aimed at as is compatible with efficiency and economy. The large majority of the patients undergoing treatment in a sanatorium will be in very fair physical condition. They will be up and about all day, and require but little nursing. A proportion, however, will require treatment on hospital lines.

The Sanatorium Unit therefore consists of:—

- (1) The sanatorium proper, which provides accommodation for the large majority of the patients.
- (2) A hospital for cases with acute symptoms.
- (3) An administrative section, in which will be included—
 - (a) kitchen and dining halls for patients and staff in close association.
 - (b) store-rooms, larders and other offices.
 - (c) consulting room, waiting room, nurses' duty room, drying rooms, &c.
 - (d) matron's office.
 - (e) quarters for resident staff.
 - &c. &c.
- (4) Power house and laundry.

The sterilising plant and sputum destructor should be installed in the power house.

The Sanatorium proper.—This building should be divided into sections for the separate accommodation of men, women, and children. In the opinion of the majority of the writers of this memorandum, children are best treated separately from adults. It is thought better that distinct institutions be provided for the treatment of children, or failing that, that separate pavilions for children should be attached to some of the sanatoria.

Generally speaking, accommodation must be provided in the same sanatorium for men and women patients. It should be remembered that the proportion of men and women who will be under treatment in a sanatorium at any one time, will vary considerably.

It is inadvisable therefore to allot the whole of the beds to men and women respectively. In practice, it is found better to allot a certain number of beds permanently to men and women respectively, and to make provision that the remaining beds can be conveniently used for men or women as occasion requires. The patients sleeping in this part of the sanatorium will spend most of the day out-of-doors. It is not therefore essential that the wards face the south.

Construction.—As little as possible should be spent upon the actual construction of sanatoria. The experience of the writers of this memorandum leads them to think that a sanatorium need not cost more than 150*l.* per bed. No hard and fast figure can be stated, for the cost per bed varies with the number of beds and other conditions. With regard to the materials to be used in construction, whatever is least expensive in the various districts in which the sanatoria will be placed should be employed. In one district bricks may be the cheapest and best material, in another stone and slate, in another one of the various kinds of cement or concrete blocks. Wood, again, may be the best material in some districts, and in view of the number of old wooden buildings that are to be found in excellent condition, a wooden building should not be regarded as of a merely temporary character. Provided the buildings allow of an abundance of fresh air and sunshine, and afford adequate protection from the weather, the actual construction and material are of small importance.

The standardisation of parts, e.g., doors, windows, and fittings makes for economy.

From the educational standpoint the provision of single rooms has an advantage inasmuch as patients are taught to occupy single rooms on their return home. For economy of upkeep and administration the ward of two or more beds has, in the opinion of the majority, an advantage. The cubic space allotted

to each patient is of little moment when we are dealing with rooms that are flooded with fresh air and have thorough cross ventilation. In practice, a floor space of 8 feet by 8 feet with a height of 8 feet is found to be adequate. Balconies and liegehalle are not required.

This part of the building should be provided with a minimum of one bath to every 12 patients. An alternative is a large lavatorium fitted with a number of needle sprays. With such an arrangement bathing is expedited and less water is used. W.c. accommodation should be provided in the same minimum proportion, viz., 1 to 12. If earth closets are used the proportion should be increased to a minimum of 1 for 6 patients. There should be lavatory basins in the proportion of one basin to eight patients. The sanitary provision should include indoor and outdoor urinals.

The walls should be treated with some easily washable material. The floors may be of polished wood, or may be covered with an impervious substance such as linoleum.

Wards may be fitted with French glass windows or merely with jalousies. Jalousies, if closed on wet and windy days, still allow of a free entry of air. Some glass for lighting purposes should be placed above the jalousies. Jalousies in place of windows are now in use in several sanatoria and found to be quite satisfactory. With regard to the door, an air space between the top of the door and the ceiling is recommended, as this arrangement makes it quite impossible for the rooms to be closed completely.

The Administrative Section.—The dining room should be sufficiently large to accommodate all the patients at one time.

If the provision of a chapel is contemplated it should be so arranged that it can be used by various religious denominations, as well as for secular purposes, such as lectures, concerts, &c. In some sanatoria the dining hall serves all these purposes.

The Hospital.—Should consist mainly of single rooms. The proportion of the beds in this block should be 20 per cent. of the total number in the sanatorium. Proper provision must be made for the nursing of invalids. Provision may be made in the way of balconies or verandahs, so that beds can easily be run out into the open air. In this block may conveniently be placed the operating theatre, throat room, X ray department, and the dispensing department.

Quarters for Nursing Staff and Staff generally.—The accommodation for nurses and other staff should preferably be in a building apart from the patients. Special arrangements should be made to ensure quiet for night nurses during the day-time. The medical superintendent should be provided with a comfortable house large enough to accommodate a family. Such provision is important, if the posts of superintendent are to be held by capable men or women. Cottage accommodation will be required for the head engineer, and, in all probability, for some other members of the staff.

The Power House and Laundry should be situated some little distance from the sanatorium buildings, but near enough to avoid undue condensation of steam in transit. It should be placed to the side of the sanatorium which is away from the prevailing winds. Power will be required for cooking, for heating the water for service and baths, and for supplying heat to various parts of the sanatorium.

Electric light is the best illuminant.

The best form of laundry equipment is that of a combined machinery and hand system.

The sanatorium must be complete in itself; hence boilers, dynamos, and engines must be duplicated. A small engineering repair plant and carpenters' shop are necessary.

If a children's block forms part of the sanatorium unit it should consist of wards which have easy access to the outside, so that beds can be pulled out. It is

essential to have an observation ward or wards, where the children can go to on their arrival, until the incubation period of the various infectious diseases is past. The observation ward may be divided by glass into separate cubicles.

Heating.—The dining hall, hospital wards, and staff quarters administration block should be heated. It is not necessary to heat the patients' sleeping quarters. Low pressure steam is the best system.

Sanatorium Site.—Although it has been shown that treatment can be carried out satisfactorily in sanatoria situated close to large cities, a more isolated position is generally advisable for this class of institution. The advantages of special climates have been very much exaggerated; still, within reasonable distance, it is well to obtain the best air and climatic conditions that are available. A low rainfall is desirable. Speaking generally, a sanatorium should be on a somewhat elevated and sloping site with a sunny exposure, well sheltered from the prevailing winds, a dry and permeable soil, together with an abundant water supply and facilities for drainage. Shelter from winds may be obtained by trees or by the general contour of the land. A good open view has a cheering and beneficial effect upon the patients. For convenience of transport and haulage, the sanatorium should not be at a greater distance than three miles from the railway station, and should be easy of access.

The size of the site should be sufficiently large to allow of scope for graduated work, the erection of workshops, and the making of a kitchen garden.

Cost of Maintenance per bed.—This will probably work out at 25s. to 30s. per week.

The Size of Individual Institutions.—It is a general experience that institutions of less than 100 beds are unnecessarily expensive to maintain, and it is recommended that an individual sanatorium should contain not less than 100 beds. It is difficult to fix a maximum number. Other things being equal, the larger institutions have obvious economic advantages.

Suggestions as to the Staff of the Sanatorium.—In a sanatorium for the working classes, it is usually found that the proportion of staff to patients works out at

one to three. The following list is given as indicating the general character of the staff that is required for a self-contained sanatorium of 100 beds.

Medical Superintendent.	Kitchen porter.
Resident Medical Officers.	Laundresses.
Laboratory assistant.	Wash-house man.
Matron.	Chief Engineer.
Sisters.	Other en-
Nurses (staff).	gineering { Carpenter.
Housekeeper.	staff { Painter.
Maids.	Plumber.
Secretary-Steward.	Porters.
Cook.	Motor man.
Kitchen maids.	Gardener.
	Store porters

With regard to salaries of the staff, the Medical Superintendent should be adequately paid. The suggested salary for this officer is 500l. per annum with house. It is suggested that the second medical officer receive 250l. per annum with quarters, board, &c., and that any further medical officers required should receive 150l. per annum with all found.

No paid visiting medical staff will be required, but the medical superintendent should be able to call in the services of a surgeon when necessary.

It is of great importance, both from the point of view of efficient administration and of attracting capable officers, that the medical superintendent be possessed of supreme power, so far as the patients and staff of the sanatorium are concerned, with regard to all questions involved in the treatment of the patients and all questions of administration. The medical superintendent must of course be to some extent under the control of local bodies. His appointment, however, should be made subject to the approval of the central authority, and he should have the right of appeal to the same authority. To facilitate this arrangement, all sanatoria should be inspected by the central authority at regular intervals.

N. D. BARDSWELL.
ARTHUR LATHAM.
MARCUS PATERSON.
R. W. PHILIP.
JANE WALKER.

March 1912.

MEMORANDUM submitted by F. W. ANDREWES, M.D., F.R.C.P., D.P.H., Pathologist and Lecturer on Pathology, St. Bartholomew's Hospital, E.C.

At the request of the Chairman of the Committee on Tuberculosis, I beg to submit the following propositions respecting the early diagnosis of tubercle. They are based upon an experience of 15 years as pathologist to St. Bartholomew's Hospital, during the whole of which the laboratory diagnosis of the disease has formed no small part of my work, while I have been in close touch with clinical medicine and surgery.

1. Measures for early diagnosis should form a *central part* of the machinery for dealing with tuberculosis, because treatment must be based on diagnosis, which is thus second only in importance to prevention. The diagnosis must be early, because the prospects of cure become smaller the later the disease is recognised.

2. The clinical recognition of tuberculosis in its early stages is commonly very difficult. It demands not only careful physical examination, but considerable experience in that special line of work. It commonly demands also a bacteriological examination of the sputum or other excreta. In certain cases it demands diagnostic inoculation of guinea pigs or other animals. In a few cases it demands the cautious employment of the tuberculin test in one or other of its forms.

3. Although the necessary skill can be commanded by the well-to-do, and is available for the poor in hospitals it is not as a rule available under the conditions of club practice or such as are likely to prevail under the Insurance Act. The possibility of early tubercle would, however, suggest itself in many cases to general practitioners, who would be glad to avail themselves of free expert advice.

It follows that there is need for the *provision of consultative advice* wherever early tubercle is suspected, and the consultant must be backed by the resources of a laboratory.

4. This should be the chief function of a so-called tuberculosis "dispensary." What it ought to dispense is not so much treatment as *accurate diagnosis and advice* as to treatment. It would better be termed an "advisory clinic," and it should act as a sort of "clearing house" where cases could be sorted out according to the treatment required.

5. The *equipment* of such a centre might be very simple—a waiting-room, a consulting-room, and probably a small laboratory. In larger centres it might be deemed desirable to add a few beds for keeping selected cases under observation for a few days, strictly for purposes of diagnosis only.

6. The *staff* of such a centre would be as follows:—

(i) A highly trained *clinical expert* specially versed in the recognition of tubercle. To get the right sort of man, he must be highly paid (500l. to 800l. per annum): a cheap man would be no good. A body of men suitable for the work in question could in a few years be drafted from those who had held clinical resident appointments in chest hospitals and sanatoria, if the remuneration were adequate.

(ii) In large centres it would be needful to add *assistants* to the chief, working under him and less highly paid.

(iii) If a laboratory were attached to the centre, a *laboratory attendant* would be required capable of staining tubercle bacilli. Any reasonably skilled person, at 25s. or 30s. a week, could do this.

(iv) One or more *nurses*. Even for consulting-room work one nurse would be required for female patients. If beds were attached more than one would be needed. Such nurses might be used for home visiting, taking evening temperatures and other aids to diagnosis.

7. *The Provision of Laboratories*.—There are three distinct functions to be fulfilled by a laboratory in connexion with tuberculosis:—

(a) The *microscopic recognition* of the tubercle bacillus in sputum, &c. In most cases this is all that is required. It can be done by any intelligent youth after a week's practice, and all the equipment needed is a bench in a back room, a microscope, and a few dyes. This is the only sort of laboratory required at the consultative centre itself, and it might be dispensed with if a central laboratory were close at hand.

(b) More difficult cases require a *central laboratory* under the control of a *bacteriological expert* paid on the same scale as the clinical expert. Here would be performed the animal inoculations required for diagnosis in doubtful cases, opsonic work when needful, the cultivations necessary for distinguishing the human from the bovine types of tubercle, and perhaps the testing and even the preparation and standardisation of tuberculin. Such a laboratory would only be required in large towns, and would serve many consultative centres.

(c) The third function of a laboratory is *research*—a higher matter which lies outside the subject of this memorandum.

In the scheme outlined above it will be seen that importance is laid—

- (1) upon the provision of *local consultative centres* for early accurate diagnosis of tubercle, manned by trained *clinical experts*.
- (2) upon the provision of *central laboratories*, manned by competent *bacteriologists*, to whom the clinical expert can go for help in difficult cases.

March 1912.

MEMORANDUM submitted by SIR CLIFFORD ALBUTT, K.C.B., M.D., F.R.S.

When I was a student of medicine, and indeed after I began practice, to find evidence of tuberculous disease of the lung was to despair of the patient's life. Here and there cures were reported, but in a legendary way; and the method of treatment then was the very opposite of the methods of to-day.

I think the first ray of hope which came into my mind was in a conversation with the late Dr. Archibald Smith, who brought scientific evidence of cures of consumption on the highlands of Peru. Peru was a far cry. But about this time I formed an acquaintance with the late Dr. Henry Bennet, of London and Mentone, and learnt from him—both in London and Mentone—to hope more and more from the open-air treatment, as begun and practised by him at Mentone.

The next step in my experience was a visit to Davos with the late Mr. Symonds, when the success of the Swiss mountain cure made so strong an impression upon us both that Mr. Symonds, then suffering from advanced phthisis, decided to settle there, with the well known good results. It was at Davos that, for the first time, I became satisfied that so far from being a hopeless or almost hopeless disease, consumption, if taken in hand at an early stage, was in the large majority of cases curable at Davos, and on the Davos methods.

The next stage of my education in this subject was by the methods and results of Dr. Walther at Nordrach. After eliminating from his methods certain needless and even mischievous features, I learnt the next important lesson, viz., that continuous and vigilant supervision by the physician was an essential part of a successful curative method. And as part of this system the regime of the sanatorium began to appear in its true importance.

The next step in my education was a visit to Dr. Brehmer's Sanatorium, where I became convinced that the new principles of treating consumption could be efficiently put into practice in ordinary climates, and at elevations lower than the Swiss mountains. And these lessons I have read again and again in my experience at King Edward VII. Sanatorium at Midhurst, and become more and more fortified in the belief that by the modern methods of fresh air, liberal food and continuous medical oversight the recovery of a fairly early case of consumption in a fairly good subject no longer is a matter of despair, nor indeed only of moderate hope, but of confident anticipation, more confident perhaps than in any other organic disease. But this means sanatorium treatment—or the equivalent of it—for two-and-a-half to three years at least, if the recovery is to be a sound one. I have ventured to sketch this short history of my own experience and education in the matter, and to contrast the hopes of the present with the despair of the past, that the ines-

timable boon of the sanatorium may be fully comprehended, and that its invaluable services may never be neglected.

I am now engaged in one more stage in my education; namely, that perhaps by the use of tuberculin, the sanatorium means may be largely reinforced. It seems probable, but I speak with reserve of an impression but lately formed, that by tuberculin in addition to the sanatorium methods, the cures may be doubled; that is, that they may now come not only from the class of early cases, but to some extent also from the class of established cases, if not too far advanced. But I should view with dismay any attempt of the advocates of tuberculin to supersede the sanatorium. During the use of tuberculin, indeed, the vigilant eye of the physician is more than ever necessary.

But, it will be said, two to three years in a sanatorium is practically impossible—the scale of the demand would be enormous. This is true, and it is also true that a prolonged residence, in the same sanatorium at any rate, becomes stale and less profitable. A change of sanatorium from time to time is for this reason desirable. Moreover, in the classes not used to physical labour, and in persons indisposed to exert themselves in any regular work, the life is not only monotonous, but lounging and demoralising. Happily, however, in a three months' residence an intelligent patient learns not only to practice, but dearly to prize the method; and in many cases is well able and well disposed to carry it forward at home. But I always recommend a return to the sanatorium, if possible, for a few weeks every six or eight months.

As to prevention, I have little to add to what is now well-known. But I would urge that advanced and comparatively hopeless cases should be dealt with systematically by the local health authority, as sources of infection. Nearly all such patients are willing to learn the means, which are comparatively simple, of preventing infection from themselves to others; and their friends learn to keep them up to the mark of attention. Still there are many bad cases, with much cough and spray from the mouth, which are dangerous to others. I am unwilling that such persons should be sent away into special retreats—it is a dismal fate to be consigned to a resort for the hopeless!—and thus to seclude them from their own people and neighbourhood. I think in thickly populated places, cottages hired here and there among their own people and in their own district would serve the purpose of prevention without seclusion and partial exile in an institution. Such cottages, each under a competent nurse matron, would be homely for those used to homeliness, and would be as inexpensive as it would be an effective part of the preventive machinery.

March 1912.

REPORT submitted by N. D. BARDSWELL, M.D., ON THE TUBERCULOSIS DISPENSARY SYSTEM IN SHEFFIELD.

Population, 450,000.
Deaths from phthisis in 1910, 457.
Deaths from all forms of tuberculosis, 626.
Estimated number of cases of phthisis in Sheffield, 2,000.

Component parts of the Sheffield Tuberculosis Dispensary scheme:—

- (1) Dispensary.
- (2) The Royal Hospital special out-patient department for tuberculosis.
- (3) The City Hospital for Consumption (male), 20 beds.
- (4) The City Hospital for Consumption (female), 20 beds.
The City Hospital for Consumption, out-patients department.
- (5) The School Clinic.
- (6) Ten beds in the sanatorium at Withernsea.
- (7) Open-air school.
- (8) The University Bacteriological Department.
- (9) Workhouse infirmaries for advanced cases.
- (10) Tuberculosis inspectors and visitors, male and female.
- (11) A home for cripple children (60), beds shortly to be erected.

Notes as to the Staffs and Salaries of the various Units of the Sheffield Scheme.

(1) *The Dispensary.*—1 medical officer (whole time) at 400l. per annum. 1 clerk attendant (whole time) at 50l. per annum.

(2) *Hospital Out-patient Department.*—1 hon. visiting physician, assisted by dispensary officer.

(3) *City Hospital for Consumption (male).*—1 matron at 80l. per annum, two nurses at 30l.; some domestic service.

(4) *City Hospital for Consumption (female).*—1 matron at 80l. per annum, 2 nurses at 30l., 1 male attendant at 30l., indoors. Some domestic service.

N.B.—There is no resident medical officer in either of these hospitals. The Medical Superintendent of the city hospitals, including the fever hospital, is responsible for them.

(5) *School Clinic.*—Part-time officers: Chief Medical Officer for Schools, Assistant Medical Officer for Schools, Dispensary Medical Officer.

(6) *The Withernsea Sanatorium.*—Beds (10) cost the city 1l. per week each.

(7) *Open-air School.*—Paid for by Education Authority.

(8) *The Bacteriological Department for free examination of sputum, &c.*—Cost the city 200l. per annum.

(9) *Workhouse Infirmaries.*—(150 beds) costs the city 7,000l. per annum.

(10) *Inspectors and Visitors.*—2 male inspectors (full time) at 100l. per annum, 16 female inspectors (part time) at 100 per annum each.

The female inspectors are trained nurses, midwives, and sanitary inspectors.

In all the complete scheme costs 12,000l. per annum.

Notes as to the Accommodation at the various Units.

(1) *Dispensary* consists of a flat of a weekly rental of 6s. The accommodation consists of—One waiting room, one consultation room and office, one dressing-room, with scullery used for special sputum examinations.

The equipment of the dispensary cost 50l.

(2) *City Hospital for Male Consumptives (20 beds).*—Consists of a small-pox hospital, 4 miles from the city, with some 3 acres of land attached. This institution is used for observation, educational and curative purposes. Graduated labour and tuberculin treatment are both used there.

(3) *City Hospital for Female Consumptives (20 beds).*—Consists of a large house on the outskirts of the city, surrounded by a large garden. This institution is also educational and curative in character.

The 150 beds for advanced cases are situated in the two workhouse infirmaries.

Notes re working of the Scheme.

The various centres which, together, constitute the dispensary scheme, perform the functions of—

- (1) A clearing house.
- (2) A centre for treatment.
- (3) A centre for observation and education.
- (4) A centre for incurable cases.
- (5) A centre for after-care and following-up.

(1) *The Scheme as a Clearing House.*—Patients are seen for the first time and cleared at the dispensary, the hospital out-patient department, the City Hospital out-patient department, the School Clinic.

(2) *As a Centre for Treatment.*—Patients are treated at the dispensary; the Royal Hospital special tuberculosis out-patient department; the two City Consumption Hospitals; the sanatorium at Withernsea; the school dispensary; the open-air school.

(3) *As a Centre for Incurable Cases.*—The workhouse infirmaries.

(4) *As a Centre for After-care and following-up.*—The dispensary.

N.B.—A considerable proportion of the hopeless cases are cleared direct to the workhouse infirmaries by the district medical officer.

Some Notes re the Hours of the Clearing Houses.

The dispensary is open daily from 9 a.m. to 6 p.m. for the leaving of names and addresses of those wanting appointments. Similar requests for appointments can be left at the Medical Officer of Health Department at the Town Hall. Many names and addresses are obtained by the visiting inspectors and nurses. Patients are notified by postcard as to time of appointment, every effort being made to suit the patient's convenience. The Dispensary Officer sees patients practically at any hour from 10 a.m. until 9.30 p.m. daily. On Saturday he is occupied visiting the various centres.

The Royal Hospital Tuberculosis Department is open every Thursday from 9.30 a.m. until 1 p.m., and on Monday at 9.30 a.m. for the attendance of special cases under treatment.

The City Hospital for Consumption (female) has an out-patient department for the free examination of notified cases, male and female, on Mondays, at 2.30 p.m. The examinations are made by the Superintendent of City Hospitals.

The school clinic held at the dispensary is open on Tuesday 10 a.m. to 1 p.m., Wednesday 10 to 1, and Thursday 5 p.m. to 7 p.m.

The dispensary can clear patients to (a) the City Hospital for four weeks' educational treatment, (b) to the open-air school, through the school clinic, and (c) to itself for home treatment under the direction of the dispensary officer, with or without association with a general practitioner.

The dispensary cannot clear direct to the distant sanatorium, as all patients sent there first go through a period of observation in the City Hospitals.

It cannot clear direct to the workhouse infirmaries, but can recommend patients for admission to these beds.

The Royal Hospital out-patient department is in exactly the same position as the dispensary in these respects.

The City Hospital for Consumption out-patient department can clear to (1) its own female beds, (2) the City Hospital for consumptive males, (3) the dispensary for home treatment, (4) the sanatorium at Withernsea, (5) the school clinic, (6) can recommend for the workhouse infirmary.

The school clinic clears to the open-air school, to the Consumption Hospital for Women in the case of children over seven, and treats patients itself. There is no provision for children under seven.

To give some Idea of the Work of these several Centres.—Approximately, some 12 per cent. of original notifications are cleared by the dispensary, some 10 per cent. by the Royal Hospital out-patient department, some 20 per cent. are cleared direct to the workhouses by district officers, some 25 per cent., after notification by

the general practitioners, are cleared by the City Consumption Hospitals.

Of the remainder, the school clinic clears a considerable number, mostly contacts and suspicious cases. The majority, however, after notification by the general practitioners, are treated by them.

Treatment Centres.

Dispensary.—The treatment directed by the dispensary is essentially home treatment. The patients treated there are mostly cases discharged after a short course of treatment from the City Hospitals, cases from other clearing centres, and fresh cases, for the most part contacts, found by the dispensary itself.

It is the aim of the dispensary medical officer to give every case a preliminary course of at least four weeks' observation, education, and treatment, in one of the two City Consumption Hospitals. The dispensary officer has no beds under his absolute control, but he is authorised to send cases to the City Hospitals. On the average, patients sent in this way have to wait some ten days for admission. After the preliminary course of observation and treatment, with or without tuberculin, the case is transferred to the dispensary for home treatment. Home treatment consists of continued instruction in general hygienic principles, with the administration of tuberculin in suitable cases. Considerable care is exercised in the selection of these cases. The dispensary medical officer has no time in which to visit patients in their own homes. The home visiting is done by the specially trained inspectors and nurses. The dispensary was opened and tuberculin treatment systematically commenced in October 1911. It is too early yet for the dispensary medical officer to speak with any confidence as to results of home treatment with tuberculin. He is of the opinion, however, that tuberculin, if judiciously administered, can safely be given to cases undergoing home treatment, and that when the desirable combination of sanatorium treatment with tuberculin is not available, carefully supervised home treatment with tuberculin in suitable cases is of considerable value.

The dispensary is of great value as a centre for after-treatment, especially after a preliminary course of training in the educational sanatorium.

The Royal Hospital Out-patient Department.—The treatment carried out at this centre is similar to that carried out at the dispensary. The home visiting is done by the same inspectors and nurses. The same case-taking papers and recording papers generally are used in all the centres, and for the most part are centralised at the dispensary. A patient transferred from one centre to another takes his records with him.

The City Hospitals for Consumption.—Provides the beds for the observation of cases sent by the dispensary and other clearing centres, and for the giving of a preliminary course of education and treatment to a large number of cases capable of improvement before being transferred to the dispensary and elsewhere for further treatment. The home treatment of such cases is directed by the dispensary Medical Officer and the Medical Superintendent of the city hospitals, working in association at the dispensary.

As previously mentioned, these two hospitals have only 20 beds apiece. It is possible, then, to give a month's treatment to 480 patients yearly.

The ten beds at the Wethersea Sanatorium are used to give a course of from three to four months' treatment to specially selected cases.

Commentary.

The scheme as outlined has been gradually evolved and co-ordinated. The dispensary is thus not the sole clearing house for all the cases of phthisis in the city, but combines this duty with other centres which are not under the direct control of the dispensary medical officer. The common centre for all is the Medical Officer of Health. The fact that the dispensary officer has no beds for observation and emergency purposes under his absolute control is a distinct drawback. The available sanatorium accommodation would at first sight appear to be too limited. With the present facilities it is only possible to give every year a course of four weeks' treatment to some 480 cases. As previously stated, the estimated number of cases of

phthisis in Sheffield at the present date is 2,000, and the notification of fresh cases in 1911 was over 800. It is the intention of the local authority to provide further sanatorium accommodation of 45 beds, and to give up the ten beds at Wethersea. This would make 85 beds in all, or one sanatorium bed for every 5,300 of the inhabitants. In the opinion of those dealing with the work in Sheffield, the provision of 85 beds would to a considerable extent meet the existing requirements so far as sanatorium treatment is concerned. The experience of Sheffield up to the present has been that patients come under observation and are notified at a very late stage of the disease. It is a very common occurrence for a case to live but a few weeks after notification. The proportion of curable cases has in consequence been, and remains, relatively small. It has been more a question of making provision for advanced and hopeless cases than for curable cases. Since the opening of the City Hospitals, and again since the opening of the dispensary, the proportion of curable cases using the term in its widest sense, amongst those notified, has distinctly increased. The early contact cases found by the dispensary form an appreciable proportion of this increase. The indications are, then, that in the comparatively near future a greater proportion of the more curable cases will have to be dealt with, and that a larger number of sanatorium beds will be required if these patients are to receive the full advantages of sanatorium treatment.

Some Notes re Notification.

Compulsory notification has been in force since 1903. As a result, the number of cases of phthisis known to the local authority has nearly doubled since 1902. Compulsory notification alone did not lead to earlier diagnosis. The opening of the City Hospitals for Consumption, and the dispensary, have had a greater effect in this respect. It is estimated that at the present time there are some 600 cases of obvious phthisis who are still unnotified. It is noticeable that the number of fresh cases notified last year (836) is very considerably greater than the total number of deaths from phthisis during the year (457). The number of fresh cases notified annually, in which the diagnosis is confirmed by the presence of tubercle bacilli in the sputum is roughly equivalent to the annual number of deaths from the disease. Errors of diagnosis account doubtless for some of this discrepancy. In this respect, the following record as to what happened to a number of notified cases is of interest:—

(1) New cases notified November 1899 to December 1910	6,681
(2) Cases cancelled by medical attendant on recovery	35
(3) Cases known to have removed from city	250
(4) Cases lost sight of, most of whom have probably left the city	634
(5) Cases who died	4,174
(6) Cases remaining on books, December 1910	1,588

Some Notes re the Home Conditions in Sheffield in the light of Home Treatment of Pulmonary Tuberculosis.

The efficiency or non-efficiency of home treatment depends very largely indeed upon housing conditions. In this respect conditions vary very materially in various towns. The facilities for home treatment in Sheffield are unsatisfactory, as the following facts demonstrate.

Of the first 100 female cases of phthisis over 18 years of age visited during each of the years 1907 to 1911 inclusive, on an average 74 per cent. shared a bed with others and 8 per cent. shared a bedroom with others.

Of the first 100 male cases of phthisis over 18, visited in the same years, on an average 67 per cent. shared a bed with others and 11 per cent. shared a bedroom with others.

In Sheffield, then, it is very often impossible for the patients to have a sleeping room to himself, and very frequently, too, he cannot obtain a separate bed. Possibly something might be done to remedy this by a supply of beds by the local authority. The provision

of sleeping accommodation by the loan of a shelter is not practicable. For the most part Sheffield houses are tenements, with a small yard common to a number of families.

Some Notes re Contacts.

As evidence of the amount of work required efficiently to examine contacts, the following records are valuable.

To 736 cases of obvious phthisis seen during 1911 were associated 3,154 house contacts, and of this number 617 were bed contacts. The influence of occupation on the incidence of the disease is very marked in Sheffield. For instance, the death-rate from the disease per 1,000 living amongst grinders is nearly 15 and amongst workers at several other trades the death-rate per 1,000 is much above the average. This would suggest that the examination of trade contacts is desirable if possible.

Relation of the Dispensary to the General Practitioner.

A small proportion of general practitioners use the dispensary as a consulting physician, as a means of confirming diagnosis, or of learning modern principles of treatment. In such cases the patient is seen by the dispensary medical officer with the patient's own medical man. For the most part, however, the general practitioner takes no interest in his patients who attend the dispensary, and willingly hands over his treatment. Every facility is given for the attendance of the general practitioner.

I have to express my thanks to Dr. Scurfield, Medical Officer of Health for Sheffield, and to Dr. Chapman, dispensary medical officer, for giving me access to records of the various centres concerned in the control of tuberculosis, and for supplying me with the information which is contained in this report.

AN ESTIMATE OF WHAT WILL BE REQUIRED IN THE WAY OF A DISPENSARY AND SANATORIUM FOR A TOWN OF 500,000, BASED UPON THE EXPERIENCE OF SHEFFIELD, by DR. J. E. CHAPMAN, Dispensary Officer, Sheffield.

The following are the facts in Sheffield:—

At the end of 1911 there were, approximately, 1,800 cases of pulmonary tuberculosis on the notification register known to be living in the city. This total included the 834 fresh cases notified during the year. Of the fresh notifications, the number of males over 15 compared with the number of females and children were as 6 to 4. We may, therefore, assume that of the 1,800 cases alive in 1911, 1,080 were males above 15 and 720 females and children.

Of the fresh male cases notified during 1911, 38 per cent. were members of benefit clubs, the actual figures being 193 out of 495 cases. On the basis of this analysis it is calculated that, at the end of 1911, there were 410 males over 15 who were members of sick clubs. If the same proportion (that is, 6 to 4, see above) of females and children are added as dependents, there would be an addition of 270, bringing the total to 680.

Within a year or two of the coming into force of the Insurance Act it is estimated that a very much larger number of the consumptive population will be insured persons; in the opinion of those well qualified to judge, this figure may be as high as 75 per cent.

It is further estimated that the number of fresh cases notified every year will for some time remain fairly constant at the estimated rate for this year, viz., about 1,000.

Of these 1,000 cases, assuming that 75 per cent. of the males over 15 are insured persons, there will be 450 fresh male cases to deal with yearly, and 300 women and children dependents, that is, 750 in all.

The exclusion from insurance benefits of cases found to be consumptive on medical examination prior to admission to clubs will tend to keep the numbers down.

To deal with the males alone. On this assumption there will be, in a few years' time, 450 new male cases every year who will require treatment of some sort.

In addition to this number there will probably be a further 450 males under supervision who have already received a course of treatment; that is, 900 cases in all.

The dispensary itself will not have to deal with all the 900 cases, since a considerable proportion will be in sanatoria, homes for advanced cases. It seems probable that the dispensary will be looking after some 600 cases at any one time during the year.

These estimates take no account of the women and children dependents.

In addition to the treatment of the cases of disease, there will also be the contacts to be examined. 450 new cases means, approximately, 1,700 contacts. To summarise, then, a staff will be required to deal with 900 cases during the year, with an average of 600 cases under supervision and treatment at any one time. In addition, there will be 1,700 contact cases to be examined.

This estimate is for men only, and disregards all dependents.

The staff required for this purpose, assuming that tuberculin, used to some extent in home treatment, and that a certain amount of home visiting is carried out, would be five whole-time medical officers, or their equivalent, and four full-time nurse inspectors. These would have sufficient time to visit all the out-patients on an average once a fortnight, to attend to patients at the dispensary, and to look after patients in the observation beds.

If no provision for observation and emergency beds existed reasonably close to the dispensary, such beds should be provided there.

Six beds would be adequate for the males of cities with a population of about half a million, allowing an average of five days' observation for each fresh notification.

With regard to sanatoria. It is difficult to estimate the probable requirements a few years hence, but it would seem that one sanatorium bed to every 3,000 of the inhabitants would be sufficient.

Addendum to Sheffield Report.

City of Sheffield Department of the Medical Officer of Health.

ANNUAL EXPENSES IN CONNECTION WITH THE NOTIFICATION OF TUBERCULOSIS OF THE LUNG (APPROXIMATE).

	£
(1) Salary of Dr. Chapman, assistant medical officer of health (tuberculosis)	400
(2) Salaries of two male inspectors (130 <i>l.</i> , 78 <i>l.</i>)	208
(3) Salaries of two female inspectors (say, 90 <i>l.</i>) each	180
(4) Salaries of clerks (proportion)	40
(5) Salary of female assistant at dispensary	52
(6) Fees for notification (actual, 1911)	108
(7) Fees for examination of sputum (actual, 1911)	245
(8) Maintenance at the corporation hospitals of 40 patients at, say, 25 <i>s.</i> per week each	2,600
(9) Expenses sending selected patients to sanatoria, and maintenance	740
(10) Tuberculin and apparatus	100
(11) Tram fares of inspectors and nurses	25
(12) Disinfectants, sprayers, sputum flasks, &c.	75
(13) Printing, &c.	20
	£4,794

March 1912.

MEMORANDUM submitted by N. D. BARDSWELL, M.D., ON AN EXPERIMENTAL FARM COLONY FOR PULMONARY TUBERCULOSIS.

In view of the possibility of Farm Colonies forming part of a comprehensive scheme in the campaign against tuberculosis, the following brief report of the actual experience of running a small market garden colony for consumptives may be of interest.

The colony in question was established at Clacton-on-Sea in February 1907, by Dr. Chapman, and was run by him until December 1908.

Site, Land, Building, &c.—The colony establishment consisted of a two-storied brick dormitory structure, containing three sleeping wards, with dining hall, kitchen, &c., and rooms for a small staff. It had been built for, and was used as a holiday home for poor boys. This block stood in nine acres of land, and was one mile distant from Clacton. In addition to this main building, there was also a five-roomed cottage which was used chiefly for the accommodation of the female staff.

The dormitories, with slight alterations, made very suitable accommodation for 20 convalescent patients. The land, unfortunately, was of a very poor character for market-garden purposes. It was mostly grass land which had been allowed to go out of cultivation.

The buildings and land were leased from a philanthropic gentleman for 34*l.* per annum.

The Staff consisted of Dr. Chapman, a nurse-matron, a cook, two maids, one boy, a patient who acted as nurse orderly, and another ex-patient, a gardener by occupation, who was taken on to the staff and paid at the rate of 4½*d.* per hour.

Principles of running the Colony.—It was intended to limit the admissions to the colony to convalescent cases of pulmonary tuberculosis. It was decided to charge the patients a fee of 25*s.* per week, and in turn to pay them for all work done on the colony, the rate of pay being that prevailing for similar labour in the district. In this way it was hoped that patients would be able to reduce the cost of their treatment without loss to the management.

Patients were admitted on the strength of medical certificates filled in by medical practitioners. As a result, a good many cases were sent to the colony who were quite unsuited for the work there.

The colony opened with 15 beds at a fee of 25*s.* per week, and when these were fully occupied, a further seven beds were added. These seven beds were reserved for patients who wished to make a prolonged stay, and who were, for the most part, working some eight hours a day in the garden. The fee charged for the patients occupying these seven beds was 13*s.* 4*d.* per week.

Routine.—The routine of the patients in the colony was modelled on the routine life in a sanatorium. All the essentials of the sanatorium method of treatment were secured, viz., abundance of air, generous diet, rest hours, regulated exercise (walks, or work in the garden), regular hours, and medical supervision. The medical superintendent directed and personally supervised the work in the gardens. He also managed all the business work in connection with the colony.

Patients made their own beds, but apart from this most of the housework was done by a certain number of patients who were paid for these services. In all, of 212*l.* paid by the colony management for domestic service, 73*l.* 13*s.* were paid to patients.

The patients did no work in the kitchen. In the absence of women patients, there was no one capable of undertaking the cooking.

The Diet.—The diet is of interest as an example of a cheap and efficient diet for working class consumptives. The weekly cost of this diet per head for patients and staff worked out at 8*s.* 1½*d.*

THE DIET.

CLACTON MARKET GARDEN COLONY.

Breakfast, 8.30 a.m.

Porridge, ½ pint (containing 2 oz. oatmeal).
Bacon, 1½ oz. (or 2½ oz. uncooked).
Milk, a cupful (5½ oz.).

Sugar, 1½ oz. (taken with porridge).
Sugar, 1 oz. (taken in tea).
Bread, 2 oz.
Butter, ¼ oz.
Tea.

Lunch, for workers.

Coffee.
Bread.
Cheese.

Dinner, 1.30 p.m.

Joint, 4½ oz. (or 8½ oz. as purchased).
Potatoes, 6 oz. (or 8 oz. as purchased).
Green vegetables.
Suet pudding, 5½ oz.
Bread, very little.
Milk, ½ pint.

Tea.

Bread, 5 oz.
Butter, ½ oz.
Cake (occasionally).
Tea.
Sugar, 1 oz.

Supper.

Liver, fish, sausage, cold ham, &c., or
Pulse soup, containing 3 oz. pulse per head.
Bread, 1½ oz.
Butter, ¼ oz.
Cheese, ½ oz.
Cocoa (in winter or 1 pint milk in summer).
Sugar, 1 oz.

A Sample Week's Menus.

	Dinner.	Supper.
Sunday	- Boiled beef and suet dumplings.	Cold boiled ham.
Monday	- Roast beef Sago pudding	- Macaroni pudding. - Pea soup. - Vanilla mould.
Tuesday	- Roast mutton Pancakes	- Fried liver. - Lemon and crumb pudding.
Wednesday	- Cold beef Boiled ginger pudding.	- Macaroni and kidney. - Baked custard.
Thursday	- Cottage pie Plum duff	- Haricot soup. - Apple dumplings.
Friday	- Boiled mutton Jam roll	- Fish. - Rice Pudding.
Saturday	- Roast pork Treacle pudding	- Lentil soup. - Apple Charlotte.

The Work done at the Colony.—Was entirely market gardening. With the exception of the ploughing (which was done by hired labour), the patients did all the work, viz. trenching, digging, cultivation and growing of crops, planting, hoeing, gathering, packing, &c.

In the course of 18 months, 6 acres of land, out of cultivation, were cleaned and got under good cultivation. This was accomplished by an average of 19 patients, working on an average 23 hours a week each.

The articles grown were: potatoes, cabbages, peas, beans, carrots, turnips, &c., also a certain amount of herbaceous plants.

Disposal of Produce.—Whatever produce grown on the colony was used by the colony, was paid for by the management at market rates. The surplus was sold on the ground to the Clacton greengrocers. There was always a good market for the produce locally, especially in the summer holiday season. It is worth recording that there was not the least prejudice against the produce grown on the colony.

Some Notes as regards the Patients treated at the Colony.—The following notes as to (1) the occupation; (2) the number of dependents on; and (3) the length of stay of the 88 patients who were admitted to the colony are of some interest.

Occupation.	
Clerks (24), reporters (3), students (3) -	30
Shop Assistants, &c., viz. :—	
Grocers -	4
Bakers, &c. -	4
Drapers -	3
Stationers -	3
Tailors -	2
Butchers -	2
Fishmonger -	1
Jeweller -	1
Tobacconist -	1—21
Artisans, viz. :—	
Grinders -	6
Plumbers, &c. -	3
Engineers -	3
Compositors -	2
Masons -	2
Carpenter -	1—17
Seamen (4), soldiers (1), policemen (1) and postmen (2) -	8
Gardeners -	2
Grooms -	2
Porters -	3
Labourers -	5
Total	88

Particulars of those Dependent upon Patients.

- 46 men were single and without dependents.
 4 men were single with 5 adults dependent upon them.
 38 men were married with dependents.
 7 men had a wife only to support.
 1 man had 1 child to support.
 12 men had a wife and 1 child to support.
 11 men had a wife and 2 children.
 3 men had a wife and 3 children.
 4 men had a wife and 4 children.

STATEMENT OF INCOME AND EXPENDITURE FROM AUGUST 1ST, 1907, TO JULY 31ST, 1908.

	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
To Provisions	555	7	10				By Fees, 14·70 Men at 25s.						
.. Cleaning, Heating, Lighting, and Laundry	98	7	7				per week	966	5	0			
.. Dispensary	14	7	0				By Fees, 5·40 Men at 13s. 4d.						
.. Cost of Office, Stationery, Cartage, &c.	32	1	2				per week	188	5	8			
.. Medical Superintendent's Salary	150	0	0								1,154	10	8
.. Wages of Domestic Servants, &c.	73	12	8										
.. Wages paid to Patients (indoor)	40	10	7										
.. Rent, Taxes, Insurance, Renewals, and Repairs	96	2	1										
				1,060	8	11							
*Balance, being excess of Total Income over Total Expenditure											94	1	9
<i>Garden.</i>											1,154	10	8
Wages paid to Patients	85	0	0										
Hired outside Labour	14	0	0										
Seeds, Plants, Manure, &c.	48	10	0										
				147	10	0							
				£1,302	0	8							
Deduct Wages paid to Patients —Indoor and Outdoor as above	40	10	7										
	85	0	0										
				125	10	7							
				1,176	10	1							
*Deduct profit shown above											94	1	9
				£1,082	8	4							

1,082l. 8s. 4d. represents actual cost of running Sanatorium and Garden for 12 months with an average of 20 patients in residence, or say, 21s. per week per patient.

Upon 42 patients there were dependent :—
 37 wives.
 12 other adults.
 29 children 0-5 years of age.
 23 children 5-10 years of age.
 8 children 10-15 years of age.

Total - 109

Ages of Patients.	
Between 15 and 25	33
.. 25 and 35	30
.. 35 and 45	19
.. 45 and 55	5
Over 55	1
Total	88

Duration of Stay.

50 single men averaged 150 days.
 38 married men averaged 108 days.

RESULTS OF THE EXPERIMENT.

Treatment and Education.—From the point of view of the treatment and education of the patients, the work of the colony was most satisfactory. Dr. Chapman, a man of considerable sanatorium experience, was fully satisfied with the progress made by the patients, and the writer of these notes, who visited the colony on several occasions, can confirm Dr. Chapman's favourable impression. The patients took a keen interest in the work, and a certain number of them settled on the land permanently after their discharge.

Financial.—For the present purpose, it is unnecessary to consider in detail the capital outlay on buildings, &c. As a matter of fact the adaptation of the buildings to sanatorium purposes, including the re-modelling of the drainage system, and the installation of a water supply from the town main cost some 450l. The purchase of tools and other equipment for the garden, such as wire fencing, outhouses, &c., cost some 60l.

Of more practical interest is the following statement of the income and expenditure of the colony during a period of twelve months.

The sole income of the colony, it will be seen, was the amount derived from the patients' fees and the sale of the garden produce. An analysis of the financial statement shows that, if we leave out of consideration the market garden, which was run at a loss, and take merely the income from the patients' fees, and the working expenses of the sanatorium itself, we get the following result.

Over a period of twelve months, with an average of twenty patients, of whom, fifteen patients paid 25s. a week, and five patients paid 13s. 4d. per week, there was a profit after paying all expenses of 94l. 1s. 9d. The average cost of the patients per head per week during this period was 11. 0s. 4½d. These figures show how cheaply efficient treatment can be given to working class patients.

When we include the market garden account, in the above, we see that the profit of 94l. 1s. 9d. is converted into a loss of 137l. 8s. 3d. for the financial year. The loss on the market garden, the expenses of which include of course, the payments made to patients for work done (85l.) appears to have been 107l. 10s. 0d.

The following are the actual figures:—

<i>Income.</i>		£	s.	d.
Sale of produce		40	0	0
Balance—representing loss		107	10	0
		£147	10	0
<i>Expenditure.</i>		£	s.	d.
Wages paid to patients		85	0	0
Extra labour, hired		14	0	0
Seeds, plants, manures, &c.		48	0	0
		£147	10	0

Of this loss, Dr. Chapman estimated that at least 50l. could fairly be written off on account of the improvement of the property.

The following broad conclusion can be deducted from the Financial Statement. The actual cost of running the market garden and sanatorium for twelve months with an average of twenty patients was 1,082l. 8s. 4d., which works out at an average of nearly 21s. per week per head. The sums paid to the patients in return for their labour are not included in the 1,082l. 8s. 4d., as this item would not appear in the accounts of an ordinary farm colony for consumptives.

It is quite clear that if a market garden colony is established on land, which is not already under cultivation, considerable time and money must be expended before any adequate financial return can be expected. The gardens, in short, must for a time at least be run at a loss, the profit being represented by the education and treatment of the patients. The Clacton experiment suffered from this initial handicap of uncultivated land. Had the work been continued for several years, the financial result would unquestionably have steadily improved. The results of the experiment suggest a market garden run in connection with a sanatorium should ultimately be a source of profit. There would need to be a very careful selection of the patients sent to the colony, and skilled business management. It is also important that the colony should have some large centre close at hand, to serve as a market for the produce.

This brief report has been written up from notes and records kindly given me by Dr. Chapman.

N. D. BARDSWELL.

March 1912.

REPORT submitted by N. D. BARDSWELL, M.D., ON THE OXFORD DISPENSARY SCHEME.

This was established by the Oxfordshire Association for the Prevention of Tuberculosis in October 1910, the tuberculosis officer having been appointed on the same date.

The work of this Association extends over the city of Oxford, the whole of the county of Oxford, and parts of Berks and Bucks: roughly over a radius of 22 miles in every direction from the city.

The population of the city of Oxford	=	53,149
The number of deaths from pulmonary tuberculosis	=	47
The number of deaths from other forms of tuberculosis	=	22
Approximate population of rural area	=	200,000
Approximate number of deaths from pulmonary tuberculosis in same	=	188

Compulsory notification has been in force since January 1st, 1912.

From May 1st to December 31st, 1911, 79 cases of pulmonary tuberculosis were notified in the city, of which in 45 cases the diagnosis was confirmed by the presence of tubercle bacilli.

The staff concerned in the work of the Association are:—

- The tuberculosis officer.
- Two nurses (whole time).
- The sanitary staffs of the city and county medical officers of health do house inspection, disinfection, &c.

The tuberculosis officer has a salary of 200l. per annum all found, his board and residence being given at the General Hospital of Oxford. Of his salary, the Association pays 80l. per annum and all travelling expenses. The remaining 120l. is paid by the city, in return for which the tuberculosis officer works three days a week in the city under the supervision of the medical officer of health.

The work of the Ante-tuberculosis Association can conveniently be considered under two heads: (1) in the city; (2) in the surrounding rural districts.

(1) In the City.

Accommodation.—There is no dispensary in the usual sense of the term, e.g., no separate building. The dispensary consists of a special tuberculosis out-patient department of the General Hospital, under the medical control of the four honorary physicians. The tuberculosis officer, to all intents and purposes, is an out-patient house physician. No hospital letters are required of those attending this department, but all patients must be passed by the almoner before receiving attention. If the patient thus passed is under the care of the local general practitioner, this general practitioner is informed, and is asked whether he would like his patient treated at the dispensary department. In most cases the general practitioner assents. Tuberculin is given to a proportion of cases considered suitable. The dispensary hours are: Friday, 10 to 4, Wednesday and Saturday, 6 to 7.30 p.m., for tuberculin treatment; and Monday, Tuesday, and Friday, 6 to 7 p.m. for examination of contacts.

In addition to this tuberculosis department, the ordinary out-patient department of the hospital, open on three days weekly, sees and treats cases of pulmonary tuberculosis independently of the tuberculosis department. The records of these cases belong to the hospital authorities, but the records of the tuberculosis department belong to the Association. Under these conditions, a patient within a short period may pass through the hands of the four visiting physicians to out-patients, the tuberculosis officer, the resident house physician when assisting out-patients, and the general practitioner.

Beds.—There are 18 open-air balcony beds in the General Hospital, under the control of the honorary medical staff. The tuberculosis officer has no power to admit patients to these beds, and a patient recommended by the honorary staff for admission usually has to wait three months for a bed. These 18 beds are not kept exclusively for cases of pulmonary tuberculosis, and at times only half these beds will be thus occupied. The cases of pulmonary tuberculosis selected for admission are usually well-advanced cases, with a view to teaching

physical signs to the Oxford student. Probably less than 10 per cent. of all the cases of pulmonary tuberculosis in the city pass through these beds.

Sanatoria.—There are no sanatorium beds available. Occasionally, a case is sent to a sanatorium by voluntary effort. Less than 1 per cent. of all the cases are treated in a sanatorium.

Advanced Cases.—The only provision is the workhouse infirmary. On an average, seven cases of pulmonary tuberculosis die in the workhouse per annum.

The dispensary thus serves as a consulting physician to the general practitioner. It examines sputum free of charge and supplies sputum flasks at 6d. (sixpence) each, also printed instructions *re* home treatment. The tuberculosis officer only sees such cases as come up to the dispensary, and most of these patients remain under the care of their general practitioner.

As assistant to the medical officer of health on three days of the week, the tuberculosis officer has access to the houses of most of the cases he sees at the dispensary. In this way he is able to get at, and examine contacts, with or without the co-operation of the general practitioner, and in a tactful way he associates himself with the general practitioner in the treatment of the case. The tuberculosis officer does not visit the cases notified to the medical officer of health who do not attend the dispensary, and in consequence the contacts of these cases are not examined by him.

The arrangement by which the tuberculosis officer visits homes under the auspices of the medical officer of health, and not in virtue of his post as tuberculosis officer, was made, on the anticipation that the general practitioners would object to his going to the houses of their patients. As a matter of fact, no such difficulty has arisen. Recently some 20 general practitioners memorialised the Association requesting that the tuberculosis officer should be free to take complete charge of home treatment in some cases, but this request was refused. Before examining contacts in houses of the better-class club patients, the tuberculosis officer obtains permission from the club doctor concerned.

The tuberculosis officer estimates that in one way or another he sees 40 per cent. of the cases of pulmonary tuberculosis amongst the working classes.

Housing Conditions in Oxford.—The house accommodation in the city is above the average. The large proportion of the working classes live in five-roomed cottages. Bed contacts are thus rare, and bed contacts "of necessity" extremely rare. A separate bedroom for a patient can nearly always be obtained without bringing about any bad degree of overcrowding. The great majority of houses have sufficient garden for the erection of a shelter. There is one loan shelter in use in the city and three other shelters have been converted out of out-houses. Home treatment, then, can be carried out under conditions which compare extremely favourably with conditions existing in cities like Sheffield. The results of home treatment in Oxford are very satisfactory.

The disadvantages of the work in the city, from the point of view of the tuberculosis officer, are that he serves three masters, viz., the honorary staff of the dispensary, the medical officer of health, and the Association. He has no beds under his control for observation, &c., and no sanatorium beds. Also that he cannot take complete charge of the home treatment of cases.

The tuberculosis officer would like to be clear of his three days' work for the medical officer of health, as he would then be more free to get about the country. Personally, the relations of the medical officer of health and the tuberculosis officer are most cordial, but the tuberculosis officer is essentially keen on treatment, while the medical officer of health is chiefly concerned in sanitary efforts.

(2) *Work of the Association in the surrounding Rural Districts.*

As previously noted, the Association covers a radius of 22 miles in every direction from the city.

There are two branch dispensaries in this district—at Thame (13 miles E., population 3,000 urban and

6,000 rural); at Witney (12 miles W., population 3,800 urban and 17,000 rural).

Another dispensary is proposed for Banbury (22 miles N.).

The country generally consists of small villages of some 200 people pretty close together and fairly easy of access by road and rail.

The dispensaries at each of these centres are Non-conformist meeting-houses. Thame is visited once a fortnight, hours 12 to 3, and Witney once a week, hours 2 to 5. In both cases the market day is the selected date. The tuberculosis officer travels on a motor bicycle provided by the Association, and the nurses travel by road on bicycles from the nearest available railway station. All the general practitioners in the district served were advised of the opening of the dispensaries and invited to co-operate.

Patients seen at these centres are for the most part sent in by the local general practitioner, and nearly all belong to clubs. A local lady also attends at these dispensaries. She keeps a record of the cases, and also serves as an almoner. At these branch dispensaries, the patients receive the sputum flask (price 6d.) and the usual directions. The patient's home is visited within a few days by the tuberculosis officer who examines contacts, and by a nurse who gives the more detailed instructions as to home treatment. The nurses play a very important part indeed in the direction and supervision of home treatment. The branch dispensaries also provide medicine, which can be obtained with a dispensary order on the local chemist.

The cottage accommodation is very fair; most patients have good gardens. Though a poor country, there is little real poverty and a large amount of charitable help for necessitous cases. The treatment of patients is often carried out in shelters. The tuberculosis officer is empowered to order shelters when necessary. They cost five guineas each and are provided by the Association. There are 23 such shelters now in use. There is no provision for advanced cases. The cases who die, die in their cottages.

The tuberculosis officer covers the whole of the rural area once in every four to six weeks, and the nurses about do the same. The visits are arranged so that one of them visits once a fortnight and in the interval the general practitioner visits. The giving of tuberculin treatment to patients in the rural districts has been found to be impossible, owing to the comparatively infrequent visits of the tuberculosis officer, the difficulty of keeping appointments as a result of the long distances to be covered by the patients, and the impossibility of the patients going to Oxford. As things are, the general practitioner would have to undertake tuberculin treatment.

Apropos of tuberculin, the tuberculosis officer, after 18 months' experience, concludes that tuberculin, though of distinct service in a proportion of cases, is by no means an essential, generally speaking. He finds no material difference between the after results of those treated with tuberculin and those treated on sanatorium principles only.

Reviewing his work of the past 18 months, Dr. Stobie, the tuberculosis officer, is of the opinion that with adequate supervision, home treatment in the city is quite satisfactory. What is wanted for the whole area, viz., the city and rural district is:—

- (1) Sanatorium accommodation for early cases—50 beds, or one bed per 5,000
- (2) Home for advanced cases—50 beds.
- (3) Central dispensary in the city with 4 beds.

The tuberculosis officer and the medical officer of health suggest a house with garden being converted into a dispensary. A suitable house might be got for 100l. per annum, in or on the confines of the city.

The tuberculosis officer thinks that two medical officers and three nurses, two of whom should live at the out country dispensaries, would be sufficient. The senior nurse should get 100l. per annum with bicycle and travelling expenses and the junior nurse 80l. ditto.

As evidence of the amount of work that can be got through, the annual report for 1910-11 records that Dr. Stobie from February to September 29th, paid 787 visits, and one nurse during the same period 1,249 visits.

I have had the opportunity of talking over the work of this Association with Sir William Osler who takes a very active interest in it. Sir William agrees with Dr. Stobie as to the requirements already stated. He is strongly of the opinion, however, that the observation beds in the city should be in the local hospital. This plan would be better for student purposes, and would allow the tuberculosis officer to keep in touch with surgical tuberculosis and other work. Sir William has a horror of the tuberculosis officers sinking into a deep groove of one line of work. He agrees that for the success of this scheme, the hospital staff must hand over these observation beds to the absolute control of the tuberculosis officers.

Sir William Osler makes a strong point of protecting the susceptibilities of the general practitioner, and cordially approves of any scheme of co-operation of the general practitioner and the tuberculosis officers. This co-operation has been cultivated with the greatest success in and around Oxford. As expressed by the tuberculosis officer himself, when working his country districts he lunches with one general practitioner, dines with another, and often sleeps at the house of another. The nurses, too, are welcomed everywhere.

It is quite clear that the staff of the Association are particularly suited for the work.

A note *re* after-care in rural districts.—With the nurses and the tuberculosis officer continually through the country, little difficulty is experienced in keeping in touch with discharged cases. The Association staff in the course of 18 months' work have come to know the country and its inhabitants very intimately. In addition, in every village throughout this district there is a correspondent, usually the wife of the vicar, who reports once a month. The organisation of this village correspondence scheme which is wonderfully complete, is due to the efforts of the honorary secretary of the Association in Oxford.

In conclusion, I should add that a marked improvement in regard to open windows, and hygienic living generally, is to be noted throughout the country served by the Oxford Association.

N. D. B.

March 1912.

I have to thank Sir William Osler, Dr. Stobie, and the Hon. Secretary of the Oxford Anti-Tuberculosis Association for their assistance in the preparation of this memorandum.

MEMORANDUM submitted by N. G. BENNETT, M.B.

In view of the constitution of the Committee appointed by the Chancellor of the Exchequer, it is probably unnecessary to refer at any length to the importance of insuring a healthy state of the mouth in tuberculous patients. The liability to infection by the tubercle bacillus of tissues, especially glands, whose resistance has already been lowered by septic infection is pretty generally recognised; and, unfortunately, owing to the extreme prevalence of dental caries in childhood, and the neglect of treatment, most tuberculous patients exhibit an unhealthy condition of the teeth, gums, tonsils, and oral cavity generally, which, if it has not been a contributory cause of their infection, is almost certainly a serious impediment to cure.

When any treatment of the mouth is undertaken, it is usually of a somewhat drastic character, and involves the extraction of all teeth in any way affected by caries or by disease of the periodontal membrane, in order that the mouth may be brought into a condition as little septic as possible. This form of treatment is no doubt much to be preferred to total neglect of the oral condition, but it is very far removed from the best. Many of the teeth extracted could be saved by appropriate conservative treatment, and this, in the case of patients suffering from a wasting disease, is surely of importance. It must often happen that the mouths of tuberculous patients are rendered more or less aseptic at the expense of masticatory efficiency, and that thereby one of the first essentials for improved nutrition is abolished. It is not here suggested that anything at all elaborate in the way of conservative treatment is desirable; the wants of the patient are—

- (1) Removal of teeth seriously affected by caries or periodontal disease.

ABSTRACT OF BALANCE SHEET, October 1910 to October 1911.

	£	s.	d.
Tuberculosis Officer	Salary	200	0 0
31II. 12s.	Residence in Radcliffe		
	Infirmary	36	3 0
	Travelling expenses	15	15 8
	Motor bicycle	48	0 0
	Repairs to ditto	11	13 4
Nurse	Salary, seven months	58	6 8
8II. 0s. 8d.	Training at Edinburgh, &c.	9	4 0
	Travelling expenses	6	10 0
	Bicycle, annual charge	7	0 0
Dispensaries	Radcliffe Infirmary (opened Oct. 1910)		
7II. 8s. 1d.	Furniture and equipment	6	3 3
	Printing and stationery	28	0 0
	Postage	5	0 0
	Flasks, &c.	9	15 9
	Thermometers and cases	13	16 6
	Tuberculin	6	16 8
	Drugs	1	15 11
42I. 18s.	Witney (opened March 30, 1911):—		
	Rent	2	11 0
	Furniture and equipment	18	17 0
	Chemist	19	12 6
	General expenses	1	17 6
10I. 15s.	Thame (opened Nov. 28, 1911):—		
	Consulting room	10	15 0
		90	17 9
16 shelters	Erection, repairs, delivery, &c.	12	9 0
103I. 6s. 9d.	Special cases. Granted to	26	16 9
	Printing reports, stationery, &c.	100	6 6
	Advertising, lectures, petty cash	5	2 6
	Stamps on agreement with district councils	0	15 0
	Insurance—doctor and nurse	1	5 6
	Cheques	0	10 0
	Total	£755	16 9

- (2) Simple conservative treatment of teeth less affected, and treatment of the gums and oral mucous membrane.

- (3) Provision of artificial substitutes for those whose masticatory efficiency is gravely defective.

For these purposes it is, perhaps, obvious that dental surgeons should be appointed to sanatoria or other institutions for the reception of tuberculous patients. The treatment should be undertaken directly after admission, or as soon after as the physician in charge of the patient considers fit.

It is difficult to lay down conditions of tenure of appointment or terms of remuneration without more knowledge of the sanatoria to be established, and other arrangements to be made in connection with them, but it may be said that the appointments should probably be part-time ones, and with local dentists; that the remuneration should be on a time basis (except for artificial dentures if, or whenever, required); that the work should be done at the sanatoria; and that with a view to uniformity indications of the general lines of treatment to be adopted and objects to be attained should be laid down.

Finally, it may be pointed out that the whole matter is closely bound up with that of dental clinics for school-children; as soon as these become general, both the amount and the severity of the treatment needed for tuberculous patients (especially those in early adult life) will be much reduced.

On behalf of the Executive Committee of the British Dental Association,

NORMAN G. BENNETT,
Chairman of the Representative Board.
March 1912.

MEMORANDUM submitted by THE BRITISH MEDICAL ASSOCIATION.

The British Medical Association, in laying its views before the Committee appointed by the Chancellor of the Exchequer to consider questions of general policy in respect of the problem of tuberculosis in its preventive, curative, and other aspects, confines its observations to the part which the Association is of opinion the general medical practitioner should play in any provisions made by the Government or local authorities.

It is assumed that the Committee is already in possession of, or has access to, expert information as to the special medical and administrative points which arise for consideration.

The Association also assumes that the Committee is considering the subject of its reference in its widest aspects and not with a view merely to the provisions of the National Insurance Act, or of any existing administrative methods of dealing with tuberculosis.

1. The Association would lay down as a fundamental proposition that no system of dealing with the problem of tuberculosis can be efficient which does not make the fullest use of the general clinical experience and the opportunities for intimate personal contact with affected persons which the general practitioner possesses. The general practitioner has the best opportunities for making that early diagnosis on which successful treatment depends, and for knowing when other advice should be sought; his intimate personal contact and influence with the family should, if properly utilised, be invaluable in any system of prevention.

The Association would endorse the words used in an authoritative recent work:—

“If we aim at mastering tuberculosis, no matter by what means, it must in the future become and remain the domain of the general practitioner; it is he who must advise and select and then insist on treatment.”—(Bandelier and Roepke, “Tuberculosis in Diagnosis and Treatment,” 1909.)

2. The relation of the general practitioner to the administrative problem may be dealt with under the following heads:—

- (a) Diagnosis by practitioner in attendance, either alone, or with expert assistance (clinical, microscopical, or otherwise).
- (b) Treatment—(1) Domiciliary, (2) dispensary (tuberculin or otherwise).

Diagnosis.

3. It is fully realised that there are many cases in which the opinion of an expert would be invaluable, and it is submitted that such opinion should be placed freely at the service of the attending practitioner, who should be encouraged to arrange for a personal consultation. If such an arrangement is to be successful there must be no risk of the practitioner in attendance being superseded, except, of course, in the ordinary way, namely, by the desire of the patient himself. No case should be seen by the expert except at the request of the practitioner. The practitioner should be encouraged not only to send his patient to the expert, but to take him for the purpose of a personal consultation. Provision for a bacteriological examination of sputum, &c. should be placed freely at the disposal of every practitioner.

Treatment—Domiciliary.

4. Domiciliary treatment should be carried out as far as possible by the practitioner in attendance, when necessary with the help of and under the supervision of expert consultants.

The Association fully recognises the necessity and value of expert assistance. It is not suggested for a moment that every general practitioner is cognisant of the details of the most modern treatment of tuberculosis, but it is believed that if encouragement were given to the private practitioner to make full use of expert advice given by men who were not and could not be in competition with him for private practice, there would be great advantage, both from the public and the professional point of view. The patient and the attending practitioner would have expert opinion placed at their disposal, while the

services of the private practitioner would be enlisted in carrying out the treatment decided on in consultation with the expert. There is no real difference between the domiciliary treatment of tuberculosis and that of other cases as to which expert advice in consultation is taken every day. The expert (consultant) and the attending practitioner settle the line of treatment in consultation and the attending practitioner carries it out, if it can be carried out, at home.

5. In order that private practitioners may be able to co-operate effectively with the local authorities and with the experts appointed by these authorities it is suggested that practitioners should not only be encouraged to take their patients personally to the institutions where expert diagnosis and treatment is provided, but should be invited to look upon these institutions as places of post-graduate instruction in which they may learn the technique of tuberculin or other special treatment, and carry it out in cases reserved for domiciliary treatment. Treatment by tuberculin injections is mentioned only because it is the method of treatment at present most in vogue. It may quite possibly be superseded in a few years, but in any case it presents no difficulties which could not be overcome in a short time by properly trained and qualified practitioners.

Dispensary Treatment.

6. If the above suggested methods were adopted dispensary treatment would only be needed for (a) cases sent by outside practitioners for early treatment afterwards to be continued at the patient's home under the combined supervision of private practitioner and consultant, and (b) cases where the treatment was continued at the dispensary by agreement between private practitioner and expert.

7. The work at the dispensary might with great advantage to the public and the local profession be carried on by a staff of part-time practitioners under the supervision of the whole-time expert. If the local practitioners were appointed on a rota, so that all practitioners who cared and were in other respects suitable might in their turn take a share in the work, the educational effect on the profession would be great and the ultimate benefit to the public marked.

8. It is hoped that the Committee will not overlook the question of provision for cases of surgical tuberculosis. Here, again, the combined services of the consultant and the attending practitioner will often allow of these cases being treated at home, but proper hospital accommodation should be provided for the cases which need such provision.

Position of the Experts.

9. It is submitted that there will be little danger of friction between the authority directing the administration of tuberculosis prevention and treatment and the general body of private practitioners if the relation between the expert employed and the local profession is definitely defined to be that of the consultant to the attending practitioner. There would be no hesitation on the part of the attending practitioner to call in the services of the expert if he knew that these were freely at his disposal, and he was assured that there was no danger of supersession or unnecessary interference. That is to say, the consultant must be a well-paid whole-time officer of undoubted special experience.

10. The Association submits that the principles here laid down are the only ones applicable to all parts of the country, urban and rural. Whereas in a town it is conceivable, though in the opinion of the Association highly inadvisable from every point of view except perhaps that of mere administrative convenience, that the tubercular patients needing special treatment might be attended entirely by whole-time officers, it would be extravagant and almost impossible to deal in this way with patients scattered over rural areas. The services of the general practitioner must therefore be utilised in some parts of the country, and the Association strongly holds that it will be better that in the initiation of a national tuberculosis system the general practitioner should be gladly and freely recognised as an essential factor everywhere, and arrangements made accordingly.

11. It is realised that for administrative purposes the employment of whole-time officers offers certain obvious advantages.

But these advantages would be dearly bought if, as the Association believes, the extension of this principle would lower the status and general standard of attainment of the general practitioner and diminish his

sense of responsibility, his field of experience, and his general public utility. The possibility of thus lowering the standard of the class of practitioner on whom the general public must for the most part rely, is one which the Association regards with dismay.

April 1912.

MEMORANDUM submitted by the BRITISH SCIENCE GUILD to the CHAIRMAN of the
DEPARTMENTAL COMMITTEE ON TUBERCULOSIS.

MEMORANDUM BY THE MEDICAL COMMITTEE.

A. The system best fitted for the prevention of tuberculosis is a matter that may very properly be considered and advised upon by the British Science Guild.

B. Tuberculosis is a widespread and protean disease, whose effects are apparent at all ages. Its aetiology soil and seed are inter-dependent factors. The eradication of tuberculosis can therefore only be attained by a system which will control the sources of infection, treat the patients and correct the environment.

C. There are two possible causes of infection—bovine and human. A small proportion of tuberculosis in childhood is due to milk, but the Final Report of the Royal Commission on Tuberculosis (Human and Bovine) states that "Only rarely has a pulmonary lesion in adult man yielded the bovine bacillus." We may rightly assume that in every case of pulmonary tuberculosis, with tubercle bacilli in the sputum, there is the potentiality for the massive infection of those in contact with the patient. While milk cannot be regarded as so important a factor in infection, its significance must not be overlooked.

D. Many types of case require consideration: the infants who die in the early months of life from tuberculosis meningitis or tabes mesenterica—the children who fill the wards of sick children's hospitals, with bone, gland and joint tuberculosis—the potential cases of the future, the infected children of consumptive parents—the incipient cases of early adult life—the tuberculosis mother—the unknown and undiagnosed carrier cases—the patient with moderately advanced disease—the chronically affected worker—and the dying. The morbid activity of the tubercle bacillus covers a large portion of the field of clinical medicine. It is clear that there must be adaptation of institutions to the different issues. Any scheme for the eradication of tuberculosis must be so co-ordinated as to control the source of infection at every point and provide treatment within the reach of every patient at every stage of the disease.

E. The factors in such a scheme would require to provide for the diffusion of knowledge, the treatment of patients and the control of their homes. For this the following units are necessary:—

1. TUBERCULOSIS DISPENSARIES.
2. OPEN-AIR SCHOOLS.
3. SANATORIA.
4. HOSPITALS FOR ADVANCED CASES.
5. FARM COLONIES.

Each of these units is essential, but their efficiency depends upon the manner in which they are combined and co-ordinated. Some areas possess already one or more of the institutions mentioned, and in such cases it only remains to fill up the gaps.

The details of organisation should be as complete as possible, and full recognition should be given to the work of existing agencies, whose efforts should be linked up into one systematised scheme. Such is the general outlook of the Edinburgh System, the component parts of which are hereafter described.

1. THE TUBERCULOSIS DISPENSARY.

- (a) Its relation to the scheme.
(b) Collection and diffusion of knowledge.
(1) Limitation of infection by direct and indirect measures.
(2) Limitation of the fear of infection.

(c) Centre for immediate treatment.

- (1) Of patients on general, therapeutic and specific lines at the dispensary.
 - (2) Of patients in their own homes.
- (d) Centre of domiciliary investigation.
(1) Investigation of the household.
(2) Investigation of the house.
(3) Social treatment and co-operation with charitable agencies.
- (e) Centre for sorting out the entire mass of tuberculous material in the area controlled.
- (f) Centre of after-care of patients returned from sanatoria.
- (g) Staff—qualifications, duties and relation to other officials in the scheme. Salaries.
- (h) Equipment and maintenance of dispensary.
- (i) Number of dispensaries required.

(a) *The Dispensary is situated in the centre of the area to be controlled.* It is close to the disease, the sources of infection, and the conditions which favour the spread of it. It is directly in touch with the patients, and forms the connecting link between them and the other institutions connected with treatment—the sanatorium, the open-air school, the farm colony, and the hospital for advanced cases.

(b) *For all interested in the problem, it is the Information Bureau,* where advice on every aspect of the question may be obtained. It is, moreover, the tuberculosis directory of the area and the storehouse of facts and figures relative to the disease, and the social and economic conditions of the patients. It is, therefore, the natural centre from which an educational campaign may be carried on among the people. Such a campaign aims at the limitation of infection by the direct education of the patients by the dispensary staff in those simple precautions whereby a check may be placed upon the spread of infection. This also would be advanced by the distribution of periodicals, by leaflets, by lectures and demonstrations (caravans in rural areas), and by personal instruction (district visitors, nurses and cured patients).

Another most important aspect of education is the limitation of the fear of infection. The fact that we have no authentic case of infection among the medical or nursing staff of any tuberculosis institution during the past ten years is proof of the absence of danger under proper conditions.

(c) *The Dispensary is the centre for immediate treatment for a large proportion of tuberculous patients.*

- (1) The large group of early cases who may be treated at the Dispensary without interfering with their occupation. The treatment comprises open-air conditions in their own homes, medicinal treatment when required, and tuberculin. This last is an invaluable adjunct to general treatment, and the form and method of its administration in a matter for the expert in charge of the Dispensary to determine.
- (2) It is the centre from which a number of more chronic cases will be treated in their own homes—where the conditions are so good that the patient may without danger be allowed to remain at home, or where it is not possible to persuade the patient to enter a hospital.

(d) *The centre of domiciliary investigation.*

- (1) From the Dispensary, an expert visits the homes of all patients, not only to see that his instructions have been carried out, but

also to examine all those in contact with the original case, so that the disease may be detected at a stage when its cure is relatively simple. Objective evidence of tuberculosis may be present before the patient complains of subjective symptoms.

- (2) An investigation of the house is also made by the doctor and nurse, the latter noting condition of rooms, windows, sleeping accommodation, precautions to disinfect, &c., on a special form. This she fills up on her return to the Dispensary. The doctor will report any unfavourable conditions of housing, outside the patient's control, to the Medical Officer of Health.
- (3) The Dispensary is the centre of co-operation between an expert medical staff and those who are working in the same field from religious, social and philanthropic agencies. Such co-operation is invaluable to all concerned, as voluntary workers can assist in a variety of ways—in the friendly visitation of patients—in the care and nourishment of infants and children—in selecting children to be apprenticed on leaving the open-air school—in the choice and preparation of food—and in finding suitable employment for adult patients.

(e) *The Tuberculosis Dispensary is the clearing house.*—At the Dispensary, the great mass of tuberculous material is sorted out. Probably 70 per cent. of the cases can be treated at the Dispensary. Of the remainder, there are the infected school children, who do not progress at the ordinary schools, but who quickly recover the balance of health, and whose resistance is raised at an open-air school. The adult whose recovery depends upon his having the optimum of hygienic conditions is sent to the Sanatorium. The dispensary is the institution most suited for the selection of sanatorium cases. Advanced cases are recommended for suitable hospitals, not only in their own interest but in that of their friends.

(f) *The Tuberculosis Dispensary supervises the after-care of patients.*—When patients return from the Sanatorium, they should return to the supervision of the Dispensary, which should look to conditions of home, work, &c., so as to prevent a relapse.

(g) *Staff.*—The Principal Medical Officer should be an expert of large experience. The early diagnosis of pulmonary tuberculosis is often a difficult clinical problem. To secure the best results and ensure confidence in the Dispensary, it is necessary that the medical officer have sufficient reputation in this branch of medicine. His duties should comprise:—

The entire medical administration and discipline of the Tuberculosis Dispensary.

- (a) To diagnose and classify the cases.
- (b) To treat the majority of patients at the Dispensary.
- (c) To treat patients in their own homes.
- (d) To distribute suitable cases to various institutions.

Salary.—If the work is to be efficient and the best men attracted, good salaries should be paid of 500*l.*–600*l.* per annum. Assistant Medical Officer to assist in the above duties, salary 250*l.* per annum.

The Nurse receives patients at the Dispensary before they see the doctor, entering particulars as to family history, &c., on the medical case sheet. She visits the homes in order to—

- (1) Gain the confidence of the patients and indicate how best the home conditions may be changed.
- (2) Rectify any faulty conditions, where this lies in the power of the inmates.
- (3) Report the result of her investigations carefully in the "Schedule of Enquiry" at the Dispensary.
- (4) Nurse bed-patients where this is required.
- (5) Collect a specimen of sputum the day after the patient has first attended the Dispensary.

Salary.—120*l.* per annum.

Dispenser.—Salary, 75*l.*–100*l.* per annum.

Clerk.—To assist Medical Officer in correspondence and statistics. Salary, 75*l.*–100*l.*

Porter and Caretaker.—To look after the premises, weigh and measure patients. Salary, 50*l.* per annum fire, light, and rooms.

(h) *Equipment and Maintenance.*—A dwelling-house may be adapted.

The Tuberculosis Dispensary includes:—

- One or more waiting rooms.
- One or more dressing rooms.
- One or more consulting rooms.
- An office.
- A drug dispensary.
- A small bacteriological laboratory.
- Caretaker's rooms.

Unnecessary furniture to be avoided. Rooms light and airy. The equipment of the rooms requires no comment.

Maintenance:—

	£
Rents and taxes	100
Principal Medical Officer's salary	500
Assistant Medical Officer's salary	250
Salaries of two nurses (120 <i>l.</i> each)	240
Dispenser's salary	75
Drugs	75
Porter	50
Heating and lighting	40
Cleaning and repairs	30
Stationery and postage	15
Printing	25
Petty cash	10

Total . . . 1,410—say, 1,500*l.*

(i) *Number of Tuberculosis Dispensaries required.*—This will vary in different cases, and it is not possible to lay down definite numbers. One Tuberculosis Dispensary is required for each of the London boroughs, and in cities in general, one dispensary, given certain conditions, can serve 150,000 to 200,000 of population. The Royal Victoria Dispensary, Edinburgh, may be cited as an example of a town dispensary, while the Tuberculosis Dispensary at Oxford is an instance of a county dispensary.

2. TUBERCULOSIS SCHOOLS.

For purposes of medical treatment and the control of the affected homes, these should be under the supervision of the medical officer of the Tuberculosis Dispensary or the Sanatorium. The time-table must be varied according to the health of the children, and will be drawn up by the Education Department in co-operation, as far as possible, with the medical officer of the Tuberculosis Dispensary or Sanatorium.

The following classes of children are suited for treatment at a Tuberculosis School:—

- (1) Infected children from tuberculous homes.
- (2) Children who have already been treated for tuberculosis at sanatoria or convalescent homes, and have been discharged cured.

It follows that to deal adequately with these children, medical supervision, not only of the child, but of the home conditions, is required, and that their health should determine their choice of occupation in later life.

The Tuberculosis Schools must be open all the year round, and, if necessary, the child must complete his education there.

3. THE SANATORIUM.

It is best that these should be situated in the immediate neighbourhood of the area it is intended they should supply, and this for the following reasons:—

- (a) Altitude and surroundings are minor considerations compared to the establishment of a physiological regimen. If one compares sanatorium statistics from all over the

world, it is clear that cures do not depend upon situation, but upon the class of case admitted, the efficiency of the regimen and the duration of treatment. Again, it has been found possible to treat dispensary patients in the midst of city surroundings.

- (b) If the Sanatorium be near a large centre, it becomes an object lesson to the entire community.
- (c) The cost of supplies, transit and maintenance, is much increased if sanatoria be built far removed from the patients' homes.

The patients for the Sanatorium should be selected out of the Dispensary clientele by the medical officer of the latter institution. The duration of treatment should be entirely in the hands of the Sanatorium Medical Superintendent. In most cases it should not be less than six months. Too early discharge has been the cause of most failures to arrest the disease. Working in this manner with the Dispensary, the patient returns to a home, the conditions of which are under medical supervision, and he himself continues under expert direction. Again, this arrangement ensures that only suitable cases are sent to the Sanatorium, and a vast waste of public funds is avoided, while relapse on the part of the patient would become less frequent.

Sanatorium furniture should be as simple as possible, and limited to beds, chairs and tables. The installation of any system of heating, except open fires, is a considerable and useless expenditure.

The smaller the Sanatorium, the more individual supervision is possible. A good unit is one of 100 beds; none should have more than 150-200 beds. For this, three medical officers would be sufficient.

There should be sufficient land to ensure a scheme of graduated labour being carried out—say one acre for every four or five patients. Children should be admitted as well as adults; the combination is serviceable in many ways. To erect separate sanatoria for children is to add to administrative difficulties. When thought better, the children can be housed in separate pavilions.

While the majority of the patients will return to their own homes, the disease being arrested, and there

continue under the supervision of the Dispensary, a certain number will require more direct superintendence at the farm colony, not only to complete the cure, but to train them to a new occupation, so that their lives may be spent under the most suitable conditions when they are able to resume their place as wage-earners.

4. THE FARM COLONY.

For affected workers, and to complete the Sanatorium cure in certain cases, farm colonies are essential if an economic as well as a clinical cure be aimed at. The farm colony should be near the Sanatorium, but entirely separated from it—near enough to transfer patients easily and for the Sanatorium to buy its produce. Farm colonies, apart from the initial cost, may be made self-supporting, after, say, three or four years.

5. HOSPITALS FOR ADVANCED CASES.

These must be near the area served, or better, in that area. There should be no compulsion, and the more they resemble a sanatorium in making a definite effort to treat even the advanced cases, and arrest the disease, the more popular they will become. It is better from every point of view that they be not too large, and patients' friends should have ready access to them. The present poor law accommodation is inadequate to meet the needs of the case.

Improved sanitary conditions and better housing will contribute towards the diminution of tuberculosis. On the other hand, a direct attack on the disease is necessary, and we are of opinion that in the different units enumerated in the above, whether founded by voluntary effort, Insurance Committees or borough or county councils, provided always that their work be co-ordinated, as indicated on the lines of the Edinburgh system, and welded into one comprehensive scheme, there is sufficient machinery for the total abolition of tuberculosis in this kingdom.

NORMAN LOCKYER.

Chairman, British Science Guild.

LAUDER BRUNTON.

Chairman of the Medical Committee,
British Science Guild.

MEMORANDUM submitted by Sir JOHN BYERS, M.A., M.D., M.A.O.: Professor of Midwifery and of Diseases of Women and Children, Queen's University of Belfast; Physician to the Belfast Maternity Hospital; Physician for Diseases of Women to the Royal Victoria Hospital, Belfast; and Consulting (formerly Visiting) Physician to the Belfast Hospital for Sick Children.

In considering the administrative treatment of tuberculosis, a problem with so many phases, it may be of interest to discuss certain aspects presented by this protean question, so far as it concerns Ireland.

1. How is it that Ireland, as is shown in the Yellow Book, "Tuberculosis in Ireland," published in 1908, has a comparatively lower death-rate from tuberculosis, than either England and Wales, or Scotland, in the period of life under five years of age, while the first great increase in the tuberculosis death-rate begins in Ireland with school age (5 to 10 years), and continues during it (10 to 15 years), the increase growing steadily during the whole period of school attendance until it reaches its maximum height about the age of 25 years? When we consider the admittedly insanitary condition of so many of the Irish primary schools, to which attention has been so frequently drawn, does it not seem as if the children of Ireland become during school life specially exposed to the direct contagion of consumption, or that the natural forces of their bodies, which we term their resisting power to the attacks of disease, that is, their general tone and vigour, get weakened when attending these unhealthy schools, so that tuberculosis, previously latent, springs into existence? Further, is it not remarkable that, while the female death-rate showed in the period 1901-1905 a reduction of 35.5 per cent. in England, and 32.9 per cent. in Scotland, there was actually an increase between these years in Ireland of

29.8 per cent.? And is it not still more extraordinary that the increase in female mortality from tuberculosis in Ireland at the age period, 10 to 15 years, between the two groups of years, 1871-1880 and 1901-1905, amounted to 29.8 per cent. as compared with an increase of only 2 per cent. in males? Is such a large and such an exceptional increase related to some incident of school attendance? Did more girls go to the national schools during those thirty years than boys, or are girls more prone to tuberculosis than boys during school life in Ireland; or is it due to the fact that when school work is over, the boys are more in the open air, while the girls are obliged to do domestic work at home, and so become still more lowered in physical vigour, or even exposed at times through infection to some relative who is ill of the disease?

2. In 1864 the death-rate in Ireland from tuberculosis was 2.4, in Scotland it was 3.6, and in England 3.3. In 1887 it had risen to 2.7 in Ireland, in Scotland it had fallen to 2.6, and in England to 2.3. In the year 1904 the death-rate from the disease in Ireland had actually risen to 2.9 per 1,000, the highest point touched since registration of deaths was introduced. (In the the years 1880, 1897, 1898, and 1900 this rate was also reached.) The rate declined to 2.7 per 1,000 in each of the years 1905, 1906, and 1907, and since that in the years 1908, 1909, and 1910 it has been steadily falling as is shown by the accompanying diagram.

TUBERCULOSIS MORTALITY.

*Diagram showing the Death-rate in Ireland during 11 years, 1900-1910.

In 1907 there were in Ireland 11,679 deaths from all forms of tuberculous disease, in 1908 there were 11,293, in 1909 there were 10,594, and in 1910 there were 10,016 deaths, a decrease of over 5 per cent. as compared with the year preceding. The following deductions may be made from these figures.

- (1) That the death-rate from tuberculosis—2.3 per 1,000 in 1910—is the lowest recorded since 1864, the year in which registration of deaths was introduced.
- (2) That there has been a decrease of one-seventh of the total number of deaths from tuberculosis in three years.
- (3) That there were 32 fewer deaths each week from tuberculosis in 1910 than in 1907. Or,
- (4) That in every two days in 1910 there were about nine fewer deaths when compared with 1907.
- (5) As it is generally recognised that there are about seven or eight patients suffering from tuberculosis for each death, the decrease in mortality shows there were about 12,000 fewer people suffering from tuberculosis in Ireland in 1910 than there were in 1907, that is actually a number almost equal to the population of one of the larger Ulster towns, Lisburn.

A consideration of these figures raises two questions of great import in the solution of the tuberculosis problem. Why is it that, from 1864 to 1904, the mortality from tuberculosis rose in Ireland while it was simultaneously going down in Scotland and England, and what is the explanation of the steady fall in Ireland since the year 1907? In an address "Why is Tuberculosis so common in Ireland?" delivered on December 18th, 1907, in connection with the Tuberculosis Exhibition of The Women's National Health Association of Ireland (published in the "Lancet" of January 25, 1908, and incorporated in Vol. I. of "Ireland's Crusade against Tuberculosis," edited by the Countess of Aberdeen Dublin, Maunsel & Co., 1908), I have discussed the various causes assigned for the prevalence of tuberculosis in Ireland, and have shown that while the slow progress of sanitary reform in Ireland, as compared with England and Scotland, must be accepted as one reason for the great prevalence of the disease in Ireland, yet the most potent cause which in the past prevented a lowering of the tuberculosis death-rate has been the domestic or home treatment of advanced cases of pulmonary phthisis, because increasing experience demonstrates that with isolation of these advanced "open" cases in any country, the death-rate falls. The first Act (1838) passed for the more effective relief of the destitute poor in Ireland—unlike the English Act—entirely prohibited outdoor relief, but during the great famine (1845-48) the restrictions as to the giving of outdoor relief were for the time relaxed and, although after the famine, the rigid rules as to outdoor relief were re-imposed, it gradually became more general and, from 1880 onwards, the general policy of the poor law authorities was completely inverted, until in 1903-1904, the proportion of new cases of sickness attended, either at dispensaries or in their own homes, formed nearly one-eighth of the total population of Ireland. When I speak of outdoor relief I mean medical relief given in the form of medical attendance, advice, and medicine, either at the dispensaries or at the homes of the patients. In Great Britain, as pointed out by Dr. Newsholme, the regulation has been generally enforced that in order that a sick or disabled husband among the poor may receive relief to which his destitution entitles him he must enter the infirmary; in Ireland, through the dispensary system of the poor law, outdoor relief—in the shape of medicine and medical attendance—is brought direct to the sick consumptive in his own house (often crowded and insanitary), where he remains until he dies, and where, unfortunately, it so often happens many others of the family are directly infected through him with the disease.

* This diagram was reproduced from the Report of the Registrar-General for Ireland and is consequently omitted here.

Turning now to the brighter side of the picture, what is the cause of the steady fall in the tuberculosis mortality since 1907? To my mind such gratifying results are largely the outcome of that wonderful campaign against tuberculosis, initiated, presided over, and guided by her Excellency the Countess of Aberdeen, which was begun in 1906, and which has been carried on so splendidly ever since by the organisation known as "The Women's National Health Association of Ireland." There is an old Spanish proverb which says that "The beginning of health is to know the disease." The famous Tuberculosis Exhibition which travelled all over Ireland—visiting not merely the towns but the remote rural districts (especially in the form of the tuberculosis caravan)—brought home to the people in Ireland in a way that nothing else could, the facts about the disease, its widespread nature, and, above all, it dispelled the hopeless views previously prevailing that it could neither be prevented nor cured. Then the various lectures that were given throughout the country, the literature that was spread broadcast, dealing with every phase of the disease, the wonderful "Ui Breasail" or Health Exhibition, in which every possible feature of public health was so well illustrated, and appended to it the "Town Planning Exhibition," "The Babies Clubs," the Cookery Demonstrations, the Horts, the Guilds of Good Health, and, to crown all, the exertions of the noble band of women in the various branches of the Women's National Health Association, have taught the people of Ireland, as they never knew before, what they themselves can do—by attending to the laws of health—to get rid of what has been so well called the "white plague" of Ireland.

3. In an article, "Tuberculosis among Children in Ireland" (published in a volume "Tuberculosis in Infancy and Childhood," edited by Dr. T. N. Kelynaek, London, Bailliere, Tindall, and Cox, 1908), I have shown that in our children's hospitals about 30 per cent. of the intern patients suffer from tuberculosis in some form and that a large proportion of the cases in these Belfast children's hospitals (about 40 per cent.) are surgical; that is spinal caries, chronic abscesses, joint affections, lymph-adenitis, lupus, abdominal tuberculosis, and bone disease. Such conditions raise that very debatable question, are they due to consumption of tuberculosis milk, a question still "sub judice"? One thing, however, must not be forgotten, the Royal Commission on Tuberculosis state that "there can be no doubt 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, further, there can be no doubt that primary abdominal tuberculosis as well as tuberculosis of the cervical glands is commonly due to the ingestion of tuberculosis infective material." That is the milk of tuberculosis cows, irrespective of disease of the udder, may be a source of tuberculosis in the consumer. It has been estimated that about 10 per cent. of the milk on the market contains tubercle bacilli. In order to get some scientific evidence as to the existence of tuberculosis in cows I asked the opinion of one of the most practical veterinary surgeons in Ireland, who is prepared to submit his records to the Committee. He tested with tuberculin 546 cows, and found among them 103 reactors—that is 18.86 per cent. They were tested with the greatest care, that is each animal had her temperature taken twice or thrice before being subjected to the injection; and, after the tuberculin was used, the temperature was taken at the 9th, 12th, 15th, 18th, and 21st hour (if necessary). The majority of these cows came from different parts of Ireland. We must also recollect that it is now admitted that under present conditions of environment the great majority of individuals—whether the tubercle bacilli reach them by "ingestion" or by "inhalation"—have signs of the disease—fortunately for the larger numbers in a latent state—in their bodies.

SUGGESTIONS FOR THE PREVENTION AND TREATMENT OF TUBERCULOSIS.

1. Early Diagnosis.

If we are to make progress in the prevention and treatment of tuberculosis, early diagnosis is of the utmost importance. To wait in a doubtful case until

tubercle bacilli are found in the expectoration or in any discharges, before diagnosing the condition and starting proper treatment, is a serious waste of time. If, for instance, anyone has a cough which continues, despite ordinary treatment, for at least a month, with an accompanying loss of flesh, but without any expectoration, then, in addition to physical examination of the chest, the regular employment of the thermometer, the opsonic index test, the Röntgen Rays, and the use (in suitable cases) of Koch's old tuberculin, should be employed, and means ought to be available in every anti-tuberculosis campaign by which the poor can have the advantage of these scientific methods of early diagnosis. Treatment begun in such an initial stage of the disease in a sanatorium, or even at home, will prevent many a latent "closed" case from becoming active and "open," and so will be of incalculable value, not merely to the affected patients themselves, but, from a public health point of view, to those in their environment.

2. Notification.

There should be compulsory notification of all cases of tuberculosis; it is a most essential step in the campaign as it tells us where the disease exists and what stage it is in. Unless these facts are known how can any attempt be made to deal with the disease from a public health point of view? When the "Tuberculosis Prevention (Ireland) Act, 1908," was before Parliament many of us urged that it should apply to all cases of tuberculosis, and that it should be compulsorily in force in all parts of the country. Unfortunately, public sentiment and a curious failure to recognise that Koch's discovery of the tubercle bacillus in 1882 made it plain that pulmonary tuberculosis was an infectious disease within the meaning of the Public Health Act, and that the sections of the Public Health Act applicable to other infectious diseases were equally applicable to pulmonary tuberculosis, and that the obligation resting on local authorities to deal with and control infectious disease should be made to extend to pulmonary tuberculosis, were against us, and as a result this Act has been rendered practically useless, because: (1) Part I. of the Act relating to notification and disinfection is not compulsory but is merely adoptive. The sanitary authority who may desire to have the disease notified must first obtain the approval of the county council within whose area it is situated, before the Act can come into force. The other circumstance rendering this Act nugatory is that it limits notification to cases of tuberculosis which are a danger to others owing to the infectious nature of the discharge from the patient, and the Local Government Board aided by the advice of the Presidents of the Royal Colleges of Physicians and Surgeons, as provided for in the Act when making their regulations under section 1 (2), had in view this fact, and they have limited notification to those cases in which they deem it imperative that precautions should be taken, namely, to tuberculosis of the lung in the case of sufferers so circumscribed that they are likely to prove a means of distributing the disease unless precautionary measures are adopted. The following is printed on the back of every form of notification certificate:—

"The Local Government Board for Ireland, after consulting with the President of the Royal College of Physicians in Ireland, and the President of the Royal College of Surgeons in Ireland, have, by the Tuberculosis (Conditions of Notification) (Ireland) Order, 1909, prescribed as follows:—

"In every district to which Part I. of the Act extends, section 1 of the Act shall apply to the form of tuberculosis, known as tuberculosis of the lung, at any stage at which the sputum discharged by the person suffering is in the opinion of the medical practitioner attending on such person liable to communicate the disease to other persons.

"Provided that the said section shall only apply in the following circumstances, that is to say, when the person suffering—

- "1. Habitually sleeps or works in the same room as any other person or persons, not so suffering; or

- "2. If employed or engaged in handling, preparing, or distributing milk, meat, or any other article of human food intended for sale to the public."

As a natural result, numbers of cases of tuberculosis are never notified at all, or they are not notified at a time when by judicious treatment the disease might be arrested. Indeed, in order to fulfil the conditions on the back of the notification certificate, cases have often reached a stage at which treatment of any kind is hopeless. One might as well lay down a rule that scarlatina is not to be notified until there is disquamation. Further, if notification of any infectious disease is surrounded with so many qualifications, medical men, in their own interest, will not risk the responsibility of taking such action as notifying to the public health authorities. While on this matter I would strongly urge that both the medical officers of health and the veterinary inspectors should be officers of the county or borough councils, and that the county or county borough should be the units of the area over which their duties should extend.

3. The Schools.

In Ireland at present the most pressing public health problem is that of the primary schools. We have no medical inspection of the schools, and the reports for the past years of the inspectors of the National Board of Education show the deplorable hygienic condition of these schools. Let me repeat what I said in my opening address, as President of the Conference on Hygiene of Childhood, at the last Congress of the Royal Sanitary Institute (Vol. XXXII., No. 12 (1911), of the Journal of the Royal Sanitary Institute), on "The Hygiene of the Child with special Reference to Ireland":

"In trying to improve the hygiene of the child, keeping always in view the important fact that in health matters prevention is better than cure, we must press for increased vigour in both public and personal hygiene. We must do everything in our power to cultivate the growth of the public sanitary conscience so that all over Ireland the various county, urban, and rural councils may realise fully the pregnant words of Sir John Simon that they are the 'appointed guardians of masses of human beings whose lives are at stake in the business.' We must urge our health authorities to redouble their efforts to provide proper housing, without domestic overcrowding, and a decent environment for every dwelling, parks, and open-air breathing spaces, a good and efficient water supply, proper sewerage, prompt and efficient house and street scavenging arrangements, guaranteed pure food and milk, protection in the fullest degree from infectious disease, the adoption of the Notification of Births Act, visitation of the houses by a sufficient number of tactful and carefully trained health inspectors, who should themselves possess a practical knowledge of the management of a home and of children, thorough medical inspection of the schools, which would be hygienic in every respect, with proper playgrounds, and where instruction in the laws of health should be a necessary subject."

It is gratifying to be able to record that, largely through the direct personal influence of his Excellency the Earl of Aberdeen, K.T., Lord Lieutenant of Ireland, the Treasury have agreed to make a yearly grant of 21,000*l.* for heating and ventilating the primary schools, provided the local managers of the schools raise a similar amount. This is a step in the right direction, but when it is recollected that in Ireland we have 740,000 pupils who, at a tender and growing age, spend hours in the primary schools so many of which are unhygienic, far more money is needed in the solution of such an important public health question. Medical inspection is absolutely essential in these schools.

4. The Milk Supply.

It is surely time the State took the control of the milk supply under its care, that it insisted on real inspection (medical and veterinary) of the dairies in every part of the country, and on the clean production, conveyance, and distribution of milk from non-tubercular and otherwise healthy cows. An attempt should be made, as has been so successfully carried out

in Denmark by Professor Bang's method of separation of diseased from healthy animals for the purpose of rearing a healthy non-infected stock, to get rid of tuberculosis in the cow. Dr. Robertson, Medical Officer of Health, Birmingham, has tried this plan successfully, and it is also being adopted in various parts of the United States and in Canada. What should be aimed at is the supply of a clean, pure, non-tubercular milk, which can be used without any further treatment by pasteurising, or sterilising, a process which robs the milk of some of its best qualities, which, in my own experience, I have known to cause acute scurvy, and which is further objectionable in that it indicates to the dairyman that it is not necessary for him to take proper precautions in the production of clean, pure milk. Why are we so particular about our water supplies and so careless about milk, which is in every way a far more ready vehicle for carrying the germs of disease and a more suitable medium for their growth? It may be worth while stating that milk of this pure, non-tubercular and unaltered nature is supplied direct in sealed bottles—in case they require it for their children—to the parents attending the babies' clubs in Belfast. The cost is twopence per pint, the mothers paying one half, while the clubs pay the other. The milk is given on the recommendation of the doctors attending the clubs and, in order to see that the babies themselves are getting it, the mothers, as a condition of receiving the milk, must bring the infants for examination every week, the only exceptions being when the babies' clubs' nurse—who visits the parents—reports that the infants are too ill to attend. Every cow in this dairy is tested with tuberculin and branded, and, during the hot summer of 1911 when so many children died of diarrhoea, there was a remarkable immunity among those attending the clubs and receiving this milk. To my mind the giving of milk to poor mothers for their infants indiscriminately is a mistake, unless they receive it direct at their homes in sealed bottles, and unless the condition of giving it is that they bring their children regularly for examination.

5. Sanatorium Treatment.

From the point of view of "sanatorium benefit" patients suffering from tuberculosis may be divided into two groups: 1st, those with pulmonary disease; and 2nd, those with gland, bone, skin, abdominal, and joint affections.

1st. Those who are the subject of pulmonary tuberculosis may be divided into three classes:—

- (a) The very early cases without expectoration;
- (b) The advanced cases bringing up quantities of infective bacilli, many of whom are quite unfit to take care of themselves, and who are a great source of danger to the community; and
- (c) The intermediate class, who are also expectorating, but who are still able to be at their work at times, and who, if taught, can sterilise their expectoration.

Now, in the early cases and in some of the intermediate group, sanatorium treatment may arrest the disease, but its chief value in the intermediate group is its educative help in teaching them the importance of cleanliness, of sleeping in a room by themselves, and of the proper treatment of the sputum. The advanced cases should be isolated either in special hospitals or in separate blocks in the sanatoriums, unless so situated that they can be properly looked after at home. In working out a scheme of sanatorium treatment any existing institutions should be utilised, and the greatest care should be taken not to spend too much money in putting up expensive buildings. The cheaper they are the better, if only efficient in other respects, and several adjacent county councils might combine in erecting a single one, or unused hospital buildings—as was done in Brighton—might be employed; and they should be fitted with a good pathological laboratory and X-ray apparatus, &c., where the latest methods of diagnosis and vaccine therapy or other lines of treatment could be utilised. Let me give an illustration of what can be done to erect a most efficient cheap sanatorium. In the year 1899, on the recommendation of Dr. Robert Hall, the Senior Visiting Medical Officer

to the Belfast Union Workhouse, the board of guardians made arrangements (they were the first Poor Law Board in Ireland to do so) for the separation of consumptive patients from other sick inmates of the workhouse, and ultimately—after careful consideration—they decided to take the initial step for making suitable provision for destitute consumptive patients, and in 1904 they acquired the Mansion House and grounds (33 acres) known as "The Abbey," Whiteabbey, co. Antrim, situated on the western side of Belfast Lough, and at a distance of about five miles from the city of Belfast. Here they erected three pavilions, each to accommodate 25 patients, viz.:—

	Number.
Two for female and one for male patients	75
One pavilion for male patients	40
Two-storied hospital for advanced cases to accommodate	150
Total accommodation for patients	265

The Mansion House is used as a residence for the medical and nursing staff.

Expenditure on the Abbey Sanatorium.

The total capital expenditure in connection with the acquiring, equipping, and establishing the sanatorium is as follows:—

	£
Purchase of the Mansion House and grounds	5,000
Erection of—	
(a) Hospital, mortuary, and making alterations to administrative buildings	11,992
(b) Four pavilions, and laying water mains, drains, and other works	9,516
(c) Gate lodge, coal shed, weighbridge, and iron buildings	3,030
Fees to architect, building surveyor, &c.	1,500
Furniture	1,850
Water bore	650
Installation of plant for generating electricity for lighting, power house, accumulator house, and constructing a water-storage tank	5,600
Total	£39,138

The cost works out at about 147l. 13s. per bed, and the average cost per head of the patients in the sanatorium for food and clothing, medicines, nursing, and medical attendance amounts to 12s. weekly; but the total average weekly cost of each patient at "The Abbey" is 17s. 3½d., which includes all charges, viz.:—Provisions, clothing, medicines, medical, nursing, and other attendance; also all other establishment charges and the repayment of the interest and principal of loans for the purpose of the premises and for the erection and equipment of the buildings. This sanatorium has been pronounced by many competent judges to be one of the very best of its kind in the United Kingdom.

To make provision for the second group of tuberculosis patients—who are as a rule found among the young—those with gland, skin, bone, and joint disease (and from whom so many cripples are recruited), either existing cripples' homes (some of which have admirable marine and country residences) should be used, or vacant coastguard stations might be fitted up as resorts for such cases which do well at the seaside, sometimes with the addition of tuberculin treatment. These form a class of tuberculosis cases which often respond well to treatment.

6. Education of the People in Hygiene.

Everything should be done to educate the people more and more as to the importance of keeping their houses clean and sanitary, well ventilated, not overcrowded, and so situated as to be properly lighted by the sun, and they must be taught what measures they can adopt to prevent the onset and spread of the disease. In other words, we must instruct the people that they themselves have it in their own power largely

to control the disease. This education as to food, temperance, hygiene, and the laws of health should be begun in the babies' clubs (schools for mothers), enforced in the primary schools, and again in continuation classes, as suggested by the Royal Commission on Physical Deterioration, in which girls who had left school at an early age should be instructed in domestic science, where "the course of instruction at such classes should cover every branch of domestic science, including the preparation of food, the practice of household cleanliness, the tending and feeding of young children, the proper requirements of a family as to clothing, everything in short that would equip a young girl for the duties of a housewife," and by house visitation by tactful and carefully trained health inspectors, who should themselves possess a thorough practical knowledge of domestic hygiene, and of the management of a house and of children.

7. *The co-ordination of Anti-tuberculosis Measures.*

Recognising that "sanatorium benefit" under the Insurance Act is a very wide and elastic term, that tuberculosis is most variable in its type and clinical manifestation, that there are two factors in the problem, the seed (the bacilli) and the soil (that is the patient's own inherent vitality), that the majority of people probably become infected when young, that some cases are "closed" and some "open," and that of the latter those residing comparatively isolated can be treated (from a public health point of view) much easier than those living or working in a crowded environment, that it is essentially a house disease, that some cases progress rapidly, while, among others, the descent to death or the ascent to recovery is slow and gradual, and that for those who do recover the question often arises can they

return to their original environment or is their whole mode of life and occupation to be altered—with all these facts before us—it is of the utmost importance, if any progress is to be made in the treatment and prevention of the disease, to have the most careful classification of the patients, with a view to the adoption of a line of treatment—institutional or otherwise—suitable to each. Hence, as Dr. Hermann Briggs, the New York great health administrator, puts it, we must have "a comprehensive scheme covering all the phases of the problem," such as the Edinburgh plan is; and every factor or department in this scheme must be co-ordinated and organised in any district under one director. Hence we need, in any sanitary area, to combat this protean disease, which causes—apart from death—so much invalidity, and which lessens so much the working capacity of those suffering from it, not merely the sanatorium, but closely linked to it and to the public health authority, the tuberculosis dispensary, home-visiting, the open-air school (where it can be managed), the isolation hospital for advanced cases, the cripples' home or marine residence, the farm colony, the laboratory, and with all these, educative measures in babies' clubs, schools, &c., for training the people to observe the laws of health. In a word, "the way to complete success in the campaign against consumption lies in the harmonious co-ordination of well-directed measures," and, if this Committee will now evolve a thoroughly effective and practical scheme, there is no reason why the time may not come when tuberculosis will be as extinct as leprosy (which formerly prevailed to such a large extent in England, Scotland, and in Ireland), and that even in our own experience we may live to see its prevalence as rare as typhus now is in Ireland.

March 1912.

MEMORANDUM submitted by A. H. H. MATTHEWS, Secretary to the CENTRAL CHAMBER OF AGRICULTURE.

Your letter of the 2nd inst. to hand, in which you ask me to submit the views of the Central Chamber of Agriculture on the problem of tuberculosis, in the form of a brief memorandum. As you request that these views should be submitted not later than 14th inst., it is impossible for me to bring the matter before my council or either of my committees; consequently anything stated in this memorandum must be taken as my own view, and not as committing the Central Chamber of Agriculture in any way. At the same time I may say that as I had not taken any interest in this question previously to my appointment as secretary in 1901, my views have naturally been formed from that particular side of the question which has occupied the attention of the Chamber; and I have no doubt whatever that the following will be broadly identical with the policy and views put forward by the association I represent. I may add that I have had eight years' practical experience in farming, four of which I spent as manager of a dairy farm in Surrey.

As I note that Professor Penberthy and Mr. Charles Bathurst are also expected to submit memoranda, I will confine myself to the administrative part of the problem.

Milk.

Owing to various local authorities promoting private Bills containing diversified provisions for enabling them to control the milk supply going into their respective areas, it was found necessary to try and obtain some uniformity in methods of control. With this object in view, a conference was held in 1899, at which representatives of the Board of Agriculture, the Local Government Board, the Central Chamber of Agriculture, and certain municipal authorities, were represented; the outcome of that conference was the acceptance, as a temporary measure, of the Model Milk Clauses. So far as the Chamber of Agriculture was concerned they were accepted, even temporarily, under protest, as they contained objectionable features without giving security to consumers. We were, however,

constrained to fall in with what offered the nearest approach to uniformity of regulations.

What I principally object to in these clauses is that they confer the power of what has come to be known as "invasion." That is, the officials from any number of local authorities are empowered to inspect any farms from which milk is being sent into their areas, if these local authorities have obtained an Act containing clauses giving such power. This might mean, and does mean in some cases, that farmers in certain districts are liable to visits of inspection by officials of various local authorities, each with his own ideas as to what constitutes suitable buildings and sanitary methods. Thus a milk producer, who has altered his premises and methods to suit one inspector, may find that the next inspector is not in accord with the first. This unnecessary friction can be entirely obviated by adopting the Scottish method provided by sections 60, 61, of the Public Health (Scotland) Act, 1897. The Central Chamber has constantly advocated this solution of the difficulty.

My reason for saying that these clauses give no security to consumers is that they only apply to those particular areas which have obtained a private Act containing these provisions. If an inspector prevents milk from tuberculous cows coming into his district there is nothing to prevent this infected milk being sent to areas where no Act applies. There are many large areas which have not, and cannot, obtain an Act, and, if they did, could not put it into force.

Another blot on them is that they give a false sense of security. The local authority for a given district obtains the powers which these clauses give, but makes no effort to enforce them. So much is this the case, that the Local Government Board have objected to the Model Clauses being retained in several private Bills.

Notwithstanding the agreement of 1899, a large number of local authorities have promoted Bills containing clauses dealing with milk supply, seeking for powers widely differing from the Model Clauses; but

the Central Chamber has opposed every such Bill, and has succeeded in preventing any alteration being introduced. The attitude taken up by the Chamber on this point is shown by the following statement, which they have reiterated in their reports during the last ten years:—

"That no alteration of the Model Milk Clauses by private legislation ought to be allowed, but that they should be adhered to without modification or extension until the Government is prepared to deal with the whole question of tuberculosis in a general Act. In making his statement the necessity of safeguarding the public health is not overlooked, and, so far from wishing to oppose any necessary and general restrictions, they are anxious to assist any reasonable measures tending in that direction; but they strongly object to piecemeal legislation, to unreasonable interference, and to any loss and inconvenience being incurred by farmers, on behalf of the public, without ample compensation."

As a result, partly, of the continuous pressure from the Chambers, Mr. Burns introduced his Milk Bill in 1909. I append a full report of my committee expressing their views on both that Bill and the Tuberculosis Order, 1909, which was to have been read with it, if the Bill became an Act. You will see that no hostility was shown to that measure, though strong exception was taken to the "invasion clause" and to absolute powers being given to a Government Department (see paragraphs 2 and 5).

Objection was also taken to the provision in this Bill which left the administration in the hands of the sanitary authority (paragraph 3).

This would have perpetuated one of the serious flaws in the Dairies, Cowsheds and Milkshops Orders, which are adopted and may be administered by the same local authority. This is most unsatisfactory, and means that in many cases the Orders are not administered at all. This ought to be in the hands of the county council.

Another complaint I have against the Dairies, Cowsheds and Milkshops Orders is their cast-iron regulations. A special hardship has been found in the compulsory 800 cubic feet of air space in the cowsheds. This may be necessary in cold climates, and where milking cows are housed all or nearly all the year; but it is absurd where cows are out of doors every day, or nearly every day, and where the sheds are well ventilated. This restriction has caused many farmers to be ejected, and owners are unable to re-let. This has happened in a number of instances in the Dewsbury district.

In 1904 the Chamber opposed the London County Council (General Powers) Bill. They moved the following instruction to the Committee of the House of Commons, and though the instruction was negatived on a division, the Police and Sanitary Committee conceded three out of the four points of this instruction:—

"That it be an instruction to the Committee to insert provisions in the Bill to provide that a cow suspected of suffering from tuberculosis of the udder may be removed, and that a sample of such cow's milk shall be submitted before slaughter to the medical officer of health for the county for bacteriological examination, and to provide, if this examination shows evidence that the cow is so diseased, that the animal shall be slaughtered in the presence of and examined by a veterinary surgeon appointed in the way proposed in subsection (2) of clause 34:— and to provide that if, on examination, the veterinary surgeon certifies that such cow was not suffering from tuberculosis of the udder, the council shall pay, in addition to the compensation provided for in subsection (3) of clause 34, a sum not exceeding 50 per cent. of the full value of such cow immediately before slaughter, as special damages for loss of such cow:— to provide that, if the veterinary surgeon

certifies that the cow was so diseased, the council shall pay compensation in the manner provided by part (a), subsection (3), of section 14 of the Diseases of Animals Act, 1894, and that the council shall also bear half of the reasonable costs incurred in carrying out the purposes of clause 34:— and to provide that the value of a cow slaughtered by the council, whether diseased or not, shall be assessed by a valuer appointed by the Board of Agriculture and not by a veterinary surgeon."

I refer to this chiefly on account of the precedent created by the Police and Sanitary Committee, which, on the second point of the instruction, allowed compensation at full value, plus 1*l.* towards the loss and damage caused by the removal of a healthy cow from a milking herd. In my opinion this loss is not nearly covered by the extra 1*l.* Indeed, the 50 per cent. suggested in the instruction is none too much.

In any legislative measure dealing with tuberculosis so far as milk is concerned it is most important to repeal all existing statutes and Orders, and to frame one consolidated measure governing the whole matter. With the provisions contained in the different Public Health Acts, the Orders issued under these Acts, the Infectious Diseases (Prevention) Act, 1890, and all the provisions in some scores of private Acts, it is practically impossible for anyone to understand the position.

One of the important details which any measure must deal with is to decide at what point the liability of the consignor of milk shall cease. This should be when the milk reaches the consignee's hands; and this should mean (in the case of delivery by road) on arrival at the consignee's premises, and (in the case of delivery by rail) on arrival at the station to which it is consigned.

Meat.

In my opinion, the claims of the Meat Traders' Federation—that compensation should be paid for the carcasses of animals seized by local authorities if found to be affected by tuberculosis—is a just claim; and the Central Chamber of Agriculture supported the Tuberculosis (Animals) Compensation Bill, 1904, which was referred to a Select Committee, and that Committee gave reasons justifying the claim for compensation.

Tuberculin.

It is generally accepted now that the control, and ultimate suppression, of tuberculosis in animals must largely depend on the tuberculin test. As a layman I give no opinion upon this, but I am certain that tuberculin should only be obtainable from absolutely reliable sources, that it should only be allowed to get into experienced hands, and that the test should only be applied under the supervision of thoroughly qualified veterinary surgeons.

Compensation.

The demand for compensation is justified on grounds of equity as well as on grounds of expediency in nearly all cases. Tuberculosis cannot be diagnosed with certainty even by bacteriological examination. It cannot be diagnosed even with approximate accuracy by clinical examination. Therefore, an animal or its produce is sold quite innocently. If it is sold with knowledge of the presence of tubercular disease, the seller should be liable not merely to lose the animal, but to punishment. The suspected animal is slaughtered, and the carcass confiscated with a view to protect the public, and the public should pay for its own protection. The demand that compensation should be paid out of the National Exchequer and not out of rates is equally just, as the expense is incurred for the benefit almost entirely of the urban population. It is most unfair that the burden should fall on the shoulders of rural ratepayers.

A. H. H. MATTHEWS.

March 1912.

MEMORANDUM submitted by A. K. CHALMERS, M.D., Medical Officer of Health for Glasgow.

I am asked to submit observations regarding the lines on which and the methods by which research work in connection with tuberculosis might best be subsidised or carried on.

Under research, I assume it is intended to include enquiry into the distribution of the disease, as well as into its intimate pathology, that is, that it will proceed along epidemiological as well as bacteriological lines.

The need for inquiry on the former basis will, I think, be widely felt, for while all agree that the disease is transmissible, and that its transference from animal to animal kept under the conditions of an experiment has been demonstrated, there is by no means the same unanimity of opinion regarding the relative value of the several factors which determine its transmission under the conditions of everyday life.

As illustration, one may recall the varying degrees of importance attached by different writers to such factors as race, hereditary predisposition, degree of infectivity, food, housing and occupation. Much of the obscurity at present attaching to the value of these several factors may be explained by the almost necessarily limited field of observation of most individual observers.

The several influences affecting individuals vary so greatly that strict uniformity in the comparison is barely attainable, and the next best method would be to take groups of population of considerable size, but exposed in a fairly uniform manner to several of the influences suggested above.

I take the "general labourer" of the Registrar-General as an illustration. In food and housing, he and his family will on the average be strictly comparable. The unknown factors are heredity, infectivity and the effects of occupation. His comparative mortality figures from all causes of fatal disease is 1,987 compared with 1,000 for all males and 925 for occupied males. His phthisis figure is 450 compared with 186 for all males and 175 for occupied males. The labourer of this class, therefore, has an exceptionally heavy incidence of phthisis. Does the married labourer's wife and children suffer to a corresponding extent, or to a greater extent than those of men in other occupations similarly paid, but having a lower phthisis rate.

A comparison on these lines would, I suggest, throw some definite light on the degree of infectivity existing under fairly comparable local and social conditions.

Similarly with regard to the influence of inheritance as accentuated or retarded by local conditions, a comparison of the extent of fatal tuberculosis among the children of labourers of this class would be valuable. Do they die more frequently from any form of tuberculosis than the children of fathers less affected with phthisis? or, again, is there relatively more tubercle among the children than among the wives of the "general labourer"?

Relation of Phthisis to other forms of Tuberculosis.

This is the second question which seems to me worthy of special inquiry.

I have on several occasions made effort to ascertain whether there was any correlation between the incidence of phthisis and of the other forms of fatal tubercular disease in the districts of Glasgow. During recent years both have undergone considerable decrease. Restricting the comparison to the 30 years in which there has been a uniform classification of the "other

forms" of tuberculosis in Scotland, the decrease in Glasgow between 1883 and 1909 is 47 per cent. from pulmonary tuberculosis and almost 25 per cent. from the other forms.

But there is apparently no relation between the volume of each present in given districts.

The wards of the city which have the highest phthisis death rate preserve a fair correspondence with those in which the general death rate is excessive, but no such parallel can be established between the incidence of pulmonary tuberculosis and of the other forms of the disease.

This might be read as suggesting that infection in the other forms is not derived from co-existing phthisis. On the other hand, if a considerable proportion of cases of abdominal and gland tubercle is to be regarded as of bovine origin, it would suggest that milk enters less into the dietary of children in the poorer districts than into that of the others.

In either case I suggest that enquiry into the relative incidence of both over large areas would prove useful for preventive purposes.

I abstain from discussing the questions which surround the relationship of the bovine to the human type of tubercle bacillus, but suggest the desirability of an enquiry to discover the relative incidence of abdominal and gland tubercle in given populations in relation to the prevalence or otherwise of bovine but especially of udder disease in the areas from which these several populations obtain their milk supply.

I also suggest for consideration the question of making donations from the sums available for research (a) to any institutions which will undertake to manufacture tuberculin from the organism of individual patients for their own use, and (b) for the purpose of providing bacteriological facilities to dispensary groups in order that their work may be correlated to that of any central institution.

This assumes that each local authority will itself become the centre of the movement against tuberculosis within its own area, co-ordinating and to some extent formulating the methods by which school children of a tuberculous type and persons entitled to sanatorium benefit under the Act will be provided with suitable treatment.

Whatever part of this is covered by sanatorium benefit will, it is assumed, have the approval of the Local Government Board, and in a corresponding way the moiety of the benefit applicable to research would be used in a manner approved by the Insurance Commissioners.

There is some reason for thinking that a definite proportion of cases notified as suffering from phthisis are not so affected.*

From this it would appear that some will require prolonged scrutiny, both clinically and bacteriologically, if sanatorium benefit is to be protected against loading by this particular form of error in diagnosis, and so it seems to me reasonable to suggest that the Commissioners should set apart some portion of the fund available for research as a "grant in aid" to those local authorities who will assist them in protecting sanatorium benefit against erroneous claims.

A. K. CHALMERS.

July 1912.

* Twelve per cent. in some observations. Report by Medical Officer on the Administrative Treatment of Pulmonary Phthisis—Glasgow, October, 1911, p. 23.

MEMORANDUM submitted by the CHARITY ORGANISATION SOCIETY.

The Charity Organisation Society welcomes this opportunity of putting forward its views as to the measures which should be taken for the treatment and prevention of tuberculosis.

From the scope and character of its work the Society has special opportunities of judging of the need and also of the defects of much previous endeavour. Its information is at first hand in respect of persons suffering from tuberculosis in all stages.

It is suggested that any Government scheme for combating tuberculosis should be as complete as it can be made. It should have regard to every aspect of tuberculosis, and should be not only curative, but preventive also, as, owing to the nature of tuberculosis, a variety of methods of attacking it must be employed. It should take into account and use all those agencies for dealing with the disease which already exist. The requirements of the problem and the resources available

being accurately ascertained, it would be the duty of the Government to consider how the gaps might be filled up through State intervention in co-operation with voluntary effort.

The Charity Organisation Society has, for ten years past, endeavoured to fill one of the gaps referred to by providing sanatorium treatment for some of the London poor. The wider aspects of the question, however, have not been lost sight of, and the suggestions offered are based on considerable practical experience. From knowledge of difficulties in the past, the Society welcomed the formation of tuberculosis dispensaries, and already finds the whole aspect of the problem changed in the districts where they are at work. They would therefore urge that what is known as the Edinburgh co-ordinated system, consisting of—

- A. Tuberculosis Dispensary,
- B. Sanatorium,
- C. Farm colony for cured sanatorium patients,
- D. Tuberculosis school, and
- E. Hospital for advanced cases,

be made available for every district.

A. *The Tuberculosis dispensary* is the centre of the complete organisation. It aims at discovering and caring for every case of tuberculosis within a given boundary.

The duties of—

- (a) Prevention,
- (b) Treatment,

are undertaken on the following lines:—

(a) *Prevention.*

1. All patients attending the dispensary are followed up at home, and instructed how to live and avoid disseminating the disease.
2. All relatives of the patient and those coming into contact with him are examined by the medical staff. Such a measure facilitates the discovery of cases in the earliest stage and anticipates the progress of the disease.
3. By close co-operation with the medical officer of health and sanitary authorities much is done to secure prevention.
4. Every effort is made to secure admission to suitable institutions of those in an advanced stage, who would otherwise prove a source of danger to their families.

(b) *Treatment.*

1. At each tuberculosis dispensary it is the aim of the medical staff to make use of all existing methods of curative treatment. These are available at the dispensary and in the home of the patient, the doctor visiting each case; nurses also visit to see that the doctor's directions are carried out.
2. So far as possible, sanatorium methods are introduced into the patient's home, and arrangements are made, in suitable cases, for the patient to live in an open-air shelter.
3. Arrangements are made for sanatorium treatment in suitable cases, or for admission to a hospital or infirmary, or, in the case of children, to a tuberculosis school.

B. *The Sanatorium* should be situated as near the homes of the patient as is practicable. This may be regarded as an important point as showing the patient that the cure does not depend on conditions of climate and situation, but rather on a regimen, which, having thoroughly learned, he can follow effectively at home. In this sense the sanatorium comes to be an object lesson to all the citizens, which is impossible if it is far away.

The patients should in the first instance be selected by the dispensary staff, and should remain in the sanatorium for whatever length of time is considered necessary by the medical superintendent. In the past, one of the defects has been that, for one cause or another, patients have left before an effective arrest was achieved.

From the sanatorium patients may or may not pass to the farm colony, as is thought necessary, but in either case they should ultimately return to the supervision of the dispensary, and not be lost sight of until complete recovery is established.

The sanatorium may be utilised for children as well as for adults, and here the tuberculosis school would

have the same relationship to the child as the system of physical exercise and graduated activity to the adult.

C. *The Farm Colony* is, in the opinion of the Charity Organisation Society, a step of the first moment in the interest of selected patients from the sanatorium, for whom a return to their former occupations would mean also a return to ill-health. In the colony, while still kept under medical supervision, the patients can be trained to do more skilled farm and garden work than is possible in the sanatorium. From practical experience of the difficulty of finding work for returned sanatorium patients the Charity Organisation Society feels that this element in the scheme is one of the most important. Its adoption would obviate the too frequent disappointments in relation to sanatorium results.

D. *Tuberculosis schools* should form part of the anti-tuberculosis organisation for three reasons:—

1. Close medical supervision of each child is necessary.
2. Medical supervision of the home is also necessary.
3. The choice of occupation, when school is over, should be guided by the physical condition of the child.

Three classes of children should be admitted:—

- (a) Those returned from sanatoria or convalescent homes as cured.
- (b) Those suffering from tuberculosis.
- (c) Delicate children belonging to tuberculosis households.

Such schools should be linked with the tuberculosis dispensary, or in some cases with the sanatorium, and should be open all the year round, and the children should remain in them for several months or, if necessary, for the whole of their school life.

E. *Hospitals for advanced cases* should exist not only for poor-law patients but for patients above that level also, and should be situated as close to the homes of patients as possible, so that they may not be entirely cut off from relatives and friends. In some cases patients might advantageously be admitted much earlier than is found possible in existing "homes for the dying" or poor-law infirmaries.

In conclusion, the Charity Organisation Society would emphasise the view—which is based on prolonged experience of the difficulties of the question—that each of the elements in the above scheme, essential as it is in itself, attains its purpose effectively only when it is closely linked to the other elements so as to form a co-ordinated organisation. This is, in their opinion, the strength of the Edinburgh system.

This being the suggested scheme, it seems desirable to consider how far existing agencies can be employed to supply what is needed.

A. *Tuberculosis dispensaries* are at work in eight of the London boroughs, and several more will open shortly; and they are in operation in numerous centres throughout Great Britain and Ireland.

B. *Sanatoriums.*

- (1) Sanatorium treatment will be provided under the Act for those in an early stage of the disease. It should be noted that in London two of the Chest Hospitals provide free sanatorium treatment in institutions of their own. The Jewish Board of Guardians and the Charity Organisation Society also provide treatment in certain cases. Several medical officers of health also recommend patients to beds maintained by the borough councils at sanatoriums.
- (2) There are over 700 beds in London Chest Hospitals, and a number of consumptives are also treated in the General Hospitals.

C. *Farm Colonies.*—None have been created for London as yet.

D. *Tuberculosis schools* are in operation in two districts in connection with tuberculosis dispensaries (Paddington and Marylebone), and others are being arranged.

E. *Hospitals for advanced Cases.*—All the poor-law infirmaries in London receive consumptive cases, many in special wards, while most boards of guardians send consumptives to various institutions and homes.

The points that seem particularly worthy of the attention of the Tuberculosis Committee are:—

1. In connection with the recent Order for the Notification of Consumption, local authorities have been definitely urged by the Local Government Board to make provision for treating consumption. They have been urged to establish treatment centres (dispensaries), but they may also provide institutional treatment. *It seems of the utmost importance that action taken by the borough councils and local authorities should be combined with that undertaken by the committees established under the Act.*
2. The accommodation available for advanced cases of consumption is quite inadequate to the need. It is essential, in the interests of prevention, that such cases should be segregated. The provision of such accommodation is just as important as that of sanatoriums, both in the interests of the community and of the patients

themselves. It will probably be found desirable, either by refusal of benefit or by some other means, to secure the removal and retention of patients in certain cases.

3. If the sanatorium treatment provided under the Act is to prove effectual, it is essential that early cases should be discovered. This can only be done by the examination of contacts as carried out by the tuberculosis dispensaries.
4. The Charity Organisation Society, as the result of its experience, cannot emphasise too strongly the importance of the tuberculosis dispensary as an effective centre in respect of both treatment and prevention, but believe also that until the two main sources of tuberculosis, the infection by advanced cases and the breeding places of overcrowded and insanitary dwellings, are dealt with, no system of preventing and treating the disease can be regarded as complete.

March 1912.

MEMORANDUM submitted by Sir W. WATSON CHEYNE, Bart., C.B., M.B., F.R.S.

I do not quite know what sort of information you wish, but perhaps one or two points about the treatment of surgical tuberculosis as compared with that of internal tuberculosis may be of interest. If not, please let me know the specific points, and I shall try to answer your questions.

The conditions necessary for the treatment of surgical tuberculosis, by which one means tuberculosis affecting the external parts of the body, such as the skin, the lymphatic glands, the bones and joints, &c., differ in many ways from the case of phthisis.

Length of Treatment.—Speaking only of diseases of bones and joints, the treatment is usually a very prolonged one. As regards recovery, the shortest period may be put at two years, and most cases go on much longer. Even when the case is apparently well, especially in tuberculosis of bones, the probability is that the disease is only quiescent and not cured.

Subsequent Usefulness.—Hence when the patient takes up his life again he must choose work of such a character as not to involve severe strains or injury, which might quite well start the disease again.

Necessity for Nursing.—The treatment involves, in many cases, prolonged rest, and that of course means a larger nursing staff and much more attention than would be required for cases of phthisis, at any rate in the early stage.

Apparatus often necessary.—Many of these cases also require the application of various forms of apparatus, and these necessitate constant skilled attention both from surgeons and nurses.

Operations may be required.—Further, in a good many of these cases operations are advisable, both to arrest the disease in the early stage, and also to bring about more speedy and satisfactory recovery at a later stage, hence they must be under the care of a skilled surgeon. An ordinary resident medical officer such as would be quite satisfactory in cases of internal tuberculosis might not be able to deal with cases of surgical tuberculosis.

Relative Value of Sanatorium and Surgical Treatment.—In many respects the sanatorium treatment is secondary to the surgical treatment, both in the early stage, when the disease may sometimes be cut short by operation, and in the later stages, when recovery is not taking place satisfactorily. Of course, if both can be combined, the patient would have a better chance of recovery. I would therefore suggest that these cases should not only be treated in sanatoria, but that there should be another institution situated near a town so as to be near surgeons, in which the patients can be kept under observation in the early stage till it is evident that satisfactory progress is being made, when

they can be drafted off to sanatoria, and to which they can be returned should further need for surgical treatment arise. Of course, this might be obviated if fully qualified surgeons were placed in charge of the sanatoria, but large salaries would be necessary to tempt men of suitable skill to give up their chance of private practice and devote their lives to this work.

Expense.—From this it follows that the treatment of surgical tuberculous diseases, especially of bones and joints under ideal circumstances, e.g., in sanatoria, is a much more elaborate and expensive, as well as prolonged procedure, than the treatment of cases of internal tuberculosis, and it is a question whether it is feasible on a large scale. It would, however, be well to extend it as much as possible.

Some idea of the care and expense involved in the sanatorium treatment of tuberculosis of bones and joints would be obtained at the Treloar Home for Cripples at Alton, where the care of children affected with tuberculous bone and joint disease is very admirably carried out. I should advise that Dr. Gauvain be asked to give some account of his work.

As regards tuberculin, while it may be a useful adjunct to treatment in suitable cases, it cannot be regarded as in any way a substitute for other methods of treatment.

Prophylaxis.—As regards the question of prophylaxis, the view has become more and more generally accepted that these cases of surgical tuberculosis are, in a considerable proportion of cases, due to infection with bovine tubercle, and the preventive treatment of these diseases is therefore, to a great extent, bound up with the question of the best method of dealing with bovine tuberculosis; this consists either in the slaughter of all tuberculous animals or in careful inspection and sterilisation of milk. In my opinion, if the former were carried out in a thorough manner, the cases of surgical tuberculosis would diminish very considerably.

As regards this question of the relation of surgical tuberculous disease in children to tuberculous milk and bovine tuberculosis generally, Mr. Harold Stiles, of Edinburgh, has been making some very interesting observations, and it might be well to make inquiries from him on the subject.

As regards the question of notification of these diseases research on this point would be greatly facilitated thereby. I do not regard these cases as particularly infective, certainly not in cases where there is no external opening communicating with a tuberculous focus.

Much research is still required into the whole subject of the etiology, pathology, and treatment of these cases.

W. WATSON CHEYNE.

MEMORANDUM submitted by the NATIONAL INSURANCE ACT COMMITTEE of the COUNTY COUNCILS ASSOCIATION.

The Special Committee of the County Councils Association appointed to consider matters arising under the National Insurance Act have drawn up the following notes for submission to the Departmental Committee:—

It has always been the opinion of the County Councils Association that, as regards the administration of the public health service within the area of an administrative county, the county council should be the supervising authority for that area, and recent legislation requiring the appointment of a county medical officer of health for every county, followed by regulations of the Local Government Board requiring that officer to overlook and report periodically upon the condition of health in the county, seems fully to establish the county council in that position.

On general grounds, therefore, it seems most desirable that, in any new developments of public health administration, this position of the county councils should be fully recognised.

In the matter of provision for the treatment of tuberculosis, however, there appear to be special reasons for recognising the county council as the local authority for its area. Such provision necessarily includes the establishment and maintenance of institutions which it would be impossible economically and efficiently to maintain for areas containing only a small population. The exact proportion of institutions or beds to the population is a matter as to which no authoritative statement has as yet been made, and it is hoped that the deliberations of the Departmental Committee will throw light on this point, but it is submitted that, for the country districts at any rate, no existing areas smaller than those of the administrative counties would be large enough to warrant the establishment for them of separate institutions.

The varying sizes of the different counties and the differences caused by the existence or non-existence within them of large towns, of course complicate the question to some extent. In some parts of the country it might be desirable to group counties and county boroughs for this purpose under arrangements similar to those in force for joint lunatic asylums, while in other parts the county boroughs will be large enough to be entirely independent units.

The Committee have accordingly passed the following resolutions on this branch of the subject:—

That, with the view to co-ordinating all branches of national and public health and to thereby securing both efficiency and economy of the service, it is expedient, if satisfactory terms can be arranged as to cost of buildings and maintenance, that county councils should be the local authority for the administrative county under section 16 (1) of the Act, to provide or aid provision for the treatment of tuberculosis in sanatoria or other institutions, and to contract under section 64 (4) with the county insurance committee for the provision of sanatorium benefit.

That in order to prevent overlapping and duplication of authorities in one geographical area, co-operation between the county council and the county borough councils in such area is often desirable.

In support of the above contentions it may be pointed out that under the Isolation Hospitals Acts of 1893 and 1901 the county council is already an autho-

rity for establishing hospitals for infectious diseases and that pulmonary tuberculosis is now declared to be an infectious disease by recent orders of the Local Government Board. Moreover, the educational work of the county councils involves the appointment of medical inspectors of school children and arrangements for their after treatment by nurses, health visitors, &c. Many of these officials might be employed in visiting cases of suspected or recognised tuberculosis in combination with their other work. The county councils have also the supervision of midwives and the administration of the Food and Drugs Acts, the Pollution of Rivers Acts, &c. All these sanitary duties, taken as a whole, make it necessary for every county council to have the whole time services of a first-rate scientific man as medical officer of health.

The reference to "satisfactory terms" in the first resolution above quoted raises the question of the financial position of the county councils under such an arrangement. The treatment of tuberculosis has been generally recognised as a national question—the very name of the Act and of the Commission under which this treatment is to be organised is a proof of this—and it is therefore strongly urged that the cost of this organisation and treatment should be clearly recognised as a national responsibility, and that no part of it should fall upon the rates.

Again, with regard to the terms of arrangement there should be some distinct guarantee that, if the county councils establish and maintain sanatoria, the insurance committees shall be required by the Local Government Board or Insurance Commissioners to make use of them. Owing to the constitution of the committees, the councils will have no control over the majority of their members. If no such order can be made or guarantee given by a central department it will be advisable for the councils to defer taking any steps to establish sanatoria until the insurance committees are fully constituted and in a position to make permanent arrangements.

As regards the establishment of institutions, it is felt that it would be unwise for local authorities generally to embark at once upon the erection of large and costly buildings, and the Committee recommend—

That expenditure on building new sanatoria* should be tentative and gradual, and to a large extent the buildings erected should be of a temporary character.

The Committee of the County Councils Association have confined their recommendations strictly to the administrative side of the question. They consider it of vital importance that duplication of authorities should be avoided, and they think that it is clearly to the public interest that the larger public health authorities in the different districts, while bound to consider the requirements of and to co-operate cordially with the minor authorities, should be the responsible bodies to provide and administer the machinery for the service under consideration.

HENRY HOBHOUSE,
Chairman of the Special Committee.
March 1912.

* N.B.—Throughout this memorandum the expression "sanatorium" is intended to include not only a central institution, but also the dispensaries, clinics, and shelters ancillary thereto.

MEMORANDUM submitted by S. DELÉPINE, M.B., C.M., M.Sc.

I have the honour to acknowledge the receipt of your communication of the 13th instant, from which I understand that I am invited by the Chairman of the Committee to express views upon the "treatment of tuberculosis in sanatoria or other institutions or otherwise" in respect of the "preventive, curative and other aspects of the problem of tuberculosis."

I cannot attempt in a short memorandum to deal with the evidence upon which I rely, but I wish to

state that my views are mainly based upon the results of personal experience which I have gained by some 10 years of clinical work, 22 years of experimental research, and 34 years pathological studies.

Whether the problem of tuberculosis is considered from its preventive or curative aspect it is convenient to divide the population into three groups of persons:—

1st group: of persons not yet tuberculous.

2nd group: of persons who have contracted tuberculosis, but in whom the disease is not progressive and tends to recovery.

3rd group: of persons who have contracted tuberculosis and in whom the disease is progressive and tends to a fatal issue.

The evidence which has accumulated during the last 25 years in this and other countries shows that over 90 out of every 100 persons who have passed the age of 30 and belong to the classes *resorting to hospitals* display post-mortem evidence of having at one time or another been infected by tubercle bacilli, but that the most of these persons have recovered, or at any rate have not been killed by tuberculosis.

In persons dying before the age of 30, tuberculous lesions are found in increased proportion as the age advances. They are:

- almost invariably absent at birth;
- present in about 10 per cent. before the end of the 1st year;
- present in about 40 per cent. between the 4th and 5th year;
- present in about 60 per cent. between the 6th and 15th year.

Although these figures are probably not applicable to the whole population, they are of importance since they relate to that part of the population which is most in need of State assistance.

Various methods based upon the use of tuberculin have of late years been utilised for the purpose of detecting evidence of tuberculosis during life, and the results of these tests are even more remarkable than those of post-mortem examinations.

Various estimates have been made on the basis of these methods of the prevalence of tuberculosis at various ages, from which it would appear that from the time of birth to the 14th year of life, the number of children re-acting to tuberculin rapidly rises—being about 5 per cent. during the 1st year, 40 per cent. in the 5th year, 70 to 80 per cent. in the 10th year, over 90 per cent. in the 14th year.

These general facts indicate that of the three groups of persons mentioned at the beginning of this memorandum, the 1st group (*not tuberculous yet*) is composed of less than 10 per cent. of the population over the age of 15, if the tuberculin test is to be accepted as a guide.

If an estimate of the size of this 1st group were based upon post-mortem findings, this group would consist of less than 40 per cent. of the persons having reached the age of 15, and less than 10 per cent. of the population over 30.

Post-mortem evidence tends to show, however, that *below the age of 30* the proportion of persons belonging to the 3rd group (*i.e.*, who have contracted tuberculosis and in whom the disease becomes progressive) is large in proportion to those belonging to the 2nd group (showing a tendency to recovery). *After the age of 40*, the reverse is true, and the number of persons belonging to the 2nd group becomes increasingly large as age advances.

At all ages there is a marked tendency to recovery and if the statistics available were based on the total population, and included people in good circumstances as well as those who are placed under unfavourable conditions, one would probably find that the number of infected persons who recover from tuberculous infection (without special treatment) is considerable. This is a matter which requires close attention when an estimate is made of the curative effects of sanatorium treatment.

It is generally accepted that in order to secure a fair prospect of cure by treatment in sanatoria, patients should be admitted to these institutions as soon as possible after infection, and before the clinical signs can be confirmed by methods entirely free from ambiguity. The only convenient clinical method which could be used administratively to determine the admission of cases to sanatoria is the tuberculin method, but if this method were adopted, about 90 per cent. of the population between 25 and 30 years of age would be suitable for sanatorium treatment, unless those likely to die were excluded. By this exclusion the admissible cases would be reduced to 40 per cent. of the population at the selected age. In addition, a large propor-

tion of the population between the age of 5 and 25 would also be entitled to treatment.

It seems impossible to conceive any arrangement which would provide accommodation for all the persons belonging to the 2nd group, even if, as I have assumed, this method of treatment were offered only to those requiring State assistance in various degrees.

The persons belonging to the 3rd group appear to me to deserve particular attention. When tuberculosis has assumed a progressive character, and when lesions have begun to ulcerate, the chances of recovery are very small indeed unless rest, good food, and healthy housing are available to the patient. When these things are not available the disease progresses rapidly, and life is a burden not only to the patient, but also a great danger to his family and neighbours. Tuberculosis of the lungs is from a Public Health point of view most important, and when tuberculous lesions of the lungs have begun to ulcerate or break down, the quantity of infective material which may be expectorated by a patient passes conception.

Whatever views may be held as to the relative importance of infection of infants by tuberculous milk, and of children, adolescents and adults by tuberculous sputa, it is impossible to deny that tuberculous expectorations play an important part in the spread of tuberculosis. It would appear therefore that institutional treatment of tuberculosis should include provision for *infectious persons* who, through poverty, negligence, or other circumstances are unable to practice the methods by which their surroundings can be protected from infection.

Unless provision is made for these cases the sanatoria used purely for treatment of incipient cases will be continuously supplied with new material, and the extinction of the disease will remain an unsolved problem. An idea may be formed of the number of suspected cases of tuberculosis suffering from bronchial or pulmonary troubles, who, if careless, would be centres of infection, by considering the proportion of these persons who expectorate tubercle bacilli.

The examination of some 12,000 sputa of such persons showed that between 30 and 40 per cent. contained tubercle bacilli often in large numbers.

Many of these patients when placed under favourable conditions are capable of great improvement and of doing useful work without danger to society, but under unfavourable circumstances their condition becomes more or less rapidly worse, the issue is almost invariably fatal and the danger to others great.

Patients in this group who cannot be properly treated at home for reasons which I have already indicated, deserve the closest attention of the State, because they cannot help themselves and are a danger to public health. Moreover, philanthropists have in the past been more inclined to make provision for curable than for incurable cases.

Although I am uncertain whether views upon the prevention of tuberculosis by other methods than institutional treatment are asked for, I cannot help alluding to the important share which tuberculous cows' milk takes in the production of infantile mortality, and to the desirability of extending the work of prevention which has already been done in that direction, for it is by removing as fast as possible the sources of infection that the treatment of incipient cases will be reduced to practical proportions, and become less and less needed.

That removal of sources of infection is an effective means of dealing with tuberculosis is shown by the results which have been obtained with regard to cattle.

Bovine tuberculosis resembles closely human tuberculosis in prevalence, distribution, and modes of infection. When a herd of cows free from tuberculosis is kept in premises free from previous infection and no tuberculous animal is allowed to mix with it, this herd may be kept practically free from tuberculosis. On the other hand, if a herd including tuberculous animals is kept under the most favourable conditions of housing and feeding, tuberculosis will spread from the diseased to the healthy animals.

It has been argued that the ubiquity of the bacillus tuberculosis, and the general prevalence of infection, made any attempt at prevention hopeless, and that all efforts should be directed to increasing the resistance

of the population by general hygienic measures, with or without the help of other methods capable of producing immunity or of bringing about the recovery of cases of incipient tuberculosis. In my experience none of these methods can be carried out with a prospect of ultimate success, so long as cases of advanced tuberculosis are as numerous as they are at the present time. The local authorities can only to a limited extent prevent overcrowding, want, unhealthy occupations, vice, and all the conditions associated with poverty.

It is among the poor population that a few cases of advanced tuberculosis are capable of causing the greatest ravages.

Poverty in itself does not produce tuberculosis, and the distress caused by poverty would be considerably reduced if tuberculosis were not as prevalent as it is at present.

It appears to me, therefore, that the State should devote a considerable part of the funds available for the institutional treatment of tuberculosis to the creation or assistance of hospitals for the treatment of infectious cases of tuberculosis which are capable of improvement, and of homes for incurables. Sanatoria for the treatment of early cases of tuberculosis have

from the first appealed to philanthropists, and where these institutions are conducted economically, are open to inspection, and are intended for patients who are unable to bear the expense of treatment, they might be encouraged in their work by grants from the State.

I have not dealt with the question from an insurance point of view, I have simply attempted to indicate how, in my opinion, the problem of tuberculosis could be approached by the State most economically, and with the best prospect of ultimate benefit.

I beg to enclose a short address which I gave to the medical officers of this district in 1899 to urge the introduction of compulsory notification of tuberculosis. This indicates some of the advantages which would be obtained by placing the work contemplated by the Committee partly or entirely under the management of sanitary authorities wherever the local authorities are in a position to contribute to the efficiency of the work.

I also enclose a paper on the causes of the prevalence of tuberculosis in certain farms to explain the basis of some of the statements I have made regarding bovine tuberculosis.

SHERIDAN DELÉPINE.

March 1912.

MEMORANDUM submitted by S. DELÉPINE, M.B., C.M., M.Sc., on RESEARCH in connection with TUBERCULOSIS.

Although, generally speaking, scientific research should not be fettered by utilitarian aims, the following remarks upon Research in connection with Tuberculosis are influenced by the supposition that the assistance which the Government proposes to give is intended to promote the improvement of methods of prevention, control and treatment of Tuberculosis.

Inasmuch as these methods to be successful must be based upon a knowledge of causes and of all the natural and artificial factors that may influence the occurrence and course of the disease, the practical objects of research coincide in this case with the aims of pure science. This is so truly the case that the successful investigation of the problems connected with Tuberculosis would throw important light upon other infectious diseases.

It must be remembered that Tuberculosis is only one of the many diseases with which the State is concerned, and that any State-aided plan of research will be the more useful, in that it is applicable to the investigation of a greater number of preventable diseases.

With special reference to Tuberculosis there are many questions regarding which increased knowledge is needed. For the purpose I have in view it will be sufficient if I mention only a few of the most important problems that are not fully solved yet. I will at the same time indicate some of the departments of research to which these problems belong.

- | | |
|--|---|
| | <i>Departments of
Research chiefly
concerned.</i> |
| 1. Absolute and comparative value of various methods of diagnosis, more specially of early stages of the disease. | <i>Clinical.
Anatomical.
Experimental.</i> |
| 2. Relative importance of various sources and channels of infection at various ages, in various families, races, &c., and under the influence of various social conditions, occupations, habits, &c. | <i>Epidemiological.
Statistical.
Experimental (in function of 1).</i> |
| 3. Relation of human to animal tuberculosis. | <i>Epidemiological (Epizootological).
Clinical.
Anatomical.
Experimental.</i> |
| 4. Influence of various factors upon excessive liability or resistance of individuals to infection. | <i>Epidemiological.
Statistical.
Experimental.</i> |
| 5. Influence of various factors upon the characters and properties of tubercle bacilli. | <i>Experimental.</i> |

6. Effects of various preventive methods, general or specific, upon the incidence and type of the disease.

7.—A. Absolute and comparative value of methods of non-specific treatment used singly or in combination. Comparison of terminal effects of curative treatment, and spontaneous recoveries. Frequency of spontaneous recoveries.

B. Absolute and comparative value of various methods of specific treatment (tuberculin, bacillary emulsions, vaccines, sera).

C. A. and B. compared. Effects upon cases in various stages of the disease (complicated or uncomplicated).

D. Effects of above methods upon animals (1) healthy; (2) tuberculous; (3) affected with other diseases than tuberculosis.

8. Advantages and disadvantages of various methods of preparation of tuberculin, bacillary emulsions, vaccines, and sera.

9. Physical, chemical, and physiological properties, standardising and testing of bacterial products used in the diagnosis and treatment of tuberculosis.

10. Actuarial, economic, and sociological problems.

&c., &c.

(Details are purposely avoided in the above list.)

The words used to indicate the departments of research are intended to convey an idea of the machinery, and not the branches of science concerned.

Clinical means research conducted specially at dispensaries, hospitals, sanatoria, and, when possible, at the homes of patients, by persons conversant with clinical methods—including such physical, chemical, physiological, and bacteriological methods as can be used in current clinical work.

Anatomical means morbid anatomical and histological investigation of tissues obtained during life or after death. These investigations may be conducted

*Departments of
Research chiefly
concerned.*

*Clinical.
Epidemiological.*

*Clinical.
Anatomical.
Experimental.
Statistical.*

Experimental.

*Experimental.
Clinical.*

Experimental.

*Epidemiological.
Statistical.
Administrative.*

either at hospitals, sanatoria, post-mortem rooms, or in bacteriological and pathological laboratories.

Experimental means bacteriological, pathological, chemical, physiological, and other investigations which can be conducted satisfactorily only in a well-equipped laboratory by men who are familiar with laboratory experimental methods. Laboratory workers would need to have access to places where they could have the opportunity of studying cases or obtaining the material necessary for certain investigations.

Epidemiological means research which requires the special facilities connected with the Public Health Departments of important centres. These investigations to be reliable must be conducted as they have been in the past under the direction of experienced Medical Officers of Health. Under new conditions the amount of work will be increased and more precise than it has been in the past.

Statistical, Actuarial, Economical researches are based upon data collected by various observers. They as far as possible must be entrusted to a very limited number of specialists having had the benefit of a medical as well as of a thorough mathematical training. This part of the work is capable of centralisation, and is probably already provided for under the Act.

From this it would appear that research in connection with tuberculosis demands in each locality some association and co-ordination of work done in dispensaries, or at the bed-side, in laboratories and at health offices.

The Tuberculosis Officers, Superintendents of Sanatoria, Bacteriologists and Pathologists in charge of Laboratories, and Medical Officers of Health can only do personally a limited amount of experimental or research work, but they are in a position jointly or separately to *train, direct, supervise and assist* younger workers able to devote themselves to research. Much of the experience gained by responsible heads of departments or laboratories is at the present time wasted owing to their inability to prosecute or direct researches which would require either more time than their official duties allow or the collaboration of younger men.

On the other hand among the younger medical men wishing to enter public service there are many who could be trained to carry out efficiently useful scientific research, but under the present conditions such men could not afford to devote at their own expense two or three years to unremunerative investigation and to lose chances of promotion by not securing at the earliest possible date some of the junior administrative appointments which constitute the best stepping stones to further advancement.

Under the present conditions much of the research work which is done in the country is either not endowed, or endowed to such a slight extent as to cause it to remain an expensive luxury open only to the few and not always to the best.

With regard to research in connection with Public Health work, the bacteriologists and pathologists in charge of most laboratories have at their disposal only the income derived from teaching stipends (generally small) and fees obtained for routine reporting, which leaves them very little time for the full independent investigation of problems of great importance, and which not infrequently are actually indicated by the routine work. The number of scientific workers in such laboratories is generally limited by the income derived from fees, and, generally speaking, public authorities pay fees only for examination of material supplied by them, and not for the investigation of problems. In the past most of the research bearing on Public Health problems carried out in provincial laboratories has been carried out without any remuneration and often at the expense of the scientific workers who have been led to undertake them by a sense of duty. These researches have often proved of value to Authorities which have not contributed to their cost.

The position may be summed up as follows:—Excellent facilities and opportunities for research exist in several large laboratories, but teaching and other duties limit considerably the time which the permanent staff, generally too small, can devote to independent research. There are either no, or very inadequate, funds available for the remuneration of efficient

younger research workers, and for the payment of experimental expenses.

There are at the present time in important centres of population outside London several laboratories connected with universities, and in which more or less extensive investigations bearing upon tuberculosis and other infectious diseases in relation to Public Health have been conducted during the past 20 years under the conditions previously described. There are other laboratories where similar work could have been undertaken if opportunity had arisen.

Such laboratories exist in the following towns:—Manchester, Liverpool, Birmingham, Leeds, Sheffield, Bristol, Newcastle-upon-Tyne, Edinburgh, Aberdeen, Cardiff, Belfast. Cambridge and Oxford, though not large centres of population, have laboratories where useful work has been or could be done. (In Glasgow the Public Health Laboratory is not connected with the University.) In London there are in addition to the well-endowed Lister Institute, important pathological and bacteriological laboratories connected with several of the medical schools.

There exist at the present time in the Kingdom over 20 pathological and bacteriological laboratories of which at least half are well equipped and *only one* well endowed.

Suggestions as to the use of the fund towards research in connection with tuberculosis. Two very different policies offer themselves to the mind in connection with the use of this fund.

A.—A *central laboratory* might be equipped, placed under one administrative direction closely connected with the Local Government Board and other State Departments interested in the control of tuberculosis, and divided into several sections each directed by an experienced scientific man thoroughly conversant with at least one of the branches of the subject and capable of directing younger men engaged in research.

In such a laboratory the purely experimental part of the work could be efficiently carried out, but workers in various parts of the kingdom would remain as at present unable to complete on the spot many of their investigations which would suffer from this inconvenience. The study of the *effects of local factors* would be rendered difficult. The facilities already available in many laboratories would be wasted. The training of men who come to various universities with the object of preparing themselves for the Public Health service would suffer from the lack of opportunities to come in touch with the actual work for which they are preparing.

The establishment of central laboratories would also mean the expenditure of money on new buildings or extension of old buildings, and the payment of full stipends to a permanent staff which would involve a reduction in the expenditure needed for the endowment of research by temporary research workers among whom future leaders must be found. There might, however, be distinct advantages in centralising certain parts of the research work, specially when existing laboratories already fitted for the purpose could be utilised without material expenditure on buildings.

Investigations bearing upon the production on a large scale of tuberculin, bacterial emulsions, sera, their testing and standardising, would be conducted more economically and with greater chance of success in an institution such as the Lister Institute already staffed and equipped for such work, than if an attempt were made to carry it out in many places. For administrative purposes this would also have great advantages, and make it possible to secure comparable results in connection with the use of bacterial products in diagnosis and treatment. It would, however, be necessary that easy access to the common laboratories should be allowed to workers in other laboratories, and that facilities should be given to them to obtain for experimental purposes products prepared in the central laboratory, with full information as to their preparation. There are other parts of the work which must be centralised, as, for instance, statistical investigations; these need not specially be discussed, but a matter of great importance would be the establishment of a *central intelligence bureau* where the progress of the work in this and other countries should be followed closely and recorded.

This bureau should issue frequently (say monthly and preferably in the form of a card index) a full classified bibliography, and, as soon as possible after their appearance, translations into English of all foreign papers of scientific or practical value giving working accounts of methods, and definite statements of results. These publications should be supplied to all the laboratories where research aided by the State was conducted, and should be obtainable at a moderate cost by all other laboratories or workers. The director of this bureau should be a medical man of marked literary ability and a good linguist. He should be acquainted with laboratory methods, but need not be possessed of any special experimental skill.

B.—*Local laboratories*, more specially those already connected with universities and local authorities would offer great advantages with regard to the prosecution of very important parts of the research work connected with tuberculosis.

Some of these advantages have already been outlined, they may be summed up as follows :—

1. Opportunities for the full investigation of the disease as it occurs under natural conditions in various localities, in various communities, and under different circumstances.
2. Facilities for scientific research offered to various officers and promising workers in all parts of the country.
3. Co-ordination of clinical, experimental, and administrative work all over the country.
4. Utilisation and encouragement of many investigators who at the present time have to conduct research under unfavourable conditions through want of means and assistance, and out of whose number the men necessary for staffing efficiently a central laboratory would have to be found.
5. Better utilisation of laboratories well equipped for research, but often used almost entirely for teaching only owing to the absence or inadequacy of research funds.
6. Better opportunities offered to advanced students to become practically acquainted with the scientific methods used in dealing with problems of public importance.
7. Encouragement of research at a minimum cost, because in most laboratories what is needed is only the addition of an adequate research fund to the existing income.

In connection with research on tuberculosis it is important to remember that the value of the work done by medical officers of health and tuberculosis officers, will depend greatly upon their previous training. One of the most important advantages that would accrue from the State assistance of research in University Departments where public officers are trained is that it would assist these departments in preparing officers for the future more efficiently than they can at present.

Disposal of Funds.

The sum available having, in the first instance, been divided amongst the four Insurance Commissions in proportion to the number of insured persons in the four areas severally under the jurisdiction of one of the Commissions, three alternatives appear to be possible.

1. The four Commissions might pool their shares so as to make the whole sum available for the support of a common or central research laboratory.
2. Each Commission might spend its own share entirely in the area under its jurisdiction.
3. Each Commission might spend any part of its share which it might employ usefully in connection with research within its own area, and with the remainder contribute towards the cost of such research work as might be best conducted outside the area under its jurisdiction. Or the division of the whole sum produced by the pooling of the four shares might be entrusted to a *Central Advisory Committee* on which the four Commissions would be represented.

This Central Advisory Committee should include representatives of—

- A. The Insurance Commissioners.
- B. The four Commissions.

C. The Local Government Board and other State Departments interested in the prevention and treatment of tuberculosis.

D. The experts engaged in research supported by the fund at the disposal of the Insurance Commissioners.

The chief director of the central bureau should also be on this committee. The whole committee should meet once or twice a year to decide questions of general policy, to receive reports, to distribute funds, &c. The ordinary administrative work should be conducted from the bureau by a small sub-committee of the advisory committee.

The circumstances previously discussed seem to indicate the last course as the one most desirable.

On the supposition that this method of disposal were adopted, the following tentative suggestions are offered :—

A.—Central or Common Work.

Such research as could be conducted more economically in one or two central institutions than in a number of scattered laboratories should be entrusted to one or two common or central laboratories.

Among the matters falling into this group the following may be mentioned :—

Investigations bearing upon the production of various types of tuberculosis, bacillary emulsions, sera.

Investigations into the properties of these products, and bearing upon their action, testing, and standardising.

All this work should, if possible, be entrusted to one or two existing institutions (such as the Lister Institute), and the grant to that institution should not be greater than is absolutely necessary for the adequate extension of the means already existing. The laboratory doing common work should be treated like other laboratories and be assisted proportionally to the amount of work needed. The actual manufacture of products for which the laboratory would receive payments from other sources should not be subsidised out of the research fund.

A *central intelligence bureau* should also be established for the collection and working out of statistics, &c., for the collection of bibliographical information, the translation and publication of foreign scientific communications supplying information of value to research workers. Also for the publication, subject to the sanction of the advisory committee, of reports of work done in various laboratories or institutions benefiting from Government grants and of any other works on tuberculosis as might be submitted by unassisted workers for the consideration of the advisory committee.

B.—Work in Local Centres.

Each Commission, or preferably the *advisory committee* as indicated previously, should select a certain number of laboratories (as far as possible connected with universities and with important sanitary authorities), offering good facilities for studying tuberculosis in its various aspects and for conducting experimental investigations. The number of research centres would depend on the funds available, and preference would be given to places giving the best opportunities for study. The research fund should then be divided among the research workers selected by the committee, allowance being made for working expenses, or it would probably be simpler and more economical to distribute the money among the university laboratories and other laboratories recognised for the purpose. A certain portion of the fund allotted to each laboratory would be allowed as an indemnity for the expenses incurred in making provision for research work, and possibly instruction of health and tuberculosis officers in the laboratory or in dispensaries, hospitals or sanatoria affiliated with university laboratories. The remainder (and the much larger part of the grant) should be paid to investigators working either independently or under the general direction of the heads of the laboratories. In order to induce suitable men to undertake work under these conditions, it is probable that a yearly grant or stipend of not less than 300*l.*, renewable at

the end of each year for several years, would be desirable. The time spent in this way should be recognised in any scheme of promotion in the special tuberculosis service or the general public health service. After a period of two or three years research workers showing exceptional ability should be promoted to well-paid posts, allowing them to devote themselves for several years to research without personal loss.

The grant in aid of laboratories might be calculated on the basis of—

(1) The number of men doing research or advanced work in the laboratory.

(2) The number of candidates for examinations leading to posts of Medical Officers of Health, School Medical Officers, Tuberculosis Officers, or other public medical officers trained in the department.

To these capitation grants should be added—

(3) Some special grants towards the cost of researches, approved by the advisory committee, conducted by permanent members of the staff of the laboratory in position to undertake themselves some useful work.

(4) Grants to clinical and health officers taking part outside the laboratories in research and in the training of the officers above mentioned. (This part of the grant might, with advantage, be included in the research grant (see above 2), and distributed by the university in accordance with arrangements made with the Commissioners.)

Conclusions.

Of the schemes outlined in this memorandum, the one which appears most conducive to *wise economy*, to efficiency and to *progressive success* suggests the following organisation:—

1. *Insurance Commissioners* (executive).
2. *Advisory Committee*, representing all the interests concerned (deliberative, judicial, and administrative)
 - (a) Small *sub-committee of advisory committee* (current administrative work in accordance with decisions of advisory committee and Commissioners).
3. *Local research committees*, composed of Directors of Laboratories, Medical Officers of Health, Tuberculosis Officers, research workers appointed or recognised by Commissioners. The duties of these local committees would be to co-ordinate the means of research available in the district and institutions connected with the centre and to make arrangements for collective work when possible or desirable, also to report to the advisory committee, and to send representatives to the congress of experts.
 - (a) *Congress or conference of experts* representing the various centres or local committees. These scientific representatives would discuss together the results obtained, their value, and

the methods by which further advances of knowledge might be secured. They would report to the advisory committee and elect their representatives on the advisory committee as vacancies occurred.

On the supposition that 10 research centres (including one or two common laboratories) had been recognised by the Insurance Commissioners, there would, according to the above scheme, be at least 10 Directors of Laboratories, 10 Medical Officers of Health, and 10 Tuberculosis Officers engaged in assisting the advisory committee in the organisation of research, and if, on the average, there were four research workers to each centre, the persons engaged in promoting or carrying out research would number at least 70.

The total cost of research in the 10 local centres may be estimated approximately as follows (the numbers given are purely hypothetical):—

	£	£
A. 30 junior research workers receiving a clear stipend of 300 <i>l.</i> a year	9,000	
10 senior research workers receiving a clear stipend of 500 <i>l.</i> a year	5,000	
3 eminent permanent investigators receiving a clear stipend of 1,000 <i>l.</i> a year	3,000	
	17,000	

Reserve fund kept for the purpose of making additional appointments or granting an occasional rise in recognition of exceptional work. This fund should be allowed to accumulate during the first few years

B. Grants to 10 local centres towards the payment of expenses incurred in connection with the work of the research workers recognised by the Commissioners, <i>e.g.</i> , current laboratory expenses, special apparatus, appliances or fittings, animals, additional assistants, servants, clerks. Payment of fees to external experts (<i>e.g.</i> , experts not belonging to the regular staff of recognised laboratories). Special expenses incurred by health officers, dispensaries, hospitals, &c., on an average 1,500 <i>l.</i> each	3,000	
C. Expenses of Central Bureau, stipend of director, assistants, clerks, servants, correspondence, stationery, printing, books, &c. Expenses of the Advisory Committee	25,000*	
	£60,000	

* This sum is possibly too large, in which case the surplus might be added to the sum available for the payment of stipends of research workers and expenses of local centres.

November 1912.

MEMORANDUM submitted by H. E. DIXEY, Chairman of the Executive Committee of the Worcestershire Association for the Prevention of Consumption.

I brought your letter of the 2nd instant before the committee of the Worcestershire Association for the Prevention of Consumption at their meeting on 9th March 1912, when I was instructed to write to you on the subject.

The county officer for Worcestershire, Mr. G. H. Fosbroke, D.P.H. Camb., has issued a memorandum dealing with this matter, which was considered at a conference of the medical officers of health of the county at a meeting held in Worcester on the 8th March.

I enclose a copy of the memorandum,* as it is felt that a scheme founded generally on the lines he has suggested would, if carried out, meet the requirements of the county.

Many of the suggestions may be carried out under the existing provisions of the Public Health Act, 1875,

but, until the provisions under Acts of Parliament are made *compulsory* instead of *permissive*, no general improvement of health conditions, and especially insanitary housing conditions, is likely to take place.

Facilities for treating early cases of pulmonary tuberculosis in Worcestershire have been available at the Knightwick Sanatorium, which contains 33 beds, during the past ten years.

The cost of purchasing and equipping the sanatorium has been about 10,000*l.*, the whole of which, with the exception of 300*l.*, has been subscribed voluntarily. A large sum has also been subscribed voluntarily for the "King Edward VII. (Worcestershire) Memorial Fund," and is available for the purposes of the sanatorium, to be specially devoted to making provision for children.

If arrangements are to be made to use the sanatorium for insured persons under the Insurance Act, it will have to be considerably enlarged, for which purpose, in addition to any sums subscribed voluntarily, a substantial grant would have to be made from the money

* A summary of this memorandum has been made by Mr. Fosbroke, and will be found at the end of Mr. Dixey's memorandum.

to be advanced for the purpose under the Finance Act, 1911, and if this is done, it might be arranged for the sanatorium to be approved by the Local Government Board and arrangements made to receive insured persons on terms to be considered with the trustees of the institution.

I am especially anxious, on behalf of the Worcestershire Association for the Prevention of Consumption, to urge very strongly on your Committee the fact that very large sums of money have already been given for carrying out the object on which your Committee have to report, and to point out that it would be a great hardship if a lesser grant was given to this county because it had already endeavoured voluntarily to deal with the question of pulmonary tuberculosis, and a larger grant given to districts where no provision has been made voluntarily. If this is done, it is certain that voluntary efforts will practically cease altogether, and that no provision will be made for the larger number of cases that cannot be dealt with under the Insurance Act.

HARRY E. DIXEY.

I also enclose you a copy of a letter bearing on this question from the Chancellor of the Exchequer addressed to Mr. Willis Bund, the Chairman of the Worcestershire City Council.

H. E. D.

(Copy.)

Treasury Chambers,
Whitehall, S.W.,

DEAR SIR, 16th December 1911.

IN reply to your letter of the 4th inst., I am desired by the Chancellor of the Exchequer to say that you have his authority to state that upon the amount voluntarily subscribed to the Memorial Scheme for the county of Worcester which is mainly devoted to combating tuberculosis will in a measure depend the sum to be granted to the county under the National Insurance Bill for the same purpose. I am also to enclose for your information a copy of a letter recently addressed to a correspondent describing the provisions of the Bill with regard to sanatoria.

I have, &c.

(Signed) JOHN ROWLAND.

J. W. Willis Bund, Esq.,

Chairman of the Worcestershire County Council.

Summary of a Memorandum on Pulmonary Tuberculosis, prepared by G. H. Fosbrooke, D.P.H. Camb., County Medical Officer for Worcestershire.

Scope of the Memorandum.

The causation and prevention of pulmonary tuberculosis in Worcestershire will be discussed under four headings, viz.:

- I. Characteristics of Pulmonary Tuberculosis.
- II. The prevalence of Pulmonary Tuberculosis in the geographical county of Worcester.
- III. The statutory powers of Local Authorities with regard to Pulmonary Tuberculosis; and
- IV. Measures suggested for dealing with Pulmonary Tuberculosis.

I.—Characteristics of Pulmonary Tuberculosis.

These are set out as given in the Authoritative Memorandum, prepared by Dr. Newsholme, Chief Medical Officer of the Local Government Board, and issued in February 1909.

II.—The Prevalence of Pulmonary Tuberculosis in the Geographical County of Worcester.

The actual number of cases of recognisable pulmonary tuberculosis in the county is conjectural.

A table setting out the average annual number of deaths and death-rates as well as the estimated number of cases in each sanitary district in the geographical county is there given, which shows that there are at least 1,272 persons in the county affected by the disease in recognisable form.

Compulsory notification of pulmonary tuberculosis which became general on January 1st, 1912, will reveal many cases which have never hitherto been heard of officially, and the "tuberculosis dispensaries" to be described later on, will doubtless lead to the detection of numbers of unknown patients in the early stage of the disease, at which stage the probability of "cure" is great.

III.—The Statutory Powers of Local Authorities with regard to Pulmonary Tuberculosis.

There is no doubt that many local authorities, and the public generally do not realise that even before the National Insurance Act, 1911, became law, large statutory powers for the prevention and cure of pulmonary tuberculosis were in existence.

The statutory authorities who can deal with this disease are—

- (a) Sanitary authorities;
- (b) Boards of guardians;
- (c) Insurance committees created under the National Insurance Act, 1911 (section 59); and
- (d) County councils.

Their respective statutory powers are then set out.

County councils can greatly facilitate the detection of pulmonary tuberculosis by providing bacteriological laboratories for purposes of research.

The fact that the Worcestershire County Council have for years past provided a complete laboratory, and a skilled bacteriologist, where investigations may be carried out without charge, is well known.

There are now five health missionaries appointed by the Worcestershire County Council at work in the county, whose duty it is to make house visits and advise on all health matters. For reasons which will be obvious later on, it should also be mentioned that two "school nurses" are also employed by the County Education Committee.

Sufficient has now been said to show that long before the Insurance Act came into force, sanitary authorities could, if they desired, provide sanatoria, tuberculosis dispensaries, supply medical assistance, facilities, and any articles (such as sputum flasks, paper handkerchiefs) necessary for preventing the spread of pulmonary tuberculosis, and for removing home conditions favourable to the disease.

Now that Insurance Committees are also armed with great powers, and county councils with limited powers for eradicating pulmonary tuberculosis, which causes on an average (years 1901-10) 39,689 deaths in England and Wales annually, as well as untold misery and suffering, it is most desirable that sanitary authorities, county councils, and Insurance Committees should all heartily co-operate in doing so.

IV.—Measures suggested for dealing with Pulmonary Tuberculosis.

Two points have now been established, viz., first, that pulmonary tuberculosis is prevalent in the county, and, second, that various authorities are armed with powerful weapons for suppressing it.

It ensues that "If preventable why not prevented?"

The following proposals are made with that object:—

- (a) Establishment of tuberculosis dispensaries.
- (b) Provision for sanatorium treatment where necessary.
- (c) Provision of shelters.
- (d) Establishment of "health missionaries."
- (e) Provision of sputum bottles and paper handkerchiefs.
- (f) Disinfection of houses occupied by persons having pulmonary tuberculosis.
- (g) The abolition of insanitary conditions.
- (h) Teaching and practice of hygiene in elementary schools and provision of "open-air" schools.

(a) Establishment of Tuberculosis Dispensaries.

One of the objects of tuberculosis dispensaries is to seek out-patients, who by undergoing proper treatment will most probably be restored to health. The possibilities which these institutions will afford for the early detection of pulmonary tuberculosis are

immense. The work of a tuberculosis dispensary includes—

- (a) The examination and treatment (tuberculin, &c.) of patients at the dispensary by a *medical man having special experience in the disease.*
- (b) Visitation of the home of the patient by a nurse attached to the dispensary.
- (c) Visitation of the medical officer of the dispensary at the homes to examine not only the patients, but also other persons living in the same house with the view to securing their treatment before the disease becomes too advanced.
- (d) The selection of suitable cases for sanatorium treatment, and to decide whether they are (a) early cases, (b) intermediate cases, or (c) advanced cases.
- (e) The collection of samples of sputum for bacteriological examination.
- (f) Supervision of cases after discharge from a sanatorium, in order that the habits of life initiated at the sanatorium are maintained.
- (g) Obtaining assistance for suitable cases by working in co-operation with local charitable associations.
- (h) To act as a centre for educating patients and other persons in methods for preventing and curing the disease.

Patients should if possible attend at the dispensary periodically—at first, twice a week and later on as directed by the dispensary doctor.

The attendance could often advantageously be made during evenings, in order to prevent unnecessary interference with the avocations of the sufferers.

The dispensary buildings are nothing more than small, simply furnished houses; those capable of providing a waiting-room, dressing room, a consulting and dispensing room are amply sufficient.

In order that it may be practicable for patients to attend regularly, the dispensaries must necessarily be placed in readily accessible places. It is suggested that at least 12 dispensaries are needed for the county, and in order to obviate large capital outlay it is proposed (at least as a provisional arrangement) that general and cottage hospitals be utilised as dispensaries.

As the work to be carried out at tuberculosis dispensaries is of an expert kind, it must be entrusted to medical men having special knowledge of pulmonary tuberculosis, and who will be in constant touch with the district medical officer of health.

The Worcestershire dispensaries just suggested are consequently so grouped that one or more of them may be placed under the same doctor.

(b) *Provision for Sanatorium Treatment when necessary.*

It is not suggested that all persons suffering from pulmonary tuberculosis should receive sanatorium treatment, as many of them do not need it, and could be satisfactorily treated in their own houses by their family doctors. But, on the other hand, many of them should unquestionably do so, either with the object of "cure" or of being educated in "open-air" methods; so that on their return home they might continue them. Home treatment if depended upon alone often fails to prevent infection, besides failing to cure the patient. Hence the importance of sanatorium treatment when practicable. Before this institutional treatment is commenced, it is all-important that persons having pulmonary tuberculosis should be "sorted" at the tuberculosis dispensaries as (i) early cases, (ii) intermediate cases, and (iii) advanced cases.

(i) *Early Cases.*

Facilities for treating the "early cases" met with in Worcestershire have been available at the Knightwick Sanatorium for the past 10 years; and certainly no better place—even if as good—can be found in the country.

(ii) *Intermediate Cases.*

These are persons who are neither in an early nor in an advanced stage of the disease, but who could advantageously be sent to some institution in order to

be educated in "open-air methods" which, if conscientiously persevered in, would benefit themselves and prevent its extension to those with whom they come in contact. After staying there a month or six weeks they could return home, live in "shelters" (if necessary, provided by sanitary authorities or the Insurance Committee), and follow their usual avocations. If this course were pursued the objection some consumptives have to being removed for long periods from their families would be removed.

As provision will undoubtedly have to be made in the near future, for the institutional treatment of "intermediate cases," adaptation of the isolation hospitals in the county seems an effective way of doing so. This is no new idea, for it was suggested by the county medical officer in 1908.

Whether the Worcestershire "fever hospitals," or the "small-pox hospitals," or both, should be made use of, will depend upon local circumstances.

Some possibly may think that if this proposal were assented to, there would be risk that the tuberculous or other patients might infect each other; so it should be definitely stated, that if ordinary precautionary measures are carried out, such fear would be groundless.

(iii) *Advanced Cases.*

These are hopeless, as well as a serious danger to those with whom they come in contact, unless they are subject to proper treatment.

For some years they will occur; consequently institutional treatment will have to be provided for those persons, whose homes do not provide suitable accommodation for segregation and nursing. This treatment is not only necessary for the advanced cases, but in the interests of other people, and would be of immense service in eradicating the disease.

Special Institutions for "advanced" cases are not desirable, firstly, because they would be expensive, and, secondly, because it would be undesirable to send patients to places which would soon become merely "homes for the dying."

In localities where there are no infirmaries (other than poor law) or hospitals which could be used for the purpose, it is suggested that the isolation hospitals might also be made use of. Separate ward pavilions for advanced cases would have to be built, and distinct sets of nurses employed.

Here again the cost of administration would be much less than it would be if separate infirmaries were provided, and it would be unnecessary to remove such dying persons far from their homes and friends.

(c) *Provision of Shelters.*

"Shelters," for the home treatment of patients are of great value for consumptives, should be utilised to the fullest extent practicable, and can be provided and lent or hired by a sanitary authority.

But it cannot be too clearly understood that sleeping in the open air is not the only requisite for promoting recovery. Constant medical supervision to regulate rest and exercise are essentials of treatment; since a patient's condition often varies from day to day, or even from hour to hour, and unless he is frequently seen by his doctor, he does not get the best chance of recovery.

None of the shelters require heating, as one or two hot-water bottles, with two or more blankets, will keep the patient warm in winter.

(d) *Establishment of "Health Missioners."*

Without doubt many persons suffering from pulmonary tuberculosis, either in the "early," "intermediate," or "advanced" stages, would remain at home, and in such instances the services of "health missioners" (trained nurses) would be of great value, as personal explanations are more likely to be attended to than instructions given in "leaflets."

The duties "health missioners" would undertake would be—

- (1) To visit, re-visit, and advise patients and persons in contact with them as to requisite "precautions," and the hygienic management of their houses, and to encourage them to carry them out.

- (2) To see that sputum flasks and paper handkerchiefs are used (subject to the doctor's advice), and, if necessary, to provide them at the cost of the local sanitary authority.
- (3) To teach patients how to take temperatures, as suitable treatment is intimately connected with such records.
- (4) To watch "contacts" (persons closely associated with consumptive patients), and, if necessary to urge them to attend at tuberculosis dispensaries, or to consult their own doctor.
- (5) To report insanitary conditions, bad housing, overcrowding, &c. to the district medical officer of health.
- (6) To act as "school nurses," attend medical inspections at elementary schools, and to "follow up" children reported by the school inspectors to have defects.
- (7) When necessary to nurse "insured persons" or others who require nursing and are not in a position to provide it.
- (8) In sparsely populated localities, where there is scarcity of midwives, to attend maternity cases.
- (9) To give lectures, and generally educate people in hygiene.

Health missionaries with such multifarious duties as those enumerated must not have too large districts consigned to them: otherwise it would be impossible for them to do their work properly. With this proviso, however, there would be no practical difficulty in the proposed combination.

As the missionaries with the duties suggested would be acting for insurance, sanitary, and educational authorities, these authorities would pay their salaries in proportionate shares.

It is proposed that the control of the health missionaries should be placed in the hands of a committee representative of the bodies for whom they work.

Once a controlling authority is elected for Worcestershire, a comparatively easy way to obtain suitable health missionaries would be to make arrangements with the Worcester City and County Nursing Association, who already have 42 trained "district nurses" at work in different parts of the county, and nine in the city of Worcester.

(e) *Provision of Sputum Bottles and Paper Handkerchiefs.*

Sputum bottles and paper handkerchiefs for the use of phthisical patients are of course essential for proper disposal of expectoration. Where the patient cannot provide them themselves, they should be provided gratuitously by sanitary authorities, and the health missionaries should instruct the patients how to use them.

(f) *Disinfection of Houses occupied by Persons having Pulmonary Tuberculosis.*

When a patient removes from house to house, goes to a sanatorium, or dies, the rooms and articles he has used should be properly disinfected by the sanitary inspector at the cost of the local sanitary authority, and this is generally done in Worcestershire. It is also often desirable to carry it out now and again when the patient remains at the same house for any length of time.

(g) *The Abolition of Insanitary Conditions.*

A strong crusade should be made against insanitary conditions, especially bad housing, overcrowding, &c.

(h) *Teaching of Hygiene in Elementary Schools and Provision of "Open-air" Schools.*

It is unnecessary to enlarge upon the importance of teaching hygiene in school life as an aid in the fight against tuberculosis. Hygiene, particularly the open-air habit, should be properly taught and practised in elementary schools, and the classes might with advantage, especially during the summer, be more generally held out of doors or in open sheds in the playground, than is now the case. The provision of a residential "open-air" school where debilitated children could be sent for two months or so would be of the greatest value. As the Public Health (Tuberculosis) Regulations, 1911, authorise the school medical inspectors to examine the registers of pulmonary tuberculosis cases kept by the local medical officers of health, the Education Committee directed them, in view of the great importance of carefully watching "contact" cases, to examine these registers periodically, and to systematically examine any child in an elementary school, living in a house where a person suffering from pulmonary tuberculosis resides, in order that should a child develop the disease, it may be detected in the earliest stages.

G. H. FOSBROKE.

December 1911.

MEMORANDUM submitted by W. V. DIXON.

The invitation of the Committee to submit a memorandum has been considered by a special sub-committee appointed by the West Riding Public Health and Housing Committee to report on matters arising under the Act, and they desire in the first instance to call attention to the annexed memorandum of Dr. J. R. Kaye, the county medical officer of health, indicating the need for a comprehensive scheme for the entire administrative county and setting out the general outlines of such a scheme, leaving over for future consideration the question of making arrangements with any of the county boroughs by combination or some other form of co-operation.

A table of statistics is annexed hereto, from which it will be seen that the West Riding administrative county has a population of 1,585,135 (Census 1911), and comprises 14 municipal boroughs, 116 other urban districts, and 29 rural districts, while the geographical county contains in addition six county boroughs, with a total population of 1,460,614. It is submitted that in order to carry out such a scheme effectively and economically, the county council must be recognised as the authority to undertake it.

The county council is recognised by the Housing, Town Planning, &c. Act, 1909, and other Acts, as the supervising authority in regard to matters of health,

and as such is required to appoint a county medical officer of health giving his whole time to the work; further, the county council, as the education authority under Part III. of the Education Act, 1902, have appointed a staff of medical officers for the inspection of children in elementary schools; they may also make arrangements for attending to the health and physical condition of the children in elementary schools, for which purpose a Government grant is to be given in the ensuing financial year. The memorandum of the county medical officer refers to the staff and organisation set up by the West Riding County Council for the purpose of carrying out the above provisions.

The county council is, moreover, charged with the duty of providing hospitals for infectious diseases under the Isolation Hospitals Acts, 1893 and 1901.

Furthermore, section 64 (2) of the National Insurance Act directly contemplates action by the county council, and enables the Local Government Board to invest the county council, to whom a grant is given by the Insurance Commissioners, with all necessary powers for providing and maintaining sanatoria and other institutions for the treatment of tuberculosis or such other diseases as may be appointed under the Act, and for that purpose to enter into

agreements with Insurance Committees and other authorities and persons. It will be noted that, although the provision now in contemplation is primarily intended for insured persons, it should also be made available for the rest of the community.

The grants of the Insurance Commissioners for capital outlay in respect of sanatoria and other institutions, and the sums to be derived from the Insurance Committee for the maintenance of such institutions, will be complementary to each other, and inasmuch as the county council and the Insurance Committee respectively have jurisdiction over the area of the administrative county, the two bodies can conveniently arrange with each other for carrying out a scheme adapted to that area on a comprehensive and permanent basis. In this connection it will be borne in mind that the county council and the Insurance Committee will have relations with each other in numerous other branches of their work.

In view of the above considerations, it appears desirable that financial and administrative arrangements should be effected by the Insurance Commissioners so as to enable the county council to take up the subject without undue loss of time.

W. VIBART DIXON.

March 1912.

WEST RIDING PUBLIC HEALTH AND HOUSING COMMITTEE.

SPECIAL SUB-COMMITTEE TO DEAL WITH THE NATIONAL INSURANCE ACT.

PRELIMINARY NOTES BY THE COUNTY MEDICAL OFFICER.

The machinery which is to be created under the Insurance Act for dealing with pulmonary tuberculosis should, whilst providing the stipulated personal benefits, also aim at national betterment. For this purpose it is necessary that the scheme should fit in with and practically form part of the general health administration. It must be on a broad and uniform basis in order to be comprehensive, efficient and economical. County areas are already divided in quite a variety of ways for different administrative purposes with the county council at the head. The officials of the county councils possess an intimate knowledge of their respective areas and could render valuable aid in preparing local schemes. In the West Riding the county council have for some years had before them the question of erecting sanatoria, and have gone so far as to inspect sites, prepare plans, and discuss any questions which will arise again in the near future. The county health department comprises a bacteriological laboratory which for many years has done good service in the diagnosis of pulmonary tuberculosis. From 1,000 to 2,000 specimens of sputum are annually examined here for medical practitioners, free of charge. The county council are also, as the local education authority, closely concerned with the detection and prevention of pulmonary tuberculosis among school children, and they possess a staff of whole-time medical men. There is, therefore, good ground for the opinion that the county councils may be called on to formulate and set up complete schemes for the treatment and prevention of pulmonary tuberculosis in their respective areas.

Finances.—Before any county council can prepare a detailed scheme, however, it is necessary to know something of the financial and other relationships which are contemplated between them and the Insurance Commissioners, the Local Government Board, and the local sanitary authorities in regard to this great question; what amount of money will be available from the National Exchequer to assist county councils to build sanatoria and organise dispensaries, and what guarantee that the local insurance committee will utilise the accommodation and the means of treatment provided by county councils in their areas. Will the county council receive from the insurance funds the annual sum represented by 1s. 3d. per insured person (about 31,000l. in the West Riding), or will they figure as "sanatorium contractors" under the Insurance Com-

mittee, receiving from the latter an agreed sum per patient treated?

Number of Cases.—Pulmonary tuberculosis has now been made compulsorily notifiable in all sanitary districts, but as yet the figures obtained afford little guide as to the number of cases to be dealt with. In the West Riding administrative county over 1,200 deaths are recorded annually, and an estimate of the extent of the prevalence might be made by assuming a fixed number of deaths and the number of sufferers. Some authorities suggest 1 to 4, and at this rate there may be close upon 5,000 recognisable cases of phthisis in the administrative county. The notification figures seem to indicate that this is too high a figure. Whatever the constant phthisical population may be, it is safe to say that it is recruited by something approaching 1,200 new cases per annum, since that is the present annual number of deaths.

Kind of Provision.—The amount of provision needed can only be found out in practice, but the following are the lines on which it may be organised:—

- (1) *Dispensaries*, where all patients (whether insured persons or not) can obtain advice and special out-patient treatment, including tuberculin injection. These places need only consist of a hired suite of rooms so situate as to be conveniently accessible to the community served. A whole-time medical man would attend at stated times and might serve as many as three dispensaries by attending on different days. In the West Riding we could probably employ for a start six medical men in this and allied work. They would need to keep in close touch with the local medical officer of health and to act harmoniously with the general practitioners. A nurse would be wanted to assist at each centre and to visit cases at home, but some of these might be supplied by local nursing associations, health visitors, &c. As the county boroughs will doubtless establish dispensaries it would be possible to arrange for patients living near the county boroughs to be treated there.
- (2) *Sanatoria*.—The dispensary doctors would designate certain patients as suitable for sanatorium treatment and provision will also be needed for eligible cases from the uninsured population. Instead of multiplying institutions at the beginning, the county medical officer would advocate large-scale provision capable of extension. The site should be large enough to accommodate (a) sanatorium, (b) shelters, (c) working colony, (d) temporary isolation hospital for advanced cases, (e) summer camp. Probably two such sites would serve the West Riding, each site drawing cases from an area with a radius of from 15 to 20 miles. The actual number of beds required is quite conjectural at present, but the start should not be extravagant, as extensions could always be made if necessary, and, meanwhile, a large number of cases could be treated educationally by a short stay at the sanatorium.
- (3) *Home treatment*.—It is important that the "sanatorium benefit" under the Act should be interpreted as widely as possible. The term should admit of a person receiving sanatorium benefit at home, as, for example, by (a) loaning a portable shelter for outdoor rest near home, (b) attendance at dispensary or clinic, (c) services of health visitor in supervising home treatment, (d) removal of children or other occupants of the sufferer's bedroom or house and provision of temporary accommodation for them elsewhere. Disinfection of houses and clothing would be carried out by the local sanitary authorities. Untouched by the Act, there would remain scope for philanthropic energies by voluntary associations and care committees.

Provisional Scheme on the Lines indicated.

Whilst it would be inadvisable to attempt to show details of a scheme for the administrative county, it may be useful to form some idea of the principal items and their probable cost, as follows:—

	Capital Expense.	Annual Expense.
	£	£
(1) <i>Two Sanatoria</i> , of 100 beds each, with an administrative capable of dealing with 150 beds each. Cost per bed, including site, building, furnishing &c., 175 <i>l.</i> Maintenance of sanatoria at 65 <i>l.</i> per bed (When the extensions are made for the additional 100 beds there will be a further capital outlay of 7,000 <i>l.</i> and a further annual cost of 5,200 <i>l.</i>)	35,000 — [7,000]	— 13,000 [5,200]
(2) <i>Seventeen Dispensaries.</i> Expenses of furnishing and equipping the necessary rooms taken on rental. Rent of such rooms at 30 <i>l.</i> each centre, including lighting, warming, cleaning, &c. Provision of tuberculin, &c. Salary of six medical officers at 300 <i>l.</i> Salary of six nurses at 80 <i>l.</i> Travelling expenses of doctors and nurses Printing, stationery and sundries	1,000 — — — — — — —	— 510 1,500 1,800 480 600 110
(3) <i>For the use of Dispensaries in County Boroughs.</i> —Payment to six county boroughs for treating patients from administrative county. (If this cannot be arranged there would be an extension of the 17 dispensaries referred to above.)	—	1,000
(4) <i>Home Treatment.</i> —Provision of shelters, nurses, and other expenditure in connection with patients receiving "sanatorium benefit" at home.	—	1,000
(5) Central organising and controlling expenses	—	250
	*36,000	*20,250

* Exclusive of provision for 100 beds additional.

Administrative Areas.—A map has been prepared showing in a preliminary way the centres which might serve for dispensaries in the administrative county on the assumption that some degree of combination with county boroughs will be feasible.

Owing to the way in which the county boroughs form "islands" in the county jurisdiction, and having regard to the possible formation of more islands, it may be desirable to consider the needs of a complete geographical riding at one time. Perhaps it will be suggested that a special combination should be made between county boroughs and county councils for this work, or, on the other hand, that the predominant partner should make the provision and admit patients from the other districts by agreement. No definite

advance can be made in this direction until we have some indication from the Government as to the amount and conditions of any grant which is forthcoming for this work.

Comparative Statistics.—The following table shows in round figures the population of the administrative county and the county boroughs, the approximate annual number of deaths from pulmonary tuberculosis, and the amount of money which would go to each authority if the 1,500,000*l.* provided by the Finance Act were distributed over the county according to population. It also shows the annual amount which is equivalent to 1*s.* 3*d.* per insured person in the respective areas.

Area.	Population. 1911.	Annual Number of Deaths from Phthisis.	Capital out of the £1,500,000.	Annual Sum yielded by 1 <i>s.</i> 3 <i>d.</i> per insured person.
			£	£
West Riding Administrative County	1,585,135	1,300	52,580	30,680
Bradford	288,505	300	9,570	5,580
Halifax	101,556	100	3,370	1,960
Huddersfield	107,825	100	3,580	2,080
Leeds	445,568	550	14,780	8,620
Rotherham	62,507	50	2,070	1,210
Sheffield	454,653	450	15,090	8,800
Total	3,045,749	2,850	101,040	58,930

It will be seen that the administrative county is probably a sufficiently large unit for sanatoria purposes, and the same applies to the county boroughs of Bradford, Leeds, and Sheffield. If the other county boroughs shared in a county council scheme it is probable that the two sanatoria would still suffice,

while with regard to dispensaries a conjoint arrangement would permit of a very considerable number of West Riding patients attending centres in the county boroughs.

JAMES ROBT. KAYE.

March 1912.

WEST RIDING PUBLIC HEALTH AND HOUSING COMMITTEE.

March 1912.

NATIONAL INSURANCE ACT, 1911.

	Area.	Population (Census 1911).	Rateable Value. £ (Dec. 1911.)
Municipal Boroughs over 10,000 (13)	53,365	414,261	1,926,867
Municipal Boroughs under 10,000 (1)	1,812	8,218	42,494
Urban Districts over 20,000 (3)	4,013	71,145	277,867
Urban Districts under 20,000 (113)	317,934	708,811	3,112,771
Rural Districts (29)	1,296,426	382,700	2,991,227
Total Administrative County (159)	1,673,550	1,585,135	8,351,226
County Boroughs, viz. :—			(April 1911.)
Bradford	22,881	288,505	1,566,796
Halifax	13,983	101,556	490,285
Huddersfield	11,859	107,825	505,206
Leeds	21,593	445,568	2,117,986
Rotherham	6,001	62,507	226,946
Sheffield	23,662	454,653	1,861,429
	99,979	1,460,614	6,768,648
Total Geographical County (ex. York)	1,773,529	3,045,749	15,119,874

MEMORANDA submitted by MESSRS. DUNNAGE AND HARTMANN, Architects, 10, Lancaster Place, Waterloo Bridge, London, W.C., on the ECONOMICAL CONSTRUCTION OF SANATORIA.

THE ECONOMICAL CONSTRUCTION OF SANATORIA.

The suggestions dealing with the planning and construction of sanatoria as outlined in this report have been compiled to meet the following requirements:—

1. The smaller sanatoria to accommodate 100 and the larger sanatoria 250 patients each.
2. The buildings to consist of the sanatorium proper, hospital for acute cases, isolation hospital, administration section, power house and laundry, quarters for resident staff, medical superintendent's house, and some cottage accommodation for gardeners, &c.
3. The cost to be about 150*l.* per bed inclusive of site.
4. The area of the site to be based upon an allowance of $\frac{1}{2}$ acre per patient.

These last two considerations make it necessary to form some idea of what will be a reasonable sum at which to calculate the average cost of land per acre when dealing with sites of 50 and 125 acres respectively all over the country. In agricultural districts, and where accessibility is not a *sine qua non*, suitable sites can be secured at about 20*l.* per acre. On the other hand, in manufacturing districts and certain counties such as Surrey and Hampshire, this figure will be much exceeded; for the purposes of this report an average cost of 50*l.* per acre is taken.

The cost per bed, therefore, exclusive of site, can be taken as 125*l.*

Where economy is of great importance, as in this case, a saving in cost is always effected by deciding upon a standard plan and construction.

The first saving in cost by adopting a standard plan is effected in fees. The working drawings and bills of quantities will be the same in each case above the ground floor level. The foundations will, of course, be governed by the particular subsoil in question.

The second saving in cost can be effected by making contracts with various manufacturers for sanitary fittings, ironmongery, &c. Since these will be the same

in each building, it will be possible to place large orders at once and obtain considerable reductions in price.

Naturally it is difficult to draw up a hard-and-fast plan to serve as a general pattern, if one may use the expression.

An arrangement that would be suitable for one site might be quite unsuitable for others. For example, the subsoil, aspect, level, and approach of sites vary considerably.

Therefore, the most practicable arrangement in drawing up this standard plan will be to work out each of the essential parts separately that together make up the sanatorium, *e.g.*, the main building for patients, administration building, hospital building, and isolation block, and to supply to each separate unit its separate bill of quantities (taken from the ground floor level).

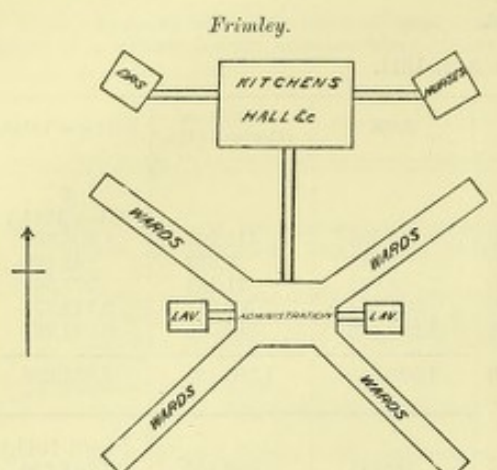
Then assuming that for some reason the ideal disposition of these buildings is not possible on a particular site, the drawings and quantities of the various parts can still be used, and it will only be necessary to decide upon the best position for the various buildings and the best means of linking them up by covered ways or other means.

This is, however, a contingency which should be avoided as much as possible, and wherever possible the site should be selected on account of its suitability for the standard plan previously determined on as the most economical and workable in all cases.

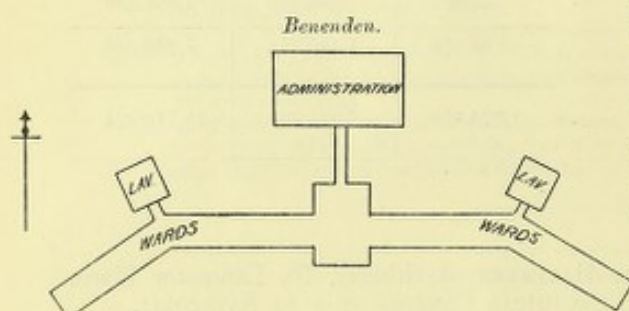
To obtain an idea what form this plan will take it will be well to turn briefly to what has already been accomplished in the erection of sanatoria in this country. We find that out of the 93 sanatoria (both public and private) that are mentioned in the Local Government Board Report of 1906-7 only 10 have accommodation for 100 or more patients, and Brompton alone is on a really large scale with 318 beds, so that the number of buildings to be examined as a precedent for the larger sanatoria is very limited.

There are, however, two sanatoria which repay careful study, inasmuch as they are good examples of the two different types of plans which have been generally adopted in designing this class of work.

These are Frimley and Benenden, and the following drawings give an outline of their general disposition :—



Number of beds	-	-	-	100.
Area of site	-	-	-	20 acres.
Cubic feet air per patient	-	-	-	1,300.



Number of beds	-	-	-	105.
Area of site	-	-	-	252 acres.
Cubic feet air per patient	-	-	-	1,200.

Both these buildings have been designed to facilitate administration, and so far as general planning is concerned it is unlikely that they can be improved upon.

The type of plan of which Benenden is an example will be the most suitable one to follow for the smaller buildings, and that of Frimley for the larger sanatoria.

SELECTION OF SITE.

As medical authorities recommend erecting sanatoria upon the slope of a hill facing southwards in order to obtain shelter from the north, it is as well to remember that such a site leads to extra expense in excavation. Furthermore, in order to secure a satisfactory cleansing of the drains, the flow through them has to be fairly slow and even; therefore, although a slight fall in the land (1 in 40) facilitates drainage, steep slopes or sudden drops are not advantageous or economical.

The importance of an abundant water supply need hardly be emphasised.

So far as the choice of subsoil is concerned, a stiff clay is to be avoided, and it is always worth while before finally deciding on a site to go to the small expense of one or two trial holes.

SOME ECONOMICAL CONSIDERATIONS *re* PLANNING.

Generally speaking, most sanatoria in this country have been built only two floors in height, and this is not an economical arrangement.

Both in the larger and smaller sanatoria the increased accommodation required should be secured by running up the buildings three or even four floors high, thus reducing the area of the foundations.

The difficulty of having to accommodate a varying number of men and women patients from time to time

is more readily got over by having several floors than when long extending wings are adopted. Outlying blocks for patients should be avoided, as they are felt to be a disadvantage from an administrative point of view.

(Although Benenden has accommodation for 105 patients, only 68 of these are in the main building, the remainder being housed in separate pavilions.)

Another method of effecting a saving is the omission of as many corridors as possible, the cubicles and wards being made to lead one out of another.

This plan has been adopted at Benenden, and it does not appear to be open to any objections in practice.

(There are only male patients at Benenden, and each is responsible for the cleaning of his cubicle. The practicability of the above suggestion might not hold good where servants were kept to do this work.)

SOME ECONOMICAL CONSIDERATIONS *re* CONSTRUCTION.

It is impossible to work out a standard plan unless some decision has been arrived at with regard to the materials and methods of construction to be employed.

In certain districts a local material will be used with advantage. For instance, generally speaking, stone should be avoided; the effect of stone buildings is depressing, the labour in working is expensive, and the walls have to be constructed very solidly to prevent wet driving through.

Nevertheless it may be possible to actually quarry stone on a particular site and a consideration of this sort might outweigh the above objections.

Where bricks are employed the walls should be constructed with a cavity. A method of reinforcement that has been applied to brick walls with success, consists of introducing at regular intervals a wire mesh between the courses.

The extra strength thus obtained allows the walls to be constructed less thick than would otherwise be the case, and sometimes a saving in cost can be effected this way.

Generally speaking, however, where there are no strong reasons for adopting a particular material, the various buildings can be economically erected by the use of steel, or preferably reinforced concrete structural members, filled in with 2-inch concrete slabs, with a space set between as a protection against the transmission of sound and weather. These partitions are light, and save time and money owing to the small amount of labour required to erect them, and the facility with which they are cut for different sized openings.

The slab sides need be no thicker for a three-storey building than for a building consisting of a single floor; it merely affects the structural members. (If built of brick, this would not be the case, as a proportion of thickness to height has to be considered even if the walls are relieved of the weight by stanchions.)

A thin concrete raft some 8 inches thick should be placed under the whole area of the buildings. The top soil need only be removed for this. The top of this raft should form the ground floor level. The construction suggested above is easily adapted to a soft subsoil, as all the loads are concentrated at the position of the stanchions, where the concrete would be deeper. By this method practically all excavation, except where the stanchions occur, will be avoided.

Buildings of the construction just described are less costly than brick buildings, are erected in a much shorter time, and are less expensive to maintain in repairs.

The only limitation to such a building is that any architectural effect must be obtained by the grouping of the various buildings; and adornments, as popularly known, must be avoided.

Floors.—The floors should be of fire proof construction. There are now certain makes of flooring that can be employed over large spans without intermediate steel joists. Where a central corridor divides a block, the rooms on each side might be kept to one of the stock sizes of such a floor. These floors can be laid very quickly.

The most suitable flooring would be one of the patent jointless compositions, of which there are many

now in use in hospitals. It is, however, necessary to exercise care in choosing such floorings, as certain of them have disadvantages.

A wooden floor is best avoided, owing to the "weather" which must find its way in through the open windows.

Joinery, &c.—Most sanatoria are fitted with glazed windows, but they seem to be rarely used. The omission of glazed windows should effect some saving in initial expenditure and maintenance; in fact, all joinery which is not absolutely necessary should be omitted, as this is always a source of expense in maintenance. The louvred doors to the window openings are best made to slide away, instead of being hung on hinges.

The same system should be applied to all the details. A contractor in estimating for this work would be enabled to put in a much lower price if all the doors, louvres, &c. were of the same design and size throughout, than if they were of various sizes. This is an essential point.

Sanitary Fittings.—A large item in the high cost of hospitals and sanatoria is accounted for by the patent sanitary fittings always recommended, and made specially for the purpose, since these fittings are never kept in stock in large quantities. The selection of good workable fittings such as are in common use in public lavatories, &c. will be a means of saving initial expense. The extra advantages of the more elaborate contrivances do not justify the additional expenditure. No saving, however, should be attempted on the plumbing or drainage work, apart from the fittings.

Roof.—Where blocks of buildings are of two floors only, the roof might be constructed as a flat, in the same way as the fireproof floors are constructed, and covered with asphalt. In this case, the structural members should be taken up, and should carry a light timber slate roof, forming a sort of roof garden, which could be used in the same way as balconies with which sanatoria are commonly provided.

This arrangement would also facilitate the addition of an extra floor, if desired at a later date, at a very small further expenditure.

Heating.—Radiators for heating purposes need only be installed in the corridors and dining rooms, &c. Although generally placed in each ward or cubicle, they are practically useless in such positions, and might well be omitted.

Power House, &c.—Power will be required mainly for electric lighting, for certain portions of the laundry equipment, and also for providing steam for cooking and for heating water for service and baths and heating purposes.

In certain cases the water supply to the sanatorium would be obtained from an artesian well, and in such cases pumping would be necessary and an increased capacity of the steam plant would therefore be required.

It is suggested that two steam boilers be installed, each capable of meeting the maximum demand for the steam required for all purposes. One boiler would always therefore be in reserve.

Similarly the steam engines or turbines actuating the dynamos, and the latter, should be duplicated, the maximum power required being always obtainable from one unit.

Steam from the boilers would be taken direct to the laundry equipment, to the kitchens and cold and hot water pumps, the steam pressure being reduced as found necessary.

Heating by hot water is probably more economical in a scattered block of buildings than steam, more especially where a power plant is installed. In such a case, the whole of the exhaust steam from the power plant can be utilised for water heating purposes, any deficiency of exhaust being made up by live steam from the boilers.

We suggest, therefore, that any heating be carried out on the low pressure hot water system, the water being circulated throughout the range of buildings to be warmed, by means of a small force pump (in duplicate) fixed in the power house. Pumps would be equally necessary with a steam heating system to return the condensed water. The latter system has, amongst others, the following disadvantage:—

- (a) Radiators cannot be regulated satisfactorily. The controlling valves must either be shut or open, and there is no half-way regulation. Therefore, when a little heat only is required, radiators require constant regulation or rooms become overheated.
- (b) Heat losses in steam mains to scattered buildings are very great, and an expensive system of insulation would be necessary to render the steam mains effective.

With a low-pressure hot water heating system, the water would be heated by exhaust steam, in calorifiers fixed in the power house, and would be circulated by means of the pumps through smaller main pipes than necessary with a steam system, to the various buildings. The heating mains could be arranged to permit of any building being isolated from the main heating system, and automatic regulation could be arranged in the power house to govern the amount of water heated and circulated, or pumped, according to the demand made for same. A similar system should be adopted for the hot water service and baths. The water would be heated in calorifiers fixed in the power house, and circulated again by means of a pump to the service buildings. Storage tanks would probably require to be fixed in certain of the buildings situated farthest from the power house, but generally storage would be formed in the calorifiers.

Both the heating and hot water systems arranged as above would be positive in circulation, and by reason of such a circulation, heat losses would be reduced in the mains, and the latter could be reduced in size to a very large extent. In one case, in our experience, a 2-inch pipe does work with a pump, which, without a pump, would require a 3½-inch or 4-inch pipe. The pumps for a complete circulation of, say, 10,000 feet of radiation or 5,000 to 8,000 feet of piping would not require to be greater than 1½ to 2 h.p.

A great advantage the above systems have is that the whole of the heating and hot water service plant, excepting the actual circulating pipes, is fixed in the power house, under the immediate control of the engineers.

Steam would, of course, require to be taken independently to the kitchens and laundry, and for economic reasons it is assumed that these departments would be arranged comparatively close to the power house.

MEMORANDUM submitted by A. EASTWOOD, M.D., ON GOVERNMENT EXPENDITURE ON SCIENTIFIC RESEARCH FOR MEDICAL PURPOSES.

THE NATURE OF THE WORK REQUIRED.

Distinction from Routine Work.

As the terms "research" and, particularly, "clinical research" are often loosely applied to work where the term "laboratory diagnosis" would be more correct, a distinction must be drawn between research and routine work. Examples of routine work are: examinations of sputum and milk for tubercle bacilli, of blood or fæces for evidence of typhoid fever, and of throat swabs for diphtheria bacilli. Such work is

necessary and must be provided for as part of every hospital equipment, but it is not research and cannot be endowed out of a research fund.

At the same time, it is to be recognised that under some circumstances, as in the following examples, research and routine are more or less closely related.

(1) *Collection and analysis of purely routine data.* As this work may throw new light on the subject under inquiry, it may be called research. (2) *Inquiries into methods of routine.* In the routine bacteriological examination of food products, for example, A, B, and

C may each adopt a different technique; the three methods may not be equally good, and possibly none of them is the best. The importance of arriving at the best method may be so great as to necessitate a lengthy experimental study of the results yielded by identical material when treated by different methods. This would be research work. Again, different institutions follow different routine methods of treating their patients with tuberculin. This is a very important instance where research is needed to determine the best method. (3) *New discoveries in the course of routine work.* Facts of scientific importance sometimes come to light accidentally in this way. It is clear that their investigation should be encouraged and treated as research work.

The fact that routine and research may overlap need cause no difficulty, beyond the need for a careful adjustment of accounts; it is certainly no justification for any claim that routine work should be subsidised out of a research fund.

Determination of the Scope of Research.

Research is stultified unless the scientist is allowed scope for the development of his originality. Valuable discoveries may arise from experiments which follow an obviously orthodox line; but they may also arise from experiments which, at the outset, appear to be due to the random promptings of an idle curiosity.

It is also to be remembered that research work very often ends in failure. A man may spend his life in trying, unsuccessfully, to discover a cure for tuberculosis or the cause of cancer; but if the work has been done in the scientific spirit, it deserves appreciation as a valuable service to the State.

It may be taken for granted that Government appreciates these considerations, and intends to encourage scientific work in this spirit.

It will equally be recognised by scientists that as the field of research is very extensive, the Government in spending public money must make a selection and must give the preference to those subjects which appear to be of greatest importance to the public as a whole. This inevitably means that the Government will be unable to assist many inquiries which may possess a genuine scientific interest. But what cannot be done by the Government may be done with funds obtained from other sources. The creation of a Government Research Fund is intended not to replace, but to stimulate to greater effort, the endowment of research from independent sources. And in the case of researches deemed suitable for support out of the public funds, the claims of one investigator must be considered in conjunction with the claims of others; Government appreciation of the scientific spirit is not to be interpreted as meaning that the individual investigator is to be given the right of claiming unlimited time and money for the prosecution of his particular inquiry.

RESEARCH ON THE TREATMENT OF DISEASE.

Treatment of Tuberculosis.

Scientific research on this subject (including diagnosis) is especially urgent in view of the arrangements already initiated for clinical treatment. As these arrangements mature they may afford excellent facilities for research. Clinical requirements have caused a sudden and very heavy demand for clinical experts on this disease, and there is cause for fear that the available supply may become exhausted unless special measures are taken to replenish it. If there be established a central hospital, with attached dispensaries, for the training of experts and the general study of the disease, this would be the most convenient centre for pathological research upon treatment and diagnosis.

It is of the greatest advantage, both to the clinician and to the pathologist, that they should work side by side; in fact, in many important branches of their work it is essential that they should do so. This is true, not only of the pathologist's study of the effects of treatment upon human beings, but also of his experimental work upon animals. The clinician is constantly puzzled to know what is really going on in

the tissues of his patient; the pathologist may throw light on this by examining an experimental animal killed when in a condition resembling, as far as possible, the condition of the patient. The clinician is often afraid to try a new treatment, because it may do harm; the pathologist may guide him by testing it on animals. And the experimenter on animals is all the more likely to make valuable observations when the course of the disease in human beings is constantly kept before him.

There would thus be required for research: (1) a large laboratory, forming one of the buildings of the hospital, equipped with every requisite for modern methods of research on tuberculosis and provided with ample accommodation for small laboratory animals; (2) at a convenient distance in the country (half to three-quarter hour's journey from the hospital) there should be accommodation for large experimental animals, with a post-mortem room and a small laboratory for doing work which could not be conveniently taken to the central laboratory. It is impossible to forecast without extensive trial what species of animals would be useful, or how many would require accommodation, but, in view of the importance and difficulty of work on immunity, provision should be made on a liberal scale (from 10 to 20 acres of land). This, it will be agreed, is one of the subjects which justifies a free use of public money. It should, however, be made clear that medical research, though it might require the use of cattle, cannot undertake to solve agricultural problems as to the possibility of immunising cattle; such investigation would require an extremely large farm, and probably extended observations over many thousands of cattle would have to be made before any conclusions could be formed.

As the pathological research would be an essential factor in the work of the hospital as a whole, it would be subject to a committee of management on which physicians, surgeons and pathologists would be represented.

To this question of research on the treatment of tuberculosis the prominence of a separate problem is given because it is the first and most obvious matter about which provision should be made. The need for it is recognised on all sides; and since it falls into its natural place as the work of a research hospital for tuberculosis, it is best to provide for it separately and not in conjunction with other research work.

Treatment of other Diseases.

So much requires to be done on tuberculosis that it seems better to postpone the question of applying similarly extensive methods of research to the treatment of other diseases in special research hospitals.

RESEARCH ON THE ÆTIOLGY AND PREVENTION OF DISEASE.

Tuberculosis.

The main facts about the causation and nature of tuberculosis are already well established, and amongst the questions still obscure or incompletely elucidated there is nothing to justify delay in urgently needed preventive measures. Still, there are unsettled matters which, though relatively subordinate, require attention and will continue to do so for considerable time to come. Some of these matters are problems of public health relative to the control of the food supply. Others are more immediately concerned with the portals of entry of the tubercle bacillus into the human body, the course of events after it has gained entry, and the possibility that it may become modified from a "bovine" into a "human" type.

It will be useful to refer to this last question in detail, because it affords a good example of the need to exercise discrimination before advising expenditure of Treasury funds upon subsidiary scientific purposes. The term "subsidiary" is used because the main fact, that tubercle bacilli of animal origin cause fatal disease in human beings, is already proved; and this fact will be quite enough for administrative purposes for many years to come. To return to modification, the experience of the last Tuberculosis Commission was that it is rarely, if ever, possible to produce modification by artificial

experiments. They may be wrong; it is just possible that some day a pathologist will find a reliable way of producing modification experimentally. But as the Commission has already spent so much time and money on experiments with this object, it would be unreasonable to ask for more Treasury money. In another direction, however, further study of modification seems more deserving of support, since the Commission has shown that so-called "anomalous" strains of tubercle bacilli sometimes occur in nature. If, as seems the most probable explanation, the "anomaly" is due to modification occurring in the course of the naturally acquired disease, it is of interest to ascertain under what circumstances this event occurs. It is therefore desirable that the anatomical conditions under which "anomalous" strains occur should be carefully noted, and that the results obtained by culture and by inoculation of rabbits should be very carefully worked out and confirmed, if necessary, by inoculation of a calf. Up to this point it is reasonable to ask for Treasury assistance. But if an enthusiast wishes to go much further, he should seek assistance elsewhere. If he wishes to test each "anomalous" virus on many species of animals, such as calves, monkeys, pigs, goats and fowls, to pass each virus repeatedly from one animal to another, and, in short, to devote about two years' costly work to each virus, he may undoubtedly produce a mass of accurate scientific data; but if he asks the Treasury to pay for them he cannot complain of unfair treatment if they refuse on the ground that there are many and costly problems of scientific research which are of greater importance.

Other Diseases.

As it is now recognised that public money must be spent in research upon the aetiology and prevention of disease and that hitherto this country has been lamentably backward in this respect, it must equally be recognised that there are many fatal diseases which must rank with tuberculosis, not merely as joint claimants, but as claimants demanding greater consideration, because at present their nature is so obscure that no satisfactory attempt can be made at prevention, still less at scientific treatment, until light is thrown upon their causation.

A beginning should be made by investigating some of these in a central laboratory (entirely distinct from the laboratory at the tuberculosis hospital), and the work in this general central laboratory should also comprise the work on tuberculosis referred to under the above heading of "Aetiology and Prevention." As questions from time to time might arise where resort to large experimental animals was necessary, convenient accommodation in the country for such contingencies would be desirable.

The work should not be confined to the central laboratory, but experts in various parts of the country should also be subsidised.

THE ORGANISATION AND CONTROL OF GOVERNMENT RESEARCH.

Owing to the many different interests which demand consideration, this is the most difficult part of the problem. It is also the most important, because the future of medical scientific research in this country will be profoundly affected by the policy now adopted.

The main considerations to be kept in view are—

- (1) The money must be expended to the maximum of advantage for scientific research;
- (2) for its proper expenditure permanent responsibility must necessarily rest with the Government;
- (3) persons to whom the Government may delegate any control must assist the Government in fulfilling both the preceding responsibilities;
- (4) the above obligations involve not merely the formulation of a scheme but the permanent control of the work in such a way as to give general satisfaction;
- (5) the control must not be dominated by individual interests or individual opinions;

- (6) there must be a systematic scheme of co-ordinated work, directed to make available for the Government the best scientific skill obtainable throughout the country.

From previous organisations for administering public funds no useful precedent can be found in commissions or committees appointed to deal with temporary problems, because (1) the work is to be permanent, and (2) it is impossible at the outset to lay down a complete or a permanent scheme, as the problem is essentially one of cautious development from tentative beginnings, and the elaboration of the scheme must be determined by the guidance of gradually acquired experience.

The work of control will involve continued care and responsibility, and it will be necessary that the assistance of experts not officially connected with the Government should be frequently sought. This is the only way of keeping in close touch with the scientific requirements of the country.

An official scheme should be proposed, to come into operation on a given date; prior to its publication, it would be communicated to the various public departments which might have suggestions to make.

On the given date a committee of permanent Government officials would be appointed. These would consist of persons experienced in public health, pathology, medicine and administration. They would be required to undertake the responsibility of developing scientific research in the interests of the general public. The committee would be authorised and expected to obtain on frequent occasions the paid advice of outside experts, who should furnish written opinions and come before the committee to discuss them. It would be a special instruction to the committee that they must obtain and, in their discretion, act upon the best scientific advice available throughout the country.

THE GRADUAL EVOLUTION OF THE SCHEME.

It is felt by all pathologists that a central Government laboratory for pathological research has long been urgently needed, and the development of such an institution would be welcomed on all sides. Interchange of ideas, in a purely unofficial way, between the workers in such a laboratory and workers elsewhere should be encouraged, and, as most pathologists have occasion to visit London from time to time, opportunities would be easy. This freedom of scientific intercourse would be of great value, both in widening the outlook of the Government laboratory and in securing co-operative work from others. Scientists rightly pride themselves on the independent spirit of their research, and they cannot be expected to lose sight of this independence in any work which they may do for the Government. But they are usually glad to widen their own interests when they become personally acquainted with the scientific interests of other institutions. The importance of promoting this feeling must never be lost sight of in dealing with the extremely difficult task of securing co-ordination amongst independent workers in different centres. It is not suggested that regard should be paid solely to the independent spirit of institutions outside the Government; at the same time, external authorities would appreciate the fact that if they were unable to accept a piece of work offered to them, the Government might get it done in its own laboratory.

Good pathological research cannot be turned out to order, and it is often extremely difficult to secure the right man. There is a dearth of experienced pathologists in this country, mainly from lack of good appointments to stimulate the development of good intellectual material. The few men who have deservedly gained a high reputation are generally too busy to undertake fresh work themselves. For the sake of their own institutions they are sometimes anxious to take new work and to sublet it to their assistants, with promise of a general supervision; but that is an arrangement which can only be regarded as satisfactory in special circumstances.

Hence it is undesirable that a large sum of money should be thrown suddenly upon the pathological market. It will all be needed in good time; but it would be better to withhold some of it to begin with than to distribute the whole incautiously.

There is one course which it is particularly important to avoid, the apportionment of the fund to different institutions according to the strength of their claims. There would be no real safeguard in limiting the grants to a number of years. A university might ask for 5,000*l.* a year, and this might be granted for five years. The university would have to increase its accommodation and its staff; and in order to retain good workers it would have to pay good salaries with a guarantee of permanency. At the end of five years the university would renew its claim; probably it would ask for more. As withdrawal of the grant would place the university in financial difficulties, the Government would be reluctant to take such a harsh step. On the other hand, as the success of the work depends on the individual worker, who may pass from one institution

to another, and as individual workers may not always turn out well, it would be a risky procedure for Government to give institutions grants which practically, if not nominally, would be permanent. Government endowment of universities is one thing; Government organisation of research in the interests of public health is a different undertaking.

Allocation to individuals, in various centres, of piece-work on a definite subject and for a definite time is a much safer procedure. During the course of the next few years experience will give further guidance. In the meantime a cautious policy of non-committal is the best means of furthering the public interests.

ARTHUR EASTWOOD.
November 1912.

MEMORANDUM submitted by R. C. ELMSLIE, M.S.

Basis of Memorandum.

This memorandum is based upon personal experience:—

(1) In the out-patient departments of St. Bartholomew's Hospital and the Metropolitan Hospital. (At the latter hospital, there has for several years been a very efficient almoner's system, facilitating the following up of patients.)

(2) In the examination of children who attend the London County Council schools for physically defective children.

(3) In work done for the Invalid Children's Aid Association.

(4) In a general investigation of the hospitals and homes which undertake the treatment of these cases.

Frequency.

Tuberculosis is the principal cause of crippling in children. In the London County Council special schools it accounts for just about one half of the crippled children.

Causes of Crippling in 3,275 London Children.

Tuberculous disease of—	
Spine	558
Hip	670
Knee	298
Ankle	70
Elbow	10
Various bones and joints	28
Total tuberculous disease	1,634
Paralysis—	
Infantile	636
Spastic	255
Progressive	32
Various	19
Total paralysis	942
Congenital—	
Dislocation of the hip	105
Talipes	91
Various deformities	31
Total congenital	227
Rickets	158
Amputations	67
Old septic bone or joint disease	78
Spinal curvatures	80
Various deformities	89
Total	3,275

In statistics compiled by Biesalski in Germany from a census of crippled children taken in 1906, the proportion of tuberculous cases is rather lower, partly because more trivial cases of deformity are included, partly apparently because of the greater severity of infantile paralysis and rickets in Germany.

Principal Causes of Crippling in German Children.

Tuberculous disease of bones and joints	11,303
Infantile paralysis	11,165
Severe scoliosis	9,167
Congenital dislocation of hip	6,479
Severe rickets	4,724

The total number of crippled children found in Germany was 75,183.

The London statistics given above do not include the cases of tuberculosis of the glands, as these are not as a rule admitted to the special schools, nor, of course do they include the more fatal classes of tuberculosis in children (peritonitis, meningitis, and general tuberculosis). In addition, they give no idea of the relative frequency of the forms of surgical tuberculosis compared with other forms. This comparison is difficult to make on account of the differences of opinion that exist as to the frequency of pulmonary tuberculosis in children. Some figures are, however, given in the report of the medical officer to the Board of Education for 1910:—

Phthisis (excluding doubtful cases)	1,243
Other forms of tuberculosis	1,625

The cases of tuberculosis in children under 15 admitted into St. Bartholomew's Hospital during the years 1906-10 (five years) fell into the following classes:—

Phthisis	30
Meningitis	97
Peritonitis	44
General	37
Lymphatic glands	137
Joints	248
Spine	77
Various	11

In addition there were 11 cases of tuberculous osteitis in 1906, but osteitis was not classified into tuberculous and non-tuberculous in other years.

Undoubtedly the proportion of phthisis to the other forms is here too low, as there is a tendency to refuse to admit them to the hospital, but during the five years 293 cases of chronic pulmonary tuberculosis of all ages were admitted to the hospital.

Age of Onset.

Tubercle of the bones and joints commonly has its onset quite early in life. In a series of cases investigated in the London County Council schools it was found that 80 per cent. of cases of disease of the spine and 78 per cent. of cases of hip disease originated in the first six years. Whitman in a large series of cases in New York confirms this.

Death Rate.

The death rate in diseases of such a chronic nature cannot be estimated with accuracy; in the series of 1,634 school children enumerated above it was only 2 per cent. But these were cases in which the active stage of the disease had passed. The total death rate in tuberculosis of the bones and joints must be at least 20 per cent., and in the case of spinal caries is more probably 30 per cent. However high it may be, the

school statistics show that a very large number of children recover from the disease, but are left with a resulting deformity.

Mode of Infection.

The mode of infection is not certainly settled. There is evidence, however, that in the large proportion of cases of tuberculosis in children, the primary infection is through the respiratory tract, and that alimentary infection is the exception. It is evident that in diseases of the bones and joints there must be a blood infection.

Although there appear to be no statistics, there is a good deal of evidence which points to direct infection in the home. Thus it is not uncommon to find that, when a child suffers from spinal caries, one of the parents has phthisis, and instances of families in which several members suffer from different manifestations of tuberculosis are frequent.

The problem of stamping out these surgical forms of tuberculosis appears then to be similar to that of stamping out phthisis.

Deformities resulting.

The results of tuberculosis of the bones and joints as seen in the London County Council schools are extremely serious. Not only is it the principal cause of crippling, but also the crippling produced by it is worse than that produced by any other disease. The deformities which commonly result come as a shock to one who has gained his experience solely in hospitals. Details of the deformities in series of cases of disease of the spine, hip and knee are given in the report of the Medical Officer (Education) to the London County Council for the year ending March 1907, and in an article in the "Lancet" February 17th, 1912. These deformities which have a serious effect upon the ability of the patient to earn a livelihood, are only to a very limited extent a necessary result of the diseases. They are in great part due to the present methods of treatment. Their importance not only to the individual child, but also to the community at large is so great that a survey of the principles of treatment, and of the respects in which our present methods fall short of these principles is justified.

Principles of Treatment.

In order to secure the best results the necessities are:—

1. *Early Diagnosis.*—This is often difficult, requiring one or more weeks of observation. It should certainly be the function of the general hospitals, so far as the poor are concerned, and can only be improved by medical education.
2. *Exact Diagnosis.*—That is, the diagnosis not simply of tuberculous disease of a joint, but of the exact situation of the disease, whether in the synovial membrane, or generally in the bone, or in a particular part of the bone. This implies both careful clinical examination and expert radiographic investigation in every case.
3. *Correction of any deformity* which may have already arisen, usually by some method of extension. This is frequently neglected, specially in disease of the spine.
4. *Rest and fixation* of the spine or joint in the "best position," that is, in that position which will be the most useful if ankylosis of the joint results.

In the case of disease of the spine and hip, rest can only be properly carried out in the recumbent position.

5. *The treatment of complications* requiring operation by means as conservative as possible.
6. *After treatment* by fixation or support for as long as is necessary to prevent any risk of subsequent contracture of the joint.
7. *Continuous after observation* to watch for any sign of recurrence of the active disease.
8. Finally, treatment is often eventually required after the disease is cured, in order to restore as far as is possible the function of the joint. Such treatment usually takes the form of operative procedures such as osteotomy and late excision of the joint.

Time occupied in Treatment.

The time occupied in these early stages of treatment is important. 1 and 2, early and exact diagnosis, may often be completed in a few days, and should never require more than two or three weeks. 3, correction of deformity by extension, may occupy a few days only, as in a case of recent disease of the knee, or several months, as in a case of disease of the spine. 4, rest and fixation, is a matter of months or years; the minimum may be put at six months, the average at one to two years, and the maximum may be seven or eight years. 6 and 7, after observation, is always a matter of years, and in fact should continue until the child is old enough to look after his own health.

Education.

Owing to the length of time occupied in treatment, special provision for the education of these children is necessary: (1) during the period of treatment by rest and fixation, *i.e.*, in hospital, and (2) during the period of after observation, in a special school.

Mechanical Difficulties.

The mechanical difficulties to be overcome in the accurate fixation of the spine or of a joint are often considerable. There are many rival methods for fixing the more difficult joints, and it would be a mistake to consider that any of them has at present been shown to possess an undoubted superiority over the others. Successful fixation is much more the result of personal attention to detail on the part of the surgeon and his assistants, than of any special excellence of the method adopted. Probably, given the necessary skill in application, plaster of paris is the best present method of fixing the spine and joints.

Present Facilities for Treatment.

At the present time treatment is carried out in many different classes of institutions.

1. General hospitals.
2. Children's hospitals.
3. Infirmarys (poor law).
4. Special hospitals—
 - (a) In town, *e.g.*, the Alexandra Hospital for Hip Disease.
 - (b) In the country, *e.g.*, Sir Williams Treloar's Hospital at Alton, and the Liverpool Country Children's Hospital at Heswell.
5. Country surgical homes, such as those at Banstead, High Barnet, Broadstairs, &c.
6. Convalescent homes.
7. Country hospitals of the Metropolitan Asylums Board, at Carshalton, Hither Green and Margate (poor law).

At present a large proportion of the children are treated in the main at the general and children's hospitals, with irregular periods of rest in one of the country homes (5). Another group are treated in the special hospitals, and a third group, of rapidly increasing size, are treated in the infirmaries and Metropolitan Asylums Board hospitals.

There is no doubt that, judged by the results seen in the London County Council schools, the second of these groups, those treated in the special hospitals, recover with far less deformity and much better general health than do the others. A comparison of the facilities possessed by the different classes of institutions with the requirements already stated makes the reasons for this clear.

Defects of General and Children's Hospitals.

In the general and children's hospitals the chief cause of failure is the short period of treatment of these children as in-patients. This is due to causes that appear inevitable—press of work, the numbers awaiting admission, the necessity of showing an apparent economy in the short stay of patients, &c. Usually these children are treated in splints as out-patients, coming into the hospital only for short periods for the correction of deformity, or for the opening of an abscess. Proper fixation cannot be carried out upon an out-patient, and, moreover, a child fixed upon a splint or in plaster requires skilled nursing, which cannot be secured in the home.

Further, the mechanical methods have as a rule to be entrusted to assistants, house surgeons, dressers or nurses, and cannot be as efficient as they would be in the hands of someone who is devoting the major part of his time to such work.

Of Country Homes.

The country homes are for the most part small; they are as a rule supervised by a local practitioner, who can give up only a small amount of his time to the work, and knows little of the mechanical principles involved. In addition, they are imperfectly equipped: have, for example, no X-ray apparatus, and no splint maker. In them as a rule the treatment which was being carried out at the time of the child's admission is continued, regardless of the question whether it is efficient or is still the correct treatment.

Special Hospitals.

The special hospitals suffer from none of these defects. They can treat the children as in-patients for an indefinite period, are for the most part well equipped, and, given the necessary ability and experience on the part of the medical officer, can carry out to the full all the principles of treatment enumerated above from (1) to (6). They then only require a proper system of co-ordination with (1) the general hospital in which the diagnosis is made, and with (2) some system of after supervision.

Convalescent Homes.

Convalescent homes, having no adequate system of supervision or nursing, are only suitable for children in an advanced stage of recovery (stages 6 and 7).

Infirmaries.

Infirmaries suffer from all the defects of the general hospitals, except that there is not the same pressure upon the accommodation.

Metropolitan Asylums Board Hospitals.

The hospitals of the Metropolitan Asylums Board should be as efficient as the special hospitals. But they must be well equipped and amply staffed. They also require co-ordination with the general hospitals and with a system of following up. At present they suffer from the defect that they are poor-law institutions, and that admission has to be obtained through the relieving officer, often with a preliminary stay in an infirmary. If, as seems probable, this class of institution is to become the regular method of treatment of these forms of tuberculosis among the poor, this should be altered. It seems hardly desirable that a distinction should be made between two such diseases as scarlet fever and tuberculosis, so that, although the treatment is organised by the same authority, in the former case it should carry with it the stigma of the poor law, and in the latter it should not do so.

Educational Provision.

Educational provision is at present made for these children in the following ways:—

1. Schools in certain of the special hospitals, e.g., the Alexandra Hospital.
2. Country recovery schools, such as the Manchester School. This is practically a country surgical home in which a school is carried on.
3. Invalid day schools, such as the London schools.
4. Trade schools for cripples.
 - (a) Day schools, such as the London schools.
 - (b) Residential schools, such as the college at Alton and the Heritage School at Chailey.

At present only a very little teaching is done in the special hospitals, and thus children suffering from tuberculous diseases fall very greatly behind in their education. The day schools serve not only for educational purposes, but also as a means of following up the children to watch for any sign of a relapse.

Summary of Defects.

To summarise then, the treatment of children suffering from tuberculous diseases of the bones and joints falls short of the ideal in many respects, so that

there results both unnecessary physical defect in the shape of deformity, and also unnecessary educational backwardness. This is due largely to defective organisation, there being too few special hospitals for these diseases and no proper system of co-ordination to enable children to obtain admission to these special hospitals without delay. But it is also in part due to a failure on the part of the surgeons carrying out the treatment to appreciate certain of the principles of treatment, notably:—

- (1) The mechanics of fixation.
- (2) The necessity of obtaining the "best position" of the joint.
- (3) The necessity for conservative treatment, specially the avoidance of early radical operations.

Tuberculosis of the Glands.

Tuberculous disease of the lymphatic glands requires special mention. It necessitates the general treatment of the other forms without any very special local treatment, particularly the mechanical difficulties do not arise. The only important point in the surgical treatment is that it should be as conservative as possible, so that operating is reduced to a minimum.

Scheme of Treatment.

A complete scheme for the adequate treatment of these "surgical" forms of tuberculosis in children may now be suggested. It must include:—

1. *Diagnosis.*—Discovery and diagnosis. This is the function of the practitioner, of the hospital out-patient department and of the medical inspector of schools. It might be argued that this (diagnosis) is satisfactory at present. But there is no doubt that diagnosis is facilitated by observation in the wards of a hospital. If the hospitals knew that, when such a child was taken in for observation, he could be quickly transferred to a special hospital as soon as the diagnosis was established, there would not be the reluctance to admit these cases to the general hospitals which is evident at present. This period of observation also suffices for the teaching of medical students, and so meets one of the great objections to the removal of the whole of any class of patient to a special hospital, viz., that medical education suffers.

2. *Special Hospital Treatment.*—Facilities for the immediate transfer of the child to a special hospital, and for treatment there until—

- (a) the general health is good;
- (b) there has been no evidence of active disease for a long period, at least six months; and
- (c) there is no further need for active treatment or for any apparatus that necessitates recumbency or frequent renewal.

3. *After-supervision.*—Return home, and immediate notification or some authority for following up. The child should then attend a special school if there is one available; there he will get—

- (a) Daily observation by the school nurse.
- (b) Periodic examination by the school doctor.

He should further attend at intervals the out-patient department (if any) from which he was sent to the special hospital, or his own doctor.

(Much good can be done to secure proper following up by a notification of the discharge of a child being sent by the hospital to any society that undertakes the visiting at home of invalid children. It is understood that the Metropolitan Asylums Board have arranged to notify the Invalid Children's Aid Association in London of all children discharged from their hospitals.)

4. *Technical Education.*—Further education—

- (a) at trade schools for crippled children, either residential or day schools; or
- (b) by apprenticing.

5. *Treatment of Recurrence.*—Facilities for the immediate return of the child to the special hospital when any recurrence of the disease is suspected.

6. *Correction of Deformities.*—Facilities for the final treatment to minimise the resulting disability. These should be procurable either in the general hospital or in the special hospitals.

7. *Home Investigation.*—Finally, a system of home investigation for the discovery of undiagnosed cases of tuberculosis in the family of the child is required.

Special Hospitals.

The special hospitals require further mention. Those at present in existence are not all up to the proper standard. As far as the buildings are concerned, those at Carshalton (Metropolitan Asylums Board) and at Heswell (Liverpool) are probably the best. In treatment that at Alton is particularly good.

The requirements are:—

1. *Situation.*—In the country, but easily accessible, and preferably on high ground.
2. *Buildings,* which include ample facilities for open-air treatment.
3. *Accommodation* for children of all ages, including infants. There should be no rules excluding particular types of cases, such as those at Alton which exclude infants and children with disease in the lungs. For the latter isolation wards should be provided if necessary.
4. *Facilities for education* of the children.
5. *Staffing.*—The residents should be permanent, not temporary, as the mechanical methods needed require to be learnt. Resident medical officers are essential. There should be at least one to every 200 children.
6. *Nurses.*—The nursing work is heavy, owing to the large number of children on splints. A proportion of the nurses must be highly skilled as they must act as assistants in the application of splints and plasters.
7. *Mechanics.*—These hospitals should do their own mechanical work in the shape of splint making, &c. The work so done is cheaper and more efficient. This necessitates a staff of blacksmiths, leather workers, &c., according to the methods employed.
8. *Consulting Staff.*—It is not clear that a consulting staff is required at these hospitals.

The superintendent can soon become more expert at the particular methods of treatment required than any consulting surgeon. But some method is certainly required of keeping the work up to the proper standard; and in the last stage of treatment, the mitigation of any remaining deformity, the assistance of an operating surgeon is advisable.

Further, so far as London is concerned, an association between these special hospitals and the teaching hospitals would be of great benefit to the teaching of surgery.

Authority.

Finally, the question arises as to what authority should provide and organise these hospitals. It has been evident for some time that charity cannot make a sufficient provision, at least in London. By the initiation of the special Metropolitan Asylums Board hospitals, which, although not originated definitely for this purpose, are gradually becoming special hospitals of this class, the work has fallen into the hands of this authority. The payment of the expenses of these institutions comes from the boards of guardians, so that they fall into the class of poor-law relief.

Reasons have already been given for dissenting very strongly from this principle, which interferes very greatly with the proper working of these hospitals and with their proper co-ordination with other agencies.

Whatever authority organises these institutions it should be insisted:—

1. That they are not poor-law institutions.
2. That they are subject to such supervision of inspection as will keep them up to the proper standard.
3. That they are properly co-ordinated with the work of the general hospitals, and with some agency for following up.
4. That they are properly co-ordinated with the education authority.

R. C. ELMSLIE.

March 1912.

LETTER TO THE CHAIRMAN FROM PROFESSOR IRVING FISHER, President of Committee of One Hundred on National Health of the American Association for the Advancement of Science.

MY DEAR SIR,

In accordance with your request in New York, October 8th, I take pleasure in sending you some brief notes containing suggestions for the proposed investigations on tuberculosis under the new Insurance Act. I assume that the problem which you need to discuss is (1) as to the organisation of the investigations, and (2) as to subjects for investigation, all with reference to the practical object of decreasing the death-rate from tuberculosis in England.

As to organisation, I would suggest that one man be placed at the head of the investigations, and that a sufficient salary be offered to secure the very best talent available. This man need not be a technical specialist in tuberculosis, although he should be equipped with a broad training in preventive hygiene. He should also have familiarity with the social and industrial aspects of tuberculosis as a disease of the masses. Breadth is more important in his case than specialisation. A young man with energy, enthusiasm, imagination, executive ability and skill in judging men and arranging their work would be the ideal I have in mind, which is not unlike the ideal for a University President in the United States.

I would suggest that there should be a large advisory committee to aid the above director of investigations. This advisory committee should include expert bacteriologists, physiologists, physicians, statisticians, sociologists, &c., particularly interested in tuberculosis, and need not be confined to England. The members of this advisory board should serve without salary and without any other remuneration than the honour of being upon the board. Their functions should be exclusively advisory, and they should have no power to interfere with the director,

who alone should be held responsible for his policies and their execution. The members of the advisory board, however, should have both the right and the duty of making suggestions, not only in reply to specific questions submitted to them by the director, but of their own initiative.

Through this advisory board, which might include a score or more of the world's students of tuberculosis, the director would have ready access to almost all the practical suggestions available throughout the world.

In organising the work it would doubtless be advisable first to subsidise workers already attached to universities and other institutions, and to continue investigations already in existence or projected. But the aim should be to secure as soon as possible an independent set of investigators, to devote their time exclusively to work under the director. The experience of the Carnegie Institute has been distinctly in favour of securing special investigators instead of subsidising those whose time and attention are largely claimed by the duties of a teacher or administrator in universities or other institutions.

At the outset competent workers should be employed to collect a selected library of the literature on tuberculosis, and to make a selected bibliography of all important writings on this subject. The bibliography should include most of the literature of the last five years. A bibliography *selected* and *annotated* (from lists now available in medical libraries) by experts would be more valuable than a merely clerical compilation including thousands of useless entries. On the basis of this library and bibliography there should be constructed an abstract of the present state of our knowledge on tuberculosis, with reference to the original sources on which this knowledge is based.

The library, bibliography, and abstract should ultimately prove of great assistance to the director and his co-workers; but it would not be necessary or advisable to delay the beginning of investigation until these or other tools ultimately obtainable should be obtained in full number. A scheme of investigation should be drawn up at once, tentatively dividing the field for investigation into the parts into which it most naturally falls for the purpose of investigation. The following is a very tentative suggestion for such a classification:—

1. There should be a *statistical division*, under a competent vital statistician, whose work would consist in securing all available statistics on tuberculosis, the death rate from it in different localities, different occupations, different ages, different races, &c., the age incidence of the disease, the duration of its various stages (a subject on which we have little data at present), the decline of the death-rate in recent years, the extent to which this decline is fictitious owing to concealment, the extent to which it is due to isolation, the "expectation of life" of cured or arrested cases, the relation of tuberculosis to overcrowding in tenements, to overstrain in industry, to dust and noxious vapours, to alcoholism, venereal diseases, &c., the cost of treatment, loss of wages, and other money costs involved, the extent to which the cost of tuberculosis falls on the family, friends, benefit clubs, insurance companies, and the State, &c. One of the most important studies should be on the effect of isolating infectious cases on the death-rate from tuberculosis. Of course, care should be taken in these statistical as in all other investigations not to duplicate but to supplement work already accomplished, such as the important work done by Dr. Arthur Newsholme in England and Frederick Hoffman in the United States.

Under this division might properly come a study of the so-called "hereditary tendency" to tuberculosis and the question whether such a tendency represents a naturally weak cell resistance or an original childhood infection liable to develop later in life into tubercular activity.

2. There should be a *division on pathology and bacteriology* to deal with the tubercle bacilli of the human and bovine type, the methods of their spread, and the methods by which to prevent their spread. This should include a study of surgery in tuberculosis; a study of the relation of other particular diseases to tuberculosis such as syphilis, typhoid fever, and measles; a study of the infection of children and the extent to which it is true that tuberculosis begins in childhood, remains latent until adult life and then becomes active; and a study of the question whether original infection produces a partial immunity against further infection.

3. There should be a *division on specific therapeutics* to study Koch's tuberculin, their modified forms, other culture products, occupation therapy (autoinoculation), the Oponic Index of Wright, the production of artificial immunity, the action of drugs. Under this division there should be a special investigation of all alleged specifics for tuberculosis, including advertised nostrums and those proposed by irregulars and quacks of all kinds. The investigation of these should be conducted in an impartial and scientific spirit, and not in a spirit of persecution. The object of such a study should be two-fold:—

(A) To secure the benefit of any actual virtues there may be in the numerous proposals sincerely believed by their promoters to be helpful for tuberculosis. At present the ordinary physician is helpless to pick out the wheat from the chaff, and finds so much chaff that he is apt to overlook the few grains of wheat that may actually exist. Yet one grain of wheat may be worth finding in a whole bushel of chaff. The Metropolitan Hospital on Blackwell's Island, New York, has recently examined twenty-six alleged specifics for tuberculosis, and found two to be of real probable value.

(B) To expose the many fraudulent and injurious so-called remedies for tuberculosis by which millions of people are to-day victimised with the aid of the advertising columns of the news-

papers. The American Medical Association has examined and exposed a great number of fraudulent cures. It is impossible in advance to decide definitely on the basis of the standing of the proprietor of a proprietary medicine, or on the basis of the ethical or unethical method of exploiting it whether it is fraudulent, injurious, innocuous or beneficial.

4. There should be a *division on hygiene* which should endeavour to discover what are the best housing and industrial conditions promoting tuberculosis, and the conditions which tend to prevent it. School construction (seating, desks, ventilation, lighting, &c.) should be considered in this connection. The study of this division should include a careful study of the optimum conditions of hygiene for the prevention of tuberculosis, industrial hygiene, factory sanitation, shortening hours of labour, abolition of child labour, &c. At the recent International Congress of Hygiene and Demography, Professor Röpke reported that at Solingen, the seat of German cutlery, the death rate from tuberculosis had been reduced from 540 per 100,000 in 1883 to 180 in 1910, and the general death-rate from 20.6 to 9.3 in the same period. The significance of this in relation to the introduction of better industrial conditions and in contrast with less rapid improvements elsewhere should be investigated.

Improved housing and personal hygiene should also be considered.

The establishment of standards of personal hygiene and their gradual adoption by the community would not only reduce tuberculosis to a minimum, but would tend to reduce every other disease as well. Among the optimum conditions to be ascertained would be the following: What is the optimum air environment? To what extent is good air a matter concerning the lungs and a matter concerning the skin? The searches of Flügge, Paul, James, and others, would indicate that many of our preconceptions on this subject have been wrong, that the injury from carbon dioxide is non-existent or slight, and that the real virtues or evils of good air are related to obscure factors, such as moisture, temperature, motion, electrical tension, ozone, &c. There should be a study of the best methods of obtaining healthful air indoors. The subject of deep breathing should be included, especially as a preventive of tuberculosis. The effects of rapid and slow respiration deserve study and the effects of rarefaction. Some studies have been made in these lines, especially by my colleague Professor Yandell Henderson. The study should include a study of the physiological effect of dust, noxious vapours, smoke, bacterial content and other impurities in the air. The truth is that we do not yet know wherein the value of outdoor life consists. If, as recent evidence indicates, it is partly or largely in relation to the skin as well as in relation to the lungs, then it becomes important to study clothing. Accordingly this division should include a study of clothing as to its weight, conductivity, porosity, &c.

The care of teeth—especially of school children—should be included among the agencies making for more resistance to the invasion of tuberculosis.

There is particular need of study as to diet both in regard to its quantity as well as its quality. Statistics which I have prepared show an enormous variety of diets used in the treatment of tuberculosis, ranging almost from fasting to forced feeding, and from a vegetarian diet to one almost exclusively of meat. The questions included relate to calories, bulk, protein, fat and carbohydrates, mineral salts, acids, enzymes, &c. The subject of tubercular germs in milk, meat, &c., would probably be best included under the bacteriological division, although through the director there should be constant co-operation between these as between all of the divisions into which the work is grouped. There should be a study of the effect of auto-intoxication, and methods of preventing it through the lactic acid bacteria of Metchnikoff and other protective bacteria, the addition of bulk or laxative foods to the diet. Vegetarianism should be studied. There is now, besides the sentimental vegetarianism, what may be called a sort of scientific vegetarianism or "near vegetarianism" represented by the investigations of Tissier, of the Pasteur Institute, and to some extent by his colleague Metchnikoff, the late Professor Herter of Columbia

University, and Professor Chittenden of Yale. The studies of Tissier seem also to show that possibly protein of vegetable origin is more hygienic, certainly less putrefactive, than protein from animal sources. In this connection should be considered the important subject of lowered bodily resistance due to insufficient evacuation and, in general, the relation of intestinal auto-intoxication to cell-resistance. This hygienic study should include the effect of alcohol, tobacco, and other drugs, including tea and coffee. There should be a study of posture, including the stooped and round-shouldered posture, in relation to tuberculosis and its effects, especially the portal circulation. In this connection the effect of sedentary life should be considered, and the best form of chairs and desks for schools and offices should be discovered. Dr. Knopf and others have the opinion that a hygienic chair should curve in the opposite way from that which is common to most of our chairs.

The effect of exercise and work, overstrain and long hours, lack of sleep and lack of amusement all deserve study in this connection, as well as in other connections already mentioned.

The relation of mental attitude, especially worry and fear, &c. in relation to tuberculosis and hygiene generally should be considered, also the value of the therapeutics of suggestion and of the gospel of optimism.

5. There should be a *sociological division* on propaganda, *i.e.*, the crusade against tuberculosis, the various agencies used in combatting it: sanatoria, hospitals, dispensaries, day camps, open-air schools, visiting nurses, boards of health, insurance laws and organisations, &c., especially with reference to their possible co-ordination, perhaps after the manner of the central government committee employed in Germany. This should include a study of the relations of the State to tuberculosis. I understand one object of the Act under which this investigation is to proceed is to organise the health agencies now existing, which are

doubtless in many cases duplicating each other and failing to articulate. One result of the investigation should be the devising of a plan for interrelating these agencies so as to promote economy and efficiency, and provide a clearing house of information. Another result should be the training of men and women for specialised service in combating tuberculosis and the utilisation of hospitals and teachers to give special graduate instruction in diagnosis. The majority of physicians do not yet make sufficiently early diagnosis.

There should go with the investigation some plan for making its results effective through improvements in laws and their administration as well as through the education of the public. Therefore the investigation should include a study of existing and proposed laws and regulations pertaining to tuberculosis, such as anti-spitting ordinances, disinfection-, isolation-, and commitment laws, Government sanatoria and hospitals, Government-aided private institutions, legal provision for examination of sputum, physical examination of tuberculous workers, especially among factory employees, and governmental confiscation of private property prejudicial to health, such as insanitary tenements.

Most important of all is to make provision for the continuous education of the public. Many expensive Government investigations result in little more than printer's ink, because no provision is made for causing the findings to filter down through all classes of society, and especially social workers of all kinds, including physicians, teachers, clergymen, editors and parents.

There is need for some efficient machinery to connect research with life so that the results of research may be practically applied. This machinery should include a highly organised press service which should not only prepare matter for the ordinary newspapers but also for the medical reviews and numerous other organs of publicity.

Very sincerely yours,

IRVING FISHER.

LETTER FROM SIMON FLEXNER, M.D., Sc.D., LL.D., Pathology and Bacteriology; Director of the Laboratories of the Rockefeller Institute for Medical Research, New York.

DEAR MR. ASTOR,

October 1912.

You asked me to prepare a memorandum for your Committee, on which I can be questioned, and I am sending you a brief statement which may, I trust, be of some use.

As I understand your proposition, it is this:— There will be available to the Government to spend upon tuberculosis a large sum annually. A portion of this sum is to be devoted to investigations that will have for their purpose discoveries, through which better means of preventing and of treating cases of tuberculosis may be found. My opinion was asked as to whether this latter sum could be more advantageously spent in dispersing it in the form of stipends or grants to already established laboratories, where it would be employed to promote investigations now begun, and also to start new investigations, or in establishing and maintaining a central institution, the purpose of which is to pursue scientific studies relating to tuberculosis alone.

Perhaps before giving my answer to this question, it may be well for your benefit, and possibly for the benefit of some of your associates, to state briefly what my experience has been as a teacher and student of medical science.

I spent nearly 10 years at the John Hopkins' Hospital and Medical School in Baltimore, in teaching advanced men pathology and bacteriology, and in conducting research in those subjects. I then spent four years in a similar capacity at the University of Pennsylvania, in Philadelphia. For the past eight years I have been connected with the Rockefeller Institute for Medical Research, in New York. I have, therefore, been in close contact with research in medical teaching institutions of a good type, as well as with research in an adequately endowed institution given over wholly to that object.

The Rockefeller Institute is, in fact, 10 years old.

For two years or more it had no local habitation, but was a dispersing body wholly, and allotted funds as grants to various laboratories in the United States, and in a few instances to laboratories abroad. The scope of the work supported included subjects in pathology, physiology, and pharmacology. The special studies were carried out by research scholars, giving their whole time, and the subjects were always approved and sometime chosen by the directors of the institute, who awarded the grants of money. The grants were indeed not made to the scholars, but to the heads of laboratories, who were held responsible for the work of the scholars.

The conclusion arrived at after this trial was that while some progress could be made in this way, the scientific results would always bear a fragmentary character and lack consistent plan. It was further believed that a large multiplex subject could not be investigated in this way.

This view led to the founding of a central institution in New York, without, however, wholly abandoning the practice of issuing money grants to further a line of work already begun elsewhere that could obviously be well pursued there, and possibly better than in the central institute itself.

My answer to your question is, therefore, that a centralised institution, properly equipped and manned with the best available scientific workers, and presided over by a director who, preferably, should be an investigator also, and possessed of wide sympathies, is the object to be aimed at. Such an institution should, in my opinion, contain several departments so that the broad subject of tuberculosis may be attacked from many different sides. Further, the departments should be organised with the idea that, sooner or later, they are to act together, although at the beginning they may start on more or less separate and discreet problems. In such an organisation it may well become necessary

for men to sink their individualities more or less for the common good result. This I consider no obstacle.

I confess that I see no other way of approaching to-day the problem of tuberculosis, which far exceeds

in scope the limits of medical science alone, and includes fundamental economic and social factors.

I beg to remain, &c.,

SIMON FLEXNER.

MEMORANDUM ON NORWEGIAN COTTAGE SANATORIA FOR TUBERCULOUS PATIENTS, procured for the COMMITTEE by the FOREIGN OFFICE.

According to the Norwegian Tuberculosis Law of May 8th 1900, tuberculous patients may, at the instance of the local sanitary boards, be placed in hospitals or sanatoria at the public expense, provided it be found impossible to allow them to remain in their homes without running the risk of infecting the other inmates; a man cannot, however, be separated from his wife, nor a woman from her husband, against their will. As the working expenses of the larger institutions of this description are comparatively high (about 3s. 4d. per bed per day), it has been found advisable to admit only those cases where a cure may be effected, and to provide other and more suitable accommodation for advanced and hopeless cases. The advanced cases would not, as a rule, be willing to be taken far from their homes, nor would it be practicable to move them any distance. The aid of the medical authorities in Norway is, therefore, to promote the building of as large a number as possible of cottage sanatoria—"Tuberculosis Homes"—where tuberculous patients of the poorer classes, who are in the more advanced stages of the disease, can receive careful attention in the neighbourhood of their homes, and where, in particular, the great danger of infection is obviated. In some of the Norwegian hospitals, advanced cases of tuberculosis are admitted, but, although these cases are kept entirely apart from the other inmates of the hospital, the arrangement is not considered to be satisfactory.

There are 48 cottage sanatoria in Norway, a few of which are, however, not yet completed; they are, as a rule, owned and administered by the various counties and communes. The cost of erection is usually

defrayed to a considerable extent by private subscriptions and by the proceeds of the "zamlag" (*i.e.*, the profits of the Commune on the sale of spirits; these profits are, by law, to be devoted to objects of public utility). As to the working expenses, these are covered by the communes or counties, by legacies and private subscriptions, by "zamlag" profits, and by a State grant to each sanatorium amounting to four-tenths of the cost of subsistence, &c., of each patient. In 1909, the grants by the State in aid of the work for combating tuberculosis aggregated about 17,000*l.*

The cost of erection of the Norwegian cottage sanatoria varies, of course, very considerably. From the printed reports that are available it appears that a sanatorium with 8-10 beds would cost, on the average, about 650*l.*, and one with 16-20 beds about 1,400*l.*

The working expenses average about 1s. 10d. per patient per day. Each cottage sanatorium fixes a certain charge for subsistence, attendance, &c.; this ranges from 1s. 1d. to 2s. 2d. per patient per day, the average being about 1s. 8d.; it is on the basis of this charge that the State grant is calculated. Some of the sanatoria admit patients who pay for themselves, at a lower rate.

The staff required for the smaller establishments consists, as a rule, besides occasional help, of one nurse and one servant who does the cooking and housework; the larger sanatoria require the services of two nurses, two servants and one man.

August 1912.

MEMORANDUM submitted by A. G. R. FOULERTON, F.R.C.S., Director of the Bacteriological and Clinical Pathology Laboratories at the Middlesex Hospital, Lecturer on Public Health in the Middlesex Hospital Medical School of the University of London, County Medical Officer of Health for East Sussex.

In response to the request conveyed by the Secretary of your Committee in his letter of the 20th March 1912, I have the honour of bringing before your Committee the enclosed memorandum on a scheme for promoting research work in connection with tuberculosis.

Your Committee are well aware of the importance of exact knowledge as to the means of infection and methods of causation of this disease. Without such exact knowledge as their basis, large administrative measures for the prevention of the disease must necessarily be empirical, will probably be wasteful of expenditure of public money to some extent, and when increased knowledge of the manner of conveyance of the disease has been gained may prove to have been in some degree purposeless.

Therefore, in drafting the memorandum which I have the honour to submit to you I have assumed that the first importance of exact research work for the guidance of practical preventive measures is recognised; and so I have confined my observations to suggestions as to the way in which funds provided by the State might be best applied to promoting individual effort to obtain that knowledge of which the State has need.

I may be allowed, however, to point out that at the present time our knowledge of the natural history of the parasite of tuberculosis, of its distribution in nature, and of the means by which infection is conveyed to man, is seriously deficient. And, consequently, whatever public measures for prevention may be adopted at the present time, whilst they may be ameliorative in some degree, cannot be other than experimental, and may have to be stringently revised when further knowledge has been obtained as the result of work in the laboratory.

It is then clearly to the advantage of the State that encouragement and help should be given to individuals who are prepared to undertake that research work which is required for the guidance of effective administrative measures. That much being allowed, and the means of help having been provided, it remains to be considered how financial help for research work can be best applied. It is frequently said that there is less endowment for scientific research work in this country than in countries—the United States and Germany for instance—which enter into competition with us. How far this general statement is true, I am not aware. But it is certain that during recent years very considerable amounts of money have been allocated, both by the State and by individuals, for the advancement by research work of our knowledge of disease. And I believe that few of those of us who are actually engaged in research work as an occupation will disagree with me when I say that it is equally certain that the funds thus provided have not been administered in accordance with sound economy, that is to say, in such a manner as to get the best possible return, by way of increased knowledge advantageous to the public health, for the expenditure incurred.

It is no purpose of mine, as I need scarcely say, to criticise in detail the methods by which funds available for the encouragement of research work in medicine and allied subjects have been applied in the past. The matter has been mentioned only because the scheme for the assistance of individual research work which I now submit differs in some details from the general lines on which schemes for the like purposes have been administered hitherto.

ALEX. G. R. FOULERTON.

Memorandum as to a Scheme for organised Research Work in connection with Tuberculosis.

(1) Taking a broad view of the matter, it may be said that research work in connection with tuberculosis may be directed profitably along three collateral lines. Thus, although all three are closely connected and interdependent, there may be distinguished—

- (a) statistical research work, which is useful often as a guide to the direction in which other research work may be undertaken, and which by comparing apparent causes with obvious effect may afford circumstantial evidence as to the probable usefulness of administrative action in the absence of ascertained facts upon which such action can alone be based with absolute certainty;
- (b) clinical research work carried out especially with the object of ascertaining the effect of treatment in individual cases, and of ascertaining the comparative value under the conditions of actual practice of methods of diagnosis which have been worked out in the laboratory;
- (c) Laboratory and general research work, which has for its object the ascertaining of facts as to the biology and natural history of the parasites which cause tuberculosis, as to the general and special disease-causing characteristics of the parasites, and as to the general pathology of the disease thus caused.

(2) It cannot be emphasised too strongly that all three lines of research are closely related and, indeed, in many places proceed along a common track. The laboratory provides the elementary facts upon which the prevention of disease, and its diagnosis and treatment when existing, must be based. Clinical research work is the logical extension of laboratory research work, in that its object is to ascertain to what extent ascertained facts are applicable in practice for the diagnosis and cure of the disease. Statistical research work, if rightly directed, ascertains the final results of clinical and laboratory research work. In what follows, however, the special requirements of laboratory research work, so far as it can be differentiated from the others, are kept more especially in view.

(3) At the commencement it may be pointed out that it is, in the highest degree, undesirable that there should be any attempt at "centralisation" or "specialisation" of the work. The problems connected with the causation and spread of tuberculosis are intimately connected with like problems in connection with other infective diseases. And I cannot but express the strongest opinion that any attempt to institute a central institution for the study of tuberculosis alone, or to subsidise a special staff of investigators who would be required to devote their whole time to research work in tuberculosis, would be relatively expensive, and, so far as the obtaining of useful scientific knowledge is concerned, would be fore-doomed to failure, either comparative or absolute.

(4) It is advised therefore that those workers to whom grants in aid of research work are made should not be required to devote their whole time to the study of tuberculosis. Rather should preference be given to those who are already engaged in regular pathological and bacteriological work, provided, of course, that there is good reason to believe that other allied occupation is such as to allow of sufficient time being given to the special work.

(5) The closest care should be given to the selection of subsidised workers. The grants should not be applied to the elementary education of beginners in scientific work, however excellent such educational application of money might be from another point of view. The funds available are provided for a specific object, the improvement of the public health in the matter of tuberculosis. In making grants, care should be taken that assistance is given only to junior research workers who have gone through an adequate preliminary training and have shown aptitude for work of the kind, and to those older workers whose aptitude for the work has been proved.

(6) It is advised that those who receive grants in aid should be allowed to carry out their work in any

laboratory which is recognised for the purpose by the body responsible for the expenditure of the fund.

(7) It is advised that the body responsible for expenditure should have as their scientific adviser a director of research. The officer so appointed should be a pathologist with special experience of the bacteriological side of pathology.

His principal duties would be—

- (a) to report to the body responsible for expenditure as to the reasonable claims of applicants for grants, and as to the probable value of the line of research in aid of which a grant is asked;
- (b) to ascertain from time to time what progress is being made in research work in respect of which grants have been made, and to report thereon;
- (c) to furnish the body responsible for expenditure with a detailed annual report, detailing the results obtained by the subsidised work;
- (d) to advise and assist, when asked by those concerned to do so, any workers in receipt of grants;
- (e) to perform all such other duties as may devolve upon him as the scientific adviser to the body responsible for expenditure.

(8) It is suggested that the director of research should be provided with a small office for general purposes and with a small laboratory equipped for the use of three or four workers. This laboratory would be used only for the purposes of checking, when necessary, the results of work carried out elsewhere and for any special research work in connection with tuberculosis that the director himself may be engaged in. The expense of equipment and maintenance of a laboratory of the kind would be relatively small; the only permanent staff required would consist of a junior medical assistant and a trained laboratory assistant.

(9) With regard to the amounts of grants in aid of research work, it is suggested that a fixed annual sum, renewable from year to year at the discretion of the body responsible for expenditure, should be paid directly to each worker. It is suggested that the annual grant should not be less than 250*l.* in any case; but that in the case of special work a somewhat higher grant should be made. This grant should cover all ordinary expenditure for material, &c., necessary for the work; but in exceptional cases, when unusually heavy working expenditure is necessary, there should be power to make a supplementary grant, to be applied strictly to out-of-pocket expenses.

(10) The annual grants in aid of research work should be paid in three equal instalments—as to one-third at the commencement of the work, as to one-third at the termination of the first six months, and as to one-third at the termination of the year and so soon as a resumé of the work done has been sent in.

(11) It is not advised that the results of research work should be collected and published in an official volume; this method of publication has a tendency to prevent that healthy criticism by other workers which is often a useful help to sound scientific work.

(12) It is advised that the body responsible for expenditure should draw up a list of "recognised" laboratories at which work under a grant in aid might be carried on. Such a list would include all laboratories at which material necessary for research work is available, and in which suitable provision for the supervision of research work by a skilled pathologist is made. It would be necessary, also, that the authority responsible for the laboratory should agree to permit occasional visitation by the director of research, made for the purpose of ascertaining what progress has been made. In connection with this, it should be clearly understood that visitation by the director should be only for the purpose specified, unless his advice as to matters connected with the carrying-out of a particular research is specially asked for. The list of recognised laboratories would probably include all pathological and bacteriological laboratories attached to the larger London hospitals, those of all provincial universities, the laboratories attached to some of the larger provincial towns which are not connected with a local university, and such other laboratories as might from time to time be approved for the purpose, together with

laboratories attached to veterinary teaching institutions.

(13) If the holder of a research grant is not a salaried officer of the authority controlling the laboratory in which the work is being carried out, it is suggested that a monthly laboratory rent of 11. 1s. should be paid to the authority for laboratory space, in addition to the grant made to the worker.

ALEX. G. R. FOULERTON.
April 1912.

NOTE.—It is suggested that the "body responsible for expenditure" (para. 7) should be appointed by the Insurance Commissioners, and that three-fifths of the members (say, in a committee of 5) should be expert pathologists. In paragraph 8 the suggestion as to "checking" the results of other workers is intended to apply to published work only. It is not intended that the director should "check" unpublished work done by others.

A. G. R. F.

MEMORANDUM submitted by Sir JAMES KINGSTON FOWLER, K.C.V.O., M.D., F.R.C.P., on the subject of a proposed EXPENDITURE ON RESEARCH in connection with TUBERCULOSIS.

1. Nothing would afford me greater pleasure than to hear that a sum of 60,000*l.* a year was to be devoted to research in pathology, yet, notwithstanding that tuberculosis is a subject in which I am deeply interested, I should regard it as little short of a calamity if that, or any such sum of money, were to be allocated to research in tuberculosis alone.

2. Although I recognise that when it is only possible to obtain money from private sources for research in connection with a special subject, such as cancer or tubercle, it is better to accept than refuse it, yet I believe that advance in our knowledge of the pathology of those diseases is more likely to follow upon increased support being given to general pathological research in an Institute, similar to the Institut Pasteur, where many workers are engaged upon a variety of researches, under the guidance and inspiring influence of men like Roux and Metschnikoff, than by devoting large sums annually to research in a given subject.

3. I am therefore opposed to the foundation of a special Institute for research in tuberculosis.

4. As Honorary Secretary and also a member of the Advisory Board, and a trustee of the Beit Memorial Fellowships for Medical Research, a foundation which has an annual income of over 7,500*l.* a year, and has 30 Fellows receiving salaries of 250*l.* a year, I have rather unusual opportunities of forming an opinion on the necessity for further endowments of a similar character, *i.e.*, Research Scholarships or Fellowships. The work done so far by the Beit Fellows has been of the highest excellence, but I believe that those Fellowships and the Carnegie and Grocer's Research Scholarships are at present sufficient and provide adequately for the men available and qualified for research.

5. Additional endowment is urgently needed for assistant professors, teachers and demonstrators, who will devote the greater part of their time to research, to work in existing laboratories connected with the universities and medical schools. Such posts would be openings for men who had held Research Fellowships and Scholarships, and in time an adequate supply of scientific workers, in which we are now lamentably deficient, would be created.

6. The work of the Royal Commission on Tuberculosis was not completed when the Commission came to an end; I should be decidedly in favour of allocating part of the money in question to re-establishing the laboratories and experimental stations of that Commission.

7. If it is inevitable that the money must be spent upon research in tuberculosis alone, I should be in favour of enlarging and further endowing the laboratories already existing in connection with hospitals and sanatoria for consumption, where pathological research and clinical observation are being carried on in association; this latter I regard as an essential feature of any such scheme.

Excellent work of this character is being done at the Brompton Hospital Laboratory and at that of King Edward VII. Sanatorium. I mention these because I have personal knowledge of them, the members of the Committee will be able to name many others.

8. I am of opinion that this grant should be administered under the general direction of a committee on which the scientific side and the clinical side should both be represented, but I should give a considerable predominance to the scientific element.

November 1912.

MEMORANDUM submitted by C. H. GARLAND, Secretary to Post Office Sanatorium Society; Chairman of National Association for the Establishment of Sanatoria for Workers suffering from Tuberculosis.

The consideration of a general policy with regard to tuberculosis will very largely depend upon whether it is intended to deal with tuberculosis as a whole or only with tuberculosis which arises among insured persons. For the purposes of this memorandum it has been assumed that tuberculosis as a whole will be dealt with.

The associations with which I have been connected have been able to gather special knowledge of the methods of dealing in sanatoria with insured tuberculous patients derived from the membership of friendly societies, and it is especially with reference to this work that the following memorandum will perhaps be found useful.

Need that Sanatoriums should be supported by other Institutions and Organisations.

A comprehensive scheme for dealing with tuberculosis must comprise much that is not generally understood to be contained in the word "sanatorium."

From the information already made public, I gather that "sanatorium benefit" is a provision for all sickness caused by tuberculosis. If this is correct, it is obvious that a complete scheme must comprise selecting organisations such as tuberculosis dispensaries or other institutions on somewhat similar lines, sanatoria for treatment of such cases as are considered capable of

being restored to working capacity and economic value, hospitals of various grades for the treatment of other classes of tuberculosis including surgical cases, institutions for isolation and care of advanced cases, and probably some kind of farm colony for the continuation of the work of the sanatorium proper.

It has been the experience of the associations with which I have been especially connected that all work in connection with the prevention and treatment of pulmonary tuberculosis is best carried out in conjunction with a broad educational campaign by leaflet, lecture, and other means.

Much of the pulmonary tuberculosis with which it is necessary to deal is the direct outcome of ignorance of some of the simpler hygienic laws. Much of the success of the treatment depends upon the close observance of medical instruction and hygienic precept. The after-history of the patient restored to working capacity is likely to be very considerably affected by his knowledge of how to preserve himself in health.

It should therefore be a part of any general policy directed towards the control and eradication of tuberculosis to include a scheme of education which should aim in the first place at prevention, in the second place at assisting the patient in procuring the greatest possible good from his treatment, and in the third place at preserving in health the patient who has been discharged from an institution.

The remainder of this memorandum will deal especially with the treatment in sanatoria of those patients likely to be restored to economic value by such treatment.

Institutions to be encouraged.

In dealing with the sanatorium treatment of pulmonary tuberculosis among the working classes, there are certain principles which should underlie the construction and administration of institutions to be encouraged. The experience of the associations with which I have been connected can be briefly described under the following headings:—

(a) *Character of Institution.*

The buildings should be as simple and inexpensive as possible, consistent with efficiency. The treatment of working-class patients in gorgeous palaces is not only wasteful but confusing to the patient.

He comes to regard his cure as in some way associated with the facilities and luxuries enjoyed in the institution, and returns to his own home feeling that it will be impossible for him to keep well. The institution therefore should aim as far as possible at producing its cure by the simple means which can be imitated and continued in the working-class home. These principles should extend not only to buildings but to diet and other matters.

(b) *Size of Institution.*

The institutions should be fairly large and should aim at not less than 100 and no more than 200 beds. The multiplication of small sanatoria is expensive and does not allow of the exclusive employment of a skilful medical staff.

The institutions should be sufficiently large to maintain a well-paid and efficient medical superintendent and assistants, but should not be so large as to make personal knowledge of every patient impossible to the medical superintendent. Insurance committees should be encouraged to give their support to large institutions rather than set up a great number of small local sanatoria.

(c) *Graduated Work in the Institutions.*

The treatment should aim at producing not only an arrest of the disease but a fitness for work. The exercises necessary to the patients can be so arranged as to cover a large variety of occupations, many of which will reproduce, or closely resemble, the occupations in which the patient is engaged in his normal life. By careful graduation of these exercises the patient can in the majority of cases be fully prepared before leaving the institution for a resumption of his usual occupation.

He is thus taught not only to have confidence in his power of work, but also how to carry on that work without danger to his health. As it is impossible to contemplate changing the occupations of the vast majority of patients who come up for treatment, this matter is of vital importance.

In dealing with a graduated work scheme applied to insured persons there are many factors to be taken into consideration which do not arise when dealing with charity patients or private paying patients.

The mental attitude of the insured workman sometimes shows a tendency to an exaggerated independence.

Unless this mental attitude is anticipated, and allowed for, it will be found extremely difficult to apply a scheme of graduated labour. Trouble also arises in dealing with trade unions, friendly societies, and other working-class organisations with regard to the work, unless the regulations are very carefully drawn up. The National Association for the Establishment of Sanatoria for Workers has had to meet these special difficulties, and has overcome them in the following way:—

It recognises that the discipline of the institutions must be extremely strict, and that any deviation from the regulations should be treated with rigorous severity. But the autocracy of the superintendent, medical or otherwise, should be a reasoned one and not merely arbitrary. The spirit of working-class organisations will not brook arbitrary methods.

The work scheme should be explained by lectures within the institution, by leaflets supplied to the patients, and by the circulation of information among the societies from which the patients will be derived. The general principles upon which the association has based its work scheme at Benenden Sanatorium are set out in the notes on that scheme attached to this memorandum (Appendix 1).

Abolition of Social Distinctions in the Institutions.

There must be no social distinctions within the institutions to which the patients are allocated.

This especially refers to insured persons. Under no circumstances should any social consideration allow patients to be differentiated in treatment. All patients admitted to the sanatoria should be regarded as belonging to one class, viz., the class of "invalids," and all variations of treatment should be based upon the patient's condition of health, and not upon any real or fancied social distinctions.

Unless this is done much friction and irritation is caused within the institution, and dissatisfaction and recrimination among the members of the insured body outside.

Strictness of Discipline.

The discipline within the institution should be of the strictest character, and it should be made quite clear to the patient on entering the sanatorium what will be the result of any breach of regulations. At the same time a reasoned explanation of the regulations should be supplied. The preservation of discipline, however, must not be allowed to make the institution in any way resemble a penal establishment.

The National Association for the Establishment of Sanatoria for Workers has found it an excellent plan to supply the patient with regulations of the institution in the form of a small book in which each rule is made the text for an explanation.

This is a good preliminary to the education which should be carried on within the institution.

Cases of Misconduct.

Under present conditions cases of gross misconduct are treated in many instances by the discharge of the patient from the institution. But a comprehensive scheme for dealing with tuberculosis as a whole would have to consider what should be done with the patient after his discharge from any institution for misconduct. Obviously he would be a most undesirable person to be left free amongst the community, and a centre of possible infection. Therefore, some other scheme of penalty will have to be devised for dealing with cases of misconduct which are sure to arise in the institutions. The minor cases could be dealt with in the sanatorium, but aggravated cases might require the establishment of a special institution.

Advanced Cases in Sanatoria.

The scheme recommended by the Committee will probably include institutions for the treatment of advanced cases. It is the experience of the National Association for the Establishment of Sanatoria for Workers that patients in an advanced stage should not be treated in the same institution as those patients whose recovery is expected. The presence of patients in an advanced stage of the disease is irritating and depressing to convalescent patients, and frequently leads to protest from both classes.

Importance of Educational Work among Prospective Patients.

Educational work should be pursued with energy amongst all classes of persons from whom patients are likely to be derived. The experience of the Post Office Sanatorium Society during five years of its existence has shown that persistent propaganda of an educational character among the members of the society has secured two excellent results:—

- (1) It has been possible to get patients at a much earlier stage of the disease; and
- (2) It has been found possible to eliminate largely the applications for benefit from persons medically "unsuitable."

Whilst the Post Office Sanatorium Society has been able to secure 45 per cent. of its patients in the early stage of the disease, *i.e.*, with not more than one lobe affected, the other affiliated societies who have not adopted the same measures have only secured 37·5 per cent. of their patients in this stage.

The number of arrests obtained has been correspondingly larger.

The methods adopted for education are :—

First. The issue in all rule books and other literature of the society of a description of the early symptoms of consumption of the lungs. (Appendix 2).

Secondly. Facilities have been given for the examination of suspected cases.

Thirdly. Illustrated lectures have been given in the centres of membership, in which, not only the routine of sanatorium treatment has been fully explained, but also the signs which were to be looked for in detecting early cases and the symptoms which should awaken suspicion of the presence of the disease.

Educational Work among Actual Patients.

The patients actually under treatment in a sanatorium should be educated in the ways of the disease, its prevention and cure. The methods adopted in the institution in which they are resident should be carefully explained to them in periodical lectures. The causes which lead up to the disease, and the conditions which favour its spread and prevention, should also be explained. The methods of life to be followed and the rules to be observed after leaving the sanatorium should be explained, not only in lectures during residence, but also by leaflets and special instructions given at the time of discharge.

The sanatorium should, throughout its operations, aim at being a school of health.

Centralisation of Education.

It is essential to any comprehensive scheme that the educational work should be centralised. There should be no possibility of any conflict between the statements made in various parts of the country, or the teaching in various institutions. This can only be secured by the supervision of all leaflets and of all lectures by some central body. This central body should either issue the educational matter itself or should have submitted to it all matter which it is proposed to issue to patients in approved institutions and to those bodies from which patients are derived. In practical work to-day much difficulty is frequently caused by the varying information given both to the patients and to members of societies by the advocates of different methods of treatment.

Standardisation of Suitability and Results.

(1) *Suitability.*—Whatever institutions are set up and whatever methods are adopted in treatment, there should be a careful standardisation of the definition of "suitability" for each class of institution. Much difficulty is caused to-day by the fact that there exist many sanatoria which resemble each other in very little except name. It should not be possible for a patient to be rejected as unsuitable for a sanatorium or for any other institution in one locality, and subsequently to be able to find admission to a similarly-named institution in another locality. Such a system leads to dissatisfaction and misunderstanding, and loss of confidence in medical methods.

(2) *Results.*—It should be essential that all approved institutions working under this scheme should adopt some common standard of results. To-day there is little possibility of comparing the methods of one institution with another, and of obtaining any information as to their relative value, because of the lack of standardisation.

The conditions of administration are different, and the methods of classifying the results obtained are different, in practically every institution which is working.

It will be much easier to determine the value of institutions and methods in the future if all these conditions are standardised. Under such circumstances it will be much easier to guide the policy to be pursued by the authority administering the scheme.

Relapses.

The question of relapses requires very careful consideration and attention. The experience of the Post Office Sanatorium Society for five years, and with 361 cases, has been that about 10 per cent. of its patients have required a second course of treatment. The period between the first and second course varies from two months to two years. Some of the relapsed cases after a second course of treatment have been restored to working capacity, and remain fit.

If the full benefit of the curative treatment is to be secured, there must be no obstacle to the re-admission of a relapsed patient. No rule should be made that the patient, once having received benefit, should be debarred from further benefit for any specified time.

The relapsed case which has responded well to a first course of treatment is likely to respond well to a second course if the treatment is not delayed.

The ex-patient should be encouraged to draw immediate attention to any untoward symptoms and make a claim for further benefit immediately there is any sign of relapse.

The sole qualification for such a second course of treatment should be a medical one.

After-Care.

It is essential that the after-care of the patients should be largely confidential in character. The prospect of obtaining employment after discharge from a sanatorium is very considerably lessened by the declaration by the patient that he has been treated in an institution.

Until this prejudice has been overcome it should be distinctly understood that after-care does not necessarily involve publicity. The visitation of post-sanatorium patients should therefore be undertaken with the utmost care and discretion.

Some assistance in breaking down the prejudice against the employment of ex-patients can be given by public bodies and State Departments, if they would remove any disability for such employment in their own service.

There are many suitable occupations for post-sanatorium cases under municipalities and Government departments.

There would be difficulty in recommending that any preference should be given to ex-patients for such employment, but representation should be made by the committee to all Public Departments that disabilities should be removed, and that there should be no prejudice possible against an arrested consumptive should he apply for employment.

Another prejudice to be overcome is that of the fellow-workers of the ex-patient, who have an exaggerated view of the infectivity of the discharged patient, and are inclined to treat him as a leper. The general educational campaign pursued under the scheme should aim at removing this prejudice. It should be made quite clear to the working classes that the discharged sanatorium patient, who has been carefully trained in the methods of preventing infection of others by himself, is not an unsafe person with whom to work.

We have found this prejudice interfering very considerably with the comfort of ex-patients among even very intelligent classes of working men and women.

Administrative Records.

The experience of the National Association for the Establishment of Sanatoria for workers shows that, in addition to keeping very full medical records within the institutions, it is also necessary to keep administrative records which are rather fuller than those usually kept in institutions. Patients, and societies with which they are connected, very frequently lodge both general and specific complaints against administration after the lapse of a considerable period of time. The best possible defence against such charges has

been found to be the existence of complete contemporary records. For instance, a dining-hall diary should be kept in which is entered the menu for each meal and each day. This diary should be placed in the hands of the medical officer in charge of the meal, and a note of any complaint received made at the time. In the absence of complaints, a note merely stating "No complaints" should be made. In the cases of complaints, the diary can thus be referred to the kitchen and stewards' department, and the matter complained of dealt with at once. The same applies to keeping a diary or log-book of the institutions, in which all matters arising during the day in connection both with the medical and administrative department of the institution should be briefly recorded at the time. Complaints of bed patients should be entered in the nurses' daily reports, inquired into immediately, and a brief record made.

This method is sometimes described as "red tape," but it is a method which protects the administration as a whole and the individual officer in the case of any complaint or inquiry made after the lapse of any considerable period of time. Such record should be kept in all approved institutions, and will greatly facilitate the dealings with societies and departments sending patients to the institution.

Note on Cost of Erection.

The Benenden Sanatorium scheme aimed at producing an efficient sanatorium at a cost of about 100*l.* per bed, excluding site and furnishing.

In carrying out the scheme it was necessary to purchase more land than was required for the proposed unit of 200 beds. The estate, however, contains several sites for further development, and in estimating the cost up to date an allowance of half an acre per bed should be made, or 100 acres for the unit of 200 beds. The land actually cost 23*l.* per acre.

In the early stages of erection it was necessary to put up the more expensive portions of the unit, *i.e.*, the administration, recreation, and single-room portions of the building. The present additions to accommodation are costing about 50*l.* per bed, and there is very little doubt that when the unit of 200 beds is complete the cost will be, roughly, that which was estimated in the first instance, *viz.*, 100*l.* per bed. On this basis it should be possible to include site and furnishing with an efficient institution at a cost not exceeding 150*l.* per bed. Until the full unit of 200 beds is finished, it is impossible to state the exact cost.

The Benenden building has stood the test of two severe winters and some trying summers. In any future erection on the same lines some money could be saved as a result of the experience gained in erecting and equipping the present institution. Being on an entirely new plan, it has been necessary to proceed experimentally at times, and some of the experiments have proved the need of alteration in detail.

On the whole, however, there is no reason to be dissatisfied either with the building, site, or equipment.

Cost of Maintenance.

The cost of maintenance at Benenden has been reduced, by careful management, to 25*s.* per week per patient. The institution is based upon the payment of this sum, and any regulations concerning approved sanatoria which would largely increase the charges would necessitate a revision of the prices charged to affiliated societies.

Such an institution as Benenden, which is supported largely by friendly societies which will subsequently become approved societies, would be gravely affected by any regulation which should be imposed which would increase the cost of maintenance.

Relation of Sanatorium to Insurance Committees.

The managing council of the institution established at Benenden has been necessarily composed of representatives of the societies supplying the funds for maintenance. Such an arrangement and such a relation with friendly societies and trade unions was quite new, but on the whole has worked satisfactorily.

The medical superintendent is made supreme head of the household, and in all medical work is responsible only to the advisory physician, who is assisted by a consulting medical staff. The lay members of the council never interfere with any question coming within the medical category. In any cases of doubt the consulting staff and the advisory physician counsel the committee on the course to be taken.

On no occasion has there been any friction under this arrangement.

The patient, having been nominated for treatment by the affiliated friendly society, is examined by the medical advisers of the institution and accepted for treatment or rejected entirely on their advice. In the future patients will presumably be nominated in like manner by the local insurance committees, but the question of their admission to the sanatorium or any other institution should be a purely medical one, and any appeal from that decision should be made on medical grounds and to some medical body.

We have found no desire among friendly societies or trade unions to interfere in the least with medical discretion in these questions.

Relation of Sanatorium to Approved Societies.

It cannot be too strongly insisted that the relation between institutions and organised societies from which patients are derived is a relation which is entirely different to that existing between institutions and charity patients or paying patients.

The experience of the Benenden organisation has been that if organised on proper lines, which are clearly explained and understood, no difficulty need arise.

But the whole spirit of the relation should aim at transparency of method, and regularity and continuity of administration. The regulations must be free from any taint of favouritism; the institutions must not allow any social distinctions among the patients. The discipline must be strictly adhered to without fear or favour, and the whole administration carried out with strict impartiality.

Due weight must be given to the democratic ideals and tendencies of working-class organisations, and explanations given to all inquirers of whose *bono fides* there is no doubt.

Many of these principles will be found to be somewhat novel in institutional practice, but they offer no serious obstacle to efficient administration, and will be found to produce satisfaction and confidence in the organisations from which the patients are derived.

CHARLES H. GARLAND.

Documents attached to this Memorandum.

(1) Note on graduated work performed by the patients at Benenden Sanatorium.

(2) "Symptoms of early Consumption," inserted in rule books and other literature of the Post Office Sanatorium Society.

APPENDIX I.

NOTES ON THE GRADUATED WORK PERFORMED BY PATIENTS AT BENENDEN SANATORIUM.

The work of patients is imposed for the following among other reasons:—

First, it is understood medically that the disease can be controlled very largely by regulating by exercise and rest the production in the patient's own tissues of the anti-bodies necessary for the destruction of the tubercle bacilli.

The exercise given, therefore, has a specific effect in promoting the cure of the disease.

A further reason is that if the patient is not carefully trained towards work-fitness, the three or four months "loafing" in the institution is likely to leave him "soft," flabby, and unfit to resume the work by which he gains his living. In the endeavour to promote this work-fitness it is wiser and better that the exercise should take the form of useful labour.

The occupations of the patients, in addition, tend to lighten the tedium and monotony of treatment in an

institution. The absence of any such occupations favours the production of melancholy and unhealthy introspection.

The principle underlying the work is that it is to be designed in the interest of the patient himself, and not in the interest of the institution. An effort should be made to combine these two interests, and the work performed by the patient should as far as possible be made useful to the institution.

The work of the patient is not, and cannot be, very profitable to the institution. The pace at which the patients work is slower than the pace at which healthy workers perform their tasks. The length of time worked by the patients is also much less than that usual amongst healthy workers.

It will thus be obvious that the dominant desire of the administration should not be to get profit from the patients' tasks, but only to promote the patient's mental and physical health.

The performance of domestic work is based upon the following general principles:—

The patients are asked to perform work for themselves only. No patient is asked to perform domestic work for another patient. He makes his own bed; he mops his own cubicle. The operation of mopping is a very simple one, and only occupies a few minutes each day.

The patient washes his own knife, fork, and plate. The patients are never asked to make another patient's bed, to mop another patient's cubicle, or to wash another patient's plates or knives. The tasks are only such as are willingly and cheerfully performed by most men when in Territorial camp, in holiday camp, in up-river living, and in other conditions which are sought by healthy men.

In arranging the work in the institution, it is often extremely difficult to find useful occupations which will give the necessary amount of exercise to the patients.

This is especially true during the bad weather, when work in the fields or gardens, or the open-air carpenter's shop, is not possible.

On such rare occasions window cleaning is sometimes given to those patients whose condition requires exercise. But it is stipulated that the windows to be cleaned by the patients are only those which can be

reached without climbing on any ladder or in any way incurring danger of strain.

There is nothing undignified or menial about the performance of these tasks when one remembers that they are designed for the express purpose of assisting in the patient's own recovery.

No deviation from the above principles is allowed unless the patients actually volunteer to perform the work and the medical superintendent approves.

Within the limits of the above principles the work is compulsory. All parts of the institution which are used in common by the patients, such as lavatories, corridors, &c., are cleaned by paid servants, except when the patients undertake such tasks voluntarily. It is not in the interests of the discipline of the institution or of the health of the patients that the above principles, or the work based upon them, should not be made compulsory.

APPENDIX 2.

THE SYMPTOMS OF EARLY CONSUMPTION OF THE LUNGS.

A Hint to those who may be suitable Patients for the Sanatorium.

Application must be made in the earliest stages, and not when already ill and weak.

Chronic or advanced cases cannot be retained or received in a sanatorium.

Indigestion, very gradual loss of weight and strength, slight pains about the shoulders and back, cough at first dry and tickling, occasional sweating at night or on slight exertion, shortness of breath and palpitation, and a pale complexion becoming flushed in the afternoon and evening, are symptoms which, taken together, demand a thorough examination of the chest stripped to the waist. A history of blood-spitting or of pleurisy in such a case is a strong additional reason for examination.

Suggested by Dr. Lister, physician to the Mount Vernon Hospital for Consumption, Hampstead and Northwood, and hon. advisory physician to the council of the National Association for the Establishment of Sanatoria for Workers.

March 1912.

FURTHER MEMORANDUM submitted by C. H. GARLAND on the COST OF ERECTION OF BENENDEN SANATORIUM.

In considering the cost of erection of Benenden Sanatorium it is necessary to take into account certain factors which do not appear from a perusal of the annual reports.

In the first place, Benenden Sanatorium is not yet complete. Some of the more expensive portions of the buildings have been erected, such as the single-roomed portion of the patients' block, the dining hall for the whole establishment, the recreation hall, and other adjuncts for the total number of 200 patients, and also the larger portion of the administration block.

The cheaper portions of the patients' quarters, which will be composed of relatively inexpensive pavilions, are yet to be completed.

In the second place, the amount of land which was acquired was sufficient for the development, not only of the whole of the scheme attached to the accommodation of 200 patients, but also for further schemes, such as a woman's sanatorium, a farm colony for after-care, and other purposes.

Thirdly, a great deal of the early work was experimental in nature, and in some cases it has been necessary to put out of use and replace portions of the building and equipment. In building a second institution the experience gained would result in considerable saving.

It will therefore be necessary to eliminate from the cost the money expended on "experimental work" which has been carried out.

In calculating the cost of erection, &c., with the experience gained in the first Benenden scheme, an allowance of land on the basis of $\frac{1}{2}$ an acre per

patient will be found amply sufficient for the purpose of treatment.

Further, it will be necessary to calculate the cost of completing the whole scheme, and base the estimate of the cost per bed upon the resulting figures.

In the following statement the actual expenditure up to date has been taken, and the cost of completion and alterations is based upon the estimate supplied by the architect. The estimate for work put out of use is very low, and represents a minimum calculation:—

ESTIMATES OF COST OF PROVIDING AN EFFICIENT SANATORIUM ON THE BASIS OF THE BENENDEN EXPERIENCE.

Cost of Buildings as per Balance Sheet.

At December 1910:—

	£	s.	d.
Freehold land	5800	0	0
Buildings	14,702	4	8
Sinking well	565	13	0
Boilers	651	5	8
Septic tank	133	19	10
Steam cookers	169	5	6
Furniture, &c.	2646	4	5
Expenditure during 1911:—			
Buildings	335	8	0
Sinking well	23	16	6
Boilers	15	15	0
Septic tank	28	10	0
Furniture, &c.	140	8	0

25,212 10 7

"Cadogan" Block, estimated at - - - 750 0 0

£ s. d.		£ s. d.		£ s. d.		£ s. d.	
Estimates of work required to complete for 205 patients :—				Less land now available at Benenden in excess of 102½ acres, such 102½ acres being at the rate of ½ an acre for each of the 205 patients - 3,440 0 0			
Administration block - 1,000 0 0				Allowance for buildings and equipment put out of use by alterations resulting from greater experience (at low estimate) - 1,000 0 0			
Furnishing - - 250 0 0						4,400 0 0	
Alterations to kitchen - 450 0 0						205) 29,688 10 7	
New boiler chimney shaft - 75 0 0							
Hot water system - 500 0 0							
Fitting kitchen - 176 0 0						Per bed - - - - - £145 0 0	
Drainage - 550 0 0							
Cost of providing pavilions for 100 patients to bring total to 205, at 1,025 <i>l.</i> for each 20, based on cost of "Post Office" pavilion - 5,125 0 0				8,126 0 0			
				34,088 10 7			
						C. H. GARLAND.	
						May 1912.	

MEMORANDUM submitted by H. J. GAUVAIN, M.A., B.C. (Cantab.), Medical Superintendent,
Lord Mayor Treloar Cripples' Hospital and College, Alton, Hauts.

The types of patients suffering from surgical tuberculous affections and needing treatment in special institutions may be grouped under the headings :—

- (1) Tuberculous Disease of the Bones and Joints.
- (2) Tuberculous Disease of the Glands.
- (3) Tuberculous Peritonitis.
- (4) (?) Lupus.

I shall discuss the requirements of the first class at some length, and refer to the needs of the others more briefly. Owing to the necessity of making my remarks as short as possible, I shall not quote authorities at any length in the subject under discussion, but shall be pleased to amplify my remarks where desired by the Commissioners, and to add further statistics both from Alton and leading authorities where required.

I understand that the problem must be discussed (1) from a consideration of the nature of surgical tuberculous affections from which may be deduced the most suitable treatment to be adopted, and (2) available means by which such treatment may be undertaken.

I shall confine my attention to the first consideration, bearing in mind the necessity of obtaining the most efficient results consistent with reasonable economy. The second consideration is outside my province.

Surgical tuberculosis must no longer be considered a local infection. It is a general disease of which the bony, articular, lymphatic, or other lesions are local manifestations. This point is of fundamental importance (Broca, Calvé, Tubby, Hutinel, and many others). Until it is recognised, treatment cannot be completely effective, and its recognition involves the logical necessity of treatment being undertaken on two lines—general and local. The best results can only be obtained by placing the patient under the best conditions.

Necessity for general Treatment.

A general disease demands general treatment. To reinforce and strengthen the natural defences against the attack of the tubercle bacillus is the surest way of defeating this attack. This is immediately evident in early and so-called pre-tubercular cases where good general conditions alone will often convert a delicate ailing child into a strong and vigorous one. It is equally, if not more important, when the disease has obtained a firmer hold and local manifestations have appeared. Life in the open air, far from towns, in a dust- and germ-free atmosphere, under the bactericidal and tonic action of the sun, is a first principle in antibacillary therapeutics. "By these means the patient himself will make the whole fight against the bacillus" (Casteigne).

The requirements of general treatment may be considered under the following headings :—

- Climatic.
- Hygienic.
- Disciplinary.
- Dietetic.
- Drug.
- Other, e.g., heliotherapy, balneotherapy, &c.

Climatic.

Mountain, country, or marine air is indicated. Mountain sanatoria for surgical tuberculous patients are almost out of the question in this country, because the mountain climate ideal for treatment in Great Britain is unobtainable. Our mountains are too enshrouded in cloud and fog, the rainfall is excessive, the amount of sunshine too limited, the extremes of temperature too severe. One of the great advantages of mountain treatment, as demonstrated by Rollier of Leysin, and more recently by Lenormant is the heliotherapeutic effect obtainable. This has led to the regrettable error that high altitude and heliotherapy are synonymous, but that is incorrect. It has been shown by Hahn, Robin, and Binet, Duclaux, Barbier, and others, that if the actinic power of sunlight is intense on the mountains, it exercises its greatest effect at the seaside.

Suitable treatment then in England could be best obtained at the seaside, or in the country.

Speaking generally, I believe that country treatment is better for the early, and marine for the more advanced or chronic cases, including those with old sinuses. To this rule, however, there would be exceptions.

Where situated.—The hospital should be reasonably remote from a town, in a district where tuberculous disease is known to be little prevalent. If in the country, it should be at a fair elevation, preferably on the slope of a hill facing south, so as to secure the maximum sunshine. A sheltered situation is not a necessity, wind is no disadvantage; on the contrary it exercises a bracing and stimulating effect. The district should be sunny, the rainfall not excessive, and the soil porous, and one which quickly dries after the rain. The institution should, therefore, not be in the neighbourhood of a river, or in a swampy district, where the air is excessively humid. Sudden extremes of temperature are undesirable.

If marine, it is of first importance that the institution should be remote from a town. A sea-side pleasure resort is, therefore, at once contra-indicated, because here even though the district may be extolled, the presence of excursionists and others rob the patients of what at the seaside is a prime necessity—untrammelled use of the beach.

A model marine resort is Berck-sur-Mer, in France. The industry of this town may be said to be the treatment of patients suffering from surgical tuberculous affections. They have the unrestricted use of the immense and magnificent beach. The presence of cripples is not regarded with abhorrence, but with pleasure, because it is a source of profit. A town cannot at the same time be a pleasure resort and be devoted to the treatment of tuberculous cripples. If the tuberculous are to be treated, then the place must be theirs to the exclusion of all others.

A marine hospital should abut on the sea and face the sun and prevailing wind to derive maximum

benefit from all three. There should be an extensive beach of firm sand, on to which the patients can be wheeled or may walk unhindered by the pleasure seeker. A low exposed littoral is to be preferred to a tree-covered sheltered one, and there should in addition be an extensive area of foreshore over which the tide advances or recedes within wide limits. The prevailing wind blowing over such a beach becomes charged with substances which exercise a markedly stimulating effect on the patient. A visit to Berck quickly proves this. Sea, sea-breeze, and sun are adjuncts to the cure which cannot be neglected.

Inigorating country and marine breezes in a sunny district exercise a marked effect in improving the appetite and general condition of immobile and recumbent patients, which should not be overlooked.

The best results would, in my opinion, be obtained by the establishment of two institutions, or one institution with a branch hospital, the one in the country the other at the seaside; both hospitals under the same management, so that a continuity of treatment could be assured. It should be possible to transfer patients from one hospital to the other, so that the benefits of change of air and scene could be obtained. A case which is at a standstill, or going slightly backwards, could then receive the added stimulus which would often lead to cure.

Hygienic.

The value of abundant fresh air in the treatment of tuberculous disease is so well recognised that it need not be laboured here. The hospital should be so designed that the patient practically lives in the open air but yet remains sheltered from rain and snow.

That bodily attention which can only be obtained by the best nursing may be included under this heading. The skin of patients, immobilised in the ways indicated for the treatment of tuberculous arthritis, requires the most careful attention to prevent the formation of sores. Indeed, in no class of patients is the necessity of that extreme personal attention which may be summed up under the heading of personal hygiene so necessary as in the tuberculous.

Disciplinary.

Patients accepted for treatment for long periods in large institutions need kind, but firm and tactful handling and occupation suited to their limitations, unless they are to lose that mental distraction which is a powerful aid to cure. Moreover, left without occupation they will become discontented and degenerate. In the treatment of pulmonary tubercle this has already been apparent. Lack of kindly discipline and well-ordered occupation has brought sanatorium treatment discredit which has been more than counterbalanced by the benefit to be derived from regulated work so ably advocated by Philip and Paterson in suitable cases.

Children should be educated, adolescents trained, and adults occupied according to their capabilities.

That such wholesome discipline is of the greatest benefit a visit to Alton will quickly prove. Happier patients in any hospital could hardly be found. There is none of the cringing air sometimes to be observed in the child recipients of charity which is so objectionable and distressing. The boys become manly little fellows, polite and engaging, the girls gentle and attractive, and in both there is a conspicuous absence of self-consciousness or self-pity. Their characters become moulded on healthy lines which will fortify and aid them in after life.

Dietetic.

Beyond stating that a liberal, plain, varied diet suited to the sometimes capricious appetite of the tuberculous, should be prescribed, I make no remarks. Special diet will, of course, be indicated for particular cases. Milk and meat are of prime importance.

Drugs.

On this and other forms of treatment I express no opinion unless it is especially desired.

Local Treatment.

This matter is of extreme importance both for the cure of the local lesion, the prevention or correction of deformity and the management of complications such as abscesses and sinuses. It is essentially a matter for a specialist, and perhaps no other disease requires more a specialist's care than does tuberculous disease of the bones and joints, if the best results are to be obtained. That it does not receive this attention is shown by the fact that tuberculous disease causes more crippling than any other condition in this country. The best results are undoubtedly obtained by the employment of conservative methods applied with minute attention to detail. Each case requires its special treatment. Only in this way can results approaching perfection be obtained.

Speaking generally, for the more severe local lesions it may be said that there are three stages of treatment depending upon the progress of the disease, viz.:—

- (1) Acute commencing and progressing disease, which requires absolute rest in the recumbent position, with immobility of the part attacked combined with the adoption of special means to correct or prevent deformity and abolish muscular spasm. The length of this treatment will vary with the nature of the case, the resisting and reparative powers of the patient (which general measures will improve), the virulence of the infection, the "soil" of the patient, the site and extent of the lesion, the presence or absence of other lesions, the age of the patient, &c., &c. Only prolonged experience and considerable judgment can tell when this stage may be abandoned. It is ridiculous to assert that every case requires a similar, even approximately similar, period for treatment. The time required will vary within very wide limits.
- (2) The chronic or sub-acute stage. Here recumbency is, as a rule, neither necessary nor desirable, but very complete immobilisation of the part attacked is essential for a double purpose—(a) to allow repair to take place; (b) to prevent the occurrence or increase of deformity.
- (3) The stage of convalescence. Now complete immobility is not essential, but protection or support, which may be given by light, accurately fitted, removable splints, is usually sufficient. These may usually be discarded while the patient is at rest, but should be worn at other times.

These periods of treatment are mentioned as general guides. They apply especially to the two commonest forms of bone and joint tuberculosis—spinal caries and hip disease. The length of time required in each stage of treatment will vary within wide limits, and the decision as to when one may be abandoned and the next undertaken requires much skilled knowledge. The problem with regards to adults differs to some extent from that of children. In adults, radical measures, especially in certain forms of tuberculous arthritis, may be more often indicated; but, speaking generally, the great majority of cases will do better if conservative measures are alone employed. As a general rule, given proper technique, aspiration of abscesses with or without the employment of modifying fluids, presents the surest, safest, and most effectual way of dealing with this exceedingly common complication. As I propose showing elsewhere, healing after aspiration fundamentally differs from healing after incision, inasmuch as with aspiration it is centripetal, after incision it is commonly centrifugal even when sinus formation does not ensue. This is a point of importance, and ever to be borne in mind in deciding which method of treatment is to be adopted.

The Nature of the Institution required.—General Considerations.

From what has preceded it may be inferred that I advocate a special hospital or hospitals, administered by a skilled staff, and situated in a district known to be peculiarly suitable for the treatment of surgical

tuberculosis. Moreover, it will be obvious that to procure the best results at the least expense, the institution must be a very large one, and, indeed, only by the establishment of a large institution, with very many beds, can the fullest efficiency and economy be at the same time obtained.

The hospital at Alton, founded by Sir William Treloar, may be taken as a model. The results of treatment undertaken there is my justification for this statement. More nearly than any other institution with which I am acquainted, it fully meets the needs of those afflicted with surgical tuberculosis. It is located in a region where tuberculosis is relatively uncommon. It is so situated that the patients derive the maximum benefit from sun and air.

Its wards are light and airy, and well adapted for the nursing of tuberculous patients.

Its equipment fulfils the needs of the work it undertakes. It is large, and moreover there is unlimited room for its expansion. Not only is the crippled child healed there, but he is trained in some occupation specially suited to his capacity.

It needs no argument to affirm that neither the general and children's hospitals nor the cripple and convalescent homes scattered all over the country can cope with the problem of the treatment of surgical tuberculosis. The former cannot detain the patients for adequate treatment, neither does their situation permit them to get the best results.

The latter in the majority of cases have neither suitable equipment nor staff available.

The need for special institutions has long been recognised and advocated by expert authorities in the medical profession.

Very tardily the necessity has been appreciated by some of our municipal authorities. Manchester and Brighton have made some attempt in this matter. Sheffield has a scheme in contemplation. But these efforts show a lack of grasp of the essentials for the solution of the problem, and suffer grave defects. In the first place, these schemes provide for treatment in the immediate locality, the benefit of climatic change being thereby lost; the institutions are small and can neither employ nor attract a special staff. They cannot manufacture the orthopedic appliances they require. It will, therefore, be always impossible for such institutions to obtain either the best curative or orthopedic results. A local hospital must always be at a disadvantage. It is still not realised that skilled knowledge of how to efficiently support and immobilise a tuberculous lesion is of infinitely greater importance than knowledge of how to remove the lesion—a crude cure at best. These facts present, in my opinion, evidence of weight against the establishment of hospitals to cope with local needs for the treatment of surgical tuberculosis. The large dual hospital, under one control, in specially selected localities, is, in my opinion, the best solution to the problem.

In building and designing such a hospital, the special work it will have to perform must be always kept in view.

The responsibilities devolving upon those entrusted with the foundation and maintenance of such institutions are heavy. The problem must be viewed from every standpoint, a correct perspective must be obtained, there must be nothing superfluous, but no essential must be omitted. To deal with the subject exhaustively is impossible in the space at my disposal, but certain points may be indicated.

It having been granted that treatment in urban hospitals is not only unsatisfactory, but costly and undesirable, their place in the scheme will be limited to the diagnosis of these affections. They become receiving houses for these patients, and from them or other centre, at frequent regular intervals, the patients would be transferred to the special hospitals about to be described.

These hospitals must be large, the larger the better, for in this way only can cost of administration and maintenance be kept low. Multiplication of such institutions means an enormous increase in the expense and a corresponding diminution in the efficiency. They must be specially and most carefully designed

for this particular requirement, and here great experience and foresight is necessary. While they should be cheaply built, they should be substantial. It is an error to imagine that carelessly erected wooden buildings are either suitable or economical. The first cost may be low, but cost of upkeep quickly counterbalances that, and the danger, discomfort, and inconveniences arising by the employment of these buildings seriously militate against any supposed advantages. As abundant fresh air and sunshine are therapeutic agents of paramount importance, ample provision should be made for these in the form of extensive balconies with a southern aspect, and provided with shelter from the rain. The wards should be so constructed that the work of the nurses and domestics be reduced to a minimum—in this way much subsequent expense will be avoided.

Both adults and children suffering from surgical tubercle may be conveniently treated in the same institution, because the treatment and requirements are the same, but it is undesirable that children should be directly associated with adults. Children should, therefore, be housed in separate blocks, and special provision should be made for the prevention of epidemic disease amongst the children. This latter necessity makes the provision of an observation block for the reception of new cases, where each child is treated on admission in a separate cubicle—a prime necessity. This system has proved of great value at Alton.

The situation of the hospital requires the most anxious consideration. The land on which it is built should be remote from towns but, nevertheless, easily accessible. It is an advantage for arrangements to be made, before the site is finally settled, for a private railway platform to be built on the estate for the reception of patients and of goods. Negotiations should be conducted with the railway company at the outset for liberal terms and advantageous service, as otherwise expense and annoyance is likely to follow.

If the land on which the hospital is to be built is of little value, so much the better, as it will be correspondingly cheaper to purchase. The hospital should, if possible, be built on the slopes of a hill having a southerly aspect, so that the maximum of sun and air may be obtained, and good drainage be secured. An abundant and pure water supply is a first necessity. Care should be taken that the cost of water and drainage is low, and that the rates to be levied should not be excessive. Provision must be made for reliable and economical heating and lighting, and the system adopted must be elastic and able to cope successfully with any sudden strain placed upon it.

Arrangements for internal administration must be planned with minute care. A central kitchen with plant for economical but good cooking is essential—a generous allowance of suitable food being necessary—and the stores, larders, pasteurising room and other necessary offices must be designed with attention to the smallest detail. Buildings must be so grouped that the food and stores may be distributed expeditiously and safely, and refuse removed without danger or offence. These and other details must receive careful attention before the hospital is built. A modern laundry should be provided.

In arranging accommodation for the patients to be admitted there should be a clear idea as to the proportion of patients requiring recumbent or ambulatory treatment. This is a matter of considerable importance, because provision for each class must be made and their special requirements kept in view. In France, leading authorities estimate that at least 50 per cent. of the beds are required for recumbent cases.

At Alton, the number is still higher, because the percentage of serious cases is higher than at similar institutions in France; one reason being that the number of beds available in England at present is so small.

Out of 217 patients under treatment to-day (March 12th) at Alton, 167 are having entirely recumbent treatment, some 20 are up part of the day, and 30 are allowed up all day. I should estimate that provision should be made for the treatment of at least 70 per cent. recumbently.

(I should be happy to give evidence as to what I would consider the ideal design for such a special hospital. This would include its size, shape, aspect, structure, size of wards, arrangement of wards, arrangement of special wards, of balconies, sanitary arrangements. Ward fittings, kind of cots, beds, and stands best adapted for nursing these patients, arrangements for septic cases. Distribution of food, accessibility of kitchens, stores, and dispensaries.

Provision for infectious cases, modes of avoiding epidemic disease, arrangements for dealing with patients with scalp infections, rhinitis, otorrhœa, vaginitis, &c., based on observations made at Alton.)

The equipment of the hospital for treatment is a matter of great importance, and would be relatively inexpensive for the work to be dealt with. While not expensive it must be thorough and perfect. It would include an operating theatre and aspiration rooms. A serviceable X-ray department is of extreme importance. A large well-lighted plaster-room with waiting-room, and a splint-room for the manufacture of splints from casts is very desirable as it is cheaper and better to make splints than to buy them. Not one splint has been bought since we have been established at Alton, every splint required has been made on the premises, and those splints which the patients take away with them have not cost the hospital anything. The majority of patients leave with light, strong, suitable well-fitting splints which we make ourselves. Patients are charged merely the estimated cost of materials, and they obtain very much more suitable appliances than could be procured from an instrument maker, at a fraction of the cost. Out of 190 discharged last year, 141 left with splints or spinal jackets.

A compact bacteriological laboratory is of importance. Cultures should be taken of all sinuses on admission to the observation wards, and patients with added infections nursed in wards reserved for their specific added infecting organism, *i.e.*, streptococcal cases in one ward, staphylococcal in another, mixed infections in a third, and so on. All these points of detail merit consideration. Provision may be required for light and bath treatment.

The equipment of these special hospitals should then be as perfect and comprehensive as possible. Only thus can the best results be obtained in the shortest time at the least expense.

Conservative treatment will be chiefly required, but, undoubtedly, in the majority of cases, conservative treatment implies a great deal if properly undertaken.

The majority of patients suffering from bony tuberculous lesions are children, but a large number of adults are also attacked. I can see no objection to treating children and adults in the same institution, provided they are treated in quite different blocks. The methods of treatment are essentially the same, but it is most desirable that patients of different ages be separated.

The Staff.

Both medical and nursing staff require special training. The medical staff should be under a medical superintendent skilled in both treatment and administration. He should have absolute responsibility, freedom of action, and unhampered control.

In France, the surgeons in charge are largely relieved of administrative duties. This is good, because it enables the chief medical officer to devote his time and experience to treatment, but the necessity should be emphasised that the manager or secretary to the hospital is working under the medical superintendent and not independent of him. This is necessary for the avoidance of friction and to secure efficiency and economy. In other words the medical superintendent should be relieved of the routine of administrative work, but should be held responsible for the manner in which it is performed. I can see no possible objection to the medical superintendent being permitted to treat private patients afflicted with the special disease to which he has devoted himself. It will ensure him better prospects, raise the standard of his work, and make him in every way a better and more capable practitioner.

The time which he may devote to private practice will, of course, be limited by the time he must devote

to the service of the hospital. This system is adopted with conspicuous success in France. Only in this way can the special work be made adequately attractive.

It must be remembered that the medical officers will be called upon to perform duties regarded by many as monotonous, certainly exacting in the extreme and involving much attention to detail, and this work will probably have to be undertaken in remote districts possessing few attractions.

The number of beds per medical officer would depend on the standard of work required and the severity of the cases admitted. It must be remembered also that for good work to be done the hospital would require the services of both a competent radiographer and bacteriologist, the former being especially needful.

Probably one medical officer to from 70 to 90 patients would suffice.

The nursing staff under a competent matron requires special training. The sisters should be well qualified for their duties, and have received a thoroughly good general hospital training. The nurses should be probationers accepted for training in this special work. It is an advantage if they have received no previous training. Ordinary hospital nurses are, in my experience, unsuited for this special work except as sisters. The best ones can usually obtain sisters' posts or remunerative private work. The remainder are certainly not good enough for the special duties they are called upon to perform.

Nurses specially and carefully trained from the start give most satisfaction and become thoroughly useful and reliable. The number required will to a considerable extent depend upon the design, conveniences of the hospital, and the standard of work required. It will probably be found that at least one nurse to from four to five patients will be necessary, if proper attention is to be given to the patients.

For male adults I should advocate male nurses, and would suggest the employment of old R.A.M.C. orderlies or similar attendants.

Classification of Cases.

It will be found that cases come for treatment which are acute, sub-acute, chronic, and with the tuberculous mischief apparently arrested, but with more or less deformity remaining. A considerable proportion will have abscesses or sinuses. The length of time these different cases call for treatment varies enormously. Early cases demand careful treatment until the disease is arrested and danger of subsequent deformity avoided.

These offer the best prospects of complete cure without subsequent or with little deformity. It is of the utmost importance to admit these for treatment at the earliest possible moment, and the value of early diagnosis for this purpose cannot be over-estimated. Deformed cases should have the deformity corrected or reduced where possible. Old, badly deformed spinal cases, without abscesses or sinuses, which cannot have the deformity corrected, should be discharged as soon as that benefit which change of air and good food has produced has been gained. The deformities in old hip and knee and other cases may be lessened by osteotomy and other treatment, which can be best given in orthopaedic or general hospitals, and consequently should be referred to such hospitals. Cases with abscesses unopened are essentially suitable for conservative treatment, and the result of such treatment is usually brilliant.

Patients with sinuses infected form the most serious class. If the sinuses are not healed after fair trial, the patient should not be detained but returned home or transferred to the infirmary.

It is noteworthy that French authorities estimate that 75 per cent. of these sinus cases suffering from spinal lesions will die. Our experience at Alton is that a considerably larger proportion may be cured, but the prognosis is always bad. It may be estimated that at least 50 per cent. of patients suffering from spinal caries, who have spinal abscesses opened, progress to sinus formation. Not more than from 2 to 5 per cent. treated conservatively develop sinuses, and these are never very serious. I have not seen one single case develop a serious sinus, and every one of our cases has recovered.

The whole question of length of treatment required for the different classes of patients is a very complex one. It will to a large extent depend upon facilities for treatment and after-care.

This may certainly be said, that if well-organised means for after-care be devised, as are in force at Alton, the length of stay at the special hospital may be greatly lessened without undue risk to the patient. I shall return to this later, when discussing the after-care of patients.

Education, Training, and Employment of Patients.

Modern requirements demand much more than mere treatment of the disease of the patient. More is required both in the interest of the patient and the community. No scheme for the treatment of surgical tuberculosis can be considered complete unless simultaneously provision is made for the patient, if a child, to receive that education which his condition would permit; if an adolescent, technical training is an occupation which would assist or enable him to earn his livelihood when discharged. At Alton all children receive such education as their condition permits, and on discharge commonly have not only made up for the loss which their enforced absence from school has engendered, but often, because of the care taken with their education, are perhaps even in a better position than if they had attended school uninterruptedly.

In our college, crippled lads are received from the age of 14 to 18 for technical training in an *occupation suited to their limitations*, for a period of three years, and on discharge are able to take up remunerative and self-supporting occupations, to their own gain and that of the community. It need hardly be said that under the complex social conditions now prevailing, the utmost care and judgment must be exercised in the selection of suitable occupations.

The requirements of the patients might be best met by the establishment of an industrial colony adjacent to the hospital, but in its own separate grounds. Such a colony would not be directly remunerative, but would to a considerable extent contribute to the cost of its maintenance.

It would have to be distinctly understood that all patients as soon as sufficiently cured to return to their work, and able to cope with outside conditions, should be discharged. Only those would be detained whose condition is such that they would be unable to work if discharged. Should cure be impossible, and the health of the patient not permit his employment, he should be discharged, returning either to his own home, or, if indigent, transferred to the poor-law infirmary.

This aspect of the problem is so vast and important that I cannot do more than allude to it in this memorandum. With the permission of the trustees of this hospital, my experience gained at Alton in this branch of the work is at the command of the Commissioners.

The After-care of discharged Patients.

This is a most important and too often neglected matter. If the full benefits derived from treatment are to be maintained, and the discharged patient is to receive the most valuable assistance, a carefully thought-out system is indispensable.

The system in force at Alton is as follows:—

When a patient is discharged, a detailed letter is sent to the parent or guardian explaining exactly how the future of the patient is to be guarded. He is informed that the splint provided is to be removed nightly, and the patient's skin washed and powdered to prevent it from becoming sore. Directions are given as to when the splint must be worn, when it may be discarded, and how it should be put on. Instructions are given as to the diet and hygiene.

London patients are requested to bring the child within three months of discharge to our out-patients' department, in London, for inspection and advice. They are instructed to notify me at once if for any reason they should be anxious about the patient's condition, or not understand directions given. They are instructed in such matters as the amount of rest the child requires, the school he should attend, the occupation he should obtain, the precautions which should be observed, &c., &c.

For the success of this scheme the co-operation of the parent or guardian is essential, and while this co-operation is gladly given by many, it is a matter of real regret that it is denied by some.

In the patient's own interest it is desirable that such co-operation should be compulsory. By this means a recurrence may often be avoided, the interests and future of the patient safeguarded, and if recurrence of the disease takes place it may be immediately treated.

The number of beds required can only be approximately estimated, because of the absence of available data on which to make provision.

In France there are 2,500 beds in special marine hospitals devoted to the treatment of surgical tuberculosis, which gives about one bed to each 8,000 inhabitants. Andrieu estimates that the number required is approximately one to every 2,000 inhabitants, and that is probably not too liberal an estimate.

It must be remembered that the percentage of patients attacked is largest in the poorer classes, and that many more children are attacked than adults. The incidence of surgical tuberculosis is greatest between the ages of three and ten years.

I turn now to the consideration of statistics, and take this opportunity of expressing my indebtedness to my friend, Dr. Calvé of Berck, who has very kindly placed at my disposal a very valuable paper which he is to read next month before the International Tuberculosis Congress at Rome. I have fully availed myself of his generosity in this memorandum, and would refer to the paper when it is published for other valuable information. The paper is entitled "*De l'importance des Hôpitaux Marins dans le traitement des tuberculoses Chirurgicales.*"

Statistics from Alton, with Comments.

(A) Re Treatment.

It should be pointed out that the cases received include the most severe forms of surgical tuberculosis. From my own observations, and from reports published, I am able to state that the proportion of serious cases at Alton is considerably higher than at Berck.

It will be seen that out of 659 patients received at Alton, no fewer than 274 suffered from tuberculous disease of the spine, and of these, a large proportion suffered from abscesses, sinuses, or paraplegia.

Patients are entered as discharged who died. Out of the 659 who were admitted, 8 died in hospital, and I have ascertained that 8 died after discharge. Of those who died after discharge, the condition of seven was hopeless when the patient left. Where possible, the parents are informed when the patient's condition appears to be absolutely hopeless, as sometimes they prefer to remove the child.

Possibly other patients have died of whom I have no record, but these must certainly be few in number, as every endeavour is made to remain in touch with discharged patients. It should be noted that tuberculous disease was probably not responsible for the death of three of these patients.

The mortality then amongst tuberculous patients since the hospital was opened, in September 1908, was in the hospital, 1·2 per cent., altogether, 2·4 per cent., possibly more, certainly not much more.

I can find no more favourable figures anywhere, bearing in mind the nature of the cases treated.

By apparently cured is meant that the disease appears to be quite arrested, abscesses absent, sinuses healed, and the patient perfectly able to resume his ordinary life not under skilled supervision.

The number of cases readmitted for recurrence of the disease is about 1 per cent. Recurrences may have occurred which have not been readmitted. I have record of recurrence in only two patients who were not readmitted.

It should be mentioned that the patients are classified according to their principal lesion. A very large number have multiple lesions, but these are called cases of "multiple tubercle" only when occurring simply in the smaller joints and not affecting spine, hip, or knee.

Cases entered as "other tuberculous lesions" include patients suffering from bony tuberculosis in whom a joint is not involved, or cases of tuberculous peritonitis, adenitis, &c.

Table 3 shows the average duration of treatment of the various conditions.

(B)—*Re Cost at Alton.*

These figures were prepared for this memorandum, and have not yet been audited, but they are, I believe, correct.

Books are kept according to the King Edward Hospital system of accounts.

I am indebted to the courtesy of the trustees of the hospital for permission to forward these tables.

It is impossible owing to the short time at my disposal to differentiate between the cost per head in the hospital and in the college, except in such items as food, &c.

Assuming that pupils and patients cost the same, we can arrive at the average cost of curing or training a cripple.

Moreover by reference to Table 3, already alluded to, the cost of treating each particular kind of tuberculous cripple can be arrived at.

The cost per head at Alton will be found to compare very favourably with that of any special hospital. Further, it could be shown that were the hospital doubled, trebled, quadrupled, or even still

further increased in size, the cost per head would assuredly decrease, providing the same economy as is now exercised was continued.

At the commencement of this memorandum I alluded to tuberculosis of the glands, skin, and peritoneum. These conditions could be equally well treated at such a special hospital as I have already described; and, indeed, would be then better treated than at present, and under the best possible conditions.

Their treatment then in such a special hospital is advocated. A number of cases of glandular tuberculosis have been treated at Alton with considerable success. Conservative methods are favoured, and the unsightly scarring so common after radical treatment may be usually avoided.

Conclusion.

I must apologise for the somewhat dogmatic way in which I have dealt with the subject. The facts stated are, to the best of my belief, absolutely correct and accurate. The limited time at my disposal for the preparation of this memorandum must be my excuse for its manifest failings, but I trust that nevertheless it may have some small value. With the kind permission of Sir William Treloar and his co-trustees, any further information which I can give is at the disposal of the Commissioners.

H. J. GAUVAIN.

March 1912.

A.

APPENDED to MEMORANDUM submitted by H. J. GAUVAIN, M.A., B.C. (CANTAB.), Medical Superintendent of Lord Mayor Treloar Cripples' Hospital and College, Alton, Hampshire.

TABLES *re* TREATMENT AT ALTON.

TUBERCULOUS PATIENTS ADMITTED and DISCHARGED—WITH THEIR LESIONS.

	Spine.	Hip.	Knee.	Ankle.	Shoulder.	Multiple.	Other.	Total.
1908—Admitted	32	19	21	2	Nil	2	4	80
Discharged	1	Nil	1	Nil	Nil	Nil	Nil	2
1909—Admitted	83	59	20	7	Nil	3	21	193
Discharged	17	26	18	1	Nil	2	13	77
1910—Admitted	61	52	23	7	Nil	3	10	156
Discharged	58	26	33	9	Nil	3	10	139
1911—Admitted	80	61	28	6	1	6	12	194
Discharged	82	64	22	5	1	4	12	190
1912—Admitted	18	5	9	2	Nil	1	1	36
Discharged	14	13	3	1	Nil	2	4	37

	Total tuberculous patients admitted, with their lesions to February 29th 1912.	Discharged
Total tuberculous patients admitted to February 29th, 1912	659	172
Total tuberculous patients discharged to February 29th, 1912	445	129
Under treatment February 29th, 1912	214	77
		39
		16
		11
		1
		659
		445

RESULTS OF TREATMENT.

	1908.	1909.	1910.	1911.	1912.	Total.
Number of patients admitted	102	196	158	198	36	690
" tuberculous	80	193	156	194	36	659
" other than tuberculous	22	3	2	4	Nil	31
" discharged	3	99	142	194	38	476
" tuberculous discharged	2	77	139	190	37	445
" other than tuberculous discharged	1	22	3	4	1	31
" tuberculous apparently cured	2	68	133	174	34	411
" tuberculous who died	Nil	Nil	Nil	6	2	8
" tuberculous not improved	Nil	6	6	4	Nil	16
" transferred to other hospitals or removed by parents before treatment completed	Nil	3	Nil	6	1	10
" of recurrences re-admitted	Nil	Nil	1	4	2	7

AVERAGE DURATION OF STAY.

Tuberculous disease of—	Days.
Hip	553
Spine	441
Knee	351
Ankle	298
Multiple	256
Other	174
Shoulder	168

Average stay each patient 320.15 days.

ASPIRATIONS PERFORMED DURING 1911.

	Ankle.	Spine.	Hip.	Knee.	Shoulder.	Other.	Total.
Total	3	147	217	69	15	32	483
Averages	3	4.2	6.6	5.3	5	2.3	4.6

DEATHS IN HOSPITAL.

Cause of Death.	Disease treated.	Summary.
Military tubercle	Tuberculous spine.	2 patients suffering from tuberculous spine died of military tubercle.
Sepsis	Do.	2 patients suffering from tuberculous spine died of amyloid disease.
Amyloid disease	Do.	1 patient suffering from tuberculous spine died of sepsis.
Military tubercle	Do.	1 patient who had tuberculous disease of the knee (cured) died of erysipelas.
Amyloid disease	Do.	1 patient suffering from tuberculous spine died of diphtheria.
Erysipelas	Tuberculous knee.	1 patient suffering from tuberculous spine died of tuberculous meningitis.
Diphtheria	Tuberculous spine.	
Tuberculous meningitis	Do.	

PATIENTS WHO DIED AFTER REMOVAL.

Cause of Death.	Disease treated.	Summary.
1. Nephritis	Tuberculous spine.	2 patients suffering from tuberculous spine died of sepsis
2. Phthisis	Do.	1 patient suffering from tuberculous spine, hip, and knee died from sepsis.
3. Post orbital tuberculome	Tuberculous ankle.	1 patient cured of tuberculous spine died of nephritis.
4. Sepsis	Tuberculous spine.	1 patient cured from tuberculous disease of the spine died from phthisis.
5. Do.	Do.	
6. Tuberculous meningitis	Do.	1 patient suffering from tuberculous spine died of tuberculous meningitis.
7. Do	Do.	1 patient suffering from tuberculous hip died of tuberculous meningitis.
8. Sepsis	Tuberculous spine, hip, and knee.	

INJECTIONS OF BISMUTH, 1911, FOR THE TREATMENT OF SINUSES.

Number of injections	260
Number of patients treated	70
Average number of injections	3.7

B.

APPENDED to MEMORANDUM submitted by H. J. GAUVAIN, M.A., B.C. (CANTAB.), Medical Superintendent of Lord Mayor Treloar Cripples' Hospital and College, Alton, Hampshire.

Sheet "A."

LORD MAYOR TRELOAR CRIPPLES' HOSPITAL AND COLLEGE.

		£	s.	d.	£	s.	d.
A. I.	Provisions	3,453	17	3			
A. II.	Surgery and Dispensary	632	0	6			
A. III.	Domestic	3,532	5	4			
A. IV.	Establishment	935	12	10			
A. V.	Salaries and Wages	4,598	4	0			
A. VI.	Miscellaneous	344	13	0			
A. VII.	College Workshops	735	13	9			
A. VIII.	Farm	209	11	2			
A. IX.	Stables	84	9	5			
	Analysis of Wages—Mechanics						14,526 7 3
	" Laundry—Cost						
C. II.	Rates	110	11	4			110 11 4
							<u>14,636 18 7</u>

Sheet "B"—A. I.

PROVISIONS.

		£	s.	d.	£	s.	d.
1.	Meat	1,065	2	4			
*2.	Fish, poultry, &c.	107	2	10			
*3.	Butter, bacon, cheese, &c.	312	12	1			
4.	Eggs	198	18	8			
5.	Milk	690	4	8			
6.	Bread, flour, &c.	491	7	3			
7.	Grocery	311	3	7			
†8.	Vegetables, fruit, &c.	257	6	10			
9.	Malt liquors	17	19	6			
10.	Lime juice	1	19	6			
							<u>3,453 17 3</u>

* Of items 2 and 4, 22l. 13s. 6d. is the value of produce supplied from own farm.

† Of item 8.— 229l. 14s. is the value of produce from own garden.

Analysis of Above.

	Average Cost.			Total Cost.	
	Average Number in Residence per Week.	Average Cost per Week each.	Average Cost for whole Year each.	Per Week.	Per Year.
To cost of Patient	217	2 11½	£ 7 2 11½	£ 31 18 3¼	£ 1,659 10 3
" College	54	4 11½	12 17 7½	13 7 6¼	695 11 3
" Staff	73	5 9½	15 1 0¼	21 2 7¼	1,098 15 9
" Residents	344	3 10½	10 0 9½	66 8 4¼	3,453 17 3

Dividing total food cost (3,453l. 17s. 3d.) by the number of patients (including College), viz., 271, the cost per patient for the year is £ 12 14 10¼ each

Sheet "C"—A. II.

[SURGICAL AND DISPENSARY.

(Materials only.)

1. Drugs, chemicals, disinfectants, &c.	} £ 632 0 6
2. Dressing, bandages, &c.	
3. Instruments and appliances (including materials for splints: see below)	
4. Wines and spirits	
5. Sundries	

Surgical Splints Account.

Number of celluloid splints made, 155	£ 129 9 8
To cost of materials purchased	
Credit by cash received for splints made during 1911 (as above)	129 10 6

Sheet "D"—A. III.

DOMESTIC.				£ s. d.		£ s. d.	
(Materials only.)							
1. Renewal and repairs of furniture				161	17	10	
2. " " " linen and bedding				239	1	2	
3. " " " hardware, crockery, and brushes				103	5	10	
4. Washing done off premises (Nil).							
5. Cleaning and chandlery:			£ s. d.				
Cleaning materials			125	0	0		
*Laundry			80	18	10		
Treatment of sewage			384	19	0		
						590	17
6. Water			292	3	6		
Softening materials			18	18	6		
						311	2
7. Heating and lighting, with all repairs to hot and cold water plant, and to engines, &c., &c.:							
Power-house coal (including haulage of trucks)			1,177	0	6		
Domestic coal and coke (including haulage of trucks)			231	4	10		
Materials for repairs and renewals			498	10	6		
						1,906	15
8. Uniforms (nursing, domestic, &c.)						97	7
9. Sundries—various			22	10	9		
Railway freight account			99	6	8		
						121	17
							3,532
							5
							4

* See Sheet "L"

Sheet "E"—A. IV.

ESTABLISHMENT.				£ s. d.		£ s. d.	
(Materials only.)							
1. Insurance							
2. Renewals and repairs (to buildings, &c. only)							
3. Annual cleaning							
						632	6
4. Garden—Estate			£ s. d.				
Kitchen			55	16	2		
			128	6	3		
			184	2	5		
Extraordinary—Repairs to roads			119	3	8		
						303	6
							1
							935
							12
							10

Sheet "F"—A. V.

SALARIES AND WAGES.				£ s. d.		£ s. d.	
1. Medical				400	0	0	
2. Dispensing	}						
and							
3. Nursing				737	1	7	
4. Other officers			£ s. d.				
Clerical			100	0	0		
			208	0	0		
			171	12	6		
						479	12
*5. Mechanics, &c.						2,256	0
6. Porters—Domestic			117	6	9		
Laundry			65	2	6		
						252	9
7. Domestic servants						366	6
8. Scrubbers (laundresses):—							
Resident			82	1	4		
Non-resident			24	13	1		
						106	14
9. Pensions (Nil).							4
							4
Average number of nurses							45
" " Domestic and scrubbers:—							per week.
Resident	}	27					28
Non-resident		1					"
" " Porters (non-resident)							5

* See Sheet "K"

		MISCELLANEOUS. (Materials only.)		Sheet "G"—A. VI.	
				£ s. d.	£ s. d.
1. Printing and stationery	-	-	-	82 0 0	
2. Postages:—				£ s. d.	
Telephone	-	-	-	19 11 5	
Stamps	-	-	-	86 0 0	
				<u>105 11 5</u>	
3. Advertisements	-	-	-	9 13 6	
4. Sundries:—					
Various	-	-	-	15 15 0	
Petty cash	-	-	-	131 13 1	
				<u>147 8 1</u>	
					<u>344 13 0</u>

Note.—These items strictly apply to Alton only.

		Sheet "H"—A. VII.		Sheet "I"—A. VIII.	
		COLLEGE WORKSHOPS. (Materials only.)		FARM.	
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
				To cost of materials	
1. Leather Work	-	596 14 10			209 11 2
2. Cobbling	-	47 0 10			
3. Tailoring	-	91 18 1			
		<u>735 13 9</u>			<u>209 11 2</u>
				Sheet "J"—A. IX.	
				STABLES.	
				£ s. d.	£ s. d.
				To cost of materials	
				84 9 5	84 9 5

Note.—All repairs to boots, making surgical boots and the clothing for college and hospital, for which parents are unable to pay, are done under headings Nos. 2 and 3.

		WAGES. Mechanics, &c.		Sheet "K"—A. V.—5 Analysis.	
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Power House—Chief engineer (plus quarters only)	-	-	139 5 10		
Assistant engineer	-	-	34 7 0		
Day and night stokers	-	-	123 8 0		
Coal labourer	-	-	62 6 8		
			<u>359 7 6</u>		
Plumbers	-	-	-	140 6 2	
Carpenters	-	-	-	276 0 0	
Bricklayers	-	-	-	136 8 4	
Painters	-	-	-	127 6 0	
Labourers	-	-	-	133 11 3	
Surgical carpenter	-	-	-	92 0 0	
Coachman	-	-	-	68 1 0	
Gardeners—Kitchen	-	-	244 0 0		
Estate	-	-	200 0 0		
			<u>444 0 0</u>		
Farm (pigs and poultry)	-	-	-	71 0 0	
College Instructors:—					
Drill Instructor (plus quarters only)	-	-	78 0 0		
Leather work instructor—Case maker	-	-	148 15 0		
Bag maker (part year only)	-	-	43 15 0		
Tailor Instructor	-	-	91 0 0		
Cobbling Instructor (part year only)	-	-	46 10 0		
			<u>408 0 0</u>		
					<u>2,256 0 3</u>

		LAUNDRY.		Sheet "L"—A. III—5. Analysis.	
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
To Wages—Female staff	-	-	106 14 5		
Male	-	-	65 2 6		
			<u>171 16 11</u>		
Cost of food only for resident staff at 5s. 9½d. week each	-	-	-	77 0 7	
laundry materials	-	-	50 16 0		
renewing roller covering	-	-	30 2 10		
			<u>80 18 10</u>		
belting for machines	-	-	-	4 4 10	
petrol for gas plant	-	-	-	25 9 10	
repairs to gas plant	-	-	-	3 14 7	
booster brushes for motors	-	-	-	2 13 0	
oil for motors	-	-	-	2 12 0	
Estimated proportion of engineer's wages	-	-	-	13 0 0	
fuel for heating	-	-	-	58 10 0	
electric current (power and light)	-	-	-	81 5 0	
water consumption	-	-	-	78 0 0	
horse, cart, and man	-	-	-	13 17 0	
				<u>613 2 7</u>	

Number of articles washed - - - 162,426.
Average cost each article, '9d.

March 1912.

MEMORANDUM submitted by THE DEAN OF THE FACULTY OF MEDICINE OF THE UNIVERSITY OF LEEDS concerning the METHODS AND LINES OF RESEARCH IN REFERENCE TO TUBERCULOSIS.

At various points in their Interim Report the Committee insists on the importance of co-operation and co-ordination of the authorities who will be concerned with the cure and treatment, according to present knowledge, of tuberculous patients. The same considerations apply also to research and to the problems of the prevention and eradication of tuberculosis. It thus follows that, to be effective, research must be conducted in the main in suitably equipped centres. A limited number of investigations can, no doubt, be carried out in a laboratory or in a hospital by themselves, but the majority and the more useful ones require linked co-operation, not only of laboratory and hospital, but also of the sanitary and educational authorities of the districts in which tuberculosis is rife.

Research with a view to the prevention, reduction and extinction of tuberculosis may proceed along several lines: for instance, prophylactic, therapeutic, hygienic, educational, administrative, and so on. For success in any of these directions the most important factors are:—

- (a) Suitable clinical cases and other opportunities.
- (b) Suitable individuals to carry out the investigations.

(a) *Clinical cases and other opportunities.*

An adequate number of suitable cases for study and investigation can obviously be found only in populous centres. No single centre can provide all the necessary opportunities, firstly, because there is variation, as in other diseases, in the incidence and character of tuberculosis in various places; secondly, because the temperament of the different communities differs, with a corresponding variation in their assistance in applying tentative prophylactic or therapeutic measures; and thirdly, because the provision of suitable places or laboratories for the various purposes also differ in various centres.

(b) *Suitable individuals to carry out the investigations.*

It is obvious that in the medical departments of the various universities throughout the country there must be several individuals capable of and, indeed, already engaged in carrying out useful research on tuberculosis, but not desirous of limiting their activities in this single direction. Consequently their services would be available, in the majority of instances, only

at the institutions to which they are attached. The fact of their inclusion in the scheme would help to widen its aspects and the chances of successful research would be materially increased.

In the same way as, in accordance with the suggestion of the Committee, the county councils should be responsible for the organisation of the general treatment of tuberculosis in their various areas, it seems reasonable and appropriate that the University schools of medicine in such centres should be given the charge of research. Obviously, they would have to co-operate with the local authorities and associations, and this, in the newer universities, is largely the case already and of comparatively easy accomplishment. Another advantage is that appropriate main laboratories already exist, and a relatively small expenditure would be required for their suitable extension.

It would appear from these considerations that the best way for dealing with research would be for the various schools to receive subsidies to be applied in research (not necessarily within the department or University buildings), and also for them to confer with one another as to the particular problems which they wish to investigate, in order, so far as possible, to avoid overlapping. In certain instances, from what has been said above, it would be useful for the same investigation to be made in different districts.

A few lines of research are suggested below:—

(a) The nature of the specific susceptibility to tuberculosis. Although the disease is not inherited, the susceptibility seems to be and may be due to the presence or absence of some specific substance.

(b) The effect of tuberculin vaccination on the large scale of susceptible but unaffected individuals. It is proposed that as much of the youth as possible should be tested for susceptibility, and those who react treated with tuberculin; the death rate would probably give indications of the result in future years.

(c) The preparation of non-toxic but protective vaccines. From experiments now in course, as well as published results, this seems to be quite feasible.

(d) The specific treatment of mixed infection. This point has hitherto been somewhat neglected.

(e) Rapid methods for the determination of the presence of tubercle in animals or in milk, &c.

(f) The existence of tubercle carriers—human and animal.

A. S. GRÜNBAUM.

December 1912.

MEMORANDUM submitted by PROFESSOR MATTHEW HAY, M.D., LL.D.

Medical Research.

I have pleasure in giving your Chairman such help as I can in regard to the proposed scheme of research.

In response to his request for information on the research scheme of the Carnegie Trust for the Scottish Universities, I enclose a copy of the scheme as originally proposed. It has not been found necessary subsequently to make any substantial alteration.

I also enclose a copy of a private circular note on the working of the scheme which I prepared for the information and guidance of my University colleagues in Aberdeen immediately after the inauguration of the scheme.

The scheme, it will be observed, consists of scholarships, fellowships and grants.

The scholarships are each of the value of 100*l.* a year, and are intended to be held by beginners in research, who are expected, however, to have already acquired some knowledge of the methods of research; but this is not always obtainable. Each intending scholar must be nominated by some competent person who usually undertakes to direct and superintend his work, or to see that he is placed, if he goes abroad, under some competent investigator. The

subject proposed for the research is stated by the applicant, and revised by the nominator. It must always be approved by the Carnegie Trust.

The scholar and the person under whom he is working are requested to submit quarterly reports of the progress of the research. If satisfactory progress has been made, the scholarship may be renewed for a second year, but no longer.

The fellowships are each of the value of 150*l.* yearly, and are awarded only to such persons as have already proved their capacity for original research, and have published the results of such research, or have the results ready for publication and examination.

A fellow does not require to be nominated, but he must give the names of competent persons to whom reference may be made as to his ability as an investigator. The proposed subject of the research must be submitted for the approval of the Trust.

Reports of the progress of the research are required from time to time, as in the case of scholars. The fellow may work in a laboratory of his own, or—what is much more frequent—in the laboratory of some university or research institute, at home or abroad.

A fellowship may be renewed twice. In other words it may be held for three years.

Fellows are largely selected from among the scholars who are doing good work, but not infrequently the fellow has not previously held a scholarship.

No expenses for research materials have hitherto been allowed to scholars. The scholars usually work in the laboratories of the Scottish Universities, which are supposed to provide the materials. A grant for expenses is, however, frequently made in the case of fellows. The grant may run from 10*l.* to 50*l.* or 60*l.*, and in a very few cases may even reach 100*l.*

Scholars are not allowed, as a rule, to undertake any duties beyond those of their scholarship. Fellows, however, may hold other appointments, and do so in a small proportion of cases. In such event the emoluments of the fellowship may be reduced by the amount of the salary drawn from the other appointments, or a deduction may be made proportionate to the time expended on the performance of such other duties.

Besides scholarships and fellowships the Trust also make grants for research. The applicant must be qualified to undertake research—frequently he is a professor or lecturer or assistant in a university, or holds some teaching post in a research laboratory—and he must submit the subject of his proposed research for the approval of the Trust, and give a more or less detailed statement of the particular purposes to which he proposes to apply the grant, such as apparatus, chemicals, animals, laboratory assistance, the assistance of an artist for illustrations, travelling expenses, and cost of publication. The Trust has only exceptionally allowed any part of the grant to go for personal maintenance.

In the earlier years of the operation of the research scheme of the Trust, the members of a Sub-Committee dealt with the various applications, and made recommendations to the Executive Committee. This Sub-Committee still continues its work, but is now assisted in its duties by three specially appointed and salaried reporters—not members of the Trust—who report briefly on each application, and on the work, if any, done. One reporter deals with applications in the subjects of physics and chemistry; a second deals with those in the biological and medical sciences; and the third takes up the applications in history and modern languages and economics.

No definite limit has so far been placed by the Trust on the sum to be devoted annually to its research scheme. The sum began with about 4,000*l.* in the first year, and rose to nearly 8,000*l.* last year. The revenue at the disposal of the Trust annually for the better endowment of the Scottish universities and for the encouragement of research is about 50,000*l.*, but the bulk of it has hitherto been applied to the extension of teaching as by the institution of new lectureships, to the better equipment of laboratories and libraries, and to additions to buildings. This sum is, of course, exclusive of the part of the income of the Trust applicable to the payment of students' fees.

I find, on looking through the list of awards and grants for the past two years under the research scheme of the Trust, that the average annual sum allocated for research in all medical subjects was, for scholarships, 700*l.*; for fellowships, 833*l.*; and about 600*l.* for grants and expenses—in all 2,133*l.*

This is exclusive of grants amounting in all to about 1,000*l.* a year for the partial maintenance of the laboratory of the Royal College of Physicians, the Scottish Asylums Pathological Laboratory, and the Clinical Research Laboratory of the Edinburgh Royal Infirmary.

The bulk of the medical research was undertaken in pathological or bacteriological laboratories, and in physiological laboratories. There is as yet only one purely public health department in a Scottish university, viz., in Edinburgh. In the other three universities public health is still taught along with forensic medicine, but the laboratories of the joint department in Aberdeen and in Glasgow, and, I believe, in Dundee, are mainly occupied with public health work.

The grants by the Trust for research are confined to Scottish graduates working in Scotland, but several of the scholars and of the fellows have carried on their researches abroad.

Some of the researches were conducted in the laboratory of the Royal College of Physicians of Edinburgh, referred to above as being in part supported by the Carnegie Trust. The laboratory was found to be in need of pecuniary aid when the Trust began its research scheme, and the Trust was also not unwilling to have available a laboratory to which medical researchers might go who happen for the time to have no convenient opportunity of working in a university. The Trust does not, however, control the lines or subjects of research in this laboratory more than in the laboratories of the universities. The director of the laboratory was appointed by the College of Physicians.

During the year 1910-11 one of the Carnegie scholars, two of the Carnegie fellows, and six Carnegie grantees worked in this laboratory. The laboratory has naturally been taken advantage of mainly by Edinburgh graduates.

It is important to state that although the Trust, in the course of the administration of its research scheme, has had to refuse a considerable number of applications, very few, if any, really meritorious applications have been rejected. This is due to the fact, already mentioned, that the Trust, although aiming at some rough limitation to its expenditure on research, has never as yet laid down any hard and fast limit. This is especially true of scholarships and fellowships. Grants for the expenses of research have suffered more, but not so much in the direction of the limitation of their number as in the diminution of the amount of the individual grants. Except for very special reasons, the grant in no single case is permitted to exceed 100*l.* annually. Those of us who have been concerned with the adjustment of these grants have not always had occasion to regret the need for curtailing the grant, as the subsequent progress of the research has not infrequently shown that the sum granted had proved to be more than adequate. On the other hand, it has to be admitted that when it comes to be known that the Trust are unwilling to exceed certain limits in their grants, investigators naturally do not put forward expensive, but, nevertheless, possibly justifiable schemes of research, as, for example, such a scheme as was undertaken by the Royal Commission on the relationship of Human and Bovine Tuberculosis.

The experience of the Trust seems to suggest that if a fresh body were to enter the field—I refer to Scotland only—with offers, under similar conditions, of scholarships and fellowships in medical and hygienic research, it might not succeed in adding greatly to the number of scholars and fellows already engaged in research, if the awards are limited, as they ought to be, to men who are really competent to undertake research. On the other hand, it might be urged, and has been urged, that if the scholarships and fellowships were of higher value—say, 150*l.* and 200*l.* or 250*l.*—some good men of small means, who from necessity must begin at once after graduation to provide the whole of their own maintenance, would be willing to come forward. I believe there is some truth in this. But it must be borne in mind that some of such possible applicants think also of their future as researchers, and, seeing little prospect of a permanent and adequately remunerated appointment at the end of four or five years of research, turn deliberately, although regretfully, to ordinary medical practice. For my own part, I would not be disposed to encourage a young graduate to engage in research for more than one year or two years, unless I saw that he was possessed of real genius for research, and that there was a reasonable prospect of a career for him in research or in teaching.

These observations are not intended to apply to grants for research expenses made to persons earning their living in other ways than as holders of scholarships or fellowships. I believe that a considerable sum, in addition to that provided by the Trust, could be usefully absorbed in such research and investigations and inquiries as the Treasury or the Insurance Commissioners might desire to encourage.

The Trust has not as yet thought it advisable for itself to organise or lay down the subject and lines of any particular research. It has been suggested more than once that it might do so; but the feeling has hitherto

been—the more that the Trust, from the nature of its constitution and its direct association with the universities, does not exist for the fostering of research along any specified lines, or in any particular science or group of sciences, and is fully as much concerned with the training of researchers as with the production of research—that the best results would probably be obtained by research on a subject proposed by the researcher himself or his University advisers rather than by research in subjects dictated by the Trust. This, no doubt, admits of considerable qualification. Much must depend on the object and aims of the body providing the funds for research, and on the character of the particular investigation.

So much for the work and methods of the Carnegie Trust.

Your Chairman has also suggested that I might indicate my views as to "the lines on which, and the methods by which, research work in connection with tuberculosis might best be subsidised or carried on." I fear I cannot pretend to any knowledge of the subject more than is possessed by any member of your Committee. I will venture, however, to state my views, whatever may be their value.

I think, in inaugurating a scheme of research in connection with tuberculosis, it would be desirable to proceed tentatively, and to ascertain, in the first place, to what extent existing agencies and institutions can be utilised.

Among such agencies and institutions, there are the public health departments of the sanitary authorities. I am convinced that with adequate support and assistance a vast amount of most useful inquiry might be conducted by the more competent health officers. In some cases, a grant to meet outlays would be sufficient; in others, the salary of a research assistant might be provided, at least for a limited period.

Research does not necessarily mean laboratory work. Much valuable research could be performed in investigating more carefully the home and occupational and, generally, the social and economic, conditions under which tuberculosis arises or spreads or diminishes. No doubt much of such research forms a normal part of the duties of an executive health officer, but he is rarely able to find time to undertake it with the minuteness and care necessary to scientific accuracy and stable conclusions. Grants for special assistants in certain selected and typical districts might be made.

It is also desirable to extend the investigations that have been made into the feeding of the working classes. Such investigations might be supervised by health officers.

There are also fruitful statistical inquiries which might be undertaken by local health officers, and which might form part of some more or less general investigation. Clerical and other assistance might be provided for such a purpose, or the material collected locally might be analysed and worked up in some central statistical bureau.

Then we have our universities, each with extensive laboratories—many new and large—equipped for all forms of medical research. In Scotland, these laboratories have been much helped by the Carnegie Trust, and in all the British Universities substantial annual grants are now being received from the Treasury. A large body of professors and lecturers and assistants—nearly all of them trained in research, and some of them men of the highest scientific eminence—are available in the universities for conducting or supervising research. I feel sure that many of them, if adequate help in the shape of assistants and grants were provided, would be willing to assist in the investigation of tuberculosis or other diseases, and to take an assigned share in any general scheme.

There is also the great Lister Institute for Preventive Medicine, which, I imagine, would be ready to help; and there is a steadily increasing number of laboratories associated with the health departments of our larger cities and counties and with the larger hospitals and sanatoria.

Many of these institutions have already rendered important service in the investigation of tuberculosis.

The question, however, remains, and is, I understand, being raised, as to whether one or more special research institutes should be established for the investigation of problems relating to tuberculosis.

Although I have just been pleading for adequate utilisation of existing agencies for research, I am inclined to think, after careful consideration, and after a full discussion of the matter with my colleague, Dr. George Dean, Professor of Bacteriology here, and formerly head of one of the departments of the Lister Institute, and, therefore, well acquainted both with research work in universities and special institutes, that a proposal to create special research institutes for tuberculosis deserves full consideration.

The advantages of an institute devoted entirely or primarily to research are that all the workers are usually free from the interruptions of teaching and the associated distractions, that their energies are entirely devoted to one sphere of work and become completely absorbed in such work, that a considerable body of workers, all moving towards the same end, are brought together, and stimulate and assist one another in their investigations, that specialisation within specialisation is more easily got, and that generally there is made available for attacking certain of the problems a disciplined co-ordinated force that is more likely to succeed than a number of separate workers. It must frankly be admitted that the time seems to have arrived in science, as in industries, when the man working almost single-handed, with simple means, has less opportunity of success than a compact and carefully trained combination of men, provided with the most specialised appliances. Great discoveries will not cease to be made, as in the past, by individual workers here and there; but it is noteworthy that at least three-fourths—I have heard it put higher by competent authorities—of the most striking advances in medicine in quite recent years have been made in special research institutes. I have in mind the Public Health Institute and Infectious Disease Institutes in Berlin, the several Pasteur Institutes in France, our own Lister Institute and Cancer and Tropical Medicine Institutes, and the Carnegie, Rockefeller and other Research Institutes in America. In some of these institutes, a certain amount of teaching is done, but their paramount function is research.

I would suggest, if I may, that the day has gone past for spending much money on palatial buildings for research. Sanatoria are teaching us that not only consumptives but all kinds of patients and all conditions of healthy persons can thrive and grow better with open windows. They are also teaching us, in spite of Midhurst, that simple and cheap, but properly designed, erections, are quite as effective as costly and massive buildings. I have had a more than ordinary experience in putting up university laboratories of the substantial and expensive type. If I were given a definite sum of money for the purpose of building and endowing a university or a research institute, I would be inclined to risk a shock to public opinion by housing every department in patches of cheap and absolutely plain one-storey buildings, but abundantly lighted and thoroughly equipped. I would, however, want 50 acres of ground, and if it were a pure research institute, without need for consulting the convenience of a large body of students, I would acquire the site where ground was cheap and the air pure, and not in the heart of a city, or even within its building fringe.

It will, of course, be necessary to have a Research Committee or Board—preferably for the whole kingdom, so that there may be no overlapping—to direct and control, in a general way, the lines of research, and to determine who are to undertake research in so far as it is to be supported out of the research funds.

The Committee might have Sub-Committees for the main divisions of research work, such as social and administrative, bacteriological and chemical, and statistical. The Sub-Committees might have power to co-opt a limited number of additional expert members.

I would hope that the investigations to be encouraged by the Committees will not be confined to this country. I could conceive of no more useful investigation than a comparative inquiry into the causes of the fall in the mortality from tuberculosis in this country, where the fall began 40 to 50 years ago; in Germany, where it began, I think, some 30 years ago; and of the practical absence of fall in France. These three countries represent an equally high civilisation. Why these differences? If we knew the causes, we might

receive much help in further lowering the mortality. A small commission of, say, three capable and properly trained and unprejudiced men, with time to spare for the purpose, could not fail to produce an instructive report.

I would also hope that the control of investigations should not be vested in one single director. The Committee, or Sub-Committees, should be the ultimate controlling bodies, and their control should not be nominal. The problems to be investigated are many-sided, and require to be viewed from more standpoints than it is usual for any single man to be able to reach.

Let me repeat that while I think there may be room for a special research institute, I trust that it will not be at the cost of neglecting the invaluable help that can certainly be obtained in existing laboratories and health departments. A system of grants for research work could not fail to produce a large crop of valuable investigations, but the grants would, in not a few cases, have to be substantial, so as to permit of the employment of adequate assistance.

Such assistance might be in part provided by a scheme of scholarships and fellowships as in the case of the Carnegie Trust. In some cases the assistance wanted would be lay assistance, such as that of a laboratory attendant; or a number of part-timers might be employed in some social inquiry. In any case, it would be well, as in the case of the Trust, to fix no definite number of scholarships or fellowships, if such terms be retained at all, but merely to let it be understood that applications for employment in research work might be considered, under certain regulations to be prepared. But these are details.

I enclose a copy of the latest Annual Report of the Carnegie Trust, namely, the Report for 1910-11, in which a considerable amount of information regarding their research scheme is given, with details of awards and expenditure. It will be seen that the researches directly bearing on tuberculosis are at present very few, although there are several important researches on other medical subjects.

MATTHEW HAY.
May 1912.

LETTER FROM PROFESSOR MATTHEW HAY, M.D., LL.D.

State Bacteriological Institutes.

Since my interesting and stimulating interview with the Committee on Wednesday, I have naturally had my mind more fully occupied with the subject of discussion than I previously had. I fear I am venturing on something without precedent in the orderly conduct of the work of a committee such as yours in seeking to offer further suggestions, but, moved by a very deep interest in the subject, I make bold to put forward a scheme which, in my opinion, would give this country a leading place among the nations of the world in providing facilities for the investigation and control of all kinds of infectious diseases, and in furthering the progress of medical science. Its only drawback—and one that may preclude its consideration by the Committee—is that it will cost yearly twice as much as the funds available for research under the National Insurance Act will allow, and will in addition necessitate a substantial initial grant for capital expenditure, but I trust this may not be a complete barrier to its consideration, as its advantages are such as, in my opinion, to far more than compensate for the larger expenditure.

Since meeting the Committee, my doubts as to the advisability of founding a research institute devoted exclusively to tuberculosis have increased. Tuberculosis is more important than other germ diseases only because of the vast number of men and animals that it maims or destroys. The bacteriological and preventive and therapeutic problems that it presents for solution do not necessarily involve more research than those of any other single zymotic. Tuberculosis should certainly occupy a principal place in the work of the research institute which the Committee is discussing, but it would, I think, be a mistake, that would soon have to be remedied, to require that it should absorb the whole attention of the research staff.

Our country is at present without any organised and complete system to enable public health authorities, school authorities, poor-law authorities, hospital doctors, and private practitioners to obtain conveniently and reliably the bacteriological and cognate examinations that are now essential to the proper diagnosis, control, and treatment of infectious diseases in general. In only a very few places have laboratories been provided by the local authorities, and in these the provision is mostly on an inadequate scale. In some other places temporary arrangements have been made, as in my own city, with the bacteriological department of a university or medical school, but the requirements are so rapidly extending that it is not to be expected that universities will much longer allow their laboratories to be filled up with a vast amount of routine work.

SYSTEM OF LOCAL INSTITUTES.

The present time is, I think, particularly opportune for the establishment by the State of a system of laboratories or institutes throughout England, Scotland, and Ireland, sufficient in number and in equipment to meet the requirements of the whole country.

In order that each institute may be well equipped and properly staffed, and be in possession of the skill and judgment that come from a large and varied experience, the money for their support should not be divided up among a large number of small institutes. On an average, about one institute for every million of population would suffice. This would give a total of 40 to 50 institutes. It would not be convenient or necessary to divide the population equally among the institutes. For example, in Scotland there might be four institutes—one in each of the four principal towns, Glasgow, Edinburgh, Dundee, and Aberdeen, but those in the first two towns would require to deal with a much larger population than the others. It would be an advantage to have the institutes situated, where practicable, in towns with medical schools or universities. The staff would thus be more in touch with other scientific workers, would have access to large medical and science libraries, and might—indeed, should—take a part within their own institute in training young graduates for the public health service. It would also be possible to obtain, if considered desirable, the services of the professor of pathology or bacteriology as consulting officer of the institute.

In these local institutes would be carried out every form of bacteriological examination required for hygienic or medical purposes within the area served by it, except in so far as any individuals or institutions chose to do their own bacteriological work at their own expense. The examinations would include simple microscopical examinations, blood-counts, cultures, inoculations, such special tests as Widal's and Wassermann's, and the preparation of individual vaccines, and would extend to samples of sputum, blood, stools, urine, and, indeed, any excretion or tissue, as also to samples of water and food. It would be a gain if the public analyst under the Sale of Food and Drugs Acts could be provided with rooms in the institute, and be required to give his whole time to his present duties, and to other chemical analyses required for hygienic and medical purposes, but it would be difficult to carry out such a proposal at present. It ought to come eventually.

The work of the institute would obviously be largely routine work, as distinguished from original research, but I would regard it as highly desirable—and indeed essential—that the staff and accommodation should be so ample that there would be both leisure and space for original research, or for the special investigation of certain problems that would from time to time emerge in the pursuance of the routine work. No institute should be so small as not to require besides the director, at least one qualified medical assistant. This would give the director more time for the higher work, and would also ensure that during his absence from illness or other cause the work of the institute would always be under competent direction. Much of the routine work could be thoroughly well done, under the supervision of the medical staff, by skilled lay assistants or preparateurs. Women excel in such work. A typist and one or more ordinary laboratory servants would complete the staff.

Cost of Local Institutes.

For one of the smaller institutes, such as might be suitable for, say, Aberdeen and the area attached to it, I reckon the annual cost of running the institute to be as follows:—Professor of pathology, as consulting director, 100*l.*; director, 450*l.*; assistant to the director, 200*l.*; two preparateurs—one at 100*l.* and the other at 80*l.*; typist and service, 170*l.*; heating, lighting, and rent of land, 140*l.*; laboratory materials, apparatus, animals, &c., 500*l.*—or a total of 1,740*l.*, say 1,750*l.* This is a liberal allowance as compared with that for a corresponding university department in most places, except that the salary of the director is lower than the usual professorial salary; but the salary is sufficiently large to induce some of the best of our university graduates to qualify for such a post, the more that in the larger institutes the director would have a larger salary—perhaps, as much as 800*l.* to 1,000*l.*—and the possible attainment of one of these more highly remunerated posts would always be in prospect for the capable director of a smaller institute.

As to the cost of providing the suggested institute, it might be put at, say, 5,000*l.*, exclusive of the land, which, in Scotland, could be obtained on a perpetual lease or feu. The site should be fairly spacious, and preferably on the outskirts of the town, where land is cheaper, and where animals can be more conveniently kept. The buildings should be plain, and as cheap as possible, consistent with the fulfilment of their purpose, and should include a small house for one of the servants, as caretaker. Money should not, however, be spared in providing a thoroughly adequate and up-to-date equipment. The largest of the local institutes should not cost more than 10,000*l.*

In some instances existing laboratories might be acquired and enlarged, and in certain of the university towns a site might be given in proximity to the bacteriological department.

CENTRAL INSTITUTE.

Above the local institutes there should be one central institute for the whole country. The local institutes would exist primarily for routine bacteriological examinations and investigations, and only secondarily for original research. The central institute, on the other hand, would have, for its sole or main purpose, original research. It should be complete in the sense of having represented within it every department of scientific activity that would assist in solving the great problems with which it would be required to deal. Besides a bacteriological department, there should be a bio-chemical department, a physiologico-pharmacological department, and a statistical and sociological department. Certain other sub-departments, such as parasitology, should also be provided.

The central institute should have a chief for each department with a salary better than that of almost any university professor in order to enable the institute to command the services of the best men in the country. One of the departmental heads would also be chief director of the whole institute. The staff of the central institute would come in course of time to be recruited mainly from among men in the local institutes, who had shown special aptitude or genius for research.

Cost of Central Institute.

Such an institute could, I believe, be erected and equipped for 35,000*l.*, including 5,000*l.* for site, if money is not wasted on fine buildings, and if the site is away, as it should be, from the heart of a town. The annual maintenance ought not to exceed 15,000*l.*

The central institute would, I hope, accomplish in course of time for Great Britain what the Institut für Infektionskrankheiten at Berlin has done for Germany, and, indeed, for the world.

It is a question deserving serious consideration whether the Lister Institute might not be taken over by the Government, if its constitution permits, and with a grant of, say, 10,000*l.* a year, in addition to its present resources, be made to serve all the purposes of the proposed central institute. But it would require to come under similar control to that of the local institutes, so that the whole system of institutes—local and

central—would work in unison. A capital grant of 15,000*l.* might then suffice for the necessary additional buildings. The sums are, for a great country, so small, and the objects to be gained are so immeasurably greater, that there ought to be no hesitation in starting a fresh central institute, if the suggested fusion or appropriation presents any difficulty. There will be scope enough for both institutes for many years to come.

FINANCE OF SCHEME.

As to the total cost of the whole scheme, I estimate that the capital expenditure would amount to about 410,000*l.* This is made up of 35,000*l.* for the central institute and 375,000*l.* for, say, 50 local institutes, at an average cost of 7,500*l.*, exclusive of site, the rent of which I have included in annual maintenance.

The annual cost of the scheme as outlined I estimate at 140,000*l.* This is composed of 15,000*l.* for the central institute and 125,000*l.* for, say, 50 local institutes at an average of 2,500*l.* for each.

Local Contributions.

To assist in meeting the cost of the local institutes, and to prevent thoughtless demands on their services, I would suggest that fees should be charged for routine examinations, the fees, however, to be low and considerably under the cost of the work—say, 1*s.* for a microscopical examination, and for such tests as a Widal test; 2*s.* for a cultural test; 5*s.* for an animal inoculation and test, a Wassermann test, or preparation of a special vaccine. These fees would be payable by the persons or authorities requiring the particular service, but would in the case of private practitioners and charitable institutions be repayable by the public health authority, except in such cases as would be determined by such authority under suitable regulations to be approved by the Local Government Board. If the public health authorities act liberally under such regulations, I estimate that the fees, which would be in essence a contribution from local rates—and a contribution by each sanitary authority in proportion to its use of the institute—should amount yearly to about 15,000*l.* to begin with, and would ultimately rise to 25,000*l.* or 30,000*l.* So long as the income from fees did not rise beyond 15,000*l.* to 20,000*l.*, the amount of the work in the institutes would be less than I have allowed for in my estimate for staff and outlays. It would, I think, be safe to assume that the net annual cost of the local institutes and the central institute would not exceed 120,000*l.* even from the first.

Animal Bacteriology.

There is no reason why all the work required locally in connection with animal diseases should not be undertaken by the proposed institutes. It would in many ways be an advantage to have animal bacteriology and human bacteriology under one roof. They serve to illumine one another. The additional work would be small, and fees for it might be provided from the funds of the Board of Agriculture.

Sanatorium Benefit.

On the assumption that either with or without an amendment of the Act, the sum of about 60,000*l.* expected to be available under the National Insurance Act for research in connection with the disease or diseases falling within sanatorium benefit can be applied towards meeting the estimated net expenditure of 120,000*l.* there would remain 60,000*l.* to be found.

I would add to this sum 15,000*l.*, to be placed in the hands of the central committee in charge of the institutes, in order to meet administrative expenses, and to provide special grants for local sociological and statistical inquiries, and for assisting in medical researches—bacteriological clinical, and etiological—that might be undertaken by persons other than those working in the institutes, for example, university professors and lecturers, university research fellows or scholars, health officers, school medical officers, veterinary officers, and sanatorium and tuberculous officers. This brings the deficit up to 75,000*l.*

Suggested Grants from Treasury.

I would venture to suggest that the whole of this annual deficit of 75,000*l.*, as also the whole of the

capital sum of 410,000*l.*, required for the erection of the central and the local institutes, should be met by grants from the Treasury. Including the 60,000*l.* to be contributed under the Insurance Act, the Treasury would have to provide 135,000*l.* annually. But the 60,000*l.* was intended—at least for the present—for tuberculosis alone, and was in a sense given for insured persons only, who number a third of the population. The larger sum of 135,000*l.* would be for all infectious diseases, including tuberculosis, and for the whole population. It is considerably less than half the revenue derived from the State from the stamp duty on patent medicines, and I do not know any purpose to which this revenue could be more appropriately applied. It would be the one justification for the continuance of the duty.

CENTRAL CONTROL OF INSTITUTES.

As the State would have provided and would be maintaining all the institutes subject to the proposed assistance from local fees, it would be entitled to control the institutes through a central committee on which, of course, each Local Government Board would be duly represented. There are certain advantages in the whole system of institutes being in the control of one body, in place of each institute being in the hands of an independent local committee. Such control would make one common service of the staffs of all the institutes, and facilitate promotion and the creation of a pension scheme, although I have not allowed for the latter in my estimate. A common service would in a time of pressure in one institute allow of the staff being supplemented by drafts from other institutes, and would also on the occurrence of special outbreaks of disease in any district make it possible to provide the relative institution with the assistance of an officer of special experience. In other words, every town and county in the kingdom would have available in an emergency, or for the solution of special problems, the resources of the whole organisation. The organisation would, in turn, be able to place at the disposal of the central committee, for research purposes, the whole bacteriological material of the country.

Local Committees.

Central control need not exclude a certain amount of supervision by a local committee; and the local health officers and other public officials should be accorded all reasonable facilities in having desirable investigations made, in addition to the examinations

required for routine purposes. But even if the pressure of routine work prevented such special investigations being freely undertaken, it may safely be assumed that the opportunities for research in the existing hospital and college laboratories would not be curtailed.

INFORMATION BUREAU.

The central committee should organise an information bureau and intelligence department, one of the duties of which would be, by circulars from time to time issued to health officials, and even to the whole medical profession, to keep them informed of definite advances in the bacteriological diagnosis and control of disease, with a view to the assistance offered by the local institutes being fully utilised. With the same object, the directors of the local institutes might, as occasion arose, meet with the medical men in their areas, in order to explain the newer methods of bacteriological diagnosis, and their precise application and value.

ASSISTANCE TO THE SERVICES.

The large body of highly trained and experienced bacteriological experts, brought into existence by the proposed scheme, and under the control of the State, would form an invaluable reserve for the assistance of the forces of the Empire in time of war. Success in a prolonged campaign is now admitted to be in large degree dependent on the sanitary measures that are born of an application of bacteriological knowledge. We have recently had an example of their importance in even one of the shortest of wars.

The proposed scheme has also the merit that it would assist in laying the foundations for the state medical service which many of us regard as not only desirable but inevitable.

If a complete system of well-organised, well-equipped medical research institutes were established in this country on such lines as have been suggested, it would, I am confident, be universally admitted that the Insurance Act had been the occasion of providing no more potent instrument for the advancement of medical knowledge and the alleviation of human suffering.

Since drafting this letter, I am particularly pleased to find from last week's *British Medical Journal* that a similar scheme has been receiving in the General Medical Council the much more powerful advocacy of Sir T. Clifford Allbutt.

MATTHEW HAY.
December 1912.

MEMORANDUM submitted by L. HILL, M.D., and W. BULLOCH, M.D.

London Hospital, London, E.,
March 1912.

We are of opinion that if the usual remedial measures are established, the fact remains that such measures are as yet unproven, both as to the nature of their action and their efficacy.

Research and statistical inquiry must continue therefore *pari passu* with the application even if it does not precede the application of such measures. To carry out research of an extended and co-ordinate character on the three chief lines—the bacteriology of tuberculosis including diagnosis and vaccine treatment, the statistics of tuberculosis, and the preventive hygiene of tuberculosis—an institute seems to us to be required founded on some such lines as the Cancer Research Institute. In using the term institute we do not have in view the establishment of a new building, but of an organising board. The board we desire to see established would include men of recognised authority now actively engaged in research on subjects cognate to the problems of tuberculosis.

As all the great advances of modern medicine have been made by laboratory workers and methods, we cannot see the utility of placing on such a board other than research workers together with representatives of those who are entrusted with the establishment of the remedial methods which your Committee may

propose. The board we have in view would devote itself to the co-ordination of research on tuberculosis and by its means from the beginning the remedial measures will be brought to the touch of refinement of experimental and statistical test.

LEONARD HILL.
WILLIAM BULLOCH.

Additional Memorandum by Leonard Hill.

I am of opinion that the question of ventilation and heating of schools, factories, dwellings, also of housing and town planning occupation, &c., requires to be examined from the point of view that movement, coolness, absence of uniformity, and relative humidity of the air are the qualities of the atmosphere which affect the comfort, metabolism, and immunity of the body, and that the beneficial effect of open air treatment does not depend on the chemical purity of the air, as is generally supposed.

Extended researches are required in order to establish the cause of the injurious influence exerted by a confined atmosphere.

LEONARD HILL.
March 1912.

MEMORANDUM submitted by A. H. HOGARTH, M.O.H., Co. Bucks.*

Given an annual grant of, say, 10,000*l.* by the Government for use in this county (population 210,000).

A.—I think the *ideal scheme* would be to allot each year—

5,000*l.* to supplying necessitous tuberculous or pretuberculous patients and their dependents with extra food and nourishment of the right kind. This fund should be administered by the Local and District Insurance Committees and not by the Guardians of the Poor; and

5,000*l.* to improving the existing housing accommodation of tuberculous or pretuberculous families or for building new houses for them. This fund should be administered by the existing local sanitary authorities under the supervision of the County Council.

There would be no difficulty in working out details, if the principle were approved. Probably it would be well to subtract 1,000*l.* from the housing improvement fund in order to obtain—

- (1) The full time services of an expert county tuberculosis officer, say, at 500*l.* a year (more in the larger counties) to advise the county council and various district councils and insurance committees. He should work in intimate co-operation with the county medical officer and, for administrative purposes, should be on his assistant staff.
- (2) The part time services of, say, 100 district nurses to help to look after the patients in their improved dwellings and environment. A grant of 5*l.* each per year would suffice.

Any surplus funds should be spent on continuing the educational campaign already begun among medical men, nurses, school teachers, sanitary inspectors as well as among the lay public. I am fully aware that such an ideal scheme will be laughed at. Nevertheless, I put it forward with the idea of emphasising our real difficulties in a rural area—

- (1) Inability of the tuberculous patients and their dependents to obtain adequate nourishment.
- (2) Inadequacy and insufficiency of existing housing accommodation.

Unless these two difficulties are faced, the institution of sanatoria, dispensaries, &c., will be of little avail.

B.—Now for the *practicable scheme* which will accord with the terms of the Insurance Act and with the present state of public opinion. I think, in the first place, the best plan will be to make the county council in conjunction with the insurance committee responsible for the whole scheme, rather than that each district council should manage its own area independently without reference to the County Council. I am fearful lest the money might be frittered away in unsatisfactory ways.

In addition to the two fundamental things above mentioned which I think are at the root of the problem there is one more; and that is the great difficulty experienced in diagnosing tuberculosis in the earliest stages. This difficulty will remain a stumbling block for many years and no amount of legislation will alter it. And yet all administrative action turns round this point (*viz.*, early diagnosis). My suggestions will therefore be directed to getting round the difficulty, as far as possible, by enlisting the sympathies, rather than the opposition, of the general practitioners, with whom the main responsibility for early diagnosis must always rest. This point I regard as of fundamental importance.

For the first year I think it would be well to begin slowly and experimentally and gradually to extend the work in the most successful directions.

Estimated Yearly Charges.

(1) Advisory and Supervisory Department under control of County Medical Officer for administrative purposes:—		
Tuberculosis officer	500	£
Travelling	100	
Maintenance	100	
(2) Tuberculosis Dispensaries—6 (on the lines of the Branch Dispensary at Thame and Witney seen by Dr. Bardswell:—		
Rent, equipment and upkeep	500	
Honorarium for 28 G.P.'s. at 25 <i>l.</i>	700	
(3) Home Supervision of patients:—		
50 district nurses at 10 <i>l.</i>	500	
3 half-time health visitors at 40 <i>l.</i>	120	
Travelling	80	
(4) Shelters, 100 a year, at 12 <i>l.</i>		1,200
(5) County laboratory. Rent, upkeep, equipment, &c.		100
Assistant	150	
		250
(6) Small sanatorium for educational purposes, say, 20 beds:—		
(a) Building†	Nil	
(b) Maintenance and upkeep	1,000	
(c) Equipment and adaptation	500	
(d) Salaries—Resident M.O. (under tuberculosis officer), matron, and nurse	250	
		2,500
	Total	£5,850

In the first year I should not advise the expenditure of more funds than are indicated in the above table. But if there were any surplus funds they might, with advantage, be used for:—

- (a) Distribution of vouchers for food, milk, drugs, &c., from the dispensaries. Probably this item should have been included in above table.
- (b) Educational campaign: Lectures, &c., supplementing work of the Education Committee.
- (c) Residential open air school. But this is a very extravagant way of going to work in a rural area, and only a small number of children can be dealt with at a time.

I do not propose in this letter to give my detailed reasons for employing local practitioners (under supervision of tuberculosis officer) to do the work of the dispensaries. I must, however, mention three reasons: (1) The sympathies and not the opposition of local practitioners must be enlisted; (2) At the present time the majority of practitioners naturally have little experience of tuberculosis in its early stages and should therefore be encouraged to take an active interest in the scheme, for in any case the preliminary diagnosis, generally speaking, rests with them; (3) They alone would be able to attend rural dispensaries in the evenings which may often be the most convenient time for men and women who go to work.

The wholesale appointment of special health visitors is not advisable. This kind of thing resolves itself into much talk, many pious resolutions and little real progress.

As regards your enquiry as to what we are doing at present, the County Council have inaugurated an extensive educational campaign by issuing leaflets to

* Written as a private letter to a friend; published without official sanction of the Bucks County Council.

† One of the existing small-pox hospitals could be adapted for the purpose.

medical practitioners, nurses, sanitary inspectors, school teachers; and one of the County Council lecturers is doing good work among the parents of the working classes. The Science Master is preparing lantern slides for use at the evening schools.

Various district councils have provided a few shelters, and others are considering the desirability of

following their example. Shelters also have been provided by various voluntary agencies. In the western part of the county we make use of the Thame Dispensary, while our largest town, Wycombe, is thinking of establishing a dispensary.

A. H. HOGARTH.

April 1912.

MEMORANDUM* submitted by E. C. HORT, M.D., F.R.C.P., in charge of the Constance Trotter Researches, the Lister Institute.

In order to give the best possible effect to an endowed scheme for the eradication of tuberculosis, the word "research" must be interpreted in a liberal spirit. Too often research in medicine is looked upon as merely a question of laboratory experiment, whether on animals or from the chemico-physical standpoint. This narrow conception of its scope is reflected in the divorce of institutes of research from the study of the human aspects of disease and suffering, and is a grave obstacle to advance. Workers in research laboratories may often have but slight knowledge of disease in men and women, and the value of their work from the utilitarian standpoint is apt to be correspondingly restricted. The absence of the constant stimulus afforded by contact with disease in man is a serious defect in the laboratory system, and tends to the pursuit of the purely scientific, a luxury that medical research can ill afford. That purely scientific work may throw unexpected light on utilitarian problems is not sufficient justification for not keeping constantly in view the true object of all medical research.

A knowledge of artificially produced cancer in mice, or of experimental tuberculosis in guinea-pigs, is of little practical value unless quickened by intimate personal acquaintance with the problems of cancer and tuberculosis presented by the human subject.

In a comprehensive scheme therefore of tuberculosis research, undue prominence should not be given to purely "institutional" requirements unless the manifold factors in research outside the laboratory are fully represented. The services of the statesman and the sociologist, of the physician and surgeon, and of the experts in general hygiene and kindred subjects are of no less importance than are those of the pure experimentalist, whatever his line.

Research organisation, to be effective, must, in short, utilise all existing agencies, though its functions must not stop here. It must also project itself into the future.

The greatest difficulty, apart from the financial, is the discovery of the right kind of worker. Mere academic distinction, or even the ability to carry out highly technical routine, is of little value in medical research unless accompanied by the possession of the creative instinct. In order to supply the demand for this class of expert, provision must be made for the education, on broad lines, of research workers of the necessary calibre. For this purpose the co-operation of the universities, medical schools, and other educational centres must be obtained, where the necessary preliminary sifting of candidates can be carried out. Subsidising by foundation of research "schools," scholarships, and so forth, might be required. In all cases the danger of laying undue stress on the experimental aspects of research would be insisted on.

In the proposed scheme the various experts required might be divided into two groups, expert advisers and expert workers, all under the control of a central advisory body. The question of the appointment of a director of research would also have to be considered.

* Prepared by request.

(1) *The Central Advisory Body.*

The functions of the central body would be twofold. They must be considered, briefly, from—

- (a) The point of view of their relations to the expert advisers on whose counsel they would rely.
- (b) The point of view of their relations to the Government they would represent.

(a) Their relations to the expert advisers should be clearly defined. They would include consultation with, and receipt of technical information from, every member of the committee of expert advisers, both collectively and individually. This committee after consultation amongst themselves, for which purpose they would meet perhaps four or six times a year, would present the central body with a summarised report of work already in progress, and of any extension of work which they considered advisable, together with provisional estimates of cost. Armed with this individual and collective information the central body would then consider to what extent they could recommend to the Government adoption of the views expressed.

(b) Having determined this point after consultation amongst themselves, the central body would for each budget year present their estimate to the Government, together with such departmental details as they considered necessary, or as might be required.

There remain the questions of the executive status of the central body, and of its composition. These may be considered together.

If a central advisory body composed of lay and clerical elements be appointed, the numerous public interests concerned could not be adequately represented unless each member was possessed of considerable experience in administrative work of an unusually difficult kind. The appointment of several laymen, however eminent, with no knowledge of public health administration, would be as unsatisfactory as would the appointment of numerous medical experts in the various departments of research having the limited outlook of the modern specialist. The existence of a body containing only laymen and specialists of the types described would be no more satisfactory. If, however, existing machinery be utilised, an excellent nucleus for the central body could be made by selecting such members of the Local Government Board as have exhibited in the past outstanding administrative ability in any of the departments directly or indirectly connected with public health. To this nucleus could be added the necessary number of laymen, one or more general scientists of repute, and perhaps a medical and a pathological expert.

A central advisory body constituted in this way would be well qualified to receive and interpret the views of their expert advisers, and to present to the Government their own considered recommendations.

Government officials carrying out these highly important functions would require to be paid.

(2) *Expert Advisers.*

The committee of expert advisers, with a composite brain, would consist of two clinicians, a medical and a surgical, a general pathologist, a bacteriologist, and an expert in public health. A larger number of advisers would not be necessary. The committee need not

contain any laymen, for these would be fully represented on the central body. The individual function of each of its members would be dual—to be in constant touch with the expert workers in his own department at the central institute explained below. The collective function of the expert advisers would be also dual—to require periodical reports from the whole body of expert workers, whether represented on the committee or not, and to advise the central body. Since close co-operation with the expert workers would be essential to effective action, the expert workers would have a representative share in the election of expert advisers equal to that of the central body. Election would be open. If the whole time of the expert advisers be requisitioned, candidates engaged in practice would have to give up practice if elected. Heads of colleges, directors or members of staffs of sanatoria, research institutes or hospitals would not be eligible unless they gave up existing appointments. Academic distinction, unless supported by records of striking original work, not necessarily in tuberculosis, would not qualify for election. From 1,200*l.* to 1,500*l.* a year would be required for each member of the advisory committee if their whole time were devoted to their work.

In such case they would reasonably expect some security of tenure. This, for many reasons, it might not be desirable to give. If, on the other hand, their whole time was not demanded, security of tenure would not be necessary. In such case the expert advisers might perhaps be paid 500*l.* to 600*l.* a year, and would combine their advisory work with their ordinary occupation. It must be remembered, however, that research work is extremely exacting, and it is possible that the cause of tuberculosis research might suffer by the appointment of advisers dividing their interest in research with their own occupations. If a single director were appointed he would certainly be required to devote his entire time and energies.

In order to avoid these difficulties, it might be wise in a year or two to make whole-time directors of some of the members of the first committee of expert advisers after their suitability had been tested. In this case, of course, it would be made clear that the appointment of members of the first committee might be only temporary.

In this way a full committee could eventually be obtained of expert advisers giving all their time. Continuity of tenure by tried men only would be thus ensured. Till the probationary period had elapsed, and till full maturity of function were reached, a director of European reputation of exceptional ability might perhaps be invited to act for a year or two as a director of directors. A high retaining fee would certainly be required. International assistance of this kind may well be encouraged. Objections to inviting the co-operation of a foreigner would probably be made, but they should not be given undue weight, science knowing nothing of frontiers.

(3) *Expert Workers.*

The expert workers would represent every department of tuberculosis research. Clinicians, medical and surgical, general pathologists, bacteriologists, hæmatologists, chemists, physicists, sanatorium experts, authorities in veterinary tuberculosis, in hygiene and public health, would all be wanted. The number of workers in each department would, of course, depend upon the funds available, and on the number of laboratories selected for the work. The dominant principle in selecting workers would be evidence, not merely of performance of work on conventional lines, but mainly of original work. Workers who have only recently taken up research observations would not be eligible. Education in research methods of men who might or might not prove themselves capable of striking new lines should not be a charge on the funds, except in the student stage in the manner already suggested. The opportunities for distinction offered by nationalised tuberculosis research should not be looked upon as a stepping stone to lucrative appointments in the outside world. Salaries of from 500*l.* to 800*l.* a year would be required to attract the tried worker, whose entire time would be demanded. In addition to the expert workers named, two permanent officers would be required, an

expert statistician and a first-rate classic in the literature of the subject. The important duties of the statistician would embrace analysis and periodical report of all the experimental results obtained inside and outside the laboratory by the expert advisers and the expert workers. They would also entail statistical treatment of all published laboratory work in tuberculosis in all countries, past and contemporary. Finally, they would include the carrying out of statistical investigations into the incidence of the disease in various parts of the world, influence of heredity, race, meteorological factors, and so forth. If the services of a highly-trained expert in the statistical aspects of research could be obtained, of the type of man represented by the founder of the statistical school in England, a salary of from 1,000*l.* to 1,500*l.* a year, or more, would be a wise economy. His whole time would be required. The statistical office would not merely afford facilities for the recording of barren facts, nor for the issue of tables of figures that are never read. The functions of the registrar, however important, are not the direct requirement in this branch of tuberculosis research. The essential function of the central statistical bureau would be the working up of material collected from all sources into a living factor, for the guidance and control of all the workers in their own departments. Bare mathematical treatment would be of little value unless subordinated to this end. In addition to an expert statistician of the type described, the services of an expert authority on the literature of tuberculosis in all languages would be essential. He would be the reference to whom every worker on tuberculosis could turn for concise information on work already done in his own line. His duties would embrace also the recording of all current work in all branches of tuberculosis at home and abroad, as well as the sifting of proceedings of congresses and ordinary meetings of scientific and medical societies in all parts, in so far as they relate to the disease in question. Such an appointment well filled would be of the greatest possible value to all the workers in preventing overlapping and repetition of work already shown to be fruitless. The annual literature of the subject is already enormous, and is increasing so rapidly that the publication of *Centralblatt* records containing a *précis* of current work in each department of tuberculosis research in all countries would be necessary. In preparing these records the co-operation of workers at home and abroad would be invited, and their international value thus assured. The work would be arduous and would require a salary of at least 1,000*l.* a year. The capacity for filling such an office is of a very special kind, but there are two or three well-known men in the profession in this country admirably adapted for the work if their services could be obtained. No doubt the services of clerks, and, in the case of Oriental languages, of translators, would be necessary. The holder of the office might be allowed to conduct research in one or other department, to give a living interest to his literary work. Otherwise his whole time would be required.

Director of Research.

Since no one man, unless possessed of extraordinary ability, can do full justice to all the different expert functions represented, it is doubtful if the appointment of a medical or pathological director of research with full powers to select his own workers would be the wisest policy. Apart from the undesirable position of autocracy which the appointment of a medical or pathological director with less than Napoleonic powers would create, the vital principle of co-ordination of all the various departments, with due regard to the complementary nature of each, would be in peril. This principle cannot be safeguarded by choosing a director expert in laboratory research alone. His very fitness for the latter renders him unfit for subordinating work in his own province to the general scheme of attack of a highly complex problem. Conversely, the value in purely laboratory affairs of a director mainly expert in the sociological and clinical aspects of the disease, is seriously curtailed. If the ideal director could be found with practical experience of human tuberculosis in all its aspects, equal to his knowledge of experimental work in the laboratory, he would certainly be of immense value. The permanent services of a director

with these qualifications would, however, be difficult to retain and the man himself very difficult to find. Search would have to be made not only in this country, but on the Continent and in America. Such a man would have to be very highly paid, though it is more than doubtful if a director already in charge of a large institute, with a clinical department attached, would consent to come.

If, however, the creation of a directorship of research is considered necessary, it might be possible to avoid the difficulties referred to by appointing a lay director. Such appointment to be satisfactory would entail search for a man endowed with unusual powers of organisation. His main work would involve close contact with the body of expert advisers, and direction and control of their multiple activities. The mere fact of being a layman, selected on account of breadth of outlook, would in many ways qualify him for seeing the various factors in tuberculosis research in their true perspective. A man of this type can be found in this country if he could be induced to serve. He would require to be highly paid, and it might be desirable to give him a seat on the central body. He would not, however, be given the power of choosing his own workers, or his colleagues on the committee of expert advisers.

*One Central Research Institute combined with
Utilisation of existing Institutes.*

The erection of numerous special research laboratories in different parts of the country would be wasteful and otherwise undesirable. Apart from the large initial capital outlay required, the annual charge of upkeep and of support of the purely lay element in each institute would be great. Since laboratory experiment in tuberculosis is only one of many factors in research, the ideal would appear to be to have—sooner or later—one central research institute, probably in London, combined with utilisation of existing laboratories. In this way, every branch of research could be properly represented without overlapping of expenditure, and with due regard to economy in innumerable ways. A necessary annexe would be a country farm for the keeping and breeding of experimental animals, and for growing the necessary supply of animal food. These are expensive factors in the experimental departments of research if purchase of stock and of food be made in the open market. Figures of the amount that can be saved in this way are accessible.

In connection with the central institute would be eventually a hospital of from 100 to 200 beds, probably in the country near London. A special staff would be required for this under the control of the medical and surgical expert advisers. The necessity already emphasised for combining clinical investigation and work with laboratory experiment cannot be over-estimated. The essential check to all disease research is the human need, and in institutes where experiment is the dominating factor this is apt to be lost sight of.

The central advisory body would distribute work and workers to important provincial laboratories already in existence. These outlying laboratories would gladly give facilities to members of the body of expert

tuberculosis workers. No doubt grants to each laboratory affording hospitality in this way would have to be made. Certainly the cost of material and perhaps of rent and of other running expenses would have to be paid by the central body. The subsidising however of research institutes where facilities are given to expert workers, the funds allotted being entirely under the control of the director of the particular institute, is not to be recommended. The advantage to the expert worker of being in constant touch with the broad outlook of general research laboratories would more than counterbalance the slight disadvantage of not being in a laboratory specially and exclusively devoted to tuberculosis investigation.

The co-operation of staffs of general research institutes already in existence would be a great asset, and would go far to destroy the undesirable character of isolation, which multiple institutes built for tuberculosis research alone would inevitably create. Centralisation of bricks and mortar, and decentralisation of work and workers, though both subordinated to the central body, itself doing its own work, would be the ideal aimed at.

Necessity for Co-operation with the Colonies.

Tuberculosis is to a great extent a product of civilisation. The expansion of British Dominion has therefore in some degree devitalised the very countries in which the civic life has taken deepest root. In the better cities of the older world a higher stage of civilisation is now pointing out the lines of escape from the dangers of its less educated activities. Unless therefore an insular view is to be taken of the best method of dealing with a disease we have helped to spread, it should be recognised that our Colonies and Dependencies have a right to look to us for guidance. This help can most effectively be given by inviting them to take part in the proposed scheme of research. The extraordinary success of research in tropical disease is sufficient evidence of the value of the co-ordination of the clinical with the laboratory aspects of disease. In Canada, Australia, New Zealand, South Africa, and elsewhere, strenuous efforts are being made with regard to the tuberculosis problem, but concerted action is lacking. The advantage to those countries of an official bureau in London for statistical and literary reference would be great, apart from the value of authoritative guidance in other aspects of research. The advantage to them and to us of co-operation of all the several departments of inquiry cannot be over-estimated, provided that breadth of principle from education to execution be constantly insisted on.

Educational centres and research institutes already in existence would be utilised, supplemented if necessary and if funds allowed, by one central clinico-technical institute in each country. Co-operation in initial outlay, in working expenses and in grants would, of course, be required. The correlation of fresh knowledge obtained outside this country with that obtained at home could not fail to strengthen the hands of all concerned.

July 1912.

MEMORANDUM submitted by W. J. HOWARTH, M.D., D.P.H., Medical Officer of Health for
the County of Kent.

I beg to submit herewith a brief memorandum expressing my views on "the problem of tuberculosis" in its preventive, curative and other aspects." The particulars refer only to the problem as it affects the county of Kent, for it is obvious that local considerations have an important influence in deciding as to the measures which may be regarded as necessary.

The proposed Insurance Committee will increase the number of public authorities interested in the control of tuberculosis. The Committee will, to a certain extent, act as the trustees for a large number of

contributors, and in that capacity I assume that it will be their duty to ensure that the annual contributions of the persons whom they represent are expended in a manner which will enable the maximum benefits to be available.

Compulsory contribution carries with it the right of treatment, and facilities for efficient treatment are essential on economic grounds, since the fact alone of prolongation of life, particularly if associated with working capacity, will result in additional contributions to the central fund.

In addition to curative facilities, this central body is vitally concerned with diminished prevalence, for again, with fewer cases, there will be less expenditure.

Existing public bodies have similar responsibilities, though perhaps the curative aspect has not been recognised as such an outstanding essential as is the case with the Insurance Committee, but it cannot be denied that curative work should be regarded as one of the lines of attack in preventive work. That being so, the objects of the new authority and the authorities already in existence are practically the same.

The existing bodies are the urban and rural sanitary authorities, education authorities and county councils. Poor-law authorities are not included in this group as their functions are somewhat different. Among these various authorities the county council occupies a unique position, inasmuch as it is closely in contact with all except the poor-law, and it seems desirable therefore that in this work the county council should be afforded an opportunity of acting as a central organising body and thus correlating the efforts of these different bodies which have one common object in view, and which, without such correlation, may be working on different lines. Separate action of this kind should, as far as possible, be avoided if for no other reason than the probability of wasted effort and unnecessary expense.

Even in a combined effort it is of prime importance that due regard should be paid to the comparative value and cost of each proposal, since it may very easily happen that development in a particular direction may be so expensive that funds are not available for other and equally important measures, and unless sufficient care is taken to ensure that no one measure in a composite scheme is developed at the expense of the rest, the maximum benefits will not accrue.

The above represent the general principles which have been kept in mind in considering the following proposals.

The chief measures which are available for controlling the spread of pulmonary tuberculosis and assisting in the treatment of patients already suffering from this disease are the following:—

1. Institutional treatment, either in specially designed sanatoria or in beds allocated for the purpose in the various isolation hospitals.
2. The provision of shelters to enable home treatment to be undertaken.
3. Central institutions, or clinics, at which treatment can be carried out, and which would be equally available for co-ordinating local preventive measures.
4. Inspectorial work and home nursing assistance.

No reference is made to the notification of phthisis, as that is already compulsory, nor to accommodation provided in poor-law institutions.

1. Sanatorium treatment should be available for both insured and non-insured persons. Dealing with the former, a division is at once possible into "curable" and "incurable" cases, and in each of these home circumstances may, or may not, be suitable for the isolation and treatment of a patient so suffering.

Curable cases without home facilities should be treated in a proper sanatorium, and on discharge they should be kept under observation at home, either by the doctor who is responsible for their general treatment or by the doctor in charge of the clinic, in either case assisted by a nurse.

Curable cases with home facilities may also be treated at a sanatorium, but if no beds are available or if it seems unnecessary that the expensive course at a sanatorium should be undertaken, outdoor shelters should be provided, with subsequent supervision by a nurse and by either the medical man responsible for the patient's general treatment or at a clinic.

Incurable cases would be best treated away from home in separate institutions, and provision might be made at certain isolation hospitals. If arrangements

are made in these latter institutions, attention should be given to the possible requirement of the accommodation for treatment of cases of infectious disease, as this would necessitate the discharge of phthisis patients. This has recently happened in the Milton and Sittingbourne district, where phthisis patients have had to be discharged from hospital to admit of cases of scarlet fever being isolated. This difficulty would, of course, be met by definitely allocating beds for the treatment of cases of phthisis, although perhaps in some instances special buildings would have to be erected to enable this to be done, or hospitals would have to be worked in groups so that if the patients require to be discharged from one institution they could be transferred to another. Probably very few of these cases would return home; if they did they would require to be supervised by the nurse, and medical attendance undertaken chiefly by the recognised medical attendant. This same course would also require to be followed if incurable cases refused to be removed.

Non-insured Persons.—Whilst making provision for insured persons, the non-insured members of the community, *i.e.*, those who are not insured by virtue of having an income in excess of the limit which necessitates their being compulsorily insured, could be provided for as regards sanatorium treatment at very little additional cost, and all the facilities available for the insured should likewise be available for non-insured persons, so far as the accommodation will allow, on payment of the ascertained costs plus a small addition to cover annual variations. It might be that such persons could not afford the total charges, but in these cases I believe it would be within the power of the local district council to contribute a share of the cost if they were so disposed. Non-insured persons of the poorer classes would, in the majority of instances, come within the scope of poor-law administration.

Dependants.—It is essential also that adequate provision should be made for the treatment of wives and children of insured persons, and that they should be dealt with in the manner above outlined. In the case of children of school age, the education authorities might arrange for teaching facilities if it were considered desirable that the children should be taught during the later weeks of what would probably be a long period of exclusion from school.

A few administrative points require attention to ensure the above being successful, the chief being—

- (a) Pressure should be brought to bear on insured persons to comply with requirements; if sanatorium treatment is shown to be necessary and accommodation is available, every endeavour should be made to ensure that the treatment is accepted and that the objection of a patient should not be allowed to operate to his disadvantage.
- (b) These objections will chiefly arise on the grounds of domestic financial inconvenience. This can, of course, be met by the Insurance Committee exercising liberally their powers to contribute sick payment during the period of treatment.
- (c) The sanatorium provided should be large enough to allow of efficient administration, and the size should not be diminished with a view to erecting two or three smaller institutions in different parts of the county on the sole grounds of facility of access.
- (d) The size should not be in excess of immediate requirements. It would be better to commence with the smallest possible institution, and extend as occasion demands. The administration block should be on a sufficiently extensive scale to serve the future maximum requirements, or at any rate it should be so designed that extensions of the block could be carried out as the increased accommodation for patients seemed to necessitate. In the case of Kent, I have suggested an institution of a hundred beds, of which sixty

should be reserved for men and forty for women and children, and the beds are so allocated that eighty-five would be available for insured persons and fifteen for paying patients.

2. *Shelters*.—In many rural districts in this county the houses have sufficient rear space attached to them to justify an attempt being made to treat the patients at home, provided facilities are given for open-air treatment and adequate supervision is maintained. Open-air treatment would be possible if portable shelters were provided which could be loaned to suitable cases on the recommendation of the doctor in charge of the case. Supervision would be maintained by the doctor assisted by a nurse.

3. *Tuberculosis Clinics*.—It is unnecessary here to enlarge on the functions of a clinic, but I beg to direct attention to the fact that in the county of Kent there is no town which is sufficiently large to justify the establishment of a tuberculosis clinic with a separate medical officer and visiting staff. I therefore consider that sanitary districts should be grouped for this purpose, and that an attempt should be made to include in such an area a population of from 200,000 to 250,000 people; the clinics should be held on different days at convenient centres in the area. By arranging combined areas of this size satisfactory clinics can be established and the expense reduced to the lowest limits.

4. *Inspectorial work and home-nursing assistance*. In some of the larger towns health visitors, who are also trained nurses, have been appointed. It would seem to me to be a perfectly reasonable arrangement for the Insurance Committee to arrange that persons suffering from pulmonary tuberculosis under treatment at home should be visited by such health visitors in the capacity of nurse, and in those areas which are not in a position to make such arrangements, either on the grounds of expense or insufficient work, the Insurance Committee might provide nursing facilities and enter into arrangements with the district councils that the nurse should undertake the usual preventive duties which fall to the lot of a woman inspector, that is, so far as the prevention of pulmonary tuberculosis is concerned. It would further seem desirable that for this purpose districts might be grouped, and the original grouping of areas for the work of the tuberculosis clinic might also represent the boundaries for nursing work. In this way the nurses would be available for nursing, inspectorial work, and for help at the clinic.

In the above brief summary no reference is made to other preventive measures such as housing reform, control of the food supply, inspection of workshops and the like. These will be undertaken by the sanitary authority as part of their existing duty.

I submit the following details respecting organisation which would ensure the whole of the bodies concerned working in harmony:—

(1) *Sanatorium*.—It would be an advantage if the entire responsibility for erection and administration of the sanatorium were undertaken by the county council. The financial details of this proposal will be an important factor in arriving at a decision, and the points to which consideration will doubtless be given are (a) the amount of the grant-in-aid in respect of erection, and (b) the number of beds which will be subsidised by the Insurance Committee, the amount of subsidy and the period proposed to be covered in any agreement.

(2) *Shelters*.—Perhaps also the county council ought to be the body to arrange for the supply of shelters, and to such expenditure the Local Government Board might agree to a grant-in-aid. The loaning of these shelters would be subject to an arrangement with the Insurance Committee, and with the district councils in the case of non-insured persons.

(3 and 4). The provision of clinics, and arrangements for nurses to act in their nursing capacity and also as inspecting officers under the sanitary authority in the areas of the clinics, could be carried out by general arrangement between the Insurance Committee,

the various district councils concerned and the county council. There will be numerous difficulties to be overcome in bringing about arrangements, but it appears to me that the right direction would be to attempt the formation of joint committees, consisting of representatives of the different bodies, to control work in each separate combination of districts, and that the expenses should be met by agreement. The details of the working arrangements would be somewhat as follows. In the county of Kent there might be, say, five or six combinations, and the linking up of the work would be as under.

County Medical Officer.

He would generally supervise the work and receive weekly reports from the medical officer of each clinic.

He would forward to the Insurance Committee the names and addresses of all cases recommended for sanatorium treatment by the medical officers of the clinics.

He would also report to the Insurance Committee respecting other insured persons who have been notified as suffering from pulmonary tuberculosis, indicating the treatment adopted, and additional requirements, if any, which might be necessary.

The Medical Officer in Charge of the Clinic.

He would report weekly to the County Medical Officer.

He would attend at each centre in the combination as arranged.

He would, at regular intervals, visit each district medical officer of health.

*He would receive from the medical officers of health and the Insurance Committee the lists of persons requiring to be visited.

*He would arrange with one of the nurses attached to his centre to visit such patients.

He would receive the report of the nurse respecting home circumstances and whether the patient was in a fit condition to visit the dispensary, and if not would communicate with the local practitioner who was responsible for the medical treatment of such patient.

He would report a case as being suitable for treatment either at a sanatorium, at the clinic, in a hospital for incurables or at home.

He would report to the district medical officer of health any recommendations which he might have to make respecting non-insured persons suffering from pulmonary tuberculosis, particularly as regards treatment.

The Nurse.

*She would visit cases where instructed by the medical officer.

She would undertake nursing supervision of the home cases.

She would arrange for patients to attend at the clinic.

She would report, on a schedule, the home circumstances. This report would be in duplicate, and one copy would be sent to the district medical officer of health.

She would subsequently report at intervals respecting the progress of the case and on the precautionary measures which are being adopted. These reports would likewise be in duplicate.

The District Medical Officer of Health.

He would receive the reports of the nurse and medical officer of the clinic and take such action thereon as he might consider necessary.

* NOTE.—In districts where a whole-time nurse and health visitor is employed. She would visit at the instruction of the district medical officer of health, and make reports direct. She would help at the clinic held in that district, and would submit to the medical officer of the clinic the details respecting cases she had visited during the week. Other arrangements would be as above.

He would discuss the general circumstances in his district, at regular intervals, with both the medical officer of the clinic and the nurse working in his district.

He would present a report to his council at regular intervals respecting the known cases of pulmonary tuberculosis and the action which was being taken as regards curative and preventive measures.

I beg respectfully to submit the above memorandum for the consideration of the Committee, and to state that I shall be pleased to enlarge on any of the points raised if such should be necessary.

WILLIAM J. HOWARTH.

March 1912.

MEMORANDUM submitted by A. C. INMAN, M.D., The Laboratory, Brompton Hospital, S.W.

Research work in connection with tuberculosis has of late years proceeded along lines which should be followed and elaborated in any scheme which proposes to lay down plans for such work. It must be borne in mind that tuberculosis is an infective disease which manifests itself in very many different ways. The types of the disease usually met with at a general hospital differ considerably from those met with at special hospitals dealing with diseases of the chest, skin, bones, &c. Further, the opportunities and limitations for the study of the disease vary at these different institutions, and yet, for the research to be fruitful, it is necessary to study in detail every form of tuberculous infection.

Again, it must be realised that the concomitant study of other infective diseases, their early recognition, the immunisatory responses on the part of the infected body, and their treatment, have enabled the formulation of fundamental conceptions in our knowledge, not only of the disease under consideration but, by analogy, in the diagnosis and treatment of tuberculous and any other infective disease.

Grants of Money to existing Laboratories.—For these reasons I would suggest that it would be profitable to subsidise existing laboratories and departments of those hospitals offering facilities for the study of bacterial diseases. But inasmuch as I am convinced that a concentrated method of research such as is developed below, would lead to more rapid strides in our knowledge, I suggest that the amount of money devoted to the subsidies be limited.

Past experience has shown that experiments conducted on animals under favourable conditions have led to often momentous discoveries: indeed, such a method of research is indispensable in any modern scheme of investigation.

Farm for Experiments on Animals.—Therefore, I suggest, that experts in this branch of laboratory work be appointed to approach the question on a farm suitably equipped for the purpose. Such workers should have access, as occasion may arise, to material obtainable from hospitals, &c., receiving infected human subjects.

In this connection may be mentioned the expediency of placing in the hands of all workers in the subsidised laboratories the advantages of animal experimentation.

The two suggestions hitherto referred to only plead for State support of existing machinery, the laboratories of one or two of our large hospitals, and the farm of the Royal Commission for Tuberculosis. Now, I am convinced that more rapid advances in our knowledge are made possible by the provision of sufficient financial support to inaugurate a *definitely planned research on tuberculosis*. A consideration of the advances made in our knowledge of tuberculosis in past and recent years reveals the fact that the site of study of the disease has been, in a great measure, transferred from the bedside to the post-mortem room, and from the post-mortem room to the laboratory. The exigencies of time and skill made it possible for the physician to combine post-mortem examinations with clinical duties, though the more detailed examinations of the morbid anatomy of tuberculous disease have been carried out by laboratory workers in this branch of medical science.

The intricacies of modern laboratory technique have made it as difficult to become a skilled laboratory

worker as it is to become a skilled physician, and a combination of the two rôles leads either to inefficiency in both branches or to neglect of one of them.

I am convinced that more rapid strides could be made by relegating more power to the laboratory worker than has hitherto been done. As far as research is concerned, the laboratory worker is of paramount importance but, in the study of diseases of the human subject he has in the physician an essential complement. The ideal to be aimed at is the combination of scientific knowledge and technical ability with clinical experience and sound, unbiassed judgment.

Hospital for Research.—A practical solution of this desideratum may be suggested on the following lines:—

An existing hospital of about 200 beds should be made the head-quarters of research and be adapted for the purpose. The administration of the hospital to be conducted by a Resident Medical Officer.

Two advisory Physicians who are on the staff of a General Hospital and have had experience on the staff of a Hospital for Consumption be appointed to collaborate with a Director and Assistant Director of laboratory research. The beds of the hospital to be divided into units, each unit to consist of not less than 30 and not more than 50 beds. Each unit to be staffed by—

- (1) A House Physician.
- (2) A clinical research officer who shall serve two units.
- (3) A trained laboratory worker.
- (4) Nurses, &c.

A laboratory attendant with two assistants be provided for the Directors of Research and the laboratory workers.

In this way there would be a Director and Assistant Director of laboratory research working in conjunction with two advisory Physicians, two clinical research officers, and four trained laboratory workers.

Access to all forms of Tuberculous Disease.—It is desirable that the Directors of Research should have access to any clinical material required, even if not obtainable at such a hospital. Arrangements could be made enabling them to conduct, or cause to be conducted, investigations at such special institutions as, e.g., a Hospital for Sick Children, a Sanatorium for Consumption, a Skin Hospital, or a Cripples' Home.

Research Committee.—I would suggest, for the sake of co-ordination, that from time to time, meetings should take place between the Directors of Research, the two advisory Physicians, the Director of experimental research on the farm, and the Directors of the subsidised laboratories, with a view to free and critical discussion on the lines of research adopted by each department, and on the results obtained from the individual efforts.

Official Publication.—In addition provision should be made for the publication of the work of all concerned, and if thought advisable from time to time, of expressed opinions on controversial matters.

Library of Current Literature.—A consideration of the importance of closely following all important contributions to the study of tuberculosis suggests the advisability of instituting some plan for the collection

of original papers in all languages. The method of writing to the individual authors for reprints or copies of their work, as adopted in America, specially commends itself for this purpose. The collection and perusal of the literature could conveniently be placed in the hands of the clinical research officers.

Travelling.—Lastly, some provision should be made to enable those engaged in research work to visit, at opportune times, any institutions at home or abroad where any work of importance is being done.

A. C. INMAN.
June 1912.

MEMORANDUM submitted by J. HOWARD JONES, M.D., D.Sc.

At the invitation of your Committee, I beg to make a statement embodying some of my views in respect to the measures necessary for the further treatment of tuberculosis.

As medical officer of health of a town which has for many years taken active measures for the prevention and treatment of this disease, I have had good opportunities of studying the subject.

Any comprehensive scheme for the better treatment and ultimate eradication of tuberculosis should include the general adoption of those administrative measures which have been found of service in many towns, such as the appointment of health visitors, disinfection, examination of sputum, improvements in housing and domestic hygiene, the loan of shelters to patients, the "after-care" of consumptives by special committees, the eradication of tuberculosis among cattle, the use of convalescent homes, hospitals for advanced cases, improved hygiene in schools, open-air schools and playground classes, medical treatment of school children, schools for mothers, tuberculosis clinics, &c.

The matters which I desire to draw special attention are, however, the following:

- (1) The number of cases requiring treatment.
- (2) The use of tuberculin in treatment.
- (3) Tuberculosis clinics.
- (4) Local sanatoriums or "observation stations."
- (5) National sanatoriums.
- (6) Poor-law sanatoriums.
- (7) Research Work.

(1) *The Number of Cases requiring Treatment.*—Many writers in computing the number of fresh cases of phthisis requiring treatment annually in some form or other, have calculated that they would be equal to the number of deaths from the disease per annum.

A special advisory committee appointed by the Welsh National Memorial to formulate a basis of a scheme for Wales recently adopted similar data. Inasmuch as phthisis is an eminently curable disease, and also one of the most chronic when it has become established in the system, figures based upon such a rule must be utterly fallacious. At certain German sanatoria where tuberculin is used, over 80 per cent. are recorded as cured amongst those treated in the first stages.

The experience of towns which have adopted with success the voluntary notification of phthisis also proves the fallacy of the above data.

Brighton.—For the three years 1908-9-10 the average notifications numbered 250 per 100 deaths from phthisis. 69 per cent. of fatal cases had been notified before death. Granting that the remaining 31 per cent. of un-notified fatal cases would represent 114 new notifications, the total notifications with a complete system of notification would be 364 per 100 deaths from phthisis.

Newport.—Primary notifications = 200 per 100 deaths. 70 per cent. of the fatal cases were notified before death. Complete notification = 285 per 100 deaths.

Manchester.—Four years voluntary notification = 6,238 whilst the deaths numbered 4,182. 75 per cent. of fatal cases were notified before death. Complete notification = 200 cases per 100 deaths.

Liverpool.—Average of three years (1908-10) notifications = 268 per 100 deaths. 70 per cent. notified before death. Complete notification = 383 per 100 deaths.

Birmingham.—1911. New notifications 380 per 100 deaths. 74 per cent. notified before death. Complete system of notification = 513 per 100 deaths.

At Edinburgh with compulsory notification the new notifications January to October 1911 were equal to 280 per 100 deaths.

The earlier the cases are notified the greater will they exceed the number of deaths registered; on the other hand, if notification is generally delayed until cases are dying, the notifications and deaths will coincide in number.

With well organised machinery for the detection of cases and a general public enlightened as to the absolute importance of early notification and treatment, the number of cases which would have to be dealt with annually at the present rate of incidence would outnumber the deaths by probably four or even five to one.

It is also necessary to bear in mind that there is a marked tendency to relapse among those who have had the disease, and that, therefore, many cases would require repeated institutional treatment of some kind from time to time.

Tuberculin Treatment.—During the last 18 months treatment of phthisis by tuberculin by the intensive methods advocated by the late Professor Koch and his disciples, has received considerable attention in this country particularly by medical officers of health. This has been largely due, undoubtedly, to the strenuous advocacy of the treatment by Dr. Camac Wilkinson. Twelve months' personal experience of tuberculin on patients during and after a month's (or more) residence at our local municipal sanatorium and a study of the work carried out in Germany, Austria, Switzerland, and elsewhere has convinced me that the present position of the sanatorium as a factor in the treatment of phthisis will have to be largely revised.

Tuberculosis Dispensary or Clinic.—The role of the ordinary dispensary is well known to the members of the Committee. The successful diagnosis and treatment of tuberculosis by tuberculin has, however, materially increased the utility of these institutions, as a certain proportion of the cases eligible for admission to our sanatoriums can be successfully treated at these clinics. Further, it will be possible to reduce the period of residence of many patients at large sanatoriums by a continuation of their tuberculin treatment at tuberculosis clinics after discharge from hospital. Such clinics form important links in the chain of preventive and curative treatment of the disease. They should, therefore, be under the primary control of the authority in charge of the general scheme of control and treatment, i.e., the sanitary authority, especially as the health department will be the administrative "clearing house" for all cases of tuberculosis.

Although the experience of Portsmouth in connection with their tuberculosis dispensary shows the necessity for sanatorium treatment in a proportion of the cases presenting themselves for treatment at such institutions, it has also been demonstrated there as elsewhere that a large number of cases can be treated without residence at a sanatorium.

Local Sanatoriums or Observation Stations.—The blocks and shelters erected or adapted at fever hospitals, small-pox hospitals, &c. for the temporary training and treatment of cases of phthisis come under this category. Such institutions are exceedingly economical in respect to cost per patient, inasmuch as in the majority of cases the administrative machinery is already in existence with the exception of nurses and ward maids. The cost at Newport is probably under 25s. per head per week, including "capital" charges.

In my opinion their more extensive adoption in connection with municipal hospitals or by arrangement with other local hospitals is highly desirable, in addition to blocks for advanced cases attached to existing local institutions.

Personal (12 months) experience of tuberculin in the diagnosis and treatment of cases of phthisis admitted into our local sanatorium for a month's (or more) treatment and training has further impressed upon my mind the utility of such institutions as important factors in both curative and preventive work.

Summary of Experience at such an Institution.

1. Many cases admitted could probably have been successfully treated at a clinic.

2. The improvement by tuberculin in many cases, on the other hand, was much increased by temporary institutional treatment, owing to the close observation of the patient possible, improvement in personal hygiene, better feeding, relief of slight complications, and improvement in general health.

3. The majority of the cases could be dealt with by combined treatment for a short period at a local sanatorium and subsequently at a clinic, as they have continued the treatment by attending the hospital as out-patients twice a week after having been discharged from hospital.

4. Some cases of moderate mixed infection were rendered fit for treatment by tuberculin by a short stay at the observation station.

National Sanatoriums or Sanatoriums for large combined Areas.—These institutions, in my opinion, are necessary for the treatment of cases such as the following:—

1. Early cases.

(a) Children of parents indifferent to treatment and incapable of the efforts necessary in carrying out the instructions for clinic treatment.

(b) Children and adults who tend to follow the line of least resistance in treatment who would do better under sanatorium supervision.

(c) Cases from homes where the conditions interfere with successful treatment locally.

(d) Cases which might be especially benefited by "a change of air" or climate.

(e) Patients without homes such as sailors, navvies, certain lodgers, and others.

2. All cases requiring extended institutional treatment.

3. "Mixed infections" likely to benefit by sanatorium combined with special treatment.

4. Cases unable to obtain local institutional treatment.

The number of cases requiring extended sanatorium treatment will gradually decrease as (1) the public learn to realise the importance of early diagnosis and treatment, (2) the local arrangements for the detection of early tuberculosis and its successful treatment are gradually completed.

These points, therefore, should be carefully borne in mind when deciding upon the type of sanatoriums to be erected throughout the country.

Some form of further institutional treatment is also required for cases of tuberculosis of the abdomen, of glands, and of joints, where tuberculin can be satisfactorily tested as a therapeutic agent in the treatment of these conditions.

Poor Law Sanatoriums.—Newport Board of Guardians possess an excellent little sanatorium of 37 beds adjoining the Union Infirmary, which is doing excellent work by the isolation of many cases of infection, and treatment of early cases among children especially; but the time has arrived when the treatment of tuberculosis should be relieved of all traces of pauper stigma in the same way as it has been in the treatment of small-pox, typhus, scarlet fever, and other infectious diseases, as such stigma undoubtedly interferes with successful preventive treatment. The control of infectious diseases should be delegated to sanitary authorities.

Research work.—Among the subjects for research work I would suggest the following:—

(a) The further study of mixed infections in phthisis.

(b) Differential diagnosis between tuberculosis of bovine and human origin in human beings.

(c) The economical eradication of tuberculosis in cattle by arranging for experimental work in a number of large farms.

(d) An exhaustive enquiry into the excessive prevalence of phthisis in certain counties, such as Cardiganshire.

If further particulars are desired upon any of the matters referred to, I shall be pleased to furnish any in my possession.

J. HOWARD JONES.
March 1912.

MEMORANDUM submitted by R. JONES, Ch.M., F.R.C.S., Liverpool.

The brief notes I submit are based on an experience of tubercle as it affects bones and joints derived from special orthopaedic practice. This experience has been gained in private work, and in connection with a large town hospital (Liverpool Royal Southern) and three open air hospitals—

The Royal Liverpool Country Hospital for Children, Heswall.

The Baschurch Hospital, Baschurch.

St. Vincent's Cripples' Home, Eastcote, near Harrow.

Sources of Infection.

I believe a very important source of infection in the case of children is to be sought for in the milk supply, and consequently the Committee's work should be largely directed to place on a scientific basis the relative incidence of human and bovine tubercle.

The hardihood and longevity of the tubercle bacillus, its resistance to the products of putrefaction, renders it necessary to strictly guard the secretions of tubercular patients.

I have seen instances of the direct local infection of individuals through abrasions of the skin, and there are, of course, several such cases recorded, more

specially in connexion with the hands of pathologists examining tubercular lesions (anatomical tubercle).

Predisposition.

I am convinced that the physical state of a child largely predisposes him to tubercular attack. Tissue of lowered vitality, due to injury or disease, is more likely to attract the ravages of bacilli travelling in the blood stream than in the case of normal tissue. This predisposition may be inherited, but is most often acquired. Children are not born with tubercular disease, excepting in rare cases of infection derived directly from the placenta of the mother.

The diseases of childhood, such as whooping cough and measles, have a direct and obvious influence in predisposing to tubercle. Quite a large number of cases of tubercle in bones and joints to my personal knowledge have closely followed these diseases.

Other important factors in the acquisition of tubercle are ill-ventilated and crowded rooms, indoor schools, and more especially insufficient and inappropriate food producing irritative changes in the mucous tract.

One of the most common causes determining tubercular attack in the bones and joints of children is injury.

The Entrance of the Bacillus.

In surgical tuberculosis I believe the entrance to be effected chiefly by way of the alimentary canal, although, of course, the respiratory tract is largely accountable. The relative number can only be ascertained by careful research.

Mortality.

The percentage of general dissemination of tubercle from local lesions is, I believe, much greater than it need be under more appropriate conditions of treatment, to which I shall refer later.

Age.

In my experience, tubercle most frequently attacks children between three and eight. It is common in the joints of adolescents, and it is sometimes found in the very old.

Deformities.

The three great sources of crippling deformities in children are:—

- (1) Tubercle.
- (2) Rickets.
- (3) Infantile paralysis.

Fully two-thirds of these deformities are in connexion with tubercle. Such deformities need scarcely ever occur if proper facilities in the way of treatment be afforded.

Suggestions.

The great outstanding fact in connexion with the etiology of tubercle in the young is the part played by the milk supply. This positive source of infection should be adequately supervised.

In the first place, careful research should be made in different centres of the country as to the relative incidence of human and bovine infection on similar lines to those instituted by Stiles, in Edinburgh. This can best be done in well-equipped children's hospitals, but should also embrace as far as possible children of the upper classes. The milk of each district should be carefully examined by highly-educated bacteriologists, and the cattle should have the most complete and scientific supervision. The municipalities and county council should have, and unhesitatingly exercise, the right of destroying cows reported infected.

At the present time, a cow reported infected in a town may be bought by a farmer to infect children elsewhere.

Veterinary surgeons and bacteriologists should devote their whole time to this work, and should be men of sterling ability and enthusiasm.

The more such work is decentralised the better the results. A healthy rivalry is created, and the general public will more closely participate in the educative advantages.

Recognising the harmfulness of ill-ventilated and overcrowded rooms, means must be adopted to remedy the present state of affairs.

The public should be educated to sleep with their windows wide open, and open spaces should be provided as playgrounds for poor children. Rules in regard to spitting should be rigorously insisted on, and the dangers of spitting taught in schools. In all new houses, and in old ones when possible, baths should be made essential.

The school doctors should be instructed in the case of tubercular children to insist on proper home sanitary conditions.

Wherever the municipal authorities have power, open-air schools should be provided.

It should be remembered as a broad principle that the majority of children at one or other period of their lives have the tubercle bacillus in their intestinal tract, glands, or blood stream, and that any condition that lessens the resistance of the tissues should be guarded against. Hence the necessity of good sanitation, good food, fresh air.

The treatment of surgical tuberculosis as it affects joints resolves itself into mechanical and operative.

If tuberculosis is treated in our large city hospitals the patient generally goes from bad to worse. For many years I have refused to treat any child with tuberculosis of joints in a town hospital. Segregated in mixed wards, even under the most cleanly conditions, they do not get on as well as if allowed to lie in splints on the front door steps in the poorest neighbourhood.

Surgeons attached to large hospitals in the town are apt to operate upon the joints of children as the lesser of evils. The ultimate results of these major operations, such as excision, are often deplorable. The limbs are found in after years short and contracted, and cases which leave the hospital with limbs in good alignment return in after years very crippled.

The treatment which renders operation unnecessary is fixation of the joints for prolonged periods—the children living in the open air. The children who are out of doors day and night do better than the children who are out during the day only.

Such open-air wards as are adequate and very economical may be seen on Ruislip Hill, Eastcote, beyond Harrow. It consists at present of 100 children, whom we have just removed from temporary sheds at Clapham. At the present time I have over 370 children in Heswall, Baschurch, and Eastcote who have remained in the open air continually day and night during the winter. They never take cold, nor complain of cold during the most severe weather.

The Royal Liverpool Country Hospital for Children, Heswall, is a fine building on the Cheshire side of the estuary of the Dee. It will ultimately accommodate 350 children, although at present we have only 90 children housed. A new wing has been completed which will accommodate 75 more children, but there are no funds available. This hospital has already cost over 70,000*l.* The structure at Eastcote has cost only a small fraction of this.

I think several such hospitals as that at Eastcote should be built on hills if possible 10 or 20 miles from large cities. They should have every facility for the active treatment of disease, and possess an operation theatre for the operative correction of deformities in neglected cases. They should have skilled interns and special men who will supervise from the cities. These hospitals should be in touch with the bacteriologist who investigates cases in the district.

Children undergoing open-air treatment in the winter time wear woollen gloves and flannel under-clothing, with hot water bottles at their feet and sides. They require much more food than when indoors, because of the great increase in appetite. At the hospitals I have mentioned the children are encouraged to eat.

Hospitals should be in close touch with charities such as the Cripples' Aid Society, who bridge the gap between visits paid by cripples to the hospital. They should be associated with trained nurses, who by gaining admission to houses become sanitary agents.

It is too early to speak with any accuracy of tuberculin.

Conclusions.

I would suggest the conclusions to be drawn from this memorandum are:—

- (1) The organisation of careful research as to the incidence of human and bovine tuberculosis.
- (2) This research should be largely decentralised.
- (3) Milk, being an undoubted and important infective agent, should be supervised.
- (4) Power should be given to local authorities to destroy tuberculous cattle.
- (5) Overcrowding of children should be prevented, ventilation secured.
- (6) Education in the home as to the dangers of spitting and the value of open windows.
- (7) The institution of open-air schools and open spaces for the urban children.

- (8) The building of many cheap hospitals, such as that at Eastcote, in the neighbourhood of great cities.
- (9) These buildings to be equipped as hospitals, not as convalescent homes.
- (10) The child to be outside both night and day.
- (11) There should be no time limit placed upon the in-patients.

If these precautions were adopted we would, I venture to think, be within sight of the extinction of the tubercle as it affects children. Deformities would cease to exist, and operations of a radical kind be scarcely ever needed.

June 1912.

MEMORANDUM submitted by W. S. LAZARUS-BARLOW, M.D., F.R.C.P.

Introductory.

The outstanding point in connection with the subject upon which my opinion is asked is, to my mind, the fact that a sum of 50,000*l.* to 60,000*l.* per annum may be devoted to research. Inasmuch as the provision of such a sum was made at the same time as the subject of tuberculosis was especially under consideration, it is probable that research upon tuberculosis was contemplated.

It must be remembered, however, that, in spite of the large number of persons afflicted with tuberculosis, and in spite of the great diversity of the diseases which are fundamentally dependent upon or are associated with the tubercle bacillus, (1) the sum of money in question is not being provided for a terminable period, and (2) knowledge in reference to tuberculosis is sufficiently advanced for us to expect that discovery of fully satisfactory remedial and preventive measures for the tuberculous group of diseases will not be delayed for an inordinate number of years. Consequently, although it be granted that research upon tuberculosis should, at the present time, pre-eminently engage attention, the very diversity of the conditions under which tuberculosis is met with (*e.g.*, it occurs along with or as a terminal complaint in cases of cancer, insanity, pneumonia) from the outset clearly postulates research upon many other diseases from the tuberculosis point of view. And, further, by the time that research upon tuberculosis has culminated in success a number of other diseases will have been partially investigated and for the continuance of research upon these, funds will be available. It appears advisable, therefore, to consider the question of research from a general point of view, while not losing sight of the advisability that for the immediate future, research should be concentrated upon the subject of tuberculosis, rather than to focus attention upon tuberculosis to the exclusion of other diseases.

Upon the assumption that the nation is about to institute research upon disease generally, which research shall continue for an indefinite number of years, it is clear that either national laboratories may be instituted or that existing laboratories at present owned and maintained by public but not national bodies may be subsidised or that the two methods may be combined.

The advantage of providing national laboratories would be that the work done in them would be under the supervision of the body which instituted them (ultimately Parliament), but the disadvantages would be (1) the large initial capital expenditure that would be necessary and (2) the peculiar nature of research and the antecedent training of investigators, both of which are such that, in my opinion, investigation would suffer by the rules and routine that would probably be found necessary for the proper conduct of such national laboratories.

The advantages of subsidising existing laboratories of repute are (1) a greatly diminished initial capital outlay; (2) a more rapid initiation of the desired researches, since the laboratories under consideration are already in full working; (3) the possibility of expansion gradually if the method of subsidising proved satisfactory; (4) the large number of centres at which it would be possible for research to be carried on and the possibility of selecting special centres for the special investigation of special aspects of disease; and (5) the provision of an additional source of income for existing research institutions the quality of whose work is often excellent but the energies of which are cramped by the small and precarious nature

of their income for maintenance. The disadvantages of subsidising existing institutions are (1) the lack of supervision, or the exiguous nature of the supervision that can be exercised by the body making the money grant (to this point reference is again made on page 5); (2) the tendency it would induce towards "payments by results" (unless the fact that in research work great expenditure of time and trouble may be followed by no profitable result be adequately appreciated by the body making the money grants), a tendency which would certainly lead to the output of much ill-considered work; and (3) a drying-up in some measure of those sources of income now represented by voluntary contributions—the main source of income for research in the country at the present time.

Arising out of the question of subsidising existing laboratories is that of subsidising individuals to work at special subjects in selected laboratories, districts, &c. Such subsidies would be of the nature of "research scholarships." Into the whole question of "research scholarships" I do not propose to enter. Suffice it to say that heads of laboratories are not unanimous in holding that the best way to utilise a large capital sum is to split it up into a number of small sums each tenable for a limited number of years by the same "scholar," while, from the "scholar's" point of view, the absence of any prospect at the end of his tenure of his scholarship is a serious deterrent to many men and in any case militates against the production of his best work during his last year of holding the scholarship. While not denying that excellent work has been done in the past and is being done at the present time by persons holding scholarships, I think that it is fairer to the individual and to the laboratory in which he works, and is more conducive to the production of satisfactory research to institute posts (*e.g.*, assistantships to the director) with a fair security of tenure and with prospects of advancement both professional and financial than it is to institute scholarships. The only good object which an institution of scholarships would indubitably serve in the present connection would be the provision of a class of men from whom the more permanent officers might be chosen, but the number of these would be, relatively, so small to the number of present and past scholars as not to modify materially the contention put forward above as to the ill-effects of an "absence of prospect" upon the system of scholarships. To institute scholarships on a large scale would be to expend a large sum of money annually on the carrying out of a diversity of researches by a number of junior men and to dispense with their services just at the time when they are becoming most valuable.

I merely touch here upon the point that any laboratory, other than one wholly supported by national funds, would probably expect payment for the facilities which it placed at the disposal of such a scholar in respect of materials used by him or supervision and help given him by the director of the laboratory in which he was working. And, finally, the co-ordination of research carried out by a number of scholars working in a number of laboratories scattered over the United Kingdom would be beyond the powers of any set of men, however eminent, unless they were at the same time the directors of the laboratories in which the researches were being carried out.

A point upon which I would lay stress is the desirability, wherever possible, that the research work should be carried out in the closest proximity of a hospital or other similar institution. Naturally, some important investigations cannot be carried out under

these conditions; thus, an investigation upon the influence of insanitary dwellings upon the occurrence of certain types of tuberculosis, or of certain trades upon the incidence of tuberculosis, would necessarily be conducted in the localities concerned, but even in these instances a considerable part of the entire research would best be carried out in the close proximity of patients suffering from the particular type of disease in question, *i.e.*, in connection with a hospital or other institution for the sick. From my experience of pathological research carried out under the two contrasted conditions of (a) an academic institution such as a University laboratory and (b) a laboratory in connection with a hospital, I have no hesitation in saying that the close proximity of patients sensibly influences the character of the researches carried on in a practical as distinguished from a theoretical direction. Moreover, since the ultimate testing of any research directed towards the curative side must ultimately be tested on the patient, it is an advantage to have the wards and the laboratories and those persons who are responsible for the direction of each in very intimate touch with one another.

The conditions under which cancer research is carried out at the Middlesex Hospital is, in my opinion, as nearly ideal as possible. This specialised research is carried out in a separate building within the precincts of the hospital, a sufficiency of cancer patients in all stages of the disease and with all varieties of the disease are always within the special cancer wards of the hospital, a plentiful supply of other diseases for purposes of comparison is always available in the general wards of the hospital and its out-patient departments, and, finally, experts in many branches of science and medicine are always at hand to whom the director of cancer research can turn for help in a difficulty or to supply a lacuna in his knowledge. In addition, the fact that research is being carried out in a large centre of population and of intellectual activity such as is London, facilitates the recognition of work done elsewhere and makes for a breadth of view in research of which it is difficult to over-estimate the value.

I cannot but think that amplification and extension of the type of condition obtaining at the Middlesex Hospital in respect of cancer research would be found practicable and advantageous in respect of research to be carried on in a national manner with the aid of national funds.

Between the collection of individuals carrying out researches in various directions and the collection of individuals entrusted with the administration of such discoveries as are made by research and have been experimentally tested on a small scale and found to be reasonably satisfactory so that they may safely be applied to the population at large (for convenience these two collections of individuals may be termed the "research body" and the "administration body" respectively), a body must exist to exercise somewhat indefinite but highly important functions. It should be able to pronounce upon the quality of any particular piece of research work, to criticise the conclusions drawn by the author, to indicate extensions of research in particular directions, to indicate the best manner of applying any particular conclusion on a large scale and to receive the results of such application on a large scale.

This body, by the very nature of its functions, will have to be composed of experts in many different directions and will have to sub-divide its work. Some of the functions indicated above can only be carried out adequately by men actively engaged in medical research, some only by men actively engaged in public health administrative work, some only by men who are statistical experts, and so forth. Resolutions passed by this body should carry very great weight, and power of veto should only reside in the ultimate person (whoever he may be) to whom administration of the research side of the Insurance Act is confided. The composition of the body in question should be such that exercise of veto would, in practice, be reserved for matters of great magnitude (*e.g.*, such as might necessitate legislation, or the expenditure of money derived from the rates). In respect of actual research,

the individual researchers should look to the body in question as their final authority.

To carry out these functions I advise the appointment of definite commissioners for research.

The very fact that the essence of research is a travelling into the unknown is an indication that rules and regulations will be a hindrance rather than a help, and an indication that such rules and regulations as may be necessary should be framed by persons who, by actual experience, have learned to imagine, with a fair degree of probability, what kind of territory the "unknown" is likely to be, what sort of difficulties the "traveller" is likely to meet with, and what sort of equipment he will need to bring his journey to a satisfactory issue. Such qualities are not possessed by any existing body, but, in my opinion, there is no doubt that a body consisting very largely of men actually conducting research themselves and directing the researches of others would lead to the production of the greatest amount of "research-value" for the money expended. The admitted deficiencies of such persons as I have indicated in respect of financial matters could be remedied by inclusion of a certain number of business or financial men on the list of research commissioners. Probably, too, a mixed body of research commissioners fortified with such powers as would enable them to dispense the annual sum of money that will be allocated to research, would be the most satisfactory to those persons carrying out researches under them.

It is patent, however, that such a specially constituted body dealing, as it would deal, with public money, must in some way become subject to Parliament. No doubt, if there were a minister of public health, the connection would be made through him. In my opinion, it does not matter who is the official head of Parliament of the proposed commissioners for research so long as the commissioners themselves command the respect and loyal co-operation of all the individuals carrying out research under them and the respect and confidence of the public for the business-like way in which they administer the funds entrusted to their charge. Equally, in my opinion, one thing in the opposite direction is certain, namely, that research, to be fully profitable, cannot be directed from an office by men who are not actually themselves engaged daily in laboratory medical research.

The Suggested Scheme for Research.

In the preceding paragraphs I have shortly indicated the guiding principles that have actuated me in drawing up the scheme for research which follows. This scheme I have drawn out on broad lines only, since the detail could not be filled in without prolonged consideration and with the experience afforded by seeing the scheme in actual working. Such filling in of detail, extension, modification would be carried out by the research commissioners whose appointment I contemplate.

The Commissioners for Research.

The scheme would commence to be put in action by the nomination of the research commissioners. This body, I suggest should be nominated in the first instance by the Insurance Commissioners as being the body to which the setting in work of the Insurance Act has already been committed. After nomination the research commissioners to be completely independent of the Insurance Commissioners.

On its first nomination the commissioners for research to consist of 11 members as follows:—

- 3 directors of pathological research laboratories, one, at least, of whom should be an expert bacteriologist.
- 1 physician of eminence.
- 1 surgeon of eminence.
- 1 expert in state medicine.
- 1 expert in veterinary pathology.
- 1 statistician of eminence.
- 3 non-medical financial and business experts.

This body of research commissioners should be given powers to add, say, four additional members to its numbers, should be informed of the amount of money that will be available for research annually for the next three years, should be given the outline of the scheme which it has been decided to initiate (whether the present one or any other), and should be requested to set it or a portion of it in action with the least possible delay.

The Research Laboratories.

My scheme contemplates the building and equipping of four laboratories in close association with hospitals or other institutions for the sick situated in large centres. From the point of view of actual research, it does not matter greatly where these centres are situated, but I suggest London, Glasgow, Manchester, and Birmingham, which are not too widely separated since my scheme also contemplates close consultative relationships between the directors of the four laboratories.

Each of these laboratories should be staffed by a director, three assistants, three to six provisional workers or "scholars," and four laboratory attendants.

The director should be appointed and re-appointed quinquennially, and should be paid a commencing salary of 800*l.* per annum.

The assistants should be appointed and re-appointed annually and should be paid salaries varying between 300*l.* and 800*l.* per annum according to their experience, responsibility, and length of service.

The provisional workers or "scholars" should be paid according to their experience in research and the amount of time they devote daily to research, annually, sums varying between 100*l.* and 250*l.* The tenure of their office should be determined in each case on its merits, but not more frequently than once a year.

The laboratory attendants would be paid the usual rate of wages for such work.

I have made no provision for ordinary cleaning of the laboratories. It is a matter of detail which would probably be arranged with the institution for the sick with which, according to the scheme, each laboratory is closely associated.

In course of time it might be found advisable to increase the number of laboratories by establishing others in other centres. For the commencement it is my opinion that four is as many as could be, at the moment, properly staffed. I would here strongly urge that in research work almost the whole question is the men, and, above all, the director of the laboratory. To staff laboratories established under the Insurance Act with men of anything less than the highest capabilities for the respective posts they have to fill would not only fatally injure the particular laboratories, but would deal a severe blow to research generally through the Empire and would certainly damage our prestige for research throughout the world.

In addition to the above four laboratories a farm laboratory would no doubt be necessary. For this purpose the Tuberculosis Commission farm is admirably adapted.

The laboratories I have described should be used for research alone. Routine work connected with diagnosis, &c. should not be undertaken by the laboratory staff and should not, preferably, be carried on in these laboratories. Arrangements for that routine diagnosis work should be quite separate, and would probably be carried out by those entrusted with the actual treatment of the patients. Nevertheless, the carrying out of research in the special research laboratories under the director of research by those to whom the care of the patients is entrusted should be warmly encouraged and "part-time" scholarships might advantageously be conferred on some of the strictly medical officers.

At a later date the provision of a statistics laboratory would become necessary, but with regard to this I have no special knowledge which I can place at the disposal of the Committee. Probably it would be desirable for it to be situated in London, and possibly

desirable to locate it closely beside the research laboratory I have suggested should be established in London.

The work carried out in the four laboratories should be carefully co-ordinated and for that purpose it is necessary that very cordial relations shall exist between the persons most intimately concerned with that co-ordination, namely, the research commissioners, and the four directors of laboratories. To secure co-ordination I suggest that the four directors should meet four times a year for conference and for the drawing up of a short report to be made to the research commissioners on work done and on recommendations for future work both in their own laboratories and in other laboratories or by other persons subsidised for research. The meetings of the directors of research should take place at each centre in rotation. The director of the research laboratory in London should be present at the meetings of the research commissioners and he might well be appointed "scientific secretary" to that body.

Research carried out by existing Institutions under Subsidy.

Reference has already been made to some advantages and disadvantages of utilising money derived under the Insurance Act for research by subsidising existing institutions. The real difficulty in this question has, however, nothing whatever to do with research directly. It is, at bottom, purely a "finance government" difficulty which shows itself widely. I do not propose to discuss this question, much is to be said on both sides, but in any case the strength of the claim of a subsidiser to a share in the government of the body or person he subsidises will depend upon the amount of his subsidy. On the other hand, the institutions now under consideration have hitherto received from time to time large benefactions (in contradistinction to subsidies) and have been self-governing. If, in return for a subsidy, the authorities in charge of the research funds derived from the Insurance Act insist in a share of the government of an institution they subsidise, I anticipate that such subsidy will be declined by most or all of those institutions from which the best research work may be expected, or the share in government offered will be too small to meet the view of the subsidiser. I believe that the only way in which subsidising research in existing institutions can be carried out satisfactorily is to confine the subsidies to relatively modest sums, to make no claim whatever for a share in the government of the institution subsidised, to select the institutions for subsidy with the greatest care, to indicate the object for which the subsidy is given in terms not too precise, and to trust to the honour of the governing body of the institution. If the subsidy be made annually or, for the convenience of all parties, be made for a limited series of years, the subsidising party can always discontinue his subsidy if dissatisfied with the result and the recipient will always appreciate the fact that continuance of a subsidy depends upon a proper appreciation of the duties which receipt of the subsidy entails. Subject to this I can conceive of nothing but good arising from a limited expenditure of money on subsidising research in existing institutions. I do not see my way, however, towards urging this on a large scale excepting from the point of view of those institutions which would be benefited pecuniarily, and, on my assumption, would lose no portion of their autonomy.

Subsidising of Individuals for Research.

In reference to the subsidising of individuals for research, three different conditions must be considered in addition to those already dealt with on page 3. (1) A junior man may be subsidised for work in one of the four laboratories I have advocated; this man will obviously be under the control of the subsidiser through the director of the laboratory. (2) A junior man may be subsidised for work in a laboratory not subsidised; this man would only be controlled by the subsidiser in a technical sense, for no supervision of his work would be paid for, and therefore the supervisor would be the

worker himself—an unprofitable proceeding in the case of a junior man. (3) A man of skill in research, whose reputation for research is well established, may be subsidised; this man does not need supervision but only a laboratory, hence he could work in a non-subsidised laboratory or in one of the four advocated laboratories indifferently. An individual of any one of these three classes may be either a whole-time or a part-time worker, but the man of class 3 will almost certainly be a part-time worker.

In my opinion men of classes 1 and 3 may be subsidised with profit to the object aimed at under the Insurance Act, but whether subsidy of a man of class 2 will be profitable in the long run is doubtful, and certainly the risk is considerably greater than in the case of either of the other two classes. I should therefore only advocate the subsidising of individuals for research in the case of a skilled researcher or in the case of a junior man working under the director of one of the four laboratories I contemplate in the scheme. I would however, not object to a subsidised junior man working in a subsidised existing laboratory in the government of which the subsidising body has no share. In this instance the subsidising body would possess a notable degree of control by reason of its power to withdraw its subsidy, not only from the subsidised individual but also from the subsidised institution, and therefore the method would not be open to the same amount of objection.

Cost.

In the following section I have endeavoured to estimate roughly the cost of the scheme I propose.

Capital Expenditure.

Exclusive of site, each of the four laboratories, the setting up of which I advocate, should cost for building and equipment about 10,000*l.*, somewhat more or less according to the greater or less difficulty of utilising adapting, or supplementing drainage, heating, lighting, hot and cold water supplies existing in the institution, for the sick to which, in my scheme, the research laboratory is to be affiliated.

A further sum of, say, 10,000*l.* will be needed at a later date for the building and equipment of the proposed statistics laboratory, this sum is also exclusive of cost of site.

A sum of *l.* for the purchase of the Tuberculosis Commission's farm laboratory.

It must also be recognised that from time to time capital expenditure might be desirable for the provision of other research laboratories in other than the four centres or for the extension of one or more of the four already provided.

Allowing a sum of 2,000*l.* for cost of site in each instance, except that of the farm laboratory, the capital expenditure during, say, the first three years would be approximately 60,000*l.*, exclusive of cost of the farm laboratory, 30,000*l.* of which would be payable during the first year, 20,000*l.* during the second, 10,000*l.* during the third year.

Maintenance Expenditure.

The approximate annual expenditure on each laboratory would be as below:—

	£
Director's salary - - -	1,000
First assistant - - -	450
Second " - - -	400
Third " - - -	350
Three "scholars" at a total cost of	600
Four attendants' wages (two men, two boys)	240
Rates, taxes, cleaning, materials, chemicals, &c. - - -	460
Total - - -	3,500

Taking the annual expenditure on the statistics laboratory and the farm laboratory as the same as obtaining for the research laboratories (an assumption that is probably not very wide of the truth), the total annual maintenance expenditure under this heading will be approximately 21,000*l.*

At the present stage it is unnecessary to specify closely the already existing institutions to which subsidies should be made on the lines I have already indicated, but at a rough guess I should say that 20 institutions exist of such repute that they might be subsidised safely and with great profit to the research object in view. An annual subsidy of an average sum of 500*l.* to each of these 20 would amount in the aggregate to 10,000*l.*

I have already indicated that I consider the subsidising of individual workers as, in many respects, the least advantageous way of spending money for research. To a certain degree, I admit, it may be advisable, and in a few special instances it may be absolutely necessary. I should not be disposed to directly subsidise individuals, other than those "scholars" allowed for already in connection with the four research laboratories, the statistics laboratory, and the farm laboratory, more than to a total sum of 5,000*l.* per annum. For this sum about 20 individuals could be subsidised for different amounts according to their abilities, and according as they worked whole time or part time at research.

The last item of annual maintenance expenditure that needs to be considered is that of the retaining fee for the research commissioners. I am not entirely convinced that such a fee will be necessary, but if necessary I reckon that the eminence of the persons to be selected as research commissioners, the responsibility of their duties, and the fact that they would not as a rule find it necessary to meet more than eight times a year, would be met by offering each commissioner a retaining fee of 200*l.* per annum.

The total annual maintenance expenditure would therefore be approximately as follows:—

	£
Maintenance of six laboratories -	21,000
Subsidies to 20 existing institutions -	10,000
Subsidies to individual workers (say 20)	5,000
Fees to 15 research commissioners -	3,000
	<hr/>
	39,000

Conclusion.

From what has been said it would appear that for an initial expenditure of about 60,000*l.* spread over three years, and for an annual bill for maintenance of approximately 40,000*l.*, a body of medical research could be set up which would, without doubt, profoundly influence the national health for good. Further, the discoveries made by this body of researchers would be available to other nations, so that it is impossible to say where the benefits would end.

It must be recognised, however, that, if the scheme be good, it must grow. Hence, although the sum of 40,000*l.* per annum is approximately that which appears to me from my present standpoint a fair average, and indeed one which will not immediately be reached, I am convinced that in course of time the sum of 40,000*l.* per annum for maintenance charges for research will need to be supplemented. As the result of 20 years' experience in research, I know that research stimulates research, and that this result is the best indication of the vitality of the research. Finally, although I am aware that a limit must be set to the expenditure on any object, however laudable, I know that parsimony in respect of research is a bad policy.

W. S. LAZARUS-BARLOW.

June 1912.

EXTRACTS from a Pamphlet sent to the Chairman by ERNST J. LEDERLE, Ph.D.,
Commissioner of Health, City of New York.

THE SANITARY CONTROL OF LOCAL MILK SUPPLIES
THROUGH LOCAL OFFICIAL AGENCIES.

In discussing this subject there are several reasons for speaking largely from the point of view of milk inspection in New York City. In the first place my own experience in this field has been gained almost entirely through a connection of 20 years, in one capacity or another, with the Local Department of Health. But of greater importance is the fact that the experience of New York City in the control of its milk supply, both historically and in the light of important recent developments, is, I believe, full of significance to other municipalities, and particularly to large cities facing similar problems.

It will perhaps be generally recognised by those interested in the administrative control of the production and sale of milk that New York City offers a most conspicuous example of a municipality undertaking practically the entire supervision of its own milk supply all the way from the cow to the consumer. Most large cities doubtless exercise more or less jurisdiction over the sale of milk within their limits, but no other city that I know of has developed such an extensive system of inspection of dairies and creameries as is practised by the City of New York, notwithstanding that nearly all the 45,000 farms on which our milk supply is produced are located outside the city limits and more than 6,000 of them outside the State of New York.

The Board of Health has power to adopt a Sanitary Code without the concurring vote of any other municipal authority, and this Code has the full force and effect of law in New York City so long as its provisions are consistent with general State laws. The existing system of public control of New York's milk supply is based upon the sanitary legislation of the Board of Health, in the form of appropriate sections of the Sanitary Code and supplementary rules and regulations.

Let us now consider briefly some of the facts that have made the sanitary control of milk supplies one of the most important public health problems of our communities.

Infant Problem.

Milk suitable for infant feeding must comply with the following requirements:—

It must have the proper nutritive value; that is, it must not be impoverished by the removal of a portion or all of its fat, or the nutritive value lowered by the addition of water. It must be clean. In general it is agreed that the bacterial content of milk is an accurate scientific index of its cleanliness, but it is comparatively recently that the danger of bacterial contamination of milk has been appreciated. It has been found that infants under one year are very susceptible to poisoning by milk infected with excessive bacterial growth, particularly during the hot season, when the resistance of the digestive tract is lowered.

Milk infected with the germ of bovine tuberculosis may transmit tuberculosis to children, but is not apt to infect adults, while milk carrying the germs of typhoid fever, scarlet fever, diphtheria and tonsillitis, is dangerous to persons of all ages.

Infectious Diseases and Milk.

Tuberculosis, typhoid fever, scarlet fever, diphtheria and tonsillitis are the principal diseases which in this country are transmitted by means of infected milk. It is believed that the tubercle bacilli are in the majority of cases derived from the cow, but they may come from human sources. Typhoid bacilli in milk are always derived from man. The contagion of true scarlet fever transmitted through milk is considered as always coming from man, but there is a disease closely allied to it, the contagion of which is derived from the cow. Diphtheria bacilli are regarded as being always of human origin.

The streptococci exciting tonsillitis are believed to be derived both from cases of septic inflammation of the udder and from human sources. According to Park, about 3 per cent. of all tuberculosis existing in New York City exhibits the bovine type of bacilli, and is therefore probably caused by milk infection. Of 279 cases of tuberculosis in adults examined by him, only one case was due to the bovine type. On the other hand, 22 out of 84 very young children and infants examined were infected with the bovine type, or about 24 per cent.

Typhoid Fever and Milk.

During the last two years much light has been thrown upon the definite origin of outbreaks of typhoid fever due to milk infection, through special investigations carried on by the New York City Department of Health. Several such outbreaks were traced definitely to so-called "carriers," persons who have recovered from an attack of typhoid fever, but who remain infected and continue to excrete typhoid bacilli. One outbreak of 400 cases was traced to infection of a milk supply by a typhoid carrier who had had the disease 47 years ago. In another, 50 cases were traced to a man who had had the disease seven years ago. These important new discoveries led the Department to strongly urge the necessity of the pasteurisation of all milk except that produced under special stringent conditions.

Public Protection of Milk Supplies.

In view of these sources of danger to the public health, what means can be employed to make public milk supplies safe?

The problem involves three distinct features:—

(1) The prevention of adulteration, either by the addition of water, the removal of fats, or both, and the exclusion of all preservatives and, in fact, all foreign substances.

(2) The production of a clean milk, a milk low in bacteria, involving great care from the time of milking to actual consumption. This involves effort to insure the cleanliness of the cows and the milkers, properly constructed, clean barns, proper and thoroughly cleansed vessels and utensils which the milk comes in contact with, exclusion of dust at every stage, immediate reduction of temperature after milking, thorough icing during transportation, the sale under sanitary conditions in stores, and finally, proper care in the hands of the consumer.

(3) The production of a milk free from pathogenic organisms, requiring first of all healthy animals, and subsequently, the careful handling of the milk at all stages to prevent the introduction of the germs of infectious disease through human agencies, flies and dust.

Methods of Public Control.

The general outlines of the methods adopted by boards of health and other governmental authorities in controlling the sanitary quality of milk supplies of cities are fairly well defined and generally accepted. It is recognised that a system of inspections of dairies where the milk is actually produced, supplemented by inspections of creameries and of the methods of shipment and handling all the way from the farmer to the consumer, are necessary elements of this public control. Such inspection must provide for the detection of contagious diseases among those handling the milk, as well as for the improvement of sanitary conditions.

Whether these details are carried out under the supervision of municipal or State authorities is a matter of expediency largely governed by local conditions. Theoretically, it would be better that State authorities should exercise a uniform control over the production and sale of milk in all communities. In

practice, some of our large cities have found it necessary, in the absence of thorough-going State control, to develop their own system of milk inspection in the country as well as in the city.

The control of conditions under which milk is handled and sold within the city is a still more usual function of the local authorities and includes the regular inspection of stores and wagons, with frequent chemical and bacteriological tests and the usual method of enforcing sanitary requirements by resort to the courts if necessary.

The New York Plan.

More particular reference to the present system of milk inspection by the Department of Health of New York City and of the methods now in use will perhaps illustrate certain phases of our general subject. The department has had prepared a special bulletin dealing much more fully with the details of our work than I shall be able to do within the present limits.

The magnitude of the problem which New York faces may be imagined, when it is considered that the city draws its daily milk supply of 2,500,000 quarts from 44,000 farms located in six different States, namely, New York, New Jersey, Pennsylvania, Connecticut, Vermont and Massachusetts. Some cream is also received from Ohio and Canada. The "milk shed" covers an area of 50,000 square miles. The milk is produced from approximately 350,000 cows, and shipped from 1,100 creameries over 11 different railroads, the shortest haul being 50 miles and the longest 425 miles. When it reaches the city it is received at 15 different terminals and eventually delivered in 5,500 wagons and dispensed at 14,000 stores. It is estimated that about 127,000 persons are engaged daily in handling the city's milk supply, and on the basis of the relative frequency of typhoid bacillus carriers in the population of New York City there may be perhaps a hundred such persons included in this army of milk handlers.

Milk inspection began in New York in the late 70's and early 80's, and this inspection work was conducted in co-operation with the State officials of New York and New Jersey. Then, however, the elementary forms of adulteration, consisting in the removal of cream and the addition of water, were the only points considered. Later, it developed that a knowledge of the bacteriological content of milk was of much greater importance so far as the public health was concerned than was its chemical composition. When it was found that the bacterial content of milk was an accurate index of the cleanliness of the methods used in its production, attention was more and more directed to the supervision of conditions at the farm, at the shipping stations and on the railroads. This work was continued in 1906, and it was then realized that successful control would never result until the milk was traced back to its very sources. This was the beginning of actual dairy inspection by the New York Department of Health. From two inspectors in 1904, the number has gradually risen until there are now 56 milk inspectors, of whom approximately one-half are assigned to the country district and one-half to the inspection of stores, wagons and other premises within the city.

Legal Aspects of the New York Plan.

It was under the administration of my predecessor, Dr. Darlington, that inspection of milk in the country districts was first established. Perhaps one of the most interesting phases of this work is the legal basis through which the authority of the department is exercised throughout an area covering portions of six different states. The Sanitary Code requires that no milk shall be sold in the City of New York without a permit from the Board of Health, and the Board maintains that it is entitled to ascertain the conditions under which milk is produced before issuing a permit to the dealer who buys that particular milk and brings it to the city. Under the operation of this system, it is rare that permission to inspect a dairy or creamery is refused. When such refusal is met with the depart-

ment notifies the dealer, who then faces the alternative of refusing to receive milk from the particular farm or creamery under criticism, or of having his permit to sell milk in the city revoked. The result, of course, is very salutary in excluding from New York City all milk from farms which do not meet the requirements. The question may be raised as to what protection other communities receive under this plan, since the producers whose milk is excluded from New York City doubtless find a market elsewhere. This exhibits the great defect of local control of milk supplies. It is undoubtedly far better that the State should undertake the control of milk production under adequate and uniform standards rigidly enforced throughout the State by a sufficient number of inspectors. New York State has an excellent Department of Agriculture and adequate laws governing the production of milk, but the appropriations made by the State for this work are totally inadequate to ensure the character of the supervision of dairy farms which the City of New York believes to be necessary to the purity and wholesomeness of its milk supply. Even if State supervision in New York were sufficient, a similar question remains in the case of the six other States from which the city's milk is drawn. With these varying jurisdictions, the city has been obliged to face actual conditions instead of legal or constitutional theories and evolve its own system of supervising the milk at every stage from the dairy to the breakfast table.

As may be well imagined, the attempt of New York City to exercise authority over the milk production of other States was not allowed to go unchallenged, and the whole question was carried through the courts in appeal after appeal until finally the Supreme Court of the United States in an unanimous opinion affirmed that the position of the City of New York was reasonable, valid and not unconstitutional. Those who care to read the text of this decision in full will find it reported in (199 U.S., 552), (81 App. Div., 128), (175 N.Y., 440). In its decision the Supreme Court stated that any State has a right by reason of regulations to protect the public health and safety and that the Supreme Court "will not interfere because the States have seen fit to give administrative discretion to local boards to grant or withhold licenses or permits to carry on trades or occupations, or perform acts which are properly the subject of regulation in the exercise of the reserved power of the State to protect the health and safety of its people." Here then we have the support of the highest court in the land behind our effort to procure proper sanitary control of our local milk supply, and here perhaps this paper might very properly end were it not that I feel compelled to take advantage of this favourable occasion to refer very briefly to the developments of this problem during the past two years in New York, the more so as the problem we have attempted to solve will be encountered in a greater or less degree in the attempt to protect the milk supply of any city.

Deficiencies in Local Milk Inspection and Recent Improvements.

For several years we have felt that our methods of controlling the milk supply were inadequate and did not accomplish the desired results, particularly in the following respects:

It is now a well-known fact that the general milk supply of every large city in the world is unfit for use in infant feeding. Two well-defined methods have been applied in New York to affect a change in this respect; first, the production of a special grade of milk, "certified" and allied grades, for infants, and, secondly, the general movement to improve the whole supply so that milk suitable for infants might be procured everywhere where milk is sold. Each of these methods has been successful to only a very limited extent. After ten years less than 1 per cent. of the city's milk is of the certified type or equivalent thereto, and the expense of this class of milk is almost prohibitive for general use in infant feeding. In fact, it is a luxury within reach of comparatively few. What is needed is a safe milk which can be furnished at a price within the means of the masses.

The attempt to bring the general market milk to the degree of purity required for infant feeding can never be successful in a large city. In the first place it is economically not feasible since too great a part of the total supply of milk is used for other purposes, for adults who do not require a milk of such special requirements and for cooking purposes where a still less degree of bacteriological cleanliness is necessary. It naturally follows that milk for the last two mentioned purposes can be produced and sold at lower prices than the special infants' milk. In the second place, although the system of surveillance has materially lessened the danger of infection of milk from the presence of cases of infectious diseases among the employees on the farms and in the creameries or from unhealthy animals, our present knowledge of the propagation of typhoid fever by milk infected by "typhoid carriers," and the fact that tuberculosis is so widespread among our dairy herds, have forced us to the conclusion that no matter how complete or well organized the system of dairy inspection, it will not be possible to render entirely safe the ordinary commercial milk which is produced and shipped to a city from so large a territory as is comprised in the New York City milk field.

In our opinion the only way in which the sanitary authorities can meet these conditions is by requiring the pasteurization at least of all milk that is not of special exempted grades. We have always been impressed with the necessity of dealing with milk to be used for infants as a separate problem. Since the requirements are so much more exacting for infants' milk, and since it has been well established that this grade of milk is much more expensive to produce and should command a higher price than can ordinarily be demanded for milk in general use, it was deemed wise to separate the two problems.

As early as October 1907, in an address given at Milwaukee, I took the position that the sanitary authorities should establish a system of grading our milk supplies, and that practically universal pasteurization must be insisted on in the interest of public health. Since January 1910, the development of such a milk programme has been one of the foremost subjects under consideration by the Department of Health. Early in January 1912, on my recommendation the Board of Health of the City of New York officially adopted the following plan of grading and labelling of all milk brought into the city and sold there:—

Grade A, for Infants and Children.

1. *Certified Milk*, milk certified by a Milk Commission appointed by the Medical Society of the County of New York or of the County of Kings as being produced under the supervision and in conformity with the requirements of that Commission.

2. *Guaranteed Milk*, produced under the same standards as Certified Milk, but under the supervision of the Board of Health.

3. *Inspected Milk, Raw*.—This milk must come from tuberculin tested cows. Farms must obtain in an official score at least 75 points with a minimum of 25 points for equipment and 50 points for method. The milk must not contain more than an average of 60,000 bacteria per c.c. when delivered to the consumer.

4. *Selected Milk Pasteurized*.—Farms must obtain at least 60 points in official score; 20 at least for equipment and at least 40 for method. The milk must be pasteurized as prescribed by the rules and regulations of the Department, which, of course, provide for such temperatures and times of exposure to heat as have been shown by our own researches to be necessary to render the milk thoroughly safe. This milk must not contain over 50,000 bacteria per c.c. when delivered to the consumer, and must be delivered in bottles, except on special permit in certain cases. Containers must be labelled "pasteurized," and the label must bear date and hour when pasteurization was completed, the place where it was performed and the name of persons or corporation performing it. The milk must be delivered to the consumer within

30 hours after pasteurization. Milk to be pasteurized must not contain over 200,000 bacteria per c.c.

Grade B, for Adults.

1. *Selected Milk, Raw*, from cows which are certified as healthy by veterinarians after physical examination. Farms must score at least 68 points, 25 for equipment and a minimum of 43 for method.

2. *Pasteurized Milk*.—This milk must be delivered within 36 hours after pasteurization.

Grade C.

This grade is to be used for Cooking and Manufacturing purposes only, and includes all raw milk not conforming to the requirements of Grades A and B.

The full details of the new rules and regulations will be found on p. , *infra*. The Department is now actively enforcing the new requirements, and in our opinion the adoption and enforcement of the plan marks the greatest advance ever made in the public sanitary control of New York City's milk supply. I will indicate briefly what it is expected that this plan of grading and labelling will accomplish.

For the Farmer.

It means in effect that farms will be scored, and a farmer will know what grade of milk he is producing and how he can produce a better grade if he so desire. The better grades of milk will command a higher price at the farm, therefore for the first time in the history of milk production an incentive will be given the farmer to produce a cleaner milk. This principle, of course, was established on a very small scale in the production of certified milk, but never before in the production of milk for the masses. There is an apparent contradiction of this principle in the case of pasteurized milk, in which case under the present condition, a supply of milk, of the cooking grade (C) may be brought into the higher grade (B) by pasteurization, without any material improvement of farm conditions. The advantage to the general public health of pasteurization is, however, so great that it was thought wise to encourage pasteurization to the fullest extent possible, without at this time making too many restrictions, but when finally worked out the general requirements for all milk, with the exception of that for cooking, will have to be further advanced so that there will be no setback in the movement for a cleaner milk supply, the fear of which condition has led so many persons to oppose the introduction of pasteurization.

For the Dealer.

The grading and proper labelling regulations will be a great incentive to the progressive and honest dealer who is willing and anxious to sell his products on a proper basis, and who by this plan will be aided in his efforts by official control. It will no longer be possible for the dishonest dealer to market the lowest grade of milk under false representations or to sell cooking milk for infants. Those dealing only in the lowest grade, cooking milk, will have to sell the same as such or go out of business.

For the Public.

The users of milk will be enabled to purchase the quality of milk they require and for which they can afford to pay. This is particularly important in the case of milk for infants and children. For those who cannot afford to purchase the special grades offered for this purpose, specific instructions will be given under what conditions Grade B may be used, and in case of the poorer classes provisions have been made by the municipal authorities, through the Infants' Milk Stations of the Department of Health (at present 55 in number, located in various parts of the city) to supply milk for infants' use at a moderate cost, and

without charge in certain special cases through the charitable agencies operating in conjunction with the Department.

The plan carries with it the establishment of the broad principle that the milk sold from cans ("dipped" or "loose" milk) in the grocery store is unfit for use for infants.

The special requirements made for the production of raw milk (Grade B) its limitations to use for adults and the recommendation that pasteurized milk of the same grade is a safer milk, will encourage the extension of pasteurization as it was intended to do.

We feel that the time has come when just as radical changes as have been inaugurated in the requirements for the grading and labelling of milk will have to be applied to the regulations for the sale of milk in stores. The situation is peculiar. Milk is sold in about 20,000 places. Every little corner grocer sells milk, not because there is any direct profit derived therefrom, but as a convenience to the customer who desires to purchase other commodities. There is, therefore, no incentive to the proper care of the milk. It must be understood that almost all of such milk is dipped from cans. No permanent reform can be inaugurated until the sale of this class of milk is limited to milk stores where other commodities are not permitted.

Infants' Milk Stations.

I have already referred to the 55 municipal stations for dispensing milk for babies which are now in operation under the administration of the Department of Health. This work was inaugurated in 1911, when an appropriation was made for 15 experimental stations. A large number of depôts were also conducted by private organisations, and the work was so successful that this year the city made provision for the much larger number. I believe, however, that this work is only in the developmental phase, and that the ultimate solution of the infants' milk problem must and will be found in the production of the special grades of milk suitable for infant feeding, and the placing of this milk on the general market so that it will be possible for mothers to obtain easily milk of the proper quality at reasonable prices in milk stores or from dealers. In that event the municipal and other milk stations for infants will doubtless gradually assume what I take to be their proper function of serving as centres for the education of mothers in the care and feeding of babies and in the care of milk in the home.

SECTIONS OF THE SANITARY CODE AS AMENDED BY THE BOARD OF HEALTH JANUARY 4, 1912, TO MAKE EFFECTIVE THE NEW CLASSIFICATION OF MILK SOLD IN NEW YORK.

Section 56.—All milk held, kept, offered for sale or sold and delivered in the City of New York shall be so held, kept, offered for sale or sold and delivered under either or any of the following grades or designations, and under no other, and in accordance with such rules and regulations as may be adopted by the Board of Health, namely:—

Grade A—For Infants and Children:

1. Certified or guaranteed milk.
2. Inspected milk (raw).
3. Selected milk (pasteurized).

Grade B—For Adults:

1. Selected milk (raw).
2. Pasteurized milk.

Grade C—For Cooking and Manufacturing Purposes only:

Raw milk not conforming to the requirements for Grade A and B.

Condensed skimmed milk.

Condensed or concentrated milk.

The provisions of this section shall not apply to buttermilk or to milk products commonly known as Kumyss, Matzoon, Zoolak, dried milk or milk powder,

or to other similar preparations, or to cream or modified milk.

Section 56a.—No milk shall be held, kept, offered for sale or sold and delivered in the City of New York under either or any of the designations known as Grade A, B, or C, or any of the subdivisions thereof, or any of the designations: condensed skimmed milk, condensed or concentrated milk, or modified milk, without special permit in writing therefor from the Board of Health, subject to the conditions thereof.

The special permit shall specify the grade of subdivision thereof, or the special designation of milk, which the holder of such permit is authorised to keep for sale, or offer for sale, as aforesaid.

None of the provisions thereof, however, shall apply to condensed milk when contained in hermetically sealed cans.

RULES AND REGULATIONS OF THE DEPARTMENT OF HEALTH RELATING TO THE SALE OF MILK AS AMENDED BY THE BOARD OF HEALTH JANUARY 4, 1912, TO CONFORM TO THE NEW CLASSIFICATION OF MILK.

Grade A—For Infants and Children.

Guaranteed Milk.

Definition—

Guaranteed milk is milk produced at farms holding permits therefore from the Board of Health, and produced and handled in accordance with the following minimum requirements, rules and regulations:—

Requirements, Rules and Regulations—

1. Only such cows shall be admitted to the herd as have not re-acted to a diagnostic injection of tuberculin.
2. All cows shall be annually tested with tuberculin, and all re-acting animals shall be excluded from the herd.
3. No milk from re-acting animals shall be shipped to the City of New York for any purpose whatever.
4. The milk shall not contain more than 30,000 bacteria per c.c. when delivered to the consumer, or at any time prior to such delivery.
5. The milk shall be delivered to the consumer only in sealed bottles, which have been sealed at the dairy.
6. The milk shall be delivered to the consumer within 30 hours of the time at which it was drawn.

Certified Milk.

Definition—

Certified milk is milk certified by a milk commission appointed by the Medical Society of the County of New York, or the Medical Society of the County of Kings, as being produced under the supervision and in conformity with the requirements of that commission as laid down for certified milk, and sold under a permit therefor issued by the Board of Health.

No milk shall be held, kept, offered for sale, or sold and delivered as certified milk in the City of New York which is produced under requirements less than those for guaranteed milk.

Inspected Milk—Raw.

Definition—

Inspected milk (raw) is milk produced at farms holding permits therefor from the Board of Health, and produced and handled in accordance with the following minimum requirements, rules and regulations:—

Requirements, Rules and Regulations—

1. Only such cows shall be admitted to the herd as have not re-acted to a diagnostic injection of tuberculin.
2. All cows shall be tested annually with tuberculin, and all re-acting animals shall be excluded from the herd.
3. No milk from re-acting animals shall be shipped to the City of New York for any purpose whatsoever.
4. The farms at which the milk is produced must obtain at least 75 points in an official score of the Department of Health. These 75 points shall be made

up as follows: A minimum of 25 points for equipment, and 50 points for method.

5. The milk shall not contain more than an average of 60,000 bacteria per c.c. when delivered to the consumer, or at any time prior thereto.

6. Unless otherwise specified in the permit, the milk shall be delivered to the consumer only in bottles.

Selected Milk—Pasteurized.

Definition—

Selected milk (pasteurized) is milk produced at farms holding permits therefor from the Board of Health, and produced and handled in accordance with the following requirements, rules and regulations:—

Requirements, Rules and Regulations—

1. The farms at which the milk is produced must obtain at least 60 points in an official score of the Department of Health. Of these 60 points, a minimum of 20 points shall be required for equipment, and a minimum of 40 points for method.

2. All milk of this grade shall be pasteurized, and said pasteurization shall be carried on under a special permit issued therefor by the Board of Health, in addition to the permit for "Selected Milk (Pasteurized.)"

3. The milk shall not contain more than an average of 50,000 bacteria per c.c. when delivered to the consumer, or at any time after pasteurization and prior to such delivery.

4. Unless otherwise specified in the permit, the milk shall be delivered to the consumer only in bottles.

5. All containers in which pasteurized milk is delivered to the consumer shall be plainly labelled "Pasteurized." Labels must also bear the date and hour when pasteurization was completed, the place where pasteurization was performed, and the name of the person, firm, or corporation performing the pasteurization.

6. The milk must be delivered to the consumers within 30 hours after the completion of the process of pasteurization.

7. No milk shall be pasteurized more than once.

8. No milk containing in excess of 200,000 bacteria per c.c. shall be pasteurized.

General Regulations for Grade A—

1. The caps of all bottles containing milk of Grade A shall be white, and shall contain the words "Grade A" in black letters, in large type.

2. If cans are used for the delivery of milk for Grade A, the said cans shall have affixed to them white tags, with the words "Grade A" printed thereon in black letters, in large type, together with the designation "Inspected Milk (Raw)" or "Selected Milk (Pasteurized)," as the quality of the contents may require.

Grade B.—For Adults.

Selected Milk—Raw.

Definition—

Selected milk (raw) is milk produced at farms holding permits therefor from the Board of Health, and produced and handled in accordance with the following minimum requirements, rules, and regulations.

Requirements, Rules, and Regulations—

1. Only such cows shall be admitted to the herd as have been physically examined by a regularly qualified veterinarian and declared by him to be healthy, and free from tuberculosis in so far as a physical examination may determine that fact.

2. The farms at which the milk is produced must obtain at least 68 points in an official score of the Department of Health. These 68 points shall be made up as follows: A minimum of 25 points for equipment, and a minimum of 43 points for method.

3. The milk shall not contain an excessive number of bacteria when delivered to the consumer, or at any time prior thereto.

Pasteurized Milk.

Definition—

Pasteurized milk (Grade B) is milk produced under a permit issued therefor by the Board of Health, and produced and handled in accordance with the following minimum requirements, rules and regulations, and in further accordance with the special rules and regulations relating to the pasteurization of milk:—

Requirements, Rules and Regulations—

1. The milk after pasteurization must be at once cooled and placed in sterilized containers, and the containers immediately closed.

2. All containers in which pasteurized milk is delivered to the consumer shall be plainly labelled "Pasteurized." Labels must also bear the date and hour when the pasteurization was completed, the place where pasteurization was performed, and the name of the person, firm or corporation performing the pasteurization.

3. The milk must be delivered to the consumer within 36 hours after the completion of the process of pasteurization.

4. No milk shall be pasteurized more than once.

5. No milk containing an excessive number of bacteria shall be pasteurized.

General Regulations for Grade B—

1. Caps of bottles containing milk of Grade B shall be white and marked "Grade B" in bright green letters, in large type.

2. The necks and shoulders of cans containing milk of Grade B shall be painted bright green, and a metal tag shall be affixed to each can with the words "Grade B" in large type, and the words of the subdivision to which the quality of the milk in the said can conforms.

Grade C—For Cooking and Manufacturing Purposes only.

Definition—

Raw milk not conforming to the requirements of any of the subdivisions of Grade A or Grade B.

1. The caps of all bottles containing milk of Grade C shall be white and shall contain in red the words "Grade C" in large type and "for cooking" in plainly visible type.

2. Cans containing milk of Grade C shall be painted red on necks and shoulders and shall have in red the words "Grade C" in large type and "for cooking" in plainly visible type, affixed to each can.

All creameries handling milk of different grades will be required to demonstrate to the Department of Health that they are capable of keeping the grades separate, and must keep records satisfactory to the Department of Health concerning the amount of milk of each grade handled each day.

CONDENSED OR CONCENTRATED MILK.

Definition—

This is milk of any grade or subdivision thereof from which any part of the water has been removed, or from which any part of the water has been removed and to which sugar has been added.

Rules and Regulations—

Milk of this designation shall be sold only under a permit issued therefor.

GENERAL RULES AND REGULATIONS.

Permits.

1. A permit for the sale of milk or cream, of any grade or designation, may be granted only after an application has been made in writing on the special blank provided for the purpose.

2. A permit for the sale of milk, of any grade or designation, or of cream, may be granted only after the premises where it is proposed to care for and handle such milk shall have been rendered clean and sanitary.

3. Every permit for the sale of milk, or cream, from places other than wagons, shall expire one year from the date of issue.

4. No wagon shall be used for the transportation of milk, condensed milk, or cream, without a permit from the Board of Health. Every such permit shall expire on the last day of December of the year in which it is granted. A wagon permit for the sale or transportation of milk, condensed milk, or cream shall be conspicuously displayed on the outside of the wagon so that it may be readily seen from the street.

5. Every permit for the sale of milk of any grade or designation, in a store, shall be so conspicuously placed that it may be readily seen at all times.

6. All stores selling or keeping for sale milk, condensed milk, or cream will be frequently inspected and scored by a system adopted by the Department of Health, and the revocation of the permit of any store may ensue if the score is found repeatedly below the required standard.

7. The revocation of a permit may ensue for violation of any of the rules and regulations of the Department of Health.

8. The revocation of a permit may ensue upon repeated conviction of the holder thereof of the violation of any section of the Sanitary Code relating to the adulteration of milk of any grade or designation.

SANITARY REQUIREMENTS.

1. Milk, condensed milk, or cream shall not be kept for sale nor stored in any stable or room used for sleeping or domestic purposes, or in any room if in communication with such stable or room, or with water-closet apartments, except when such water-closet apartments are enclosed by a vestibule and are properly ventilated to the external air.

2. Milk, condensed milk, or cream shall not be sold or stored in any room which is dark, poorly ventilated, or dirty, or in which rubbish or useless material is allowed to accumulate, or in which there are offensive odours.

3. The vessels which contain milk, condensed milk, or cream, while on sale, must be so protected by suitable covers and so placed in the store that the milk, condensed milk, or cream will not become contaminated by dust, dirt, or flies.

4. Cans containing milk, condensed milk, or cream shall not be allowed to stand on the sidewalk or outside of the store door.

5. Milk, condensed milk, or cream must not be transferred from cans to bottles or other vessels on the streets, at ferries or at railroad depôts, except when transferred to the vessel of the purchaser at the time of delivery.

6. Cans in which milk, condensed milk, or cream is kept for sale, shall be kept either in a milk tub, properly iced, or in a clean ice-box or refrigerator in which these or similar articles of food are stored.

7. All containers in which milk, condensed milk, or cream is handled, transported, or sold, must be thoroughly cleaned and sterilized before filling, but such cleaning shall not be done nor shall such containers be filled in any stable or in any room used for sleeping or domestic purposes, or in any room having connection with such stable or rooms, or water-closet apartment, except when such water-closet apartments are enclosed by a vestibule and are properly ventilated to the external air.

8. All dippers, measures, or other utensils used in the handling of milk, condensed milk, or cream must be kept clean while in use, and must be thoroughly cleaned with hot water and soapsuds directly after each day's use.

9. The ice-box or ice-tub in which milk, condensed milk, or cream is kept must be maintained in a thoroughly clean condition and must be scrubbed at such times as may be directed by the Department of Health.

10. The overflow pipe from the ice-box in which milk, condensed milk, or cream is kept must not be

directly connected with the drain pipe or sewer, but must discharge into a properly trapped, sewer-connected, water-supplied open sink.

11. No person having a contagious disease, or caring for or coming in contact with any person having a contagious disease shall handle milk.

LABELLING.

Each container or receptacle used for bringing milk or cream into the City of New York, from which the said milk or cream is sold directly to the consumer, shall bear a tag stating, if shipped from a creamery, the location of the said creamery and the date of shipment; if shipped directly from a dairy, the location of the said dairy and the date of shipment.

As soon as the contents of such container or receptacle are sold, or before the said container is returned or otherwise disposed of, or leaves the possession of the dealer, the tag thereon shall be removed and kept on file in the store where such milk or cream has been sold, for a period of two months thereafter for inspection by the Department of Health.

Every wholesale dealer in the City of New York shall keep a record in his main office in the said city, which shall show the place or places from which milk or cream, delivered by him daily to retail stores in the City of New York, has been received; and the said record shall be kept for a period of two months, for inspection by the Department of Health, and shall be readily accessible to the inspectors of the said department.

PASTEURIZATION.

1. Milk, which has been subjected to the action of heat commonly known as "Pasteurization," shall not be held, kept, offered for sale, or sold and delivered in the City of New York unless the receptacle in which the same is contained is plainly labelled "Pasteurized."

2. Only such milk or cream shall be regarded as pasteurized as has been subjected to a process in which the temperature and exposure conform to one of the following:—

- No less than 158 degrees F. for at least 3 minutes.
- No less than 155 degrees F. for at least 5 minutes.
- No less than 152 degrees F. for at least 10 minutes.
- No less than 148 degrees F. for at least 15 minutes.
- No less than 145 degrees F. for at least 18 minutes.
- No less than 140 degrees F. for at least 20 minutes.

3. The said term "Pasteurized" shall not be used in connection with the milk classified as "Grade A: Selected Milk (Pasteurized)" and "Grade B: Pasteurized," or cream obtained from such milk.

4. Milk or cream which has been heated in any degree will not be permitted to be sold in New York City unless the heating conforms with the requirements of the Department of Health for the pasteurization of milk or cream.

5. Applications for permits to pasteurize milk or cream will not be received until all forms of apparatus connected with the said pasteurization have been tested and the process approved by the Board of Health.

DEPARTMENT OF HEALTH.—THE CITY OF NEW YORK.

RULES AND REGULATIONS WHICH SHOULD BE OBSERVED BY DAIRYMEN IN THE CARE OF COWS AND HANDLING OF MILK SHIPPED TO THE CITY OF NEW YORK.

The Cows.

1. The cows must be kept clean, and manure must not be permitted to collect upon the tail, sides, udder, and belly of any milch cow.

2. The cows should be groomed daily, and all collections of manure, mud, or other filth must not be allowed to remain upon their flanks, udders, or bellies during milking.

3. The clipping of long hairs from the udder and flanks of the cows is of assistance in preventing the

collection of filth which may drop into the milk. The hair on the tails should be cut, so that the brush will be well above the ground.

4. The udders and teats of the cow should be thoroughly cleaned before milking; this to be done by thorough brushing and the use of a cloth and warm water.

5. To prevent the cows from lying down and getting dirty between cleaning and milking, a throat latch of rope or chain should be fastened across the stanchions under the cow's neck.

6. Only feed which is of good quality and only grain and coarse fodders which are free from dirt and mould should be used. Distillery waste or any substance in the state of fermentation or putrefaction must not be fed.

7. Cows which are not in good flesh and condition should be immediately removed and their milk kept separate until their health has been passed upon by a veterinarian.

8. An examination by a veterinary surgeon should be made at least once a year.

The Stable.

9. No stagnant water, hog-pen, privy, or uncovered cesspool or manure pit should be maintained within 100 feet of the cow stable.

10. The cow stable should be provided with some adequate means of ventilation, either by the construction of sufficient air chutes extending from the room in which the cows are kept to the outside air, or by the installation of muslin stretched over the window openings.

11. Windows should be installed in the cow barn to provide sufficient light (2 square feet of window light to each 600 cubic feet of air space the minimum) and the window panes be washed and kept clean.

12. There should be at least 600 cubic feet of air space for each cow.

13. Milch cows should be kept in a place which is used for no other purpose.

14. Stable floors should be made water-tight, be properly graded and well drained, and be of some non-absorbent material. Cement or brick floors are the best, as they can be more easily kept clean than those of wood or earth.

15. The feeding troughs and platforms should be well lighted and kept clean at all times.

16. The ceiling should be thoroughly swept down and kept free from hanging straw, dirt, and cobwebs.

17. The ceiling must be so constructed that dust and dirt therefrom shall not readily fall to the floor or into the milk. If the space over the cows is used for storage of hay, the ceiling should be made tight to prevent chaff and dust from falling through.

18. The walls and ledges should be thoroughly swept down and kept free from dust, dirt, manure, or cobwebs, and the floors and premises be kept free from dirt, rubbish, and decaying animal or vegetable matter at all times.

19. The cow beds should be so graded and kept that they will be clean and sanitary at all times.

20. Stables should be whitewashed at least twice a year unless the walls are painted or are of smooth cement.

21. Manure must be removed from the stalls and gutters at least twice daily. This must not be done during milking, nor within one hour prior thereto.

22. Manure shall be taken from the barn, preferably drawn to the field. When the weather is such that this cannot be done, it should be stored not nearer than 200 feet from the stable and the manure pile should be so located that the cows cannot get at it.

23. The liquid matter should be absorbed and removed daily and at no time be allowed to overflow or saturate the ground under or around the cow barn.

24. Manure gutters should be from 6 to 8 inches deep, and constructed of concrete, stone, or some non-absorbent material.

25. The use of land plaster or lime is recommended upon the floors and gutters.

26. Only bedding which is clean, dry, and absorbent should be used, preferably sawdust, shavings, dried leaves or straw. No horse manure should be used as bedding.

27. The flooring where the cows stand should be so constructed that all manure may drop into the gutter and not upon the floor itself.

28. The floor should be swept daily. This must not be done within one hour prior to milking time.

29. If individual drinking basins are used for the cows they should be frequently drained and cleaned.

30. All live stock other than cows should be excluded from the room in which the milch cows are kept. (Calf or bull pens may be allowed in the same room if kept in the same clean and sanitary manner as the cow beds.)

31. The barnyard should be well drained and dry, and should be as much sheltered as possible from the wind and cold. Manure should not be allowed to collect therein.

32. A suitable place in some separate building should be provided for the use of the cows when sick, and separate quarters must be provided for the cows when calving.

33. There should be no direct opening from any silo or grain pit into the room in which the milch cows are kept.

The Milk House.

34. A milk house must be provided which is separated from the stable and dwelling. It should be located on elevated ground, with no hog-pen, privy, or manure pile within 100 feet.

35. It must be kept clean and not used for any purpose except the handling of milk.

36. The milk house should be provided with sufficient light and ventilation, with floors properly graded and made water-tight.

37. It should be provided with adjustable sashes to furnish sufficient light and some proper method of ventilation should be installed.

38. The milk house should be provided with an ample supply of clean water for cooling the milk, and if it is not a running supply, the water should be changed twice daily. Also a supply of clean ice should be provided to be used for cooling the milk to 50 degrees within two hours after milking.

39. Suitable means should be provided within the milk house, to expose the milk pails, cans and utensils to the sun or to live steam.

40. Facilities consisting of wash basins, soap and towel should be provided for the use of milkers before and during milking. During the summer months the milk house should be properly screened to exclude flies.

The Milkers and Milking.

41. Any person having any communicable or infectious disease, or one caring for persons having such disease, must not be allowed to handle the milk or milk utensils.

42. The hands of the milkers must be thoroughly washed with soap and water, and carefully dried on a clean towel before milking.

43. Clean overalls and jumpers should be worn during the milking of the cows. They should be used for no other purpose, and when not in use should be kept in a clean place protected from dust.

44. The hands and teats should be kept dry during milking. The practice of moistening the hands with milk is to be condemned.

45. The milking stools should be at all times kept clean, and iron stools are recommended.

46. The first streams from each teat should be rejected, as this fore milk contains more bacteria than the rest of the milk.

47. All milk drawn from the cows 15 days before, or 5 days after parturition should be rejected.

48. The pails in which the milk is drawn should have as small an opening at the top as can be used in

milking; top opening preferably not to exceed 8 inches in diameter. This lessens the contamination by dust and dirt during milking.

49. The milking should be done rapidly and quietly, and the cows should be treated kindly.

50. Dry fodder should not be fed to the cows during or just before milking, as dust therefrom may fall into the milk.

51. All milk utensils, including pails, cans, strainers, and dippers, must be kept thoroughly clean and must be washed and scalded after each using, and all seams in these utensils should be cleaned, scraped and soldered flush.

The Milk.

52. Milk from diseased cows must not be shipped.

53. The milk must not be in any way adulterated.

54. The milk as soon as drawn should be removed to the milk house and immediately strained and cooled to the proper temperature.

55. All milk must be cooled to a temperature below 50 degrees F., within two hours after being drawn, and kept thereafter below that until delivered to the creamery.

56. The milk should be strained into cans which are standing in ice water which reaches the neck of the can. The more rapidly the milk is cooled, the safer it is, and longer it will keep sweet. Ice should be used in cooling milk, as very few springs are cold enough for the purpose.

57. If aerators are used, they should stand where the air is free from dust or odours, and on no account should they be used in the stable, or out of doors.

58. Milk strainers should be kept clean; scalded a second time just before using, and if cloth strainers are used, several of them should be provided, in order that they may be frequently changed during the straining of the milk.

59. The use of any preservative or colouring matter is adulteration, and its use by a producer or shipper will be a sufficient cause for the exclusion of his product from the city of New York.

Water Supply.

60. The water supply used in the dairy and for washing utensils should be absolutely free from any contamination, sufficiently abundant for all purposes, and easy of access.

61. This supply should be protected against flood or surface drainage.

62. The privy should be located not nearer than 100 feet of the source of the water supply, or else be provided with a water-tight box that can be readily removed and cleaned, and so constructed that at no time will the contents overflow or saturate the surrounding ground.

63. The source of the water supply should be rendered safe against contamination by having no stable, barn-yard, pile of manure or other source of contamination located within 200 feet of it.

By Order of the Board of Health.

ERNST J. LEDERLE.

President.

EUGENE W. SCHEFER,

Secretary.

MEMORANDUM submitted by R. C. LUCAS, B.S., M.B.Lond., F.R.C.S. Eng., Consulting Surgeon to Guy's Hospital and to the Evelina Hospital for Children; Member of the Council, and lately Vice-President, of the Royal College of Surgeons; Member of the Council of the Royal Society of Medicine.

When the Insurance Act was passed, and I read the arrangements as to the providing of Sanatoria throughout the country for the better treatment and isolation of consumptives, objects which I heartily approve, it occurred to me that the Government ought to go further and provide for all forms of tuberculosis—Surgical as well as Medical. Otherwise, less than half the infecting cases will be under control, and those which present the most hopeful outlook for permanent cure will be left without care to spread the disease.

It appeared to me that the Government had not travelled beyond the popular idea of tuberculosis of the lung, *i.e.*, that consumption was a disease *per se*, and that they were about to leave out of consideration all cases of tuberculosis elsewhere, such as lupus, tubercular fistula, tubercular disease of the glands, of the spine, of various joints (hip, knee, ankle, shoulder, elbow, wrist, &c.), of various bones, of the testicle, and of certain internal organs open to surgical treatment, of which consumption is often only the terminal stage.

One recognises that Sanatoria, besides doing good to the individual patient, afford a means of segregation, and also a tuition against the spread of infection.

The public have been taught that the sputum and breath of consumptive persons are means of infection, and soon there will be claims against employers for phthisis acquired by contact with others previously infected.

The public have yet to learn that the discharges from lupus, from tuberculous glands and ulcers, from the sinuses of tuberculous joints, and from tuberculosis of the urinary tract, contain the bacillus in an active form capable of spreading the disease. So far back as 1881 I published three cases of inoculation of lupus through wounds. It is a disease which requires active treatment and segregation as much as phthisis

for the sake of others more than for the individual, in whom the disease is slow and painless.

The treatment of tuberculosis of joints, bones, and glands in the hospitals of large cities, though improved by the introduction of balconies to the wards, leaves much to be desired; and what is especially wanted is accommodation for convalescents for a lengthened period in good air, after operations or primary treatment in cities.

The suggestions I have to make are—

I. That in all Government Sanatoria there should be two wings, one devoted to Medical, the other to Surgical, tuberculosis.

I venture to think that the advantage to the community would be more than doubled by providing for the surgical cases, because when the local lesion has been wholly or in part removed, the patient, if placed under the most favourable circumstances for regaining health, will be better able to build up a permanent resistance to further inroads than in cases such as phthisis, where the disease cannot be reached, and the cure has to be left to Nature alone.

II. The Sanatoria should contain furnaces for the destruction of all dressings used for tubercular patients.

III. At each Sanatorium an agency should exist to aid the cured cases in gaining out-of-doors situations, either in this country or in the colonies; as it too frequently happens that when a patient, apparently cured, returns to his unhealthy occupation, he again breaks down.

June 1912.

MEMORANDUM submitted by A. LYSTER, M.R.C.S.

The pathology of tuberculosis is well known, including the fact that the muscles of the body are the last structures to yield to the disease.

The following are also known facts:—

1. The bacilli causing the disease.
2. The infection from human to human.

The solution of the tuberculosis problem is to prevent the spread of the infection from human to human.

The diagnosis of tuberculosis, when physical signs are manifest, is generally quite easy.

In early cases the diagnosis is not always easy.

From a curative point of view diagnosis of early cases is essential.

Preventive Treatment.—For the last 11 years I have carried out in my district a system of isolation of cases without separation from home and friends in canvas shelters placed in gardens and fields. I further insisted upon the destruction of sputa by burning. The result has been that I have succeeded in almost stamping out the disease from my district. This can be proved by the freedom from pulmonary tuberculosis of my district, and by the figures in yearly reports of the medical officer of health for the Chelmsford rural district council.

I kept the cases in shelters day and night.

An important result, from a preventive point of view, is that the rest of the family and the neighbours have not become infected, even though, as has frequently happened, they lived day and night in the shelter with the patient.

This system of "home treatment," viz., "isolation without separation," I have proved can be carried out in all rural districts and to a large extent in urban areas.

It is obvious that this system can be carried out at a comparatively small cost; and at a cost infinitely less than that of establishing and maintaining sanatoria. Many patients, while improving in shelters, continued working.

To demonstrate the economy of the shelter system. In the year 1903 120*l.* was collected locally. Just over 100*l.* has paid for all the shelters required for my district of 5,000 inhabitants right up to the end of the year 1911—nine years' work for 100*l.* This sum included provision in some cases of bed clothing. Shelters were passed on from case to case as that became necessary. There is still a balance remaining to the credit of the fund, and it has not been necessary to spend a single penny upon any other form of treatment, such as residence in a sanatorium.

The Essex Royal Memorial (the King Edward VII. Association for the Prevention of Consumption), of which the Earl of Warwick, Lord-Lieutenant, is President, and Alderman J. O. Thompson, Chelmsford, is Hon. Sec., is now distributing shelters which are in use in various parts of the county, including the densely populated county borough of West Ham.

The shelter system, moreover, enables every doctor to keep his own case.

The establishment of dispensaries, whose main object should be to push "home treatment," is an excellent system, and meets with my warm approval.

The dispensary system is similar to what I have been practising myself in my own district for 12 years, but in addition I have gone a good step further, viz., without separating patients from home, I isolated sufferers in shelters placed in their gardens and back yards; thus not only giving a chance of cure by exposure to light and air, but also, what is of great importance from a preventive point of view, each case thus treated was obviously one point of infection the less.

Research work should have for its object means of diagnosis and treatment both preventive and curative, and should be carried on in these dispensaries, which should be equipped with a suitable laboratory, and the best scientific apparatus. Careful records of all work done should be kept. These should be collated at regular intervals and examined by a department set up for the purpose.

Infection from human to human, which undoubtedly the main source of infection in pulmonary tuberculosis, would thus be largely dealt with.

I earnestly suggest that the establishment of sanatoria be not only not encouraged, but actually postponed till the dispensaries have ascertained how many cases can and cannot be "home treated."

I suggest, instead of wasting large sums of money in establishing and maintaining sanatoria, which before many years have passed will be as useless as small-pox hospitals, that each local authority or public body be empowered to either build or rent cottages, with gardens, for the accommodation of the infected person and his family; the family to occupy the cottage, and the infected person a shelter in the garden. The cost of the cottage would exceed but little, if at all, the amount, viz., 150*l.* per bed, already proposed to be spent on sanatoria. Two problems would be solving one another, side by side:—

1. The extirpation of tuberculosis.
2. The better housing of the working classes.

This plan could be carried out in all urban areas.

The "I.K." Treatment.—In this country no specific has yet been found that is in common use. For nearly a year I have been using Dr. Carl Spengler's "I.K."

The results have been good, and I have found by means of a dispensary at West Ham, that I can keep certain of the cases at work, and that, while still living in their own homes, they improve under treatment.

I am of opinion that in "I.K." we have a valuable aid in treating tuberculosis.

To demonstrate the value of "home treatment," I would gladly welcome an inquiry as to the state of this part of the country in regard to pulmonary tuberculosis.

Further, I would gladly welcome an investigation as to what is happening at the West Ham Dispensary where I am using Dr. Carl Spengler's "I.K."

ARTHUR LYSTER.
May 1912.

MEMORANDUM submitted by R. A. LYSTER, M.D., B.Sc., D.P.H.

The Supervising Authority.

It is desirable that any national scheme for dealing with tuberculosis in the United Kingdom should be established on a broad and uniform basis with a view to its being comprehensive, efficient and economical. The most satisfactory way to obtain this is for the organisation of the scheme to form part of the general health administration by county councils and the largest county boroughs. County health departments are in intimate association with the general work of the county districts, and legislation is constantly providing these departments with fresh fields for work. Every part of the county area is now being systematically visited by county medical officers, not only with regard to general health matters, but also in connection with the medical inspection and treatment of school children,

the supervision of midwives, inspection of food and drugs, &c.

I suggest that the county council should be the authority responsible not only for the provision of sanatoria, but for the supervision and organisation of the complete machinery for the treatment and prevention of tuberculosis, working in conjunction with the local medical officers of health.

Another necessity is that the national scheme to deal with tuberculosis should be organised on such lines as to render it easily capable of absorbing, or readily absorbed by, other schemes or services for providing medical attention. It is easy to demonstrate the fact that there is at the present time a great need for co-ordination and unification of the various authorities providing medical attention. Thus it may be pointed

out that local sanitary authorities are in many parts of the country providing more or less medical care for infants under one year old: from one to five years of age children of the poor depend either on voluntary provision or upon the poor law for their medical attention: from five to fourteen years of age they are to a constantly increasing extent being provided for by county and county borough councils as education authorities: after fourteen years they will apparently be provided for by the newly-formed Insurance Committees.

In selecting a special disease like tuberculosis to be a subject of a separate scheme of treatment there will be great danger in adding to the existing confusion. It appears to be desirable, therefore, that the scheme for dealing with tuberculosis should be established very largely with a view to co-ordination and unification subsequently. I suggest that the proper bodies for dealing with the problem are county councils and large county boroughs of 250,000 population or over.

Necessity for Elasticity.

It is not possible at present to estimate with any degree of accuracy either the amount or the extent of the provision that will be required ultimately. For instance, some authorities have stated that the number of persons infected with tuberculosis may be estimated at three times the number who die annually from that disease, while other authorities suggest various factors up to 15. A careful estimate of the number of notifications that have been received since consumption became notifiable appears to indicate that the practical factor is most likely to be about four.

The vagueness of the probable number to be provided for makes it extremely desirable that a commencement should be made with an elastic scheme so that the immediate necessities may be met and exact additional provision made when necessity arises. I suggest that a central organisation is best for a commencement, and this should be so built up that it is capable of indefinite expansion locally. The provision of the necessary treatment in large towns is an extremely simple matter, but is a very difficult problem in county areas, and a wide experience in county work will be indispensable in elaborating a workable scheme for such areas.

Sanatorium Provision.

It has now become generally recognised that sanatorium provision of some kind is absolutely indispensable, and clinics and out-patient dispensaries that were originally started with the intention of proving the uselessness of sanatoria are now gladly availing themselves of hospital wards which they use very largely in the same way as in modern sanatorium treatment. For instance, in connection with the tuberculin dispensary established at Portsmouth there have been eleven beds continuously in use for some time and the Medical Officer of Health has, in a recent report, asked for the provision of 25 beds which he considers may be sufficient. Any attempt to deal with tuberculosis without provision of beds is just as foolish as trying to run a large general hospital by only holding an out-patient department.

I suggest that in all areas (county councils and large county borough councils) there should be established a central institution as an essential beginning of the scheme. These central institutions should have accommodation equal to one bed per 5,000 population. This is a minimum provision and is suggested as a beginning, as too lavish an expenditure on the erection of permanent buildings is not desirable.

Linked up with this central institution there could subsequently be established home and dispensary treatment in urban areas, while home and general preventive treatment and supervision of work undertaken by local sanitary authorities (home shelters, home nursing, medical treatment, &c.) could be arranged everywhere.

Part of the central institution could be reserved for advanced cases, and considerable extension in the local provision for such cases could be made on the sites of local isolation hospitals and could be managed economically by using the administrative blocks for both purposes.

During the commencement of the working of the scheme, at all events, I suggest that the majority of notified cases should be passed through the central institution in order that correct diagnosis may be made, careful observation of the patient carried out, some scheme of treatment begun, general education of the patient commenced, and charts and general directions for treatment prepared, so that the patient may quickly return home and the treatment be continued locally by general practitioners, while the sanitary authorities could be expected to take up the care of the cases and to exercise their wide powers of prevention and treatment.

Areas.

I suggest that geographical county areas are the best units for the scheme, excluding only large county boroughs of over 250,000 inhabitants. Small counties could be absorbed by neighbouring areas. One reason for suggesting large areas is that a sanatorium institution of less than 100 beds is not economical, largely on account of the fact that the resident medical officer is not fully occupied. The provision of one bed per 5,000 inhabitants in a town of 250,000 population would mean a sanatorium of 50 beds, and this could be managed quite economically on account of the fact that members of the staff could be usually occupied outside, because, in large urban districts, the outside work is condensed on a small area.

Tuberculosis Dispensary or Clinic.

In large urban areas where there are certain to be large numbers of tuberculous people needing immediate attention dispensaries or clinics should be established at once. In such districts there should be little difficulty in providing ample material to justify the employment of whole-time medical officers. At these institutions about 60 out-patients could be treated per day or 300 per week, by each whole-time officer. As most of the patients will attend twice a week, this represents 150 persons under treatment. Assuming such cases to be continuously under treatment for six months, this would represent 300 patients per year treated by each whole-time medical officer.

Dispensaries so established in an urban area could deal very well with a considerable rural area immediately surrounding them, because, as a rule, railway and carrier facilities develop in connection with urban centres and the patients could be brought in easily.

The establishment of dispensaries or clinics in the greater part of the ordinary county area would be difficult, expensive, and of doubtful benefit. In my opinion, at the commencement of the scheme, the rule should be that the patient should come to the medical officer and not *vice versa*. This is not only important on the grounds of economy, because a medical man's time is more valuable than the patients' time, but is also indispensable because the best results in any new form of treatment will only be obtained by specialists and there will therefore be few medical men really available. The best plan will therefore be to keep such men at central institutions so that they may deal with a maximum number of patients. It might be possible, but in my opinion it is undesirable and wasteful, to establish small dispensaries in a county area, and to work them with a peripatetic medical officer; but the fact that each patient should be seen at least twice a week would make the area covered by each officer quite small and the scheme correspondingly expensive. In my opinion the establishment of dispensaries or clinics to be worked by local practitioners would be unwise.

In estimating the expense connected with the establishment of a dispensary or clinic serious errors are likely to be made, and one already hears of these being established, on paper, "at small expense." In practice, however, it is always found that it is a difficult and expensive problem to find premises for such a purpose, and in many areas it may be confidently expected that special buildings will have to be erected.

Use of General Practitioner.

It should be possible to arrange matters so that a maximum amount of work could be undertaken by the general practitioner, and the scheme could be

developed with this end in view. The local organisation necessary for the provision of ordinary medical benefit should be of great assistance in arranging this. The scheme will depend upon the general practitioner for most of the early diagnoses and notifications, and his intimate contact and influence with the public should, if properly utilised, be invaluable in any system of prevention.

Part of the necessary scheme will involve the provision of expert help for the general practitioner for difficult cases of diagnosis or treatment. In large urban areas the whole-time medical officer of the dispensaries or clinics should be available for this purpose, but in the remaining parts of the county it will be necessary to appoint whole-time itinerant officers. It should be quite easy to arrange for such an officer to visit different areas in succession and for all medical practitioners to be acquainted with the time of his visits to their district.

In the scheme herein outlined the ordinary notified case would proceed to the central institution and would there be accurately diagnosed and some treatment commenced during a short time there. The case would then return home and the medical practitioner would be informed exactly of the patient's condition, his peculiarities as regards treatment, details of the treatment commenced, and full suggestions for the continuation of such treatment. In the ordinary way this would probably be sufficient, but there should be at the disposal of the practitioner the assistance of the itinerant whole-time medical officer in cases where special difficulties in treatment are met. Some of these difficulties could, of course, be disposed of by correspondence or by telephone. There would be no hesitation on the part of the general practitioner to call in the services of the official if he knew that these were freely at his disposal and he was assured that there was no danger of being superseded.

Treatment by tuberculin injections, or any other form of treatment which may subsequently be developed, is not likely to be beyond the capacity of the average qualified practitioner, especially if expert official help is available as suggested above.

So long as the whole of the treatment is supervised and organised as part of the public health machinery of the county there is no doubt that the public would benefit by the inclusion of the general practitioner in the scheme of treatment and prevention.

A COUNTY SCHEME.

A county scheme includes educational work, general preventive work, home treatment, searching for disease, provision of sanatorium, sorting hospital and hospital for advanced cases, county laboratory, organisation of voluntary work, &c.

I.—Education Work.

(a) *Instruction in Elementary Schools.*—Instruction in hygiene and in elementary facts concerning consumption should be organised in every elementary school.

(b) *Instruction of Teachers.*—In order that adequate instruction may be given in the elementary schools it would be necessary to arrange for special lectures to be given to teachers on the subject.

(c) *Evening Lectures.*—The lectures to teachers and the popular lectures given locally in the evenings should be given invariably by medical men. I have had considerable experience as an examiner of classes that had been instructed by nurses, and am satisfied that such instruction is not only incomplete, but may, in many instances, be dangerous.

(d) *Exhibitions.*—It may be possible to arrange for the well-known tuberculosis exhibitions of the National Association for the Prevention of Consumption to be given at some centres in the county. For the villages a caravan should be provided.

(e) *Cinematograph Entertainments.*—This could be made a very popular form of instruction concerning health and the prevention and cure of tuberculosis.

(f) *Churches and Chapels.*—A special Sunday might be devoted towards the education of the public in this matter.

(g) Other means would include the provision of central press and information bureau, the distribution of pamphlets, &c.

II.—Preventive Work.

(a) *Public Health Work.*—The recent Public Health Tuberculosis Regulations give wide powers of treatment and prevention to local sanitary authorities, but experience leads one to believe that such powers will not be exercised by the ordinary urban and rural authorities unless definite powers of supervision and organisation are given to county councils.

(b) *Provision of Nursing.*—Many invalids inadequately or improperly nursed are for long periods in such a condition as to render them an easy prey to tubercle bacillus.

(c) *Removal of Cases.*—An important preventive measure is the removal of advanced cases in order that they may be properly educated, and so taught how to prevent the spread of the disease.

(d) *Treatment of Predisposed Cases.*—Treatment of predisposed children will prove to be a valuable method of prevention. Residential open-air schools will be necessary.

(e) *Improved Supervision of Milk Supply.*—The supervision of the milk supply by county councils is very desirable.

III.—Health Visitors.

Health visitors should be provided for the county area for the purpose of visiting the homes of patients as well as the districts generally. It is essential that such work should be organised on a large scale if it is to be successful and economical. I suggest that these health visitors should have their duties drawn up by the medical officers of health and the county medical officer, and should work largely under the direction of the medical officer of health. Their duties would include educational work in the home, the instruction of the patient and his family, the recommendation of medical attention where necessary, the formation of lists of children for the school doctor, reporting of sanitary defects, collection of specimens of sputum, &c.

It is obvious that this work could be very well and economically co-ordinated with the work in the homes in connection with the medical inspection of school children, and the reduction of infantile mortality. The appointment of health visitors would enable every district at once to adopt the Notification of Births Act.

IV.—Machinery for Detection.

An indispensable part of the organised searching for the disease will be the complete medical examination of all affected families. In large urban areas this could be easily arranged in connection with the dispensaries or clinics on the lines that are now well known and have been carried out successfully in several large towns. In rural areas this work could be carried out largely by the medical men who notify the cases, but the supervision and organisation of it should be central.

V.—Sorting Hospital or Tuberculosis Clinic.

In large towns it is quite easy to arrange for a sorting hospital and for an out-patient tuberculosis clinic to act as a feeder to the sanatorium for suitable cases and for treating other cases to some extent. In a county area, however, I am convinced that the initial provision of such local arrangements would lead to a great waste of money and to considerable difficulties of organisation and supervision. It may be suggested that some beds at the local isolation hospital might be used for such purposes, as well as for the care of advanced cases, and in some areas such a course might be practicable. In my experience in three counties, however, I have found personally that such a step is viewed with disfavour by most of the district councils concerned.

The setting up of small hospitals in this way would lead to considerable difficulty and expense as regards supervision, and would also necessitate combination of neighbouring districts, a step which experience has shown to be extremely difficult to carry out. For a beginning, I am therefore suggesting that the sorting hospital, the sanatorium, and the hospital for the care of advanced cases should be combined for the purposes of county administration.

VI.—*The County Sanatorium.*

A county sanatorium should be provided with at least one bed for every 5,000 population. It is difficult to apportion these beds for the work during the first few years, but they would be arranged so as to provide separate accommodation for the diagnosis, education, treatment, and training of male and female ordinary cases, and for the isolation and treatment of advanced cases. All notified cases would be sent to the sanatorium for exact diagnosis, and in order that education and treatment may be commenced. In many instances, after a short stay the patient would be sent home and his education and treatment completed there.

Assuming that out of 100 beds provided 70 beds would be available for ordinary cases, and that such patients made an average stay of two months, it would be possible to deal with 420 cases per annum, while 30 beds would be available for advanced cases continuously. In practice I feel confident that the average stay in the sanatorium would average less than one month so that each bed would represent at least twelve cases. As soon as a case was accurately diagnosed and treatment commenced there would be, in the majority of instances, no reason for any further stay in the institution. Full directions and exact details for further treatment would be given to the local medical practitioner and the patient could go home where he would be affected by the far more cheerful influences of home life. The central institution could also be available for the instruction of medical practitioners in the area, an advantage that would probably be taken advantage of very eagerly. On his return home the patient would be treated by the local practitioner who would carry on the treatment commenced at the central institution. District councils would be urged to avail themselves of their full powers to attend to him and voluntary agencies would be informed of his existence and of his special needs.

VII.—*Hospital for Advanced Cases.*

This should, as I have said before, be combined with the sanatorium. By this I do not suggest that the cases should be in any way mixed. They should be kept quite distinct from those undergoing treatment for the earlier stages of the disease, but in the interests of economy of administration and establishment charges the hospital should be practically part of the sanatorium. In cases when difficulty was experienced in moving advanced cases some distance from home, the local guardians or district council (according to the circumstances of the case) would have their attention called to their existence. Voluntary organisations also would be able to help. By these methods the isolation of the case at or near home would be possible.

VIII.—*County Laboratory.*

The county laboratory will, of course, play an important part in the exact diagnosis of tuberculosis and other diseases, and it is an essential factor in the machinery of detection.

IX.—*District Councils.*

District councils have been given considerable powers under the recent regulations. It is suggested that they can best carry out their work in those cases with whom it is decided to carry on home treatment, and those who have passed through the sanatorium and have been educated and partly treated. All such cases should be kept under supervision, shelters provided where suitable, and full advantage taken of the wide powers already referred to, including general public health work, improvements in housing, disinfection of houses, prevention of overcrowding, &c.

X.—*Boards of Guardians.*

In the past boards of guardians have played a very important part in preventing the spread of consumption by isolating advanced cases among the poor. It is

probable that they will continue to do this to some considerable extent. Provision should be made at all workhouse infirmaries for the reception of incurable poor-law cases.

Where the consumptive patient is in receipt of out-relief, a condition of such relief should be that the instructions of the medical officer of health are carried out satisfactorily.

Guardians also should be requested and expected to co-ordinate their medical service to the needs of the scheme.

XI.—*Voluntary Agencies.*

All existing voluntary agencies should be used, and relief committees, hospital committees, district nursing associations, branches of the Charity Organisation Society, village nurses, &c., should be included in an organised county scheme. As soon as persons are sent from the central institution (or in the event of the treatment being entirely carried out at home) the attention of these voluntary agencies should be directed towards them, and in this way there is no doubt that a great deal of assistance could be given to the average case. The fact that these agencies were waiting to receive cases would enable them to be discharged very rapidly from the central institution. If the patient apparently needed assistance, the fact would be reported to the local joint voluntary committee, who would be mainly concerned with the provision of food, milk, clothes, help in house work, maintenance of family, finding of work, &c.

Voluntary agencies in the county area could be organised centrally into "joint care committees" which would form a very natural development of the "after-care committees" established at present all over the area in connection with the medical inspection of school children.

GENERAL CO-ORDINATION OF SCHEME.

1. *County Council and Officers.*

- Medical inspection of children.
- Educational efforts.
- Supervision of milk supply.
- Supervision of housing.
- Organisation of "sanatorium benefit."
- Control of sanatorium.
- General supervision and control of tuberculosis prevention.
- Peripatetic expert staff.
- Health visitors.
- Organisation of search for cases.
- Organisation of voluntary workers.

2. *Local Sanitary Authorities and Officers.*

- Powers under tuberculosis regulations.
- Supply of open-air shelters, sputum flasks and cups, &c.
- Disinfection; supervision of sanitary matters.
- Improvement in housing.
- Improvement in workshops and factories.

3. *Guardians.*

- Wide powers under Poor Law and Orders.
- Co-ordination of out-relief with the scheme.
- Co-ordination of poor-law medical service with the scheme.

4. *General Practitioners.*

- Notification.
- Examinations.
- Home treatment.
- Reports.
- Search for cases.

5. *Voluntary Workers.*

- Joint care committees.
- Organised from county centre.

R. A. LYSTER.

April 1912.

MEMORANDUM submitted by C. J. MARTIN, M.D., F.R.S., Director of the Lister Institute of Preventive Medicine.

IN accordance with the request of the Chairman of the Committee on Tuberculosis that I should express my views as to the methods by which research work in connection with tuberculosis might best be organised, I have the honour to submit in outline two schemes.

1. The appointment of a quasi-permanent team of research workers capable of undertaking any line of investigation, experimental (bacteriological and biochemical), epidemiological or statistical, as may be determined. The late Royal Commission on Tuberculosis and the present Commission for Investigation of Plague in India afford instances of this method.

2. The allocation of definite lines of inquiry to individuals or groups of individuals selected on account of their particular fitness for the investigation proposed and in consideration of the suitability of the laboratory and other facilities at their command. As an instance of this latter scheme, I may mention the method in which the Government grant for investigation is utilised by the Medical Department of the Local Government Board.

Both methods have advantages and drawbacks, but in either case a small expert advisory committee is essential. The committee should consist of persons some of whom are conversant with the problems of tuberculosis from the point of view of the public health, and others experienced in methods of research. The latter should be in the majority, for it is easier to decide what knowledge is wanted than how to get it.

The function of such a committee as I have in view would be to decide from time to time the problems for

investigation and in general outline the methods of inquiry. It would also, under scheme 1, select the investigators and arrange the necessary laboratory and other requirements, and under scheme 2 it would decide who should be invited to undertake particular lines of inquiry. Under either scheme the committee should keep in touch with the various investigators, and be responsible for the co-ordination of the different researches.

I should recommend the adoption in the first instance of scheme 2. It would be more economical because it would utilise machinery that already exists. Under its operation the services of investigators holding permanent appointments at universities or other institutions would be available. As it may be taken for granted that most of the persons possessed of the expert knowledge required occupy such positions, this seems to me of importance. If not satisfactory or adequate it could be abandoned or supplemented at any time without difficulty.

Scheme 1 would be more costly and would involve capital outlay. It depends for its success upon the scientific fitness and personality of the leader of the team. The "man for the job" may not be immediately available. Further, there is a horrible tendency for scientific workers who are employed too long and exclusively on one subject of investigation to become stale.

The two schemes are not incompatible.

CHARLES J. MARTIN.

May 1912.

SUPPLEMENT TO DR. C. J. MARTIN'S MEMORANDUM.

I. Regarding scheme 2 mentioned in my memorandum, I would emphasize—

- (1) That there would be no difficulty in London and other large centres of finding suitable starting accommodation for both the business and scientific work of the inquiry.
- (2) That it would be better as a common-sense proposition to avail oneself of such accommodation on a short lease to provide a temporary headquarters, than to saddle the project with buildings which a year or two's experience would probably prove to be unsuitable, and possibly also unsuitably placed.
- (3) That there are throughout the country many agencies, both medical and scientific, that can with advantage be drawn upon for co-operation in the work of investigation.
- (4) That after a few years the Commissioners would be, owing to experience gained, in a much stronger position to consider the case for a central establishment.
- (5) That this course would be far more economical in the best use of the funds provided—in themselves not too large for the important inquiries contemplated—and would release at starting a larger portion of these funds for the proper remuneration of the best scientific men that can be procured.
- (6) That it will enable the Commissioners to partially employ first class men without calling upon them to abandon their present appointments in universities, &c.

II. I gathered that the majority of the Committee felt the necessity for some such advisory committee, as pointed out in my memorandum, but that they

found some difficulty in deciding how far this committee was to be entrusted with executive functions, and also how it was to be brought into relation with those Government departments at present entrusted with the care of the public health. I think the best results would be obtained by some such organisation as detailed below:—

That the Commissioners entrust the investigations into tuberculosis or other diseases comprehended by the terms of the Act to a "National Medical-research Committee" to be formed of—

- (1) Four representatives of the Insurance Commissioners.
- (2) Representatives of the Local Government Boards of England, Scotland, and Ireland, and other Government departments whose duties include the care of the health of the community—making together five in number.
- (3) Five scientific experts (three of which should be pathologists) chosen with a view to the nature of the inquiries contemplated.

In addition, there should be a sub-committee of the above (call it what you will) composed of the five scientific experts together with enough of the official members to give it business strength.

The duties of the sub-committee to be to advise (or consider and report to) the National Research Committee regarding—

Investigations to be undertaken.

Methods of research.

Agency to be employed.

Grants for expenses of particular investigations, and generally to supervise and co-ordinate the inquiries.

CHARLES J. MARTIN.

December 1912.

MEMORANDUM submitted by G. F. McCLEARY, M.D., D.P.H., Medical Officer of Health, Hampstead, on the INFANTS' MILK DEPÔT MOVEMENT.

The Need for Special Measures for the Protection of Infants.

No scheme for the control of tuberculosis can be considered complete if it fails to take account of the special conditions that favour the prevalence of disease among infants and young children. The death-rate from tuberculosis among children under 15 years of age is highest in the first year of life: it remains high during the first five years of life, and then steadily falls. About 4 per cent. of the total infant mortality is due to tuberculosis. There is evidence that young children are highly susceptible to tuberculosis, and they are specially exposed to infection from tuberculous milk. The Royal Commission on Tuberculosis, in their Final Report conclude that—

There can be no doubt 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, further, there can be no doubt that primary abdominal tuberculosis, as well as tuberculosis of the cervical glands, is commonly due to ingestion of tuberculous infective material.

It is probable that the conditions affecting infant life have an influence on the prevalence of tuberculosis at later age-periods that cannot be estimated from the mortality returns.

Tuberculous lesions, unrecognised during life, are frequently discovered at the autopsies of children dying from other causes, and it is probable, as the Chief Medical Officer of the Board of Education points out in his Annual Report for 1910, that a certain number of children, who may be apparently healthy or suffering from nothing more definite than general "delicacy," may have somewhere in their bodies a focus of tuberculosis that may be sufficient to exercise an adverse influence on the child's development, and may become active, and even fatal, during the physiological stress of puberty. And even if the child escapes infection during a childhood passed under unhealthy conditions, he may survive with a constitution permanently impaired by those conditions and fall a victim to the tubercle bacillus in later life. The conditions affecting the period of infancy and early childhood have an important influence on the future development of the individual and, generally, it may be said that a healthy manhood can only be built upon the foundation of a healthy childhood. Though the rate of infant mortality in this country has been lower in the last decade than formerly, it is still sufficiently high to show that a large proportion of our infant population is living under conditions so injurious to health, that many of the survivors must reach early adult life permanently damaged and rendered susceptible to the tubercle bacillus. In infancy and early childhood, therefore, there is need for special preventive measures against tuberculosis. These measures may be grouped as follows:—

- (1) Measures of general infant hygiene tending to safeguard infant life, and so to diminish susceptibility to infection.
- (2) Measures tending to improve the milk supply, and therefore to cut off a source of infection specially dangerous to infant life.

The preventive agency known as the Infants' Milk Depôt endeavours to attain both these objects.

History of the Milk Depôt Movement.

During the last 10 years of the 19th century the continuance of a high rate of infant mortality in this country, in spite of a steady decline in the general death-rate, demonstrated that special measures for the protection of infant life were required in addition to the measures of general sanitation, on which sanitary authorities had hitherto relied; and in searching for

special preventive measures it was natural to turn to France, where, chiefly owing to the declining birth-rate, the question of infant mortality had become widely regarded as one of national importance. In France, it appeared, the chief preventive agency was an organization, which, according as it belonged to one of two types, was known as the "*Consultation de Nourrissons*," or the "*Goutte de Lait*." The objects of this agency are:—

- (1) Systematic medical supervision of infants.
- (2) Instruction of the mothers in infant hygiene.
- (3) Encouragement of breast-feeding.
- (4) The supply of pure milk for infants for whom hand-feeding is necessary.

The "*Consultation de Nourrissons*" is the earlier of the two types, and may be said to date from the year 1890, when Professor Herrgott founded "*L'Oeuvre de la Maternité*" in connection with his maternity hospital at Nancy. The infants born in the hospital were required to be brought up to the hospital by their mothers for medical examination one month after birth, and if the child's progress had been satisfactory the mother received a gift of money. In the years 1890-1900, 2,052 mothers passed through the institution, and 25,382 francs were distributed amongst them.

The Nancy maternity charity, however, was only an embryonic form of the *Consultation de Nourrissons*, the first fully developed example was founded by the late Professor Budin at the Charité Hospital, Paris, in 1892, and two others were afterwards established by him in Paris, one at the Maternité Hospital in 1895, the other at the Clinique d'Accouchement Tarnier in 1898. Similar consultations were established by Drs. Porak, Maygrier, Boissard, and other accoucheurs in Paris. There are two kinds of infant consultations. Those of the type established by Budin are attached to the maternity hospitals, and are limited to the children born in the hospital. The women are admitted gratuitously to the hospital for confinement, and after discharge they are encouraged to bring the children every week to the hospital to be examined by a member of the medical staff. The child's weight is taken, and periodically entered with other particulars in a register. The mother is instructed in the care of her own and her child's health, and every effort is made to encourage breast-feeding. Should the mother's milk begin to fail prematurely, the causes of the failure are investigated, and, if possible, appropriate remedies are applied. If breast-feeding is impracticable, the mother is given a daily supply of sterilized milk in bottles, each bottle containing sufficient for one meal and no more, the amount being varied by the medical man according to the weight of the child. There are many *Consultations de Nourrissons* that are not attached to maternity hospitals, but otherwise the work is conducted on much the same lines. The mothers are urged to bring the babies regularly for medical examination and breast-feeding is encouraged by gifts of money and food for those mothers who suckle their infants. In connection with many of the French consultations there is a supply of milk for the hand-fed babies, but often this is not the case. In 1892, shortly after Professor Budin had opened his consultation at the Charité hospital, Dr. Variot started an important consultation in connection with the Belleville Dispensary, Paris, in which the supply of sterilized milk forms an important feature, most of the babies being, owing to unavoidable causes, hand-fed.

In 1894 Dr. Leon Dufour of Fécamp established in that town an institution to which he gave the name of "*Goutte de Lait*." Dufour's *Goutte de Lait* is an infants' consultation, separate from any hospital, with a supply of specially prepared milk for the hand-fed babies. It was the prototype of some hundreds of similar institutions that have since been established in

various parts of the world, and it may be useful to give the following abstract of Dufour's own description of his *Goutte de Lait* which appears in his brochure "Comment on crée une Goutte de Lait."

The objects of the *Goutte de Lait* are:—

- (1) To induce mothers by advice and by every possible encouragement to feed their babies at the breast.
- (2) When it is impossible for the child to be wholly breast-fed the mother is urged not to abandon breast-feeding altogether, but to supplement her own milk with suitably prepared cow's milk, in order to secure that the child shall be, if not wholly, at least partially breast-fed.
- (3) When, however, there is no doubt that it is impossible for the mother to suckle her baby, there is given under the best possible conditions a milk of good quality, with advice as to the conditions necessary for success in artificial feeding.

Any child in the town in whatever state of health or of whatever social class he may be is admitted to the *Goutte de Lait* on the application of his parents, guardians, or other responsible persons, but the institution is chiefly intended for the poor. The infants are distributed in three sections

- (1) Gratuitous section.
- (2) Half-paying section.
- (3) Paying section.

In the first are the very poor, in the second the working people, and in the third "les bourgeois, les gens établis at les riches." The hand-fed infants in each section receive the same kind of milk, prepared and distributed in the same way. Each infant has for its sole use two numbered sets of baskets and bottles, and each mother receives every day a basket containing a number of bottles corresponding to the number of meals the infant takes during the 24 hours. Each bottle contains a sufficient quantity of milk for one meal and no more, and the quantity is suited to the age of the child. In order to emphasise the fact that the milk is nothing more than an inadequate substitute for mother's milk, each basket is marked with the motto of the *Goutte de Lait*, "Faute de mieux." The next day the basket of empty bottles is returned and a fresh supply is given out. Once a week the mothers bring the children to be weighed and medically examined. The *Goutte de Lait* is administered by a president and a committee of four ladies. The president, who is a medical man, is charged with the general supervision of the work, and the ladies collect the subscriptions and take charge of the funds.

At Fécamp the milk is modified by the addition of water in the proportion of one part water to two parts of milk, and to each litre of the mixture is added 15 grains of centrifugalised cream, separated on the premises, 35 grains of lactose, and one grain of common salt. After modification the milk is bottled, heated to a temperature of 102 C., and kept at that temperature for three-quarters of an hour.

Of these French institutions the most successful are, as might be expected, the consultations attached to the maternity hospitals. The babies are kept under supervision from birth and adequate breast-feeding is secured in a very large proportion of the cases. The task of the *Goutte de Lait* is harder, for many of the babies have been weaned when they are first brought under supervision, and are indeed often brought because of their ill-health. But both the *Consultation de Nourrissons* and the *Goutte de Lait* are alike in that they are essentially medical institutions. They were established by medical men, and their chief object is the systematic medical supervision of the infants and the education of the mother. Their work is clinical and educational, and the supply of milk is quite subsidiary. It is perhaps partly for this reason that in many cases sufficient control is not exercised

over the sources of the milk supplied, and in this respect the French dépôts compare unfavourably on the whole with the dépôts that have been established in the United States, which must now be described.

The pioneer in the Infants' Milk Dépôt movement in America is Mr. Nathan Straus, who established his first dépôt in New York in 1893. Mr. Straus' long study of infant mortality in New York led him to the conclusion that the most effectual preventive method was "to place milk suited for infant nutriment within 'reach of the poor,'" and he established several dépôts where infants' milk, modified and pasteurized was supplied in separate bottles for each meal. The first of these dépôts is thus described by Dr. Rowland G. Freeman, Mr. Straus' chief medical adviser.

"This milk dépôt was located on a pier at the foot of East Third Street, that situation being accessible to a very large tenement-house population. Awnings and seats were put up on the pier so that the babies and their mothers could remain there and inhale the fresh air from the river. The building which was erected was, owing to the character of the site, of necessity long and narrow; it was placed several feet from the edge of the pier, so that an outside passage-way connecting the rooms was reserved. The building was divided into four rooms. The first room is used for sterilising the bottles, stoppers and nipples, and preparing and pasteurizing the milk. The second room is occupied by large water-baths of iced water for keeping the pasteurized milk until it is delivered. The third room contains ice-boxes for the cans of raw milk. The fourth room, which is nearest the end of the pier, is devoted to the business of selling the milk."

In Mr. Straus' dépôts the milk is pasteurized, not sterilized, as in most of the French dépôts. It is heated in stoppered bottles to 167° F. (this temperature is reached in about ten minutes), and remains at that temperature for twenty minutes.

Mr. Straus gradually increased the number of his dépôts, and in 1911 he had 18 at work in New York City.

The first infants' milk dépôt in this country was opened on August 8th, 1899, by the St. Helen's Corporation, on the initiative of Dr. F. Drew Harris, who was then Medical Officer of Health, after a Committee of the Corporation had visited the *Goutte de lait* at Fécamp. Dépôts were opened at Liverpool, Ashton-under-Lyne, and Dukinfield, in 1901; at Battersea in 1902; York, Leith, and Bradford in 1903; Burley, Finsbury, Glasgow, and Dundee, in 1904; and subsequently at Lambeth, Woolwich, Leicester, Oxford, and Dublin. Nearly all of these were municipal dépôts.

The milk dépôt of the Liverpool Corporation is the largest in this country. Up to the end of 1909 no less than 16,131 infants had been supplied with milk from the dépôt. The expenditure varied from 2,000*l.* in 1901, to 4,077 in 1909, and the income from the sale of milk from 318*l.* in 1901, to 1,328*l.* in 1909. The cost falling on the rates in 1909 was 2,749*l.*

The lines upon which the British milk dépôts are conducted are indicated in the following description of the Battersea dépôt.

The Battersea dépôt is a three-storied building, which was adapted for the work. The two upper stories are occupied as a residence by the manageress and some of the staff, and the work is carried on in four rooms on the ground floor. The front room is used as a shop, in the next room the babies are weighed, the third is the bottle-washing room, and in the fourth the processes of modifying, bottling, and sterilizing are carried out.

The milk, which is supplied from a farm approved by the Medical Officer of Health, arrives at the dépôt about 6 a.m. It is carefully strained through a Ulix strainer, and is then (for infants under six months) modified by the addition of water, cream, sugar, and a little salt. The following table gives the dilutions and the amounts given at different ages:—

Age of Child.	Modification.	No. of Bottles per Day.	Amount per Bottle.	Amount per Day.
During 1st fortnight	Milk 1 part, water 2 parts	9	Oz. 1½	Oz. 13½
" 2nd "	" " " "	9	2½	22½
" 2nd month	" " " "	9	2½	22½
" 3rd "	" " " 1 part	9	3	27
" 4th "	" " " "	8	4	32
" 5th "	" 2 parts " "	7	5	35
" 6th "	" " " "	7	5	35
" 7th "	Milk unmodified	6	6	36
" 8th "	" " " "	6	6	36
Over 8 months	" " " "	6	7	42

Cream and sugar are added to the modified milk, so as to bring the proportion of fat and sugar to about 3·2 and 6 per cent. respectively. The milk is varied to suit individual cases upon the request of a medical man. After modification the milk is bottled and is then, the stoppers being closed, placed in the sterilizing chamber. Steam is injected and the temperature raised to 212° F., where it remains for from 15 to 30 minutes. The bottles are then taken out of the sterilizer and rapidly cooled in the cooling tank.

The bottles are supplied in wire baskets, each basket holding from six to nine bottles, and containing a 24 hours' supply. The next day the basket of empty bottles is returned and a fresh supply obtained.

Before a child begins to be fed from the depot the mother is warned that the milk is nothing more than a poor substitute for mother's milk, and that it should not be used unless breast-feeding is absolutely impossible. This caution is repeated by the lady inspector who visits the homes of the children fed on the milk. When the child begins to be fed on the milk certain particulars are entered in the register. These particulars include the child's name, age, address, and state of health, and the name of the medical man who advised the use of the milk. A record of each child is kept, and the milk is varied from time to time as the child grows older.

When a child is entered at the depot the mother is instructed by the manageress as to the proper method of using the milk, and she receives a printed card on which the instructions are clearly set out.

The milk depot method of infant feeding is a very simple matter as far as the mother is concerned. When feeding time arrives all she has to do is to place the bottle, unopened, in a basin of warm water until it reaches body temperature, to open the bottle, put on a rubber teat supplied at the depot, and feed the baby from the sterilized bottle direct. There is no need for a "feeding bottle," which alone is a great advantage. The homes of the children are visited by the council's health visitor, who endeavours to secure that the instructions are properly carried out, and the mothers are urged to bring the babies once a week to the infants' consultations, conducted by the Medical Officer of Health, of which there are two, one at each end of the borough, rooms at the two public baths being used for this purpose. A considerable proportion of the infants are now brought to the consultations, which are growing in popularity.

The present Position of the Milk Depot Movement.

During the past few years the milk depot movement has made great progress. In France there is hardly any town of considerable size without some form of depot. In the Department of the Nord, for instance, there are 25 *Gouttes de lait*, and 53 infant consultations without a supply of milk.

In the United States there are milk depots in over 40 cities. In New York City there were no less than 87 depots at work in 1911. Of these 15 were municipal depots, 18 were maintained by Mr. Nathan Straus, 31 by the New York Milk Committee, and the remainder by other charities.

In Germany there are between 70 and 80 infant consultations in connection with which milk is supplied to the artificially fed babies. In Berlin the

municipality has seven consultations, the milk for which is supplied from municipal dairies outside the city. Most of the German depots are municipal institutions.

In this country the number of milk depots has diminished during the last few years, the depots at Glasgow, Woolwich, Finsbury, Dukinfield, and Leith having been closed, chiefly on the ground of expense. In 1907 the Leicester depot substituted a supply of dried milk for modified cow's milk, and dried milk is now supplied at Sheffield, Barking, and some other towns. On the other hand, the number of infant consultations without a supply of milk has increased. In 1911 there were at least 25 districts in which infant consultations had been established, and the number has now probably increased. In 13 districts the consultations are municipal institutions, forming part of the work of the public health department, and in most of the other districts the consultations, though under voluntary management, work in co-operation with the sanitary authority, and are more or less under the supervision of the medical officer of health.

The present Tendencies of the Milk Depot Movement.

The chief features of the work of a milk depot are—

- (1) Systematic medical supervision of the infants.
- (2) Instruction of the mother in infant hygiene.
- (3) Encouragement of breast-feeding.
- (4) The supply of pure milk for infants for whom hand-feeding is necessary.

The present tendency of the milk depot movement is to attach less importance to the supply of milk, and to develop the other features of the work. This is specially noticeable in France and Great Britain. In America, on the other hand, special attention has been paid to the milk supply, and until recently the systematic medical supervision characteristic of the French institutions was not made prominent. At the present time, however, medical supervision and educational work form an important feature of the work of many of the American depots, as appears from the following extract from the Annual Report of the New York Milk Committee for 1911:—

On May 22nd, 1911, the Committee held the formal opening of 27 milk stations. This number was increased to 31 during the early part of the summer. A trained nurse and an assistant were placed in each station, and additional nurses were added as the enrolment of babies increased, until at the close of the demonstration the Committee had built up a staff of 51 nurses and 46 assistants for carrying on the educational work of the stations under the immediate supervision of a supervising and an assistant supervising nurse. There was also engaged a staff of 10 physicians, not only to exercise medical supervision over all registered babies, but also to aid the station nurses in carrying out the educational work among the mothers. The work of the medical staff came immediately under the supervision of Dr. Philip Van Ingen, a volunteer supervising physician, chosen by the Medical Council.

The plan of feeding and medical supervision adopted was prepared and approved by the Medical Council of the Committee. This pro-

vided for the use of whole milk mixtures with barley water as a diluent. A high-grade raw milk from tuberculin tested cows was used throughout the demonstration. The contract for supplying this milk was awarded to the New York Dairy Demonstration Company after competitive bidding. Careful supervision was exercised to ensure that the daily supply of milk was up to the standard agreed upon at the time the contract was awarded. The Medical Council ruled that in case the company should find it impossible to maintain the standard as to bacteria content, pasteurization should immediately be resorted to. However, this was not found necessary owing to the excellent co-operation existing between the farmers and the milk company. This milk cost the Committee 7½ cents per quart, and it was dispensed in the original bottles to the mothers at 7 cents per quart. Milk sales were confined almost exclusively to mothers having babies registered at the stations, and who were in regular attendance at the weekly consultations conducted by the station physician and nurse. About one half a million quarts of milk were dispensed during the five months in which the demonstration was carried on.

On June 1st the stations of the Committee had under supervision 894 babies, and by July 1st this number was double; while during the months of July and August the enrolment increased rapidly until 4,500 babies were in regular attendance by September 1st. The number of babies registered at the close of the demonstration, October 31st, was 4,937. Altogether 7,919 different babies came under the direct supervision of the Committee's 31 milk stations some time during the period of demonstration.

In Germany all sides of the work have been well developed, and the depôts of the Berlin municipality afford probably the best examples of the lines on which a milk depôt should be conducted. The work of these institutions is described in Dr. Laue-Clayton's recent report to the Local Government Board on the value of boiled milk as a food for infants, from which the following extract is taken:—

Each of these consultations is in charge of a medical officer who has made a special study of the diseases and ailments of children. The attendance is so large that assistants have been appointed to assist the medical officer in the discharge of his duties. The consultations are held daily, and at the Naunyn Strasse (where the material here dealt with was obtained) the average daily attendance is about 100 babies.

Each consultation has its own staff of health visitors attached. These are women who have been thoroughly trained for work among children, and are appointed by the municipality to visit the homes of the babies who are brought up to the consultation. Their duty is to instruct the mothers in the general care and hygiene of the infant in accordance with the directions given by the medical officers at the consultation.

The clientèle of the consultation consists exclusively of the working classes. The fathers of the children who are brought up to the consultation are for the most part earning about 20-30 marks a week (see p. 41 and Table VI).

Parents whose income is over 40 marks a week are expected to pay a private doctor, and are only allowed to attend in very special cases.

The attendance at the consultation is entirely voluntary, except in a few cases where the babies are illegitimate, and are boarded out under the poor law authorities; here the consultation is used as a means of keeping the baby under medical supervision.

The simpler ailments of children are dealt with at the consultation, but sick children in need of in-patient treatment are referred to the hospital.

Breast-feeding is actively encouraged, and the great majority of the children are breast-fed. Small nursing bonuses are given to the nursing mothers. (Usually about two marks a week.)

The Milk Supply to the Consultation.—Regulations to ensure the quality and purity of the milk for the babies attending the consultation were drawn up when the consultations were first started, and tenders were invited from dairies who were willing to comply with the regulations. The milk was required to be of a higher standard, and was subjected to regular chemical and bacteriological examination by the municipality.

Two years ago, the town of Berlin started its own dairies outside Berlin, and all the municipal institutions are now supplied from these municipal dairies.

In these dairies 200 cows are kept which are tubercle-free, and the farm is conducted upon all the model lines of an up-to-date dairy.

The milk is examined chemically and bacteriologically, and I was informed that the fat content is never less than 3 per cent., and the bacterial count varies from 20,000 to 30,000 per c.c. The milk is thus one of great purity.

After milking, the milk is rapidly filtered, bottled, and cooled to 3-4° C., at which temperature it is kept in the cold chamber. It is sent off as soon as possible by special train to Berlin, where it is delivered in cooled vans to numerous centres (about 80) in various parts of the town, whence it is fetched by the mothers of the infants attending the consultation, who are being artificially fed.

Milk is not given out by the consultation, except in a very few cases in which for some reason a plain milk dilution is not considered suitable.

The milk is paid for in full if possible by the parents of the babies, or in part if the social conditions are poor. Each case is dealt with on its own merits on the report of the health visitor, and in some cases the milk is given free. No child is allowed to have a deficient supply of milk as a result of the poverty of its parents.

Over-feeding is avoided by the amount ordered by the medical officer being written on a separate card, which the mother has to show to the dairy when the milk is fetched. The card is valid only for a certain number of days (usually 7-10 days, according to the discretion of the medical officer of the consultation), being stamped with the date up to which the milk may be given out by the dairy. After that date the mother must bring the baby up to the consultation in order to have the card stamped for a further period. The food of the infant and the milk of the municipality are thus kept under control.

The milk is ordered to be diluted on much the same lines as are followed in this country. The preparation of the milk in the home is under the care of the health visitor, who personally instructs the mother in this important matter. The milk is fetched from the dairy, is cooled, and is directed to be brought to the boil, and to be allowed to froth up twice. It is then at once covered, and placed in a vessel of cold water. In hot weather the water is directed to be changed frequently. Thus every care is taken of the food for the artificially-fed baby.

The Notes taken at the Consultation.—Full and careful notes are taken at the consultation, and entered on special sheets. The notes show the date of the child's birth, the date of its first attendance at the consultation, the feeding of the infant before its first attendance, the health of the parents, the number of children in the family, the wages and the general social condition of the family, the legitimacy or illegitimacy of the infant, and any other point which may require noting.

During the attendance of the infant the dates of its attendance, the weight at each attendance, the directions as to feeding, and the medical notes as to the child's health are all entered upon these sheets. In addition the remarks of the health visitors as to the general condition of the home, the baby, and the milk are entered after each visit. The visits are made at frequent intervals.

The Place of the Milk Depot in the Scheme of Preventive Medicine.

The chief objects of the milk depot are the systematic medical supervision of the infants, and the training of the mothers in infant hygiene. To every depot there should be attached an infants' consultation, conducted by a physician skilled in the special needs and ailments of babies. From the point of view of public health administration, the infants' consultation is a necessary extension and complement of the work of the health visitor, which has been so greatly developed since the passing of the Notification of Births Act. Health visitors teach the general principles of infant hygiene, but the teaching of general principles needs to be supplemented by the advice of a skilled physician in applying the principles in certain cases. Each baby is a separate individual, and may from time to time need an individualised regimen of diet and general hygiene. All who have had practical experience of health visiting carried out in connection with an infants' consultation must realise how much more effective the work becomes when the health visitor can bring her cases under systematic medical supervision. The work of the infant consultation, which is essentially preventive, should be regarded as an extension of the principle of the public medical inspection of children, which, in the case of school children has been applied in practice on a large scale by the Education (Administrative Provisions) Act, 1907, and in this way the work of the milk depot is closely connected with that of the local education authority.

But the milk depot is not only a clinic; it is an educational agency. To every depot there should be attached a school for mothers. Simple lessons and

demonstrations should be given to the mothers on infant hygiene, the care of the mother's health in pregnancy and lactation, food values, the making of infants' clothing, and other kindred subjects. In this way, as in the medical supervision of the infants, the work of the milk depot is closely correlated with that of the local education authority; and it should be noted in this connection that the Board of Education have recently stated that they are prepared to give grants in aid to schools for mothers in respect of definite and systematic courses of instruction in such subjects as those mentioned above.

Lastly, the provision of pure milk for the hand-fed children should be regarded as an important feature of the work. Medical supervision of the children and the education of the mothers will do comparatively little if the baby is fed on tuberculous, manure-laden milk. It is true that breast-feeding is encouraged, but in many cases it is impossible to secure an adequate supply of breast-milk for the whole of the first year of the child's life, and many children continue to be brought to the consultation until well advanced in their second year. Budin encouraged attendance until the child was two years old. Hence the infant consultation and the school for mothers should be supplemented, as in the Berlin depôts, by a supply of pure milk drawn from sources under the direct control and management of those responsible for the depot. The cows supplying the milk should be tubercle-free, and the processes of producing and handling the milk should be so conducted as to afford an object lesson in pure milk supply to the private dairyman. In this way the milk depot should perform an important function in raising the general standard of the milk supply.

July 1912.

MEMORANDUM submitted by Professor E. J. McWEENEY, M.A., M.D., D.P.H., F.R.C.P.I., containing
SUGGESTIONS as to the lines on which RESEARCH with regard to TUBERCULOSIS might be fruitfully conducted.

1. Research on Tuberculosis under the Insurance Act should be of a practical character, bearing as directly as possible on the prevention and cure of the disease.

2. The research contemplated should not be merely such as can be conducted at, or in connection with, hospitals and dispensaries, by ordinary clinical methods; it should require for its prosecution what are commonly known as laboratory methods and laboratory resources.

3. It should be borne in mind that our ability to prevent Tuberculosis may be more or less dependent on our knowledge of various matters which at first sight might appear to be of an academic and unpractical nature. Thus, for example, the question as to the exact portal of entry of the virus (respiratory or alimentary tract, skin, &c.) has important bearings on prophylaxis.

4. Coming now to the actual points to which experimental inquiry might, in my opinion, be directed, I would venture to suggest the following lines as being of immediate practical value:—

- (a) An endeavour to ascertain whether there exist for tuberculosis bacteriotropic drugs capable of exercising on the bacillus a specifically destructive effect comparable with that of salvarsan upon the syphilis spirochaetae, and of atoxyl upon certain trypanosomes, in other words, to work steadily at the chemotherapy of tubercle.
- (b) It seems to me quite within the bounds of possibility that the lipid substances of which the outer coating of the tubercle bacillus to a large extent consists, might possess properties that could be utilised for therapeutic, immunising, or diagnostic purposes. In this connection I might recall the fact that lipoids such as cholesterolin and lecithin have been found to play the part of activators of snake venom and other poisons: that they can also possess haemolytic and bactericidal properties, and that they play a

leading part as anti-gens in the mechanism of the now famous Wassermann reaction for syphilis.

- (c) In connection with (a), systematic attempts might be made to finally determine what value (if any) is to be attached to the practice already in vogue of treating internal tuberculosis by intravenous injection of drugs, such as iodoform, ether, radio-active iodine, &c.
- (d) In connection with the search for curative drugs, that for protective agencies should also be prosecuted. By protective agencies I mean substances which when introduced into the animal economy are found to delay or prevent the development of a subsequent experimental infection. The recent work of Calmette and Guérin ("Ann. Pasteur," Vol. 25, 1911, p. 625) on the effect of inoculation with cultures attenuated by growth on glycerinated ox-bile-potato may serve as an example of this line of work. The production of passive immunity by the injection of antisera, and the possible prophylactic effect of chemical substances quite unconnected with the bacilli seem to offer promising fields for future research.
- (e) In connection with the rôle of the cow in transmitting tuberculosis it might be well to continue the work of the recent Royal Commission by prosecuting the search for bovine strains of tubercle bacilli affecting the human subject.
- (f) The question as to the possible infectivity of the milk of reacting, but not clinically tuberculous, cows seems to me not yet sufficiently cleared up.
- (g) The existence of a non-acid-fast and granular condition or phase in the life history of the tubercle bacillus as maintained by Much of Hamburg is a matter of diagnostic and practical importance, and needs to be

scientifically tested on a large scale. If established, it would account for the infectivity of caseous pus and other materials in which the bacillus cannot be detected by the ordinary methods.

- (h) It is well known that abundant exudations of serous fluid frequently take place e. gr. into the pleura, under the influence of tubercular infection, and yet even on the *closest* microscopic investigation no bacilli can be detected. Are such effusions due solely to the influence of specific toxins *in vitro*? Or are they due to the presence of living bacilli that have assumed what may be called the "masked" or granular condition described by Much?

The original reference to me having been enlarged by a request conveyed to me in a letter from Dr. W. J. Maguire, dated 17th May, that I should append a statement of my views as to how best the sum of 5,000*l.* per year, now to be rendered available for research, should be allocated, I beg to subjoin the following:—

5. Inasmuch as, for the special purposes in view, it is essential—

- (a) that cases of tubercular disease in the human subject should be available for continuous study, covering prolonged periods in hospital, in order that the effect of treatment on the various lines set forth higher up, should be accurately observed and recorded, and
 (b) that ample laboratory accommodation should exist in close connection with such hospital, and, inasmuch as
 (c) none of the hospitals now existing in Ireland appear to meet the requirements of the case,

I would suggest that a *special research hospital* containing but a small number of beds—say, 10 or 20—be founded in some convenient place, and be provided with the necessary laboratory resources. It should be worked by a staff consisting of a visiting physician, a visiting surgeon, the usual nursing *personnel* and three pathologists, namely, a principal pathologist and two assistants. (The term "pathologist" is to be taken as including that of "bacteriologist.") The three last-mentioned appointments should be whole-time ones. The salaries should be such as to secure the services of first-rate men. The senior or principal pathologist, who might be expected to remain permanently in his position, might receive 700*l.* yearly—the senior assistant 300*l.*, and the junior 200*l.*

With regard to the remuneration of the visiting physician and surgeon, they would, I think, be inclined to look upon connection with such an institution as

sufficient remuneration in itself. They would be regarded (and justly so) by the public, as possession unusual opportunities for the study of tuberculosis. Such a reputation must necessarily be of great value to a practitioner.

With regard to the material for study at the hospital, it would not, in my opinion, be difficult to find, amongst the thousands of persons who are afflicted with tuberculosis in its various stages, some who would willingly undertake to remain as patients in such an hospital for indefinite periods, whilst their cases were being studied and the effect of the newly devised remedial measures tested. Their surroundings would be more comfortable and their chance of ultimate recovery greater than at the ordinary charitable hospitals.

The scheme now proposed is not without precedent. In "The Times" of last Thursday (May 23rd) will be found an account of the foundation at Cambridge of a research hospital on precisely the lines which I have just sketched out.

I have no doubt that the project of such an hospital for tuberculosis in Ireland would meet with general support and would be aided by substantial pecuniary donations from wealthy and philanthropic citizens.

The advantage of such an hospital would be that no disease save tuberculosis would be studied there, and that the necessary laboratory arrangements would be in the hospital itself, so as to avoid all waste of time, and ensure a complete concentration of the activity of the staff on the subject of research.

Should, however, the creation of such an hospital fail to meet the approval of the Commissioners, then I would suggest, as an alternative, the setting up of a special laboratory for tuberculosis research in connection with the pathological department of some existing institution of University standing. A specially favourable opportunity for doing this is presented at University College, Dublin, which is now about to erect its new buildings. It would be easy to arrange with the Governing Body for the inclusion in the pathological department of a laboratory specially constituted and equipped for tuberculosis research.

We have on the staff of the University College a lecturer who makes a special study of the practical application of the results of immuno-research to actual treatment, and whose appointment is the only one of the kind in Ireland.

Whoever may be selected to carry out this work would require to have beds placed at his absolute disposal in some general hospital, if a special one is not provided. The services of a fully trained pathologist would also be needed to carry out the laboratory work.

May 1912.

MEMORANDUM submitted by W. F. MELLERSH.

For many years those practising dentistry have been aware of the connection between oral sepsis and dental deficiency and physical deterioration; but only recently has it been fully realised that a healthy mouth is a factor of the first importance in the treatment of pulmonary tuberculosis. We see the result of the recognition of this fact in the regulations of several of the leading sanatoria for the treatment of consumption with regard to the care of the teeth.

In the regulations for patients at the Brompton Hospital Sanatorium, Frimley, the following appears:—

"Patients are not allowed to remain at the sanatorium unless their teeth are in such condition that they are able to eat the ordinary food, and are free from any suppuration of the gums."

In the Ventnor rules we read:—

"Each patient is advised to have his or her teeth attended to before admission so as to secure the best results from the treatment at the hospital."

In the rules of the Royal National Sanatorium at Bournemouth is the following:—

"As the condition of the teeth is of great importance in the treatment of consumption,

patients should always have their teeth attended to before admission to the sanatorium, and it is hoped that the medical attendant will see that this is done."

I need say nothing more as to the obvious need for making some provision for treatment of the teeth of patients suffering from tuberculosis generally, and particularly of patients who are undergoing sanatorium treatment.

The medical and dental professions are of one mind on this question. It is a pressing necessity.

It is a much more difficult matter to suggest the means by which adequate dental treatment may be provided. The need for skilled dental treatment is extremely widespread amongst the working classes. Such treatment, however, to be efficient, cannot be given cheaply. Most conservative dental work is tedious in character, and, in consequence, relatively expensive. The simplest method of giving dental treatment to tuberculous persons would be to have a dental clinic established in connection with every tuberculosis dispensary.

As a beginning it would, perhaps, be as well to engage the services of some local well qualified

practitioners who would attend at the dispensaries, say for two or three evenings a week. If the work were limited to the removal of septic stumps, the sale of tooth brushes at cost price and the giving of general directions as to the hygiene of the mouth, much good would be done. Experience would soon show to what extent it is desirable and economically possible to do more conservative work, such as fillings, &c.

For the most part, the working classes are satisfied to have deficient teeth extracted. They rarely trouble about having them stopped.

It might be possible to run the dental dispensary in connection with a tuberculosis dispensary on a contributory basis: the regular payment of a small sum securing for the patient skilled dentistry at a much reduced fee.

Such a scheme has actually been running in Reading for the past eight years. The following notes, as regards this work, are taken from the "British Dental Journal," July, 1911.

Mr. Vernon Knowles, of Reading, at a meeting of the Southern Counties Branch of the British Dental Association, said:—

"They had there a large artisan population that required attention and the doctors had long been troubled with the difficulty of knowing what to do in the case of poor patients who needed dental treatment. Happily, that problem was now solved. It was understood that no one earning more than 30s. a week, except in the case of large families, should go to the dispensary; they had to pay 6d. on joining and 4d. per month's subscription (1d. per week), making 10d. in all. Extractions were done for nothing; gas or stopping 2s. 6d.; and dentures 1l. to 4l. The system worked easily, they had 20 doctors connected with the dispensary, and it proved a great blessing to the town and neighbourhood, people coming from distances of 10 or 12 miles away. So they covered quite a large area round Reading. As regards school children, Reading had now a school clinic, at which parents earning below 24s. per week paid nothing; those earning from 24s. to 30s., 3d.; and above those wages 6d., to a maximum fee of 9d. This scheme had only just been started and there were 13,000 children in the schools. He had gone through the schools and treated the children between five and seven years, and was now dealing with those of eight years. He visited the schools with the nurse and chartered the children's teeth; the parents were notified of defects and, if they were willing, the child was sent to the clinic on a suitable day for treatment. He did not think they would get any general treatment of elementary school children if parents had to pay more than a few pence. From that standpoint he was disappointed that educational authorities received no State aid for this purpose, but perhaps the Insurance Bill might do something. He could not help thinking that the dental profession ought to have tackled this question seriously, on broad and practical lines, for the benefit of the poor. He did not like to say that they were working merely against the quack; there was a real public need for such schemes. By the way, he might remark that the fees of the quacks in Reading had come down to the level of the dispensary. Personally, he believed that the public often went to the quack not from choice but from compulsion and ignorance."

Of greater importance than the caring for the teeth of the adult population is the care of the teeth of the children. There is no question that any scheme of dental treatment is unsound that does not put the treatment of children in the first position.

School dental clinics such as working at Cambridge and elsewhere are the best organisations for this important work.

The following notes in regard to the Kettering School clinic are of interest as giving some indication of what the probable work and cost of a dental clinic in connection with a tuberculosis dispensary would be and are taken from the report of a meeting of the School Dentists' Society on March 21st last.

Mr. Bryan J. Wood, describing the work at Kettering, said he "believed it was generally agreed that treatment should begin at the period of the eruption of the first permanent molars; it was obvious that the earlier caries could be detected, the easier it was to fill the teeth affected, and to avoid the infliction of pain on the children. For practical purposes in starting a clinic it was best to limit the initial examination to children in the 'infants' department; although even then children would occasionally be found to have cavities in permanent molars so large as to render these teeth unsavable without resort to pulp treatment—to say which was, at present, the same as saying that the teeth are unsavable. At Kettering they had been reluctantly compelled to abandon the treatment of any molars in which caries had progressed to any great extent: being so limited for time they thought it wiser to treat three children with incipient caries of the permanent teeth rather than one with the disease well developed in these teeth.

"Having decided as to the age limit, the next consideration is, what treatment shall be accorded to the children so selected. In the first place, the aim of the clinic should be to give each child treated a clean mouth, with a reasonable chance of its remaining clean and free from disease in the future. To accomplish this, three things are essential.—

"(1) All seriously carious temporary teeth shall be

" extracted;

"(2) All permanent teeth that are saveable shall

" be filled;

"(3) The child and its parents should be instructed

" in the proper methods of cleaning the

" teeth.

"The last point is often lost sight of in the rush and hurry of carrying on a clinic, but it is a side of the work that must be given its full share of time and energy. As the work of a school dental officer is apt to be judged solely by figures shown in the annual report, one is tempted to neglect the educational side of the work for the operative. In this matter the whole time officer is in an infinitely stronger position than the part-time officer can possibly be.

"The average number of children in the elementary schools at Kettering is 5,500. The dental clinic is open for forty half-days during the year, or rather eighty quarter days of one and a half hours each, the attendance being on two days in one week from 9 to 10.30 a.m. The salary of the dental officer is 10l. 10s. per annum, plus a fee of 15s. for each half-day of three hours—making in all 40l. 10s. for the forty half days. Two rooms at one of the most central schools of the town are used for the clinic, the surgery being also used by the school medical officer and the school oculist. In addition, the nurse's room is also used as a recovery room after extractions, this arrangement obviating waste of time in the surgery. The school nurse and a probationer are at the disposal of the dental officer. The nurse is responsible for arranging for a proper number of children for treatment being at the clinic, the children being brought to the clinic from their respective schools by the assistant nurse. The nurse assists in the surgery, cleaning instruments and mixing fillings; her assistance is extremely valuable, her tact often working wonders with children inclined to be frightened or refractory, and so easing the work of the operator. The nurse is also responsible for all the clerical work except the sending out of notices to parents, which is done by the clerical staff of the educational authorities. The equipment consists of a wooden Morrison chair, a foot engine, the necessary probes, excavators, burnishers, burs, &c.; the dental officer uses his own forceps and hand-pieces."

For full information in regard to such clinics reference should be made to Sir George Newman's reports in the Blue Books for the last two years.

In conclusion I would suggest that to secure efficiency there should be a properly organised dental service running in connection with and on similar lines to the medical service.

W. FRANCIS MELLERSH.
March 1912.

MEMORANDUM submitted by D. J. MORGAN, M.D., County M.D.H. (Glam.).

The administrative county of Glamorgan consists of 19 urban and 8 rural districts, having a total population (as enumerated at the Census taken in April 1911) of 743,110 (391,663 males and 351,447 females). The total acreage is 489,529, and, calculated on the

1911 Census population, the density of population amounts to 1.52 persons per acre.

The following table gives the population of each of the 27 districts (Census 1901 and 1911), together with the number of deaths from pulmonary tuberculosis in these districts during the year 1910:—

Districts.	Population.		Deaths from Pulmonary Tuberculosis, 1910.	Deaths from other Tubercular Diseases, 1910.	Death-rate from Pulmonary Tuberculosis, worked on estimated Population to mid-Year 1910.
	Census 1901.	Census 1911.			
<i>Urban.</i>					
Aberavon	7,553	10,506	7	5	0.73
Aberdare	43,357	50,844	35	23	0.72
Barry	27,030	33,767	32	14	0.57
Bridgend	6,066	8,021	7	2	0.88
Briton Ferry	6,361	8,474	11	—	1.37
Caerphilly	16,250	32,850	22	10	0.71
Cowbridge Borough	1,202	1,167	1	—	0.83
Gelligaer	17,242	35,521	23	11	0.75
Glyncorwg	6,500	8,689	3	7	0.33
Maesteg	15,013	24,977	17	6	0.59
Margam	9,014	14,717	7	3	0.49
Mountain Ash	31,093	42,256	34	2	0.79
Neath Borough	13,720	17,590	22	13	1.29
Ogmore and Garw	19,907	26,747	12	14	0.46
Oystermouth	4,460	6,098	8	3	1.44
Penarth	15,300	15,488	17	4	1.03
Pontypridd	32,316	43,215	39	16	0.91
Porthcawl	1,871	3,443	2	1	0.47
Rhondda	113,735	152,798	113	48	0.81
<i>Rural.</i>					
Cowbridge	6,732	7,935	1	—	0.11
Gower	7,266	8,618	7	7	0.96
Llandaff and Dinas Powis	23,504	33,208	26	8	0.91
Llantisant and Llantwit Fardre	12,097	17,486	12	7	0.99
Neath	27,343	41,619	34	9	0.71
Penybont	16,564	22,330	11	9	0.62
Pontardawe	20,931	31,507	30	12	1.09
<i>Swansea:—</i>					
Llangyfelach Division	29,900	43,239	10	9	0.78
Llandilo-Talybont Division			24	8	0.81

The following table gives the number of deaths from pulmonary tuberculosis, together with the general death-rate in the administrative county of Glamorgan for the years 1893-1910 inclusive:—

	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.
Deaths	700	626	610	603	712	688	531	813	604	588	511	629	613	574	608	566	542	567
Death-rate	1.42	1.24	1.17	1.15	1.30	1.23	0.92	1.38	1.00	0.95	0.80	0.96	0.91	0.83	0.85	0.87	0.78	0.79

In the administrative county there is at present no provision made for the treatment of cases of pulmonary tuberculosis by means of tuberculosis dispensaries or sanatoria.

As previously mentioned, the population of the administrative county of Glamorgan is 743,110. If we add to this the population of the city of Cardiff—estimated to mid-year 1912 at 182,729, the county borough of Swansea 115,176, and the county borough of Merthyr Tydfil 81,293, the total population of the geographical county of Glamorgan is 1,122,318. The total population of Wales, including Monmouthshire (Census 1911), is 2,436,340. The population therefore of the whole county of Glamorgan, including Cardiff, Swansea, and Merthyr, is practically one-half of the whole population of Wales, including Monmouthshire, the population of the latter, including the county borough of Newport being 414,750.

In any scheme for the prevention and treatment of tuberculosis advantage must be taken of co-operation with all voluntary agencies, present or future, and joint schemes must be considered between the administrative

county of Glamorgan, the city of Cardiff, and the county boroughs of Swansea and Merthyr Tydfil on the grounds of greater economy and efficiency. Section 44(3) of the National Insurance Act, 1911, gives the Local Government Board power to make an Order facilitating such co-operation. The city of Cardiff is situated at the eastern boundary of the administrative county, the county borough of Swansea at the western boundary, and the county borough of Merthyr Tydfil at the northern boundary.

In the case of the city of Cardiff, steps have already been taken to secure co-operation between that city and the administrative county. Since the year 1899, a joint laboratory between Cardiff and the county, known as the Cardiff and County Public Health Laboratory, has been established at No. 9, the Parade, Cardiff. This laboratory is controlled by a joint committee consisting of members of the county and city councils. At this laboratory systematic chemical and bacteriological examinations have been made of all public water supplies, and of samples of food, milk, and meat, and of pathological tissues, including the

examination of sputum for the tubercle bacillus. During the last quarter of the year 1911 research work for the detection of the tubercle bacillus in milk supplies of the administrative county and of those serving the city of Cardiff was commenced. It is proposed to maintain and extend this research work with the object of tracing any tuberculous milks to their source, and of detecting and eliminating animals with tuberculous udders. The following table gives the results of the examination of the mixed milks in this way for tubercle bacilli:—

Source.	Number examined.	Positive.	Negative.	Percentage of Positive Results.
Cardiff -	11	1	10	9.09
County -	15	2	13	13.3

Recently the Cardiff City Council approached the Glamorgan County Council in regard to the establishment of a joint tuberculosis dispensary, which would extend the usefulness of the tuberculosis dispensary already established in the city of Cardiff, in order that patients from the adjoining districts may be treated at this centre. The Glamorgan County Council at its meeting on the 14th March last, appointed its representative on the Joint Laboratory Committee to meet representatives of the Health Committee of the Cardiff City Council to discuss with them the possibility of forming a joint committee for the purpose of establishing and maintaining a joint dispensary in connection with any sanatoria which might hereafter be erected. It is anticipated that this committee will meet shortly to discuss the matter.

We are particularly fortunate in Wales in having in our midst a very important and influential voluntary association known as the Welsh National Memorial Association, which has been formed for the purpose of assisting in the campaign for the eradication of tuberculosis in the principality. This association has already collected subscriptions amounting to about 200,000*l.*, the greater portion of which has been provided by the noble generosity and munificence of David Davies, Esquire, M.P., and his family.

At a meeting of the Public Health and Housing Committee of the Glamorgan County Council, held on the 13th November 1911, to consider certain proposals of the Welsh National Memorial Association, at which Mr. David Davies was present and explained the views of the association with regard to sanatorium treatment, &c., the following resolutions were passed and subsequently confirmed by the County Council:—

"That the Council approve the proposal of the National Memorial Committee to amend the Bill by providing for the establishment by Royal Charter of a King Edward VII. Welsh National Memorial Association empowered to provide national sanatoria for the treatment of tuberculosis for Wales and Monmouthshire."

Provided that such institution be established so as to be accessible to patients from all parts of the area, and that each sanatorium be under the full management of a quota of the council of the memorial association consisting of the officers of the association and the representatives on the said council of the county councils, county borough councils, and local health committees of the counties and boroughs for whose patients such sanatorium is primarily intended. Nevertheless it is fully understood that all sanatoria so to be established under the King Edward VII. Memorial Fund are to be available for patients from any part of the principality and Monmouthshire.

The committee recommends that having regard to the very large sums of money collected for the fund from all Wales, the council agree to accept for the present purpose the limited representation on the council of the proposed association agreed to by the promoters, according to which this council will have eight representatives on a body of about 73 members, provided that an amendment be made whereby the council of any county or borough who can satisfy the

Registrar-General that their population during the past year has attained a complete 100,000 shall be entitled to an extra representative in respect of such 100,000 without waiting for the next census.

The constitution of the proposed council to be created would be as follows:—

- (a) The officers of the association, viz., president, two vice-presidents, and treasurer, and the representatives of the board of governors of the Treasury, the Local Government Board, and the Insurance Commissioners.
- (b) Persons appointed from among members of the board of governors by the council of every county and county borough respectively in Wales and Monmouthshire at the rate of one person at least by each such council and one further person for every completed 100,000 of population within the limits of jurisdiction of such council.
- (c) Persons appointed from among the members of the board of governors by every local health committee at the rate of one person at least by each such committee, and one further person for every completed 200,000 of population within the limits of the jurisdiction of such committee as determined by the then last official census.
- (d) Eight persons elected by the board of governors.
- (e) Eight persons co-opted by the council.

The committee is of opinion that the administration of sanatorium benefit is better left in the hands of the local health committees and county and county borough councils, and that such committees and councils should have the right to send their patients to the National Association's sanatoria, subject only to an appeal on medical grounds as to the suitability of any case for sanatorium treatment.

The clerk was instructed to send copies of the above resolutions to the Chancellor of the Exchequer and to the Local Government Board forthwith, with a letter explaining that they were sent without being confirmed by the county council, owing to the progress made with the Bill in the House of Commons.

Mr. David Davies, M.P., informed the committee that the original intention to transfer the future administration of sanatorium benefit to the proposed national association was not now to be carried into effect.

From the above it will be seen that the county council, while desiring to co-operate to the fullest extent with the Welsh National Memorial Association, are of the opinion that the administration of sanatorium benefit is best left in the hands of the county council, and that the sanatorium or sanatoria should be established within the county, so as to be easily accessible to patients from the area.

In my opinion, it is extremely important that sanatoria to serve the geographical county of Glamorgan should be situated within the administrative county, and at centres easily accessible to friends of patients, for experience shows that patients from this part of the country at least, will refuse to go to a sanatorium if it is situated in a place where they cannot be visited by their friends, and further where sanatoria are situated at long distances from populous centres, the great educative influence on the friends of the patients is lost.

In the case of infectious diseases hospitals administrative experience has shown that the more easy the access to the hospital the greater is the willingness of patients to go into hospitals, and the greater the educative influence on the people generally with regard to the prevention of infectious diseases.

One difficulty which will certainly arise in the administration of sanatorium benefit is that persons suffering from pulmonary tuberculosis will refuse to go to a sanatorium, wherever situated, unless they can be certain that their families will be adequately supported during the time of their treatment in such an institution. In my opinion, local authorities should be empowered to grant additional aid in necessitous cases so as to meet this difficulty.

With regard to sanatorium provision—on the estimation that one bed will be required per 2,500 of the population—the administrative county of Glamorgan

will require 300 beds, or together with Cardiff, Swansea, and Merthyr, a total of 450 beds.

A sanatorium to be economically and efficiently maintained should be large enough to require two resident medical men, a superintendent, and an assistant; this would mean an institution containing between 100 and 200 beds. The geographical county of Glamorgan will therefore require two, if not three, sanatoria, and these should be placed within easy access of Cardiff, Swansea, and Merthyr, respectively.

Provision should be made in sanatoria, not only for early cases, but also for advanced cases, in which there is no hope of recovery, for these are the cases which cause the greatest menace to the health of the general public, and in the majority of these cases, especially in industrial centres, there are no facilities in the home for the proper nursing of the same with a view to the prevention of the spread of the disease.

It is sometimes urged that special institutions for these advanced cases are not desirable, chiefly on the ground that these institutions become known as homes for the dying, but my experience for five years at the Cancer Hospital, Fulham Road, London, leads me to believe that institutions containing beds for the advanced cases would be welcomed both by the patients and friends. At the Cancer Hospital there are at least 40 beds which are set apart for advanced and hopeless cases of cancer, and they are always full, and I have never heard of any objection on the part of patients or their friends to avail themselves of the opportunities of treatment in such wards.

In any scheme for the prevention of tuberculosis, it is, in my opinion, highly desirable and essential that more complete inspection should be made of our meat and milk supplies. In only two of the 27 districts in the administrative county of Glamorgan have veterinary surgeons been appointed to examine cattle slaughtered for food with a view to detection of tuberculosis. The figures given in the table showing the results of the examination of milk for the tubercle bacillus indicate the desirability of the systematic examination, by a veterinary surgeon, of all herds of cattle, with a view to the elimination of those found to be suffering from tuberculosis.

At the present time many sanitary inspectors in the administrative county hold the certificate of the Royal Sanitary Institute, qualifying them as inspectors of meat and other foods, but many of them, with their present duties, are unable to afford the time which should be properly expended upon the inspection of all cattle slaughtered for food.

Local authorities should be encouraged as far as possible to appoint whole-time qualified meat inspectors, whose primary duties should be to inspect all meat slaughtered or sold in the district, and see that it was free from tuberculosis.

In the year 1910, the Glamorgan Education Committee, at the request of the Sanitary Committee, established a course of instruction for persons desirous of qualifying as inspectors of meat and other foods.

The course, which was approved by the Board of Education, was divided into two parts, viz., 12 lectures delivered at the Public Abattoir, Pontypridd, followed by a practical demonstration of one and a half hours, and three weeks' practical instruction at the Islington Meat Market, and Billingsgate Fish Market, under the superintendence of the veterinary inspector of the London County Council and of the Fishmongers' Company, respectively.

Scholarships were awarded by the Education Committee to 21 persons, the majority of whom were sanitary inspectors holding office in the county, cover-

ing all railway fares, and maintenance whilst in London.

All the candidates presented themselves for the examination of the Royal Sanitary Institute, and 10 were successful in obtaining the certificate qualifying them as inspectors of meat and other foods.

A second course similar to the above was conducted during 1911. Fourteen candidates were awarded scholarships, 11 presented themselves for examination, and 10 were successful in obtaining the certificate.

I am not without hope that public health laboratories will shortly be established in every county and county borough, at which examinations of all pathological tissues, including sputum for tubercle, will be made free of all charge whatsoever for all medical practitioners, for I hold it to be in the highest interests of the public health of the community that all such examinations should be made free of charge, and that medical practitioners should be encouraged to avail themselves of this means of assisting in exact diagnosis of diseases which may come under their care.

It is hardly necessary to mention that co-ordination of the school medical inspection service with the public health service is bound to be an important factor in the detection and eradication of those diseases in school children which predispose to tuberculosis.

The question of stamping out pulmonary tuberculosis is a public health problem, the administration of which should be left in the hands of local authorities, and it will be a great misfortune in Wales, and a retrograde step, if the administration of the sanatorium benefit is allowed, in any way, to be taken out of the hands of the local authorities, who are both able and willing to do the work.

It is most undesirable that the method of treatment of tuberculosis or any other particular general disease should be officially centralised over so large an area as Wales, under the ultimate direction of one mind, which may be affected by prepossession, for the interaction of the various methods of treatment resulting in the reputation of the most successful, will, in the present state of medical science, tend to greater general progress, and, finally, better results.

In my opinion, as far as it is possible, grants in aid might well be made in the following cases:—

1. To institutions (other than sanatoria) such as tuberculosis dispensaries.
2. Towards the cost of structural alterations in the adaptation of smallpox or other hospitals for the reception of cases of pulmonary tuberculosis; or towards the extensions of existing sanatoria or tuberculosis dispensaries (if any) with a view to increased accommodation.
3. To county public health laboratories, such as the Cardiff and County Public Health Laboratory, where research work has been undertaken with regard to the spread of pulmonary tuberculosis by means of milk, meat, food, sputum, &c.
4. To local authorities to enable them to obtain the services of veterinary surgeons for the examination of cows; and of veterinary surgeons, or whole time sanitary inspectors, qualified as inspectors of meat and other foods, to examine cattle slaughtered for food, with a view to detecting tuberculosis.
5. In necessitous cases, to adequately maintain a family during the stay of the breadwinner at a sanatorium.

DAVID J. MORGAN.

April 1912.

MEMORANDUM submitted by F. W. MOTT, M.D., F.R.C.P., F.R.S., Pathologist to the London County Asylums; Director of the Pathological Laboratory; Physician to Charing Cross Hospital; Examiner in Pathology, University of Cambridge; on the Subject of RESEARCH in connection with TUBERCULOSIS.

Tuberculosis is a disease in which all conditions (inborn or acquired) which lower the general vitality and resistance of the body play an important part in primary infection and subsequent generalisation of

the specific organism in the body. The rational and scientific study of tuberculosis should embrace the "soil as well as the seed."

I shall consider "the expenditure" of the 60,000l.

per annum made available by the Insurance Act for the purpose of research under two main headings:—

- I. The aid of existing pathological research laboratories.
- II. The establishment of a central bureau for initiating, co-ordinating, and organising research.

I.

1. Recognition of the importance of laboratory research:—The importance of clinical laboratory research is already recognised in all large city and county hospitals; and municipalities of cities with universities utilise the excellently equipped pathological departments of the university.

2. The importance of pathological laboratory research as an important aid to diagnosis and treatment by routine methods:—My own experience in hospital and asylum practice.

3. The discovery of the essential cause of diseases by laboratory research, which is the necessary preliminary to more efficient methods of diagnosis, treatment and prevention:—The importance of pathological research in this respect has been recently well exemplified by the discovery of the organism of syphilis, the establishment of a new method of diagnosis of the latent as well as the active form of this disease; and by experiments on animals, which have not only greatly increased our knowledge of the disease, but also led to its more efficient treatment. These discoveries cannot fail to have a most remarkable effect upon the prevention of the spread of the disease and its transmission to offspring, an incalculable benefit to humanity.

4. The necessity of the correlation of clinical knowledge and experience (a) with routine laboratory investigation, and (b) with laboratory research:—My own experience can be given of the correlation of clinical knowledge and experience as Director of the Pathological Laboratory of the London County Asylums, in the investigation of dysentery and tuberculosis among the insane; of syphilis as a cause of general paralysis of the insane; and of "human genetics" in relation to the inheritance of types of insanity, and tuberculosis.

5. The recognition by monetary grants of the importance of physiology and chemistry in regard to research, respecting value of foods and the functions of nutrition and respiration in relation to tuberculosis. The advantage of utilising existing science departments in Universities and large medical schools in this respect, where a staff of highly trained and competent men exist.

6. The establishment of laboratories in connection with sanatoria.

7. Routine laboratory methods as aids to diagnosis and treatment in private medical practice. The general adoption of laboratory aids to diagnosis by better-class practitioners, also the treatment of disease by administration of vaccines and anti-toxins are becoming very general. The laboratory work is carried out by private clinical research institutions or by expert bacteriologists attached to the large hospitals. These experts are frequently called in consultation by the general practitioners who find their opinion of more value in many of their cases than that of the consulting physician. The poorer classes are at present denied the advantages of these new laboratory methods of diagnosis and treatment, unless they are attending

general hospitals where the routine practice of pathological aids to diagnosis is adopted.

The dangers of relying too much on these methods and neglecting a careful clinical investigation cannot be over-estimated. Laboratory methods should supplement and not replace the ordinary clinical methods of diagnosis; especially does this remark apply to early tuberculosis.

The Advance of Medical Science by Research.

The advance of medicine by research will be best attained by the establishment of well-paid professorships, sub-professorships, and directorships of laboratories and by subsidising where necessary present institutions out of public funds. Brains not bricks are required.

II.

A Central Bureau for Initiating, Co-ordinating, and Organising Research.

To arrange for organised research there should be established a central bureau.

To avoid the delay and monetary outlay necessary for the acquisition of a central site and building new premises, this bureau might be located in some existing institution, e.g., the Lister Institute.

The bureau should have a council who would appoint a director with clinical experience of the disease, possessing administrative ability and capable of co-ordinating and organising research work in all its branches. He should be assisted by a staff of highly qualified assistants.

Arrangements should be made whereby the officers of this central bureau could come into practical relations with, and obtain the collaboration of, county medical officers of health, tuberculosis officers, and those engaged in routine as well as research laboratory work.

I.

Comparative organised researches in various districts could thus be made in reference to the influence of (a) environment, (b) inheritance.

(a) The influence of climatic, social and industrial conditions; the relation of industrial poverty, compared with degraded poverty, to tuberculosis. The relation of disease, especially syphilis, drink and insanity to tuberculosis.

(b) The study of human genetics in relation to tubercular infection.

II.

(a) The compilation of statistics based upon critical and scientific methods by statistical experts with preparation of spot maps, showing the prevalence of tuberculosis in various districts and the effects of improved social and industrial conditions.

(b) The comparative effects of the various forms of treatment adopted, e.g., a critical analysis by independent experts of the results obtained by the different methods of treatment by tuberculin injection, sanatoria, &c.

(c) Publication of reports of investigations and researches by the central bureau.

November 1912.

MEMORANDUM submitted by R. MUIR, M.D., of the University, Glasgow.

The research to be carried on seems to me to be of two chief types, and it will be convenient to consider it in that way.

1. In the first place, it will be concerned with the application of already known methods of investigation to particular problems or questions that may be placed before the workers. Under this heading come inquiries into the paths of infection, the relative prevalence of the types of bacilli, the lesions produced by them, the effects of treatment and the associated immunity phenomena,

various statistical enquiries, &c. Work of this kind is relatively simple and straightforward, and the obtaining of valuable results within a reasonable time might be predicted. All that is necessary is a band of able men, well trained in methods, and such men are available. The investigations might be carried on (a) by whole-time workers, and it would often be advisable to have junior workers associated with them; (b) by part-time workers, that is, men holding other posts, scientific or clinical. Any of the workers who showed marked

promise might be sent abroad for special training. I consider that work of the kind referred to would be most profitably carried on in different centres throughout the kingdom, for the following reasons: (a) the workers necessary, and well equipped laboratories, already exist in different centres, and work of this kind is going on at present; (b) some of the problems are modified by local conditions—tuberculosis is not the same in all places; (c) the presence of research going on in a centre would be of great value to, and would have a stimulating influence on, all those concerned with tuberculosis. The subjects and lines of investigation would be drawn up chiefly by the central advisory committee (*vide infra*), but might also be proposed by the workers and approved by the committee.

2. The scheme of research will include investigations which have as their object the throwing of fresh light on the disease—the making of new advances or “discoveries.” Examples are: the obtaining of new methods of diagnosis and treatment, bio-chemical investigations on the products of the bacilli and their modes of action, on immunity and anaphylaxis, experimental therapy in animals, &c. For work of this kind men of the very highest qualifications are necessary; they must possess originality and breadth of outlook,

and must have had the most complete scientific training possible in their particular department. They are, of course, few, and ought to be selected with care. The number can be added to according to circumstances and a band of experts may be obtained. It is manifest that work of this kind must be centralised to a greater or less extent, but I do not think that the building of an institute or institutes for the purpose is necessary; for the present, at least, the workers could be housed in existing laboratories. An experimental farm or experimental farms would, however, be required at once.

The whole scheme of research would be best administered by an advisory committee of experts, who would arrange lines of research and distribute the work, make appointments to the working staff, allocate grants, &c. I may add that I think that any scheme drawn up at present ought to be regarded as tentative and made as adaptable as possible, and that no large sums ought to be expended on buildings. The carrying on of research on tuberculosis as a man's life-work is practically unknown in this country, and accordingly the available talent is largely latent; it may, however, soon be brought to light.

ROBERT MUIR,
November 1912.

MEMORANDUM submitted by Sir SHIRLEY F. MURPHY, F.R.C.S., late Medical Officer of the County of London.

The subject matter on which I am invited to express my views is: “The general policy in respect of the problem of tuberculosis in the United Kingdom in its preventive, curative, and other respects 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.”

The following are the considerations which, I think, should be borne in mind.

Sanatoria may be thought of as having two objects: (a) the cure of the sick person; (b) the protection of the community from infection. To the extent to which cure can be effected, (a) procedures may also be thought of as sharing in the (b) object.

On the question of the infectiousness of the disease, opposite views are held: (a) by those who attach the greatest weight to the fact that a person affected by the disease has often been known to have been associated with an antecedent case, frequently a member of the same family; (b) by those who are impressed by the evidence of hospitals for consumption that attendants on the sick do not suffer exceptionally from the disease, and by the absence of evidence of conjugal infection.

These opposing facts are explicable if the liability to attack be thought of as depending more upon susceptibility than upon exposure to a particular infection.

Susceptibility to attack appears to be transmissible from parent to offspring, and hence in non-resistant families, multiple cases of tuberculosis are likely to occur.

Assuming that the view is correct that the greater part of pulmonary tuberculosis is due to infection from person to person, there is much probability that a large proportion of the population, especially in urban communities, is from time to time exposed to risk of tuberculous infection, and, indeed, the experience of the post-mortem room has demonstrated that many persons, dying from other diseases, have, at some period of their lives, been affected by tuberculous disease which had become arrested. The probability of escape from fatal tuberculosis would thus appear to depend more upon the possession of powers of resistance than upon freedom from exposure to known infection, and accordingly the hope of success in effective administration appears to lie in recognition of that view.

A notable feature in the behaviour of the disease is the progressive reduction in the death rate from tuberculosis. While it may be necessary to bear in mind

that better diagnosis may have materially affected the figures, there is much reason for thinking that there has been actual decline of the mortality, and that this decline dates from a period before recent teaching of the infectiousness of pulmonary tuberculosis could have had influence.

The decline, therefore, may be referred to one or more natural causes, and the improvement in the well being of the population suggests itself as a likely factor by increasing the resisting power of the community. In support of this view may be urged the fact that the death rate from pulmonary tuberculosis of populations presenting different degrees of prosperity, is less in the well-to-do than in the less prosperous populations.

These considerations appear to point to the conclusion that the prevalence of pulmonary tuberculosis is governed more by the powers of resistance of the community than by exposure to known infection, and that, apart from any question of the willingness of infected individuals to submit to more than temporary residence in an institution, any comprehensive effort to segregate persons so suffering in sanatoria does not give expectation of results commensurate with the large expenditure involved. Concerning the provision of sanatoria with the object of the cure of the patient by treatment within these institutions, although I cannot claim experience of the treatment of tuberculous persons, I think it may be said that the original expectation of the value of this method of treatment has not been realised in later experiences. The cases which are regarded as able to receive more than temporary benefit have become more restricted in number as the result of inquiry into the subsequent history of the patients, and hence those cases, now deemed suitable for sanatorium treatment, are patients whose disease has made but small advance, or who indeed have symptoms which raise question of tuberculous mischief rather than give confirmed evidence of it. Value, however, is still attached to temporary residence of incipient cases in sanatoria, and there has been added to the reasons for approving these institutions, the education within them received by the consumptive person which aims at the maintenance of his own improvement in health, and the protection of the community against infection by his sputum, when he returns to his home. The estimate of the value of sanatorium treatment cannot as yet be said to be so finally determined as to indicate the necessity of permanent provision on a large scale of public institutions of this nature. Probably a profitable expenditure of public money would be in providing sanatoria of the nature of convalescent homes for ailing children

from tuberculous families, or suffering from tuberculous affections.

More recently, "anti-tuberculosis dispensaries" have been instituted for the treatment as out-patients of persons suffering from tuberculous disease. The essential condition in which these dispensaries differ from the out-patient rooms of general hospitals is that the physician who treats the patient in the dispensary follows him to his home, and endeavours to influence his home conditions and the management of his life within the home both in his own interest and that of others living with him. Moreover, in this way, other members of his family are brought under observation and opportunity given for early detection in them of the disease. These institutions promise to play a useful part in the administration for dealing with the subject. They need not involve any large capital expense in the erection of buildings, nor a large expense in their management.

For the purpose of obtaining the best results, the institutions provided for dealing with tuberculous patients should be part of the local public health administration.

The services of medical officers of health are required to supervise the whole tuberculosis administration, and ensure its efficiency. They will be needed, moreover, for the purpose of study of the results obtained, and for the proper appraisal of its value, and they must be utilised as far as possible for the study of all the circumstances of the disease. The services of the health visitor will be needed for ensuring as far as possible that the advice given to the patient is acted upon in the home, for obtaining information as to the circumstances of the family, and in suitable cases, bringing in the aid of philanthropic bodies.

Further reason for the association of the administration relating to the care of tuberculous persons with that of the health authority is the opportunity which is now given in the elementary schools for the

early detection of tuberculous disease in school children through the system of medical inspection which has been instituted throughout the country.

It appears, therefore, that it is of considerable importance that sanatorium provision made by funds supplied in connection with the Insurance Act should not be a separate provision independent of the health administration, but should be a part of it. Some division of administration, however, appears to be inevitable under existing circumstances between the county council and the sanitary authority, and the best arrangement would probably be for the county councils to be vested with the power of providing and managing institutions.

The power of providing dispensaries might be delegated by the county councils to the borough authorities and in some counties to combined sanitary authorities, but it would be well for the county councils to make provision of both classes of institutions for all minor sanitary authorities. The provision to be made might well include arrangements with existing suitable institutions.

In submitting this memorandum, it is necessary to emphasize that any design of administration at the present time should not be regarded as more than tentative, and until further knowledge is gained of tuberculosis, it is desirable to limit expenditure on permanent buildings. Especially is further knowledge necessary as to the extent to which bovine tuberculosis is responsible for disease in man, the channels by which he is infected with tubercle, and the possibility of rendering him resistant to the disease by artificial means. To obtain such knowledge would involve laboratory investigation during a prolonged period.

The most profitable expenditure of public money with a view to accelerating the decline in mortality from tuberculous diseases would be in the institution of such inquiries.

March 1912.

MEMORANDUM submitted by SIR GEORGE NEWMAN, M.D., Chief Medical Officer of the Board of Education, on TUBERCULOSIS in CHILDREN.

(1) *Prevalence.*

The exact prevalence of tuberculosis in children is unknown, but some indication is obtainable from (a) the findings of medical inspection, (b) post-mortem examinations and inoculation tests, and (c) death-rates.

(a) The medical inspection of 543,594 ordinary school children examined by routine methods in England and Wales in 1910 yielded 1,553 cases of pulmonary tuberculosis and 2,069 cases of other forms of tuberculosis—total 3,622, or .67 percentage of tuberculosis. Groups of children selected for medical examination on account of some ailment yielded a higher percentage (1.09, 1.80, 2.22, 4.18). In Worcestershire one of the assistant medical officers diagnosed pulmonary tuberculosis in about 15 per cent. of the children examined. In 1911 a similar examination of 629,422 "routine" children yielded 3,727 cases of tubercle, or .59 percentage, and selected children yielded 1.68 per cent. tuberculosis. Dr. Philip considers that not less than 30 per cent. of school children have the stigmata of tuberculosis. Broadly speaking, the official figures for England and Wales are generally taken at 1 per cent. of all the children on the school registers (namely, 6,000,000), which yields about 60,000 cases of tuberculosis in school children. It should be explained that this 1 per cent. does not include (i) tuberculous children who are in hospitals, (ii) tuberculous children absent from school, (iii) tuberculous children in special schools for physically defective children, or (iv) doubtful or missed cases.

(b) It is well known that post-mortem examinations reveal a large percentage (40-50 per cent.) of tuberculous lesions in the bodies of children dying from all causes. There are also a number of returns on record with regard to the results of the von Pirquet inoculation and other similar diagnostic tests, yielding positive results in some age-groups, and under some circumstances, of as many as 90 per cent. of children inoculated (Hamburger). These figures, taken generally, indicate a wide prevalence of tuberculosis in children and a high degree of susceptibility.

(c) The following tables, taken from the Registrar-General's Returns, illustrate the degree of mortality of various forms of tuberculosis among children. Table I. records the number of deaths in England and Wales in 1910, and Table II. the death rates for England and Wales for 1907-10:—

TABLE I.

1910.	Under 5.	5-10.	10-15.	Total.
Phthisis - - - - -	1,173	485	955	2,613
Tuberculous meningitis - -	3,512	928	422	4,862
Tuberculous peritonitis and tubes mesenterica.	2,711	399	247	3,357
All other forms of tuber- culosis { Lupus - - - - -	1	—	2	3
{ Tubercle of other organs and general tuberculosis.	1,479	418	476	2,273
{ Scrofula - - - - -	20	2	2	24
Total - - - - -	8,896	2,232	2,004	13,132

TABLE II.

England and Wales : Mortality at several Ages from all Causes and from Tuberculous Diseases, 1907-1910.*

Cause of Death.	Deaths under one Year of Age per 1,000 Births	Death-rate per 1,000 living.							All Ages.
		1-5.	5-10.	10-15.	15-20.	20-25.	25-35.	35 and up.	
1907.—All causes	117.62	17.74	3.39	1.98	2.80	3.51	5.10	26.36	15.11
Phthisis	0.40	0.29	0.16	0.26	0.84	1.26	1.71	1.84	1.15
Other forms of tuberculosis	4.14	1.62	0.50	0.29	0.24	0.20	0.18	0.18	0.47
1908.—All causes	120.43	16.18	3.25	1.92	2.66	3.45	4.94	25.72	14.80
Phthisis	0.36	0.27	0.16	0.27	0.81	1.27	1.69	1.79	1.12
Other forms of tuberculosis	4.29	1.66	0.49	0.28	0.23	0.19	0.18	0.17	0.47
1909.—All causes	108.73	15.98	3.31	1.96	2.73	3.38	4.88	26.50	14.62
Phthisis	0.29	0.23	0.15	0.27	0.80	1.22	1.64	1.74	1.09
Other forms of tuberculosis	3.71	1.57	0.46	0.31	0.25	0.18	0.19	0.17	0.45
1910.—All causes	105.44	14.09	2.92	1.81	2.49	3.14	4.50	24.55	13.50
Phthisis	0.39	0.26	0.13	0.26	0.74	1.13	1.49	1.63	1.02
Other forms of tuberculosis	3.52	1.42	0.46	0.29	0.24	0.19	0.18	0.17	0.42

* The above rates have been calculated upon revised estimates of population at all ages based upon the enumerations of 1901 and 1911 (unrevised). The proportion of the population at each age-group is, however, still based upon the enumeration of 1901 only.

It is difficult, if not impossible, to estimate on a basis of the number of deaths recorded the number of children who are actually suffering from tuberculosis. It is probable that the mortality is high under the age of one or possibly two years, but thereafter it rapidly falls, and for children generally is low, and certainly much lower than in adult life. To obtain an approximate figure of incidence among school children from the number of deaths, the total number of deaths may certainly be multiplied by 5, or possibly even by 10 (which would yield 130,000, or twice the number actually found by medical inspection of children attending school). It may be added that in many cases the tuberculous infection is relatively slight in children, and complete recovery may occur without the disease being diagnosed or even suspected.

The relative proportion of pulmonary to other forms of tuberculosis in children cannot at present be ascertained, but, generally speaking, "other forms" largely predominate.

(2) Significance of Child Tuberculosis.

Broadly speaking, it may be taken that tuberculosis in the adult is the result of—

- (i) the development or sequelæ of tuberculosis occurring in childhood;
- (ii) tuberculous infection (which may be relatively slight) in adult life associated with a favourable predisposition to the disease;
- (iii) tuberculous infection (which may be relatively massive or long-continued) associated with an unfavourable predisposition or active resistance to the disease.

It is important to undertake the systematic and adequate treatment of tuberculosis in children, (a) because the disease is more curable than in the adult, (b) because childhood affords the best opportunity for detecting the disease in its earliest stages, and (c) because, in order to secure the ultimate reduction of the disease in the adult, it is necessary to begin with the child and deal thoroughly and radically with the disease in children from a wide preventive standpoint, including the improvement of the stamina and the increase of the powers of resistance. The more the matter is considered the more obvious does it become that the only truly effective way of dealing with the disease in the nation as a whole is by eradicating it in children and increasing their powers of resistance. If the resistance of the children of one generation

could be increased, the lighter would be the burden of dealing with the adults of the next.

At the same time it should be remembered that healed tuberculosis in children may lead to a greater or less degree of immunity to that form of tuberculosis in the adult. If the disease does not prove fatal immediately, the health of the child may be more or less permanently crippled, but in most cases it would appear that the body tissues are able to oppose an effective resistance to the spread of infection, and that for the time, at any rate, a complete arrest of the disease takes place. It may even be that a slight infection has a protecting influence and serves to bring about a greater or less degree of immunity. It must not be assumed, therefore, that because a child has suffered from some form of tuberculosis his constitution has necessarily been irretrievably injured; under suitable conditions he may become and remain a healthy person. He will, however, in such case require to be placed in an environment calculated to secure the full development of his bodily powers of resistance, and it is during the years of rapid growth and adolescence that this favourable environment is chiefly needed. Followers of von Behring consider that pulmonary tuberculosis, at all events when it occurs in the adult in the usual more or less chronic form, is always a late manifestation of tuberculous infection acquired during infancy or childhood. If this is true, the fact serves still further to emphasise the need for protecting children from infection, whether human or bovine.

In dealing with tuberculosis in children it is necessary to remember that there are three main factors in causation which must be considered in devising preventive measures, namely:—

- (a) The influence of heredity and *predisposition*, or, in other words, the constitutional condition of the child (*cf.* also predisposing diseases, measles, decayed teeth, adenoids, &c.).
- (b) The influence of *environment*, including absence of home hygiene, overcrowding, lack of fresh air, and above all mal-nutrition.
- (c) The factor of *infection* (personal infection and infected milk, &c.). Considerable difference of opinion exists as to whether, and if so, how much, the source the infection in childhood is human or bovine in origin.

These factors obtain, of course, in adult life also, but in childhood they can more easily be brought

under control. The young child must be protected from infection, especially in infancy; it must be taught a way of life which is hygienic; and it must be strengthened in its powers of resistance, above all being well nourished. Both seed and soil must be carefully considered.

(3) Existing Institutions.

Some of the chief residential institutions for dealing with pulmonary tuberculosis in children already existing in England are as follows:—

(1) Sanatorium at Harpenden	50 beds.
(2) Dr. Barnardo's Sanatorium, Barking-side	—
(3) Sanatorium at Stanington, North-umberland	80 beds.
(4) Sanatorium at Holt, Norfolk	40 ..
(5) Sanatorium at Peppard Common, Reading	18 ..
(6) Sanatorium at Gateforth, near Selby, Yorks	20 ..
(7) West Kirby School, Liverpool*	50 ..

For non-pulmonary and surgical tuberculosis there are (*inter alia*) the following residential institutions:—

(1) Treloar Cripple Home, Alton, Hants	230 beds.
(2) Swinton House, Manchester*	120 ..
(3) Royal Liverpool Country Hospital for Children, Heswall, Dee Side	—
(4) The Royal National Orthopaedic Hospital, London	100 beds.
(5) The Alexandra Hospital for Hip Disease, Queen's Square, London	68 ..
(6) The Hampstead Home for Incurables	49 ..
(7) Royal Sea Bathing Hospital, Margate	85 ..
(8) The Cripples' Hospital, Baschurch, Shropshire	80 ..
(9) St. Vincent's Surgical Home, East-cote, Middlesex	10 ..

In addition there are various general and special hospitals which have beds set apart for surgical tuberculosis in children.

There are also the following day schools for pulmonary tuberculosis:—

(1) Kensal House School, London*	90 places.
(2) Whitley Open Air School, Reading*	30 ..
(3) Barnsley Open Air School for Phthisical Children*	34 ..

In addition to the above there are eight open-air schools at Halifax, Bradford, Sheffield, Norwich, Birmingham, Darlington, and London (two), to which a few phthisical and many pre-tuberculous children are admitted.

Speaking generally, it may be said that there is accommodation already existing for not less than 300 cases of pulmonary tubercle in children and 1,000 cases of non-pulmonary and surgical tubercle. There are in addition about 150 places in open-air schools for tubercular children and 750 places in general open-air schools. These figures do not include a certain amount of miscellaneous provision in general and special hospitals.

(4) Additional Provision required.

From the point of view of new and additional provision it may be convenient to consider accommodation for—

- (a) Cases of pulmonary tuberculosis;
- (b) Tuberculosis of the bones and joints;
- (c) Glandular and other forms of tuberculosis.

Broadly speaking, the cases of pulmonary tuberculosis should be treated in sanatorium schools (day or residential); bone tuberculosis should be treated in residential sanatorium schools; and the glandular and other forms may be dealt with in open-air schools and classes, &c. Medical and surgical cases should be treated in separate institutions. In exceptional circumstances it may be necessary to provide a children's sanatorium accommodating medical and surgical cases,

but this should not be done in an institution accommodating less than 200 to 250 children.

- (a) *Cases of active pulmonary tuberculosis in children* should, wherever practicable, be sent to residential sanatorium schools for a time. If the child can subsequently attend a day sanatorium school or an ordinary open-air school the period at the residential institution may be somewhat curtailed. In some cases it may be possible to board-out in country homes.

Speaking generally, it would appear that about 250 additional pulmonary beds (accommodating, say, 1,000 cases a year) would be sufficient provision at the outset.

- (b) *Tuberculosis of bones and joints.*—Residential sanatorium schools equipped with all necessary appliances for the conservative surgical treatment of these conditions are essential. Provision is at present extremely limited, the accommodation in many of the general and special hospitals and infirmaries being greatly overcrowded. In any case such institutions cannot undertake the prolonged treatment which is necessary. The present treatment provided at many of these hospitals is necessarily incomplete and unsatisfactory, and an endeavour should be made to restrict the use of ordinary hospital accommodation to cases needing definite operative treatment. Partial treatment of surgical tuberculosis, which has yielded such unsatisfactory results in the past, should not be undertaken. These children should only be treated in institutions where they can remain until cured, and such institutions should provide for open-air treatment, day and night.

Speaking generally, it would appear that at least 2,000 additional beds are needed. A larger number of surgical beds are required than medical because:—

- (1) There is a larger number of cases requiring institutional treatment.
- (2) Adequate treatment cannot be obtained elsewhere.
- (3) Treatment must be complete and prolonged (often 18 months to 2 years).
- (4) Cases must be accepted at all ages and in the earliest possible stages. (Separate provision may be necessary for hopeless and advanced cases.)

- (c) *Other forms of tubercle* may usually be dealt with by means of open-air schools or similar institutions. Full advantage should be taken of playground classes, night camps, &c. The value of these open-air institutions has been abundantly proved, and it is urgently necessary that accommodation of this character should be considerably extended and made available in all parts of the country. Such institutions are also required for dealing adequately and at an early period of ill-health with large numbers of children suffering from pre-tuberculous condition and ailments, which if neglected are likely to lead to the development of tuberculous.

It will be observed that the provision proposed for England and Wales coupled with the accommodation already existing amounts in total to about 600 pulmonary beds and, say, 3,000 non-pulmonary beds. These figures are probably much within the mark, but should prove sufficient at initiation. They do not bear any exact relation, of course, to the findings of medical inspection or to the death-rate; they can only be a rough estimate. It is, of course, understood that separate provision would be required for Scotland and Ireland.

(5) Nature of Provision necessary.

Residential institutions should follow the general lines of similar institutions for adults, laid down elsewhere in the report. It will be obvious that less land is required for children, although adequate garden space is necessary, as gardening should form an important branch of the school curriculum. It should be borne in mind that a children's sanatorium, whether for surgical or medical cases, should always be a separate department or institution. The routine of such a sanatorium differs in many ways from that of a sanatorium for adults, and for various reasons it seems

* These institutions are maintained by the Local Education Authorities.

undesirable that children should be housed in the same building as, or should associate with, older patients. If the number of children is sufficient an independent sanatorium has advantages; but if the children are comparatively few in number it may be preferable to make their sanatorium a separate department of an institution for adults.

A day school for phthisical children need not be an elaborate or expensive building, but a sunny aspect, ample and effective means of ventilation, and facilities for teaching in the open air are required. In planning the curriculum of such a school it must be remembered that the home circumstances of practically all the children will be unfavourable in many respects, and that the less time that is spent in the home the better it will be for the physical condition of the children. The main requirements of a tuberculous child are a sufficiency of food, fresh air, rest, sleep, warmth, physical exercise, and occupation. The children should remain at school the whole day if practicable, and the school should be kept open during the holidays. A mid-day dinner should always be provided, and, wherever practicable, this should be supplemented by breakfast and tea, as is the practice in the case of the ordinary open-air schools. Children should be trained to rest in the recumbent position for two hours in the middle of the day, and should be allowed to rest at other times whenever this is indicated by the physical condition. As many of the children are likely to have active disease, they should be under careful medical supervision (the doctor should visit, say, once a week) and a nurse should also be employed. Temperatures should be taken twice daily, and the individual school work planned in accordance with indications derived from the child's condition, weight, temperature, and pulse rate. Weighing should be done every week, and it is desirable that baths should be provided, both for their educational and physical effect. The question of breathing exercises and other forms of exercises requires special consideration, and it is important that unsuitable exercises should not be taught, and that teachers should carefully observe the immediate effect of the exercises on individual children. Instruction in practical hygiene is obviously of the greatest importance in the case of tuberculous children.

It should be remembered that the children attending a phthisical school will be less fit physically than children attending an ordinary open-air school. Less actual work should, therefore, be required or expected from them, and the teachers must be prepared for considerable day to day modification of the regular time-table. The school should be open all the year round and the period of each child's attendance should be regulated solely by its physical condition.

Open-air schools should be organised in a similar way to those already in existence, but an endeavour should be made to restrict the capital expenditure. Several of the English open-air schools cost upwards of 40*l.* a place, which is unnecessarily high. Where it is impracticable or unnecessary to provide an open-air school, consideration should be given to the establishment of (a) open-air class-rooms; (b) playground classes; (c) night camps, &c. in connection with one or more already existing elementary schools.

(6) Cost of New Provision for England and Wales.

The capital outlay on site, buildings, and equipment may in ordinary circumstances be taken to be approximately the same as for institutions for adults, except in those cases where an institution for children is associated on the same site as an institution for adults. Speaking in a general way the case may be presented thus:—

Capital cost	-	150 <i>l.</i> per bed.
Maintenance	-	15 <i>s.</i> to 20 <i>s.</i> per week.
		£
(a) 250 medical beds at 150 <i>l.</i>	-	37,500
(b) 2,000 surgical beds at 150 <i>l.</i>	-	300,000
(c) Open-air schools, playground classes, night camps (say)	-	75,000
		412,500

Of this total sum it might be possible to obtain 50 per cent. from local authorities and other sources, leaving at least 50 per cent. (or 200,000*l.*) for Exchequer aid. It is, of course, recognised that it may be impracticable to find the whole of this amount out of sums allocated under the National Insurance and Finance Acts, 1911. As these children will all be uninsured persons the maintenance charges would have to be met partly by contributions from authorities and partly by special grants from the Board of Education in addition to the grants payable under the Elementary Education (Defective and Epileptic Children) Act, 1899. (See *Regulations for Medical Grants issued March 1912.*) It should be added that in connection with these various grants it may be necessary to classify cases from the point of view of capacity and fitness to receive education.

(7) Regulations and Conditions.

In distributing capital grants for children's institutions there are, of course, a large number of conditions which would have to be regularised (including the necessities of the area, definition of kind of schools, the character of accommodation required, the acquisition of sites, the erection of buildings, the acquisition, enlargement, or improvement of existing buildings, approval of plans, and regulations for general control and management, medical staff, &c.).

(8) Correlation of Children's Institutions with General Administration.

It will be necessary in due course to consider questions of ways and means which will arise in connection with administration. In this connection it is to be remembered that in each district, locally, children of school age are under the definite control and supervision of the Local Education Authority and they only out of the whole community are subject to periodical medical examination as a routine element of their school life. It seems clear, therefore, that education authorities, by means of their school medical service, have the opportunity of playing an extremely important and indeed essential part, in the detection, prevention, and treatment of tuberculosis. Children suffering from tuberculosis will be detected (a) by the school medical officer or his assistants in the course of medical inspection under the local education authority, and (b) by insurance doctors, hospitals, officers of dispensary, &c.

The question of central control will require consideration. It may prove the best course to follow the existing arrangements and practice in regard to special schools, deputing the approval of plans and the educational and medical control to the Board of Education, and the approval as to sites and loans to the Local Government Board. In cases where accommodation for children is proposed in connection with institutions for the treatment of adults the Local Government Board should also approve the scheme generally.

(9) Relation to Tuberculosis Dispensary.

All appropriate cases should be referred to the dispensary (a) for confirmation of diagnosis in doubtful cases, (b) for sanatorium or hospital treatment when necessary, (c) for investigation and control over home conditions. Subsequently, children of school age fit, or likely to become fit, to receive education (even in modified form) should be referred to the school medical officer for education in open-air schools, sanatorium schools, or other special schools, or in ordinary public elementary schools under special care and supervision.

Children unfit to attend school and for whom no provision in any suitable educational institution is available should receive domiciliary treatment under the supervision of the dispensary or be "cleared" through the dispensary for suitable institutional treatment. On recovery, such children should again be placed under the care of the school medical officer in ordinary or special schools. In order to avoid over-

lapping all domiciliary visitation and treatment in connection with these cases should be carried out under the dispensary, and arrangements should be made in every area for intimate co-ordination between the school medical service, the tuberculosis dispensary, and the public health service. In order to secure this end it may be necessary for the Board of Education to issue special regulations for the guidance of school medical officers and for the proper collation of records.

(10) *Duties of School Medical Officer.*

The school medical officer should be responsible for dealing with all cases of tuberculosis which occur among children of school age in his district. Many of these he will personally select from among the routine and special cases of ordinary medical inspection. In other cases the diagnosis will be made by private practitioners, or the medical officers of hospitals, poor-law infirmaries, tuberculosis dispensaries, &c. All cases notified through the school attendance department should also receive the careful consideration of the school medical officer. In his capacity as medical officer of health, he will frequently receive notifications of pulmonary tuberculosis occurring in adult patients. The children of such patients should be kept under careful supervision at the dispensary, at the school clinic (if such exists), or in school. In view of the importance, from the point of view of prevention, not only of discovering and treating children suffering from tuberculosis at as early a stage in the disease as possible, but also of watching the subsequent career of such children as recover, it seems desirable that a register or record of all children suffering from tuberculosis in any form should be kept by the school medical officer. Such a tuberculosis register may be kept separately, or may form part of a general register of school diseases. It should include a record of such particulars as the following:—

(a) A full account of the physical condition.

- (b) The results of special tests used to confirm the diagnosis, e.g., bacteriological examination of the sputum, or von Pirquet's test.
- (c) Any family history of tuberculosis.
- (d) The home circumstances and conditions in which the child lives.
- (e) The probable source of infection.
- (f) The state of health of other members of the family.
- (g) The nature of the treatment adopted.
- (h) Results of subsequent examinations.

Such a register, kept fully up to date, would be of great value in estimating the prevalence of tuberculosis among children, the general course taken by the disease, and the relative value of the various forms of treatment.

(11) *Preventive Action of more General Character.*

It is not sufficient to provide only direct or institutional treatment for tuberculous children. Improved arrangements for securing the early detection and diagnosis of the disease and for systematic and prolonged after-care are necessary. Simultaneously, effort must be made to improve the resistant power of children generally, particularly by increased nutrition, and to remove conditions and tendencies likely to lead to the development of tuberculosis. Under the former, the Education (Provision of Meals) Act is available; under the latter, the improvement and control of the milk-supply and the medical inspection and treatment of school children are matters requiring attention in each district. Particularly important is the early and adequate treatment of diseases and ailments predisposing to tuberculosis, such as adenoids and enlarged tonsils, measles and whooping-cough, bronchitis, and decayed teeth. Questions of personal hygiene, improved sanitation, and reduction of overcrowding must of course be considered as for adults.

March 1912.

A MEMORANDUM ON THE ANTI-TUBERCULOSIS MOVEMENT IN GERMANY.

[The following Memorandum has been compiled from notes made during an official visit to Germany in April 1912 by myself and two of the medical officers of the Board of Education (Dr. Janet M. Campbell and Dr. Alfred Eichholz). The purpose of the visit was chiefly concerned with questions of school hygiene, but the opportunity was taken to inquire into the present position of the anti-tuberculosis movement in Germany.

GEORGE NEWMAN.]

I. ORGANISATION.

The Central Committee for the Campaign against Tuberculosis was founded in Berlin in the year 1895, the object of the Committee being to organise the means for preventing and stamping out the disease, though not to undertake responsibility for actual treatment. The organisation is managed by a council of 19 members, the president of which is a Government official (honorary), and on which medical men, insured persons, &c., are represented. The general secretary of the Committee (Prof. Dr. Nietner) is a paid officer, a great part of whose time is spent in travelling and inspecting various organisations, institutions, &c., all over Germany. He is thus personally familiar with most of the principal persons concerned with the treatment or prevention of the disease. In addition to the members of the council itself there are large numbers of associates in different parts of the kingdom.

The first work of the Central Committee was to found local committees or associations, some 250 of which now exist, together with a number of branch associations. Each local committee is free to work out its own problem in its own way, and the influence exercised by the Central Committee is of an advisory and

auxiliary character. No attempt has been made to exert any direct or absolute central control. The idea has been rather to establish a sympathetic and friendly understanding between the central and local bodies. Moreover, it has not been thought desirable to amalgamate the funds of the various associations, as in practice it is found easier to raise money locally for local purposes.

The Central Committee receives a grant from the Imperial Treasury of 60,000 marks (3,000*l.*) and donations from various sources, such as the local committees, insurance committees, &c. It also receives the profits from certain lotteries.

The Central Committee is prepared to give advice and, in some cases, financial aid to associations requiring it. All plans of new sanatoria are sent to the central office for expert practical criticism, when alterations in structure or arrangement are frequently suggested. A subsidy towards the capital cost of a sanatorium is usually made by the Committee, and when this is done it is usually found less difficult to raise local subscriptions. No contributions are made towards the cost of maintenance of sanatoria.

The Central Committee organises periodical meetings, when popular lectures are given and questions of general interest are raised and discussed. There is also opportunity for private discussion between members of tuberculosis associations in regard to technical, medical, and administrative matters.

Speaking generally, there are three kinds of institutions involved in the German scheme, namely, dispensaries, sanatoria, and auxiliary institutions (such as forest colonies).

The following table sets out generally the institutional provision (excepting dispensaries) in Germany for persons suffering from tuberculosis. The figures are taken from "Der Stand der Tuberkulose Bekämp-

fung," issued by the Deutsches Zentral-Komitee für Bekämpfung der Tuberkulose:—

	1909.	1911.
Institutions for phthisical adults (<i>Heilstätten</i>), open during summer and winter:—		
Number of public institutions (<i>Volksheilstätten</i>)	99	102
Number of beds (men)	6,584	6,706
Number of beds (women)	3,802	4,301
Number of beds (men or women)	680	1,058
Total number of beds (public)	11,066	12,065
Average number of beds per institution (public)	112	118
Number of private institutions	34	34
Number of beds	2,013	2,121
Average number of beds per institution (private)	60	61
Country homes of recovery for men, women, and children (<i>Walderkolungsstätten</i>), open during the summer months:—		
Number of institutions	92	99
Institutions for children suffering from pulmonary tuberculosis (<i>Kinderheilstätten</i>), open during summer and winter:—		
Number of institutions	18	22
Number of beds	695	1,000
Average number of beds per institution	38	45
Institutions which accept "scrofulous" children or children threatened with tuberculosis, open in most cases only during the summer months:		
Number of institutions	79	86
Number of beds	7,329	8,122
Average number of beds per institution	92	94
Open-air schools (<i>Waldschulen</i>), open during the summer months:—		
Number of institutions	?	15

2. DISPENSARIES.

About 600 tuberculosis dispensaries (*Auskunfts- und Fürsorgestellen*) have now been established in Germany, mainly by the local associations. These are usually to be found in the large towns. (In rural districts there are frequently small dispensaries held at or in connection with the private surgery of the medical officer of health. In such cases a more or less competent nurse is usually available for home visiting and advice.) The dispensaries undertake no treatment, patients being invariably referred back to their own doctors, though occasionally tuberculin treatment is carried out by the medical officer at the wish of the patient's own medical attendant. These dispensaries are considered to be by far the most important administrative means of preventing the spread of the disease, and there appears to be a tendency throughout Germany to rely upon this unit of administration rather than to depend upon sanatoria. Their main functions are:—

(a) To serve as centres for diagnosis. The diagnosis may be arrived at by means of careful physical examination, by an expert physician, or additional measures may be adopted such as the injection

of tuberculin, sputum examination, X-ray examination, &c

(b) To act as clearing houses and to advise patients as to the means of obtaining institutional or other treatment. The dispensary acts as a means of communication between the individual patients and various associations, charitable or otherwise, which can be of assistance to them. It works in association with the municipality, the insurance committees (*Landes Versicherungs Anstalten, Kranken-Kassen*), &c., and with voluntary associations such as soup kitchens (*Suppenvereine*), and associations for securing help in the house-work or for providing food. In Berlin, for example, there is a special endowment for providing nourishment for tuberculous families.

(c) To arrange a "march past" of a family for examination of all suspects and contacts. Infected or doubtful cases are kept under continued observation. Children in infected families may be recommended to open-air schools and their school teachers kept informed. In areas where school doctors exist some co-ordination is usually maintained with them.

(d) To secure home visits by specially trained health visitors. These visitors are always women, and are paid officers. Many of those whom we saw appeared extremely efficient and capable. They give advice as to general hygiene and explain methods of dealing with sputum, washing, &c. They subsequently report to the dispensary and advise the special assistance which appears to be necessary. The dispensary is then able to provide help of various kinds; for example, sputum flasks, disinfectants, an extra bed to enable the patient to sleep alone, &c. An additional room is often rented for a sick patient or a more healthy dwelling is obtained. Disinfection of dwellings after the family moves or a death occurs is usually arranged and carried at the instance of the dispensary. While receiving assistance the family is kept under the constant supervision of the health visitor.

Although no direct treatment is undertaken it is hoped by means of dispensaries to assist in a practical way the 90 per cent. of phthisical patients who cannot or will not obtain admission to sanatoria and to aid in preventing the spread of disease among their families and dependents.

Tuberculosis dispensaries were visited at Berlin, Dresden, Nurnberg, and Munich.

Berlin.—The dispensaries are provided by an association founded in 1905 to establish local centres to which persons suffering from phthisis, alcoholism, and suspected malignant disease may be referred for advice. The president is Herr Geheimerat von Pütter (not a medical man), who is also administrative director of the Charité Hospital. There are five centres in the city of Berlin and nine in the peripheral districts. Each centre is located in an ordinary house easily accessible to the industrial population. Speaking generally, each consists of a waiting room, medical examination room, and a room in which the sisters can make a preliminary investigation of the patient and his circumstances. The dispensaries are open as a rule on two half-days a week. The staff of each consists of a visiting physician and two or more sisters, who undertake the home visiting and do the greater part of the work. It was stated that the aim of the dispensary is to advise persons who are suffering, or think they are suffering, from tuberculosis; to reach the homes by means of sisters who are trained health visitors and so to bring the homes within the influence of the dispensary, to secure such isolation of infectious patients as may be practicable, and to enable patients to obtain help from charitable associations when advisable and necessary. A record is kept of the physical condition of each patient, together with his social circumstances, hygienic environment, &c. There do not appear, however, to be any statistical records showing the results of the work accomplished. The association receives a yearly grant of 30,000 (1,500*l.*) marks from the Berlin Insurance Company and 15,000 marks (750*l.*) from private bodies, amounting in all to 45,000 marks (2,250*l.*). Patients present themselves on their

own initiative or are sent by their medical attendants or other persons acquainted with the work of the dispensary. The medical officer of health has no official connection with the association.

In 1911 the activities of the association included 43,649 home visits paid by the 17 sisters. As a result of these visits 2,021 cases were isolated to a greater or less extent in their own homes, assistance in home management was given in 267 cases, 555 persons received meals for six weeks from the kitchens for tuberculous patients, 154,000 briquettes of coal were secured for distribution, and the disinfection of homes (formalin for rooms and steam for bedding) was secured in 1,977 cases after death from phthisis. In regard to the patients applying for treatment, 428 were referred to sanatoria, 920 to country homes, 435 to forest homes, 144 to vacation colonies, 99 for country holidays, and 1,106 to hospitals. In addition, 1,213 children were sent to convalescent homes and 85,418 meals were obtained for necessitous children, together with a number of milk breakfasts.

Dresden.—Dresden possesses two dispensaries which were founded three or four years ago, the money being provided by contributions from the town, state and local insurance committees, private charity, &c. They are managed by a committee on which the various associations concerned are represented. The dispensaries are housed in new buildings erected for the purpose at an apparently reasonably cheap rate. Waiting rooms, consulting rooms, and inquiry rooms have been provided. A part-time doctor and two whole-time sisters are attached to one dispensary and a doctor and three sisters to the other dispensary. Between 4,000 and 5,000 patients (men, women, and children) attend yearly at the two dispensaries. The dispensaries are open three or four half-days a week. The functions of the dispensary are as usual, to act as clearing houses, as centres for diagnosis, and to provide home visitation, advice, practical assistance, disinfection, and after-care. After-care and the re-examination of patients returning from sanatoria appear to be carried out with particular thoroughness. A small number of patients are treated regularly with tuberculin at the request of their private medical attendant.

Nürnberg.—The tuberculosis dispensary was founded in 1906, and is under the control of the local society for the prevention of tuberculosis. It is managed in close association with the open-air colony at Rückersdorf. The maintenance of the dispensary amounts to 25,218 marks (1,260*l.*) per annum. The income is not entirely separated from the income of the open-air colony, but the contribution of 10,000 marks from the insurance committee of Mittelfranken has been specially earmarked this year. Contributions are also made by the city of Nürnberg, the Diet of Mittelfranken, and the local Kranken-Kasse. The remainder of the cost is met out of contributions by subscribers, employers, and patients. The staff of the dispensary consists of three part-time medical officers, four sisters, and a clerk. Cases are referred to the dispensary by hospitals, sanatoria, the insurance committee, and a comparatively small number come on their own initiative. Of the 1,952 new cases in 1911, 754 were men, 780 women, and 418 children. Of these 418 children 318 were discovered in the course of school medical inspection. The work of the dispensary includes the examination of new cases and of their families, re-examinations, supervision of the homes, disinfection, and practical assistance in the shape of food, milk, coals, clothing, boots, &c. As regards improvement of the home conditions, removals to healthier dwellings were secured in 45 cases, improvements in the living rooms in 52, and in the sleeping rooms in 359 cases; 159 homes were cleansed, beds and bedding were supplied in 87 cases, and grants in aid of rent were made in 19 cases. Tuberculin is never employed as a means of treatment and is only exceptionally used as an aid to diagnosis. Separate records are kept of each case, but no statistics are available at present.

Munich.—There is only one dispensary in Munich, which was opened in 1907. This has been found to be entirely inadequate to meet the needs of the city. It is housed in an ordinary large dwelling house, but the accommodation for patients is insufficient. The annual

cost of maintenance is about 15,000 marks (750*l.*) Grants in aid of the expenditure are made by the insurance committee of Upper Bavaria, the city of Munich, and the Council of the Province of Upper Bavaria.

In addition to the honorary medical superintendent there are three part-time medical officers, three whole-time nurses, and a clerk. The dispensary is open on three half-days a week, one half-day being devoted to children.

In 1911, 1,469 new cases (including 329 children) were examined, of whom 620 were male, 849 were female. The majority of the children were referred by one of the school medical inspectors who is also medical officer to the dispensary. The general organisation of the dispensary is similar to that found in other towns. One half-day a week, however, has been set aside exclusively for children. This arrangement did not obtain in the other dispensaries visited. The medical officer of health has no official connection with the dispensary and is only notified of cases when death or a change of residence occurs. Disinfection is carried out through the "Magistrat" and not by the medical officer of health. Overcrowding and ventilation are reported to the housing committee (Magistrat). No treatment either by tuberculin or other means is undertaken at the dispensary. Tuberculin is used in doubtful cases as an aid to diagnosis. Post-graduate lectures are given by the head of the institute to medical men who come from various parts of Bavaria.

3. SANATORIA.

One of the chief objects of the Central Committee has been to encourage the foundation of sanatoria, at first mainly with the idea of isolating patients, but later mainly with the idea of curing or arresting early cases of the disease. Under section 18 of the Imperial Invalidity Insurance Act, 1899 (*Invaliden-Versicherungs-Gesetz*), the committees have the power to contribute towards the treatment of cases of disease that are likely to be improved, though not necessarily cured, by suitable treatment. There are now about 100 working-class sanatoria containing some 14,000 beds. These have been erected for the most part by insurance committees out of surplus funds or by the local associations for preventing tuberculosis. They are maintained chiefly by contributions from insured persons, but also from fees paid by uninsured persons, local subscriptions, &c. The cost of maintenance varies from 4 to 6 marks per day (say 30*s.* to 40*s.* per week) according to the accommodation provided. The length of stay is on an average three months, the object being the arrest or cure of the disease rather than a training in preventive hygiene. In addition there are 36 private sanatoria for middle-class patients at which the cost varies from 7 to 8 marks per day with extras. The capital cost of sanatoria has varied from 5,000 to 6,000 marks (250*l.*) to 15,000 marks (750*l.*) per bed. In addition to the institutions for adults there are various sanatoria for children.

The sanatoria are used almost entirely for the treatment of early cases of the disease, and practically no attempt seems to be made to use them mainly or exclusively for educational purposes. There is at present very little provision for advanced cases. There seems to be a general dislike among patients to enter such special hospitals as have been established. These are regarded as "homes for the dying," and patients prefer to remain with their own families. The cost of maintenance of advanced cases in hospitals or elsewhere can be provided, but as a rule the patient prefers to receive the actual money payments rather than the equivalent in institutional treatment. In a few cases small institutions in the neighbourhood of the patients' homes have been established, but no compulsion to enter them is possible, and hitherto they have not been very successful.

It is estimated that there are in Germany at least 500,000 to 600,000 persons suffering from pulmonary tuberculosis. Nietner estimates 750,000 as suffering from all forms of tuberculosis, of whom 500,000 have phthisis; Pütter considers that there are 600,000 persons with phthisis; Von Müller, head of the Royal Insurance Department, Bavaria, thinks 600,000 a low estimate. Of the total numbers perhaps one-tenth, or

about 60,000, obtain sanatorium treatment. These are mainly insured persons, the majority being men. The sanatorium accommodation for women is more limited, and it is somewhat difficult for the uninsured to obtain institutional treatment. Such patients must either pay the cost of maintenance themselves or obtain assistance from the local tuberculosis association or from voluntary charities. The middle classes, who are uninsured at present, are not provided for, but they will be assisted by the new insurance law for officials and individuals having annual incomes up to 5,000 marks. This will come into force in January 1913, and sanatorium accommodation, &c., will then be available for people who have hitherto been unable to afford the somewhat high cost of maintenance. As a rule patients are referred to sanatoria from the tuberculosis dispensaries, and in a smaller number of cases from private practitioners, insurance doctors, &c. They are finally selected by the medical officer of the insurance committees. The medical officers of the sanatoria do not appear to have opportunity to select their cases personally, though they are able to send away cases which prove unsuitable after a reasonable trial.

The arrangements for *after-care* vary considerably and little or none is undertaken by the sanatoria. The imperial regulations require a biennial report for six years on each patient treated in a sanatorium. These reports are furnished by the patient and are lay statements as to wage-earning capacity. They may be accompanied by medical reports made by the medical referee of the insurance committee (as in Berlin), the insurance doctor (*Kassenarzt*) or general practitioners (as in Dresden), or by the medical officer of a tuberculosis dispensary (as in Dresden, Berlin, Nürnberg).

The following sanatoria were visited:—Beelitz (men and women), Hohwald (men), Planegg (men), and Hohenlychen (children).

Beelitz Sanatorium.—The institution was established and is maintained by the insurance committee of Berlin, and is the largest of its kind in the German Empire. It was founded in 1902 and enlarged in 1908, and is therefore also one of the most modern. The institution is situated 30½ miles S.W. of the city in the heart of one of the many pine forests surrounding Berlin.

Beelitz sanatorium is under the sole control of the city insurance committee, and only insured persons, men and women, are admitted. The governing body in Berlin consists of a general and executive committee. The general committee includes an equal number of representatives of employers and employes. Added to these is the chairman, chosen annually and alternately from employers and employes. The executive committee, with whom the real financial control appears to lie, consists of 11 members, a chairman and four members appointed by the city council and three representatives each from the employers and employes.

The estate covers 140 hectares—about 300 acres, and is administered in two departments (separated by the railway), one for phthisical patients (*Lungenheilanstalten*), and one for general complaints (*Sanatorium*). The latter receives patients suffering from nervous disorders—neurasthenia, hysteria, trade diseases, rheumatism, cardiac defects, all of which require rest cures not obtainable in the general hospitals of the city.

The accommodation for tuberculous patients includes four pavilions, two for men accommodating 333 and 200 respectively, and two for women accommodating 73 and 285 respectively, the total amounting to 891. On the day of the visit there were 524 men and 348 women, or 872 in all. There are seven groups of *Liegehallen* for men and 10 for women. The pavilions are provided also with verandahs which, with the bedrooms, face the south. Additional open-air provision is made in the shape of long open cloister walks paved with concrete. There is a *central kitchen*, with separate kitchens in each block for warming and distributing food, a central heating department delivering steam, underground, under high pressure, provision being made in each block for transforming to lower pressure. The *central laundry* provides for

the washing of all clothes after disinfection, which is carried out in each block. The *isolation block* provides accommodation for about 24 cases.

The pavilions contain the following accommodation: kitchen, dining room, nurses' room, dispensary, lavatory, throat spraying room, bedrooms, with two, four, six, or eight beds, steam and lysol disinfectors, spacious and luxurious bath rooms with large dressing rooms, sitz, hip, cold and hot baths, and steam sprays and footbaths. There is also a large supply of light baths, and a gymnasium with Zander apparatus, and a free space for Swedish movements. The beds are provided with screens of washable material fitted on to enamelled iron frames to provide some kind of separation between the patients.

The unmarried medical staff are accommodated in a large building, and separate houses are provided for the medical superintendent and married staff. Workshops are provided, but no patient is allowed to work in them. They include carpenters', bakers', butchers', plumbers', and bootmakers' shops.

The whole of the buildings appear to have been designed and constructed on an expensive scale. The rooms and corridors are spacious, amply lighted, fitted with expensive tiling, and carried out in attractive schemes of colour. The outlay on land, buildings, and equipment is stated to have been 400,000 marks, 16,500,000 marks, and 1,500,000 marks respectively, or 18,400,000 in all. The institution accommodates 891 consumptives and 328 general cases, or 1,219 in all. The cost per place works out at an inclusive cost of 15,094 marks, over 750*l.* per bed, or including buildings only, of over 675*l.* per bed. The cost of maintenance per day worked out in 1910 to 5 768 marks per day (2*l.* 0*s.* 4½*d.* per week).

The staff for the combined institution of 1,219 persons includes two medical superintendents, one administrative superintendent, 16 medical assistants, 23 nurses, 43 attendants, 365 persons employed in connection with the household, garden, machinery, workshops. The salaries of medical staff are as follows:—The superintendent receives 400*l.*—600*l.* (10 years), with house and all found; first-class assistants 180*l.*—300*l.* (six years), with 45*l.* for allowances, and second-class assistants 120*l.*—170*l.* (four years), with 45*l.* for allowances.

There appear to be three main causes which contribute to the relatively high cost of maintenance: (i) the large capital outlay, involving heavy loan charges, despite the low rate of amortisation, (ii) the large staff, medical and domestic, and (iii) the high rate of wages.

Selection of Cases.—The aim of the institution is to restore patients in the earliest stages of phthisis to a wage-earning condition—though not necessarily securing a complete arrest of the disease, and incidentally to educate them in regard to a healthy mode of life, and increase their powers of resistance. None but insured cases are admitted. The procedure in regard to selection is as follows:—

- (1) The *Kassenarzt* or other private practitioner notifies the case to the central offices in Berlin.
- (2) The patient—if desiring institutional treatment—is examined by the medical referee (Dr. Kayserling or his assistants).
- (3) The patient is admitted to Beelitz if considered suitable by the medical referee.
- (4) Three successive examinations on admission are made by the second assistant, first assistant, and chief medical officer.

All men are subjected to the von Pirquet test on admission, and frequent use of the X-ray screen is made for confirmatory diagnosis. No case is retained in the sanatorium which requires treatment in bed for more than three or four weeks, such persons being returned to Berlin. The cases which are kept are classified according to the Turban-Gerhardt scheme of diagnosis.

The length of stay in the sanatorium varies from 6 to 12 weeks for patients in the earliest stage and from 26 to 30 weeks for patients in a more advanced stage. Patients who are able to walk but who do not otherwise improve are usually kept for about nine weeks in order to obtain, if possible, some general improvement.

Rejected cases are returned to Berlin, where a small number obtain admission to hospitals; the rest remain in their homes awaiting such treatment and advice as they can obtain through the tuberculosis dispensary.

Treatment.—The daily routine is as follows:—

6.30	-	-	<i>Rise.</i> —Cold-water rubbing.
7.45	-	-	<i>First Breakfast.</i> —Milk, white bread and butter.
8-9	-	-	<i>Walk.</i>
9-10	-	-	<i>Liegehalle.</i>
10	-	-	<i>Second Breakfast.</i> —Milk, sandwiches.
10.15-11.45	-	-	<i>Walk.</i>
11.45-1	-	-	<i>Liegehalle.</i>
1	-	-	<i>Dinner.</i>
1.45-4	-	-	<i>Liegehalle.</i>
4	-	-	<i>Afternoon Meal.</i> —Coffee, milk, bread and butter.
4.15-4.45	-	-	<i>Walk.</i>
4.45-7	-	-	<i>Liegehalle.</i>
7	-	-	<i>Supper.</i>
8	-	-	<i>Milk.</i>
9	-	-	<i>Bed.</i> —Cold-water bandages.
9.30	-	-	<i>Lights out.</i>

Graduated exercise or manual labour forms no part of the treatment. With the exception of cases in the earliest class all patients are now, as a rule, subjected to tuberculin treatment. During their stay patients are medically examined once in three weeks.

Results.—At the end of the course of treatment patients on their return to Berlin are re-examined within one year by the central department (Dr. Kayserling). No further examination appears to be recorded. The clinical results during 1910 are displayed in the following table:—

	No. of Cases.	Cured, i.e., totally fit for Work.	Improved.	Uncured.
Men	2,037	484	1,302	251*
Women	1,367	71	1,148	148*
Total	3,404	555	2,450	399
Percentages	—	16	72	12

* Including one man and two women who died during treatment.

Speaking from the industrial point of view, the number who have left partially or totally capable of working was 1,734 men and 1,208 women, or 2,942 in all, equivalent to 86 per cent.

Duration of Improvement.—Since 1904, 11,065 men and 6,694 women, or a total of 17,759, have left Beelitz after treatment.

The following table shows the percentage of those who had become incapable of work by 1910:—

Cases of the Year.	Men.	Women.
1904	29.0	20.3
1905	23.6	17.3
1906	24.0	15.7
1907	21.5	14.4
1908	9.9	5.5
1909	3.6	1.8
1910	2.0	0.6

After-care.—The insurance committee, though undertaking the whole maintenance while at Beelitz, has no direct machinery for the after-care of ex-patients. It does, however, make contributions to other associations for the welfare of persons suffering from or suspected of phthisis. For example, in 1910 the Red Cross Association received 10,000 marks and the Central Committee of Tuberculosis Dispensaries 30,000 marks. Grants for disinfection and in aid of rent were made to the extent of 33,248 marks, while

the committee for care of teeth in school children received 1,500 marks. In all sums amounting to 82,225 marks (4,111*l.*) were expended in similar ways.

Some brief notes may be added of several other typical sanatoria.

Hohwald sanatorium was founded in 1906 by the insurance commission of Saxony, and is situated some 40 miles east of Dresden, near the Austrian frontier, on high undulating land covered with pine woods and sloping south. The cost of building amounted to 114,450*l.*, the cost per bed being 440*l.* The cost of maintenance is about 30*s.* per week. There is accommodation for 260 patients (men), most of whom are in wards containing four, six, or eight beds.

The staff includes four medical officers, an administrative director, seven nurses, and 65 servants, attendants, &c. Patients are usually recommended by an insurance doctor or general practitioner. The committee instructs the same doctor to make a more thorough examination (there is no medical referee), and the patients are then selected on the medical reports thus supplied and sent direct to the sanatorium. Only early cases are considered suitable for admission. The medical superintendent of the sanatorium has no choice in the selection of his patients. Patients remain on an average 10 to 11 weeks, as the medical superintendent prefers a second or third "cure" at intervals as required to one more prolonged period at the sanatorium.

Treatment.—The general regime appears to be generally similar to that Beelitz. There is no system of graded exercise, although walks are definitely prescribed by the medical officers. The patients appear to spend a large proportion of their time in resting. Tuberculin is employed as a means of diagnosis and for treatment in suitable cases. The discipline of the patients did not appear to be strict, and on the whole the men looked slack and flabby.

Planegg.—The sanatorium is situated in pine woods some 12 miles from Munich, and was established by the Munich association for providing sanatoria. It has accommodation for 150 men, and the wards in most cases contain three, four, or five beds.

The total cost amounted to 820,000 marks, equivalent to 273*l.* per bed. (It was understood that this is the least expensive institution in Germany.) The cost of maintenance is about 30*s.* per week.

The staff includes three medical officers, the nurses being Sisters of a religious order. The patients, who are all insured persons, are sent from various insurance committees, and they remain on an average for 12 weeks. The admissions are confined to early non-febrile cases.

There is no attempt at graded work or exercise, and the whole of each day appears to be taken up in resting, with intervals for meals. The men are no supposed to go outside the grounds of the sanatorium and appear to spend all their time in loafing. The discipline seems to leave much to be desired. It was not surprising to hear that there is some discontent, quarrelling, and fastidiousness about food. Tuberculin as a means of treatment has been used in perhaps 10 cases so far.

Hohenlychen.—This sanatorium is entirely for children, and is situated on the Zennsee, about 60 miles north of Berlin, on an undulating sandy plain covered with pine forests. It was erected by the Red Cross Association at a cost of 100,000*l.*, that is about 206*l.* per bed. The cost of maintenance is 18*s.* per week. The premises include the following departments:—(1) Sanatorium, 160 places (summer), 105 (winter); (2) Open-air Colony, 100 places (summer), 80 (winter); (3) Home for surgical tuberculosis, 90 places; (4) Vacation Colony, 110 places; (5) Home for Girl Apprentices, 24 places. In addition there are various open-air shelters for resting. The buildings on the whole were pleasing and appeared to be adequately equipped.

The medical staff included a chief medical officer and three assistants. The treatment, particularly of the cases of surgical tuberculosis, appeared in some ways to be the least satisfactory part of the institution. The neglect of open-air treatment when in the sanatorium itself was noticeable.

4. AUXILIARY INSTITUTIONS.

In addition to sanatoria various other institutions have been provided:—

- (a) Forest Colonies (*Walderholungsstätten*), chiefly in the neighbourhood of large towns. These are intended for patients who are not severely ill, and provide in most cases day accommodation only. They are only open during the summer months, May–October. The patient in many cases brings his breakfast, his dinner is supplied either free or for the payment of about 50 pfennige (6d.). He can obtain milk at cheap rates, and takes his supper at home. An attempt has been made to use these as night camps, but hitherto with only limited success. They have been found particularly useful in cases of suspected tuberculosis and for anemia, malnutrition, &c. In connection with them open-air day or residential schools for children (*Waldschulen*) have in some cases been established.
- (b) An attempt to found colonies (*Ländliche Kolonien*) has also been made, but without great success, as, generally speaking, the patients appear to have an objection to work of any kind during their treatment.
- (c) For children there are various convalescent homes and similar institutions (*Solbäder, Seehospize, Ferien Kolonien*) which are mainly intended for cases of incipient or suspected tuberculosis.

Typical forest colonies were visited at—

Eichkamp (Berlin). Deuben, Wettringrund (Dresden). Rückersdorf (Nürnberg). Holzapfelkreuth (Munich).

Eichkamp.—This is one of seven similar camps established in the neighbourhood of Berlin by the Red Cross Association. It is situated in the midst of the Charlottenburg pine woods, and has accommodation for 250 women and children. In Berlin altogether accommodation for 1,560 (men, women, and children) is provided. The cases include non-tuberculous (nervous, cardiac, rheumatic cases) as well as tuberculous patients. There are apparently no definite rules or standards of admission. At Eichkamp, for example, patients are admitted on the recommendation of a "Kassenarzt" or other general practitioner. The institutions are intended for day use with the exception of one (*Schönholz*) which has a night camp for the use of women operatives who are free from work about 6 p.m. Some 20 tuberculous women received treatment here in 1910.

The premises at Eichkamp consist of a permanent administrative block, dining-room, veranda, kitchen, &c., and a number of wooden open-air shelters in which the patients may rest. Phthisical cases are separated from the non-tuberculous. A medical officer is attached to each camp. He visits once a week but does not undertake any treatment. Annual reports are furnished by each medical officer, but these are made out on independent lines, and there is no general classified return of the effect of the treatment. The number of patients admitted to all seven camps in 1910 was 4,623 in all (3,457 adults and 11,066 children). The average stay of each patient was 36 days. Patients arrive at 9 a.m. and leave at 5 p.m. The total expenditure in 1910 amounted to 5,855*l.* or 1*l.* 7*s.* 6*d.* per patient. The cost per day worked out at about 9*d.* per patient.

Deuben.—This colony is a voluntary institution established by a Dresden association (*Verein für Waldstätten*). It lies about four miles south-west of Dresden in pine woods. The premises, which are permanent, consist of an admirably constructed veranda house built on a steep slope so as to give three stories in front and two behind. Spacious verandas and day rooms are provided on the first and second stories. The uppermost story contains two rooms badly lighted and ventilated, with 20 beds for the night patients. This story also contains the superintendent's apartments. The cost of the building was 950*l.* and the equipment 250*l.* Accommodation is provided for men and women, and 50 day patients and 20 night patients can be accepted. There is no classification of patients according to sex or disease, and apparently

little medical supervision. The resident staff consists of a woman superintendent, a cook, and two maids. A medical officer visits twice a week, but no treatment other than air, food, and sleep is provided. The hours for day patients are from 8 a.m. to 7 p.m. Five meals a day are provided, and the cost per day is 1*s.* 6*d.* for day patients and two marks for whole-time patients. The home is open from May until October, patients remaining from 4 to 12 weeks. No report on the results obtained was available.

Rückersdorf.—The Rückersdorf Open-air Colony is the property of the Nürnberg Association for the Campaign against Tuberculosis. The institution accommodates 140 day patients (men and women) and 6 to 10 night patients. It is situated among the pine woods four miles from Nürnberg. The buildings include a permanent house for administration, with kitchens, baths, offices, dining rooms, &c. In the grounds are several open-air shelters. There is a small shelter for the night patients fitted with hammocks and rugs. The cost per place is estimated at 37*l.* 10*s.* The cost per day is 1*s.* 6*d.*, together with the railway fare, 3*d.* The cost of maintenance is borne by the insurance committee, the Krankenkassen, the Nürnberg Poor Law, the Red Cross Association, and the patients themselves. The average stay in 1911 was 73 days. The hours are from 8 a.m. to 7 p.m. The medical officer visits three times weekly, but no treatment is given and no full medical records appear to be kept. A special department, admirably organised, is set apart for children.

Holzapfelkreuth.—The colony was established by the local association for the prevention of tuberculosis, and is situated in pine woods about three miles from Munich. The accommodation provides for 250 women (day cases), 80 children (day cases), and 22 children (residential cases). The premises consist of a closed dining room with casement windows and adjacent open shelters facing south. The children's department consists of a dining room, two dormitories, and the nurses' sleeping room. There is also a Doecker shed for administrative purposes and for the accommodation of the nurses. The institution is open from May until October, and the hours are from 7 a.m. to 7 p.m., the patients coming by tram from Munich. The cost of maintenance is 1*s.* 6*d.* per day for women, 1*s.* 6*d.* per day for residential children, and 8*d.* for non-residential children. All patients are either tuberculous or pre-tuberculous, and under the supervision of the Munich Tuberculosis Dispensary, though they may be referred by insurance committees, private practitioners, &c. The medical superintendent visits twice a week, but undertakes neither inspection nor treatment.

5. GENERAL IMPRESSIONS.

(a) *The Organisation*.—The campaign against tuberculosis in Germany is, in many respects, highly organised, and much good and substantial work has been accomplished within the past 15 years. At the same time the organisation is still incomplete in more than one direction, and until these gaps have been bridged it is difficult to see how the results now obtained will be materially improved.

In the first place the whole campaign is established on a *voluntary basis*. It is true that encouragement as well as financial support is given by the Imperial and Royal Governments and by municipalities, but the central committee and its local branches are only able to offer facilities for treatment and assistance, they have no power to compel any patient, however dangerous to his fellows he may be, to accept advice or help or to adopt such hygienic methods as may be desirable. No uniform scheme has been formulated for the country as a whole, and even the central committee has no power to control the activities of its branch associations. Secondly, there is no system of *compulsory notification* except as regards deaths and removals. Even the mortality returns vary considerably in reliability and figures from different areas are not strictly comparable. It is not possible, therefore, accurately to estimate the number of persons suffering from pulmonary tuberculosis, nor is it possible to ensure that all affected persons are brought under any sort of control or supervision. Although a few administrators

may be inclined to undervalue the importance of compulsory notification, all the medical officers associated with dispensaries or sanatoria with whom the matter was discussed were unanimous in declaring notification to be the necessary first step in any complete scheme for control of the disease. They were also agreed in considering some form of compulsory supervision desirable. The medical officer of the Nürnberg Dispensary, for example, stated that, judging by the number of deaths from phthisis occurring in the city, not more than a quarter of the total number of cases of the disease have their names on the books of the institution. At present it is not possible for the authorities to get into touch with those remaining untreated. Patients come if they happen to hear of the dispensary and desire to obtain assistance, but not otherwise. There are no means of searching out suspected cases other than by examining the family of a patient who has already presented himself.

Thirdly, there is no organised *after-care* or following-up of such cases as do come within the purview of the sanatorium or dispensary. The Imperial regulations do, indeed, require a biennial report for six years from all sanatorium patients, but this is mainly concerned with the patients' earning capacity, and need not be given by a medical man. A considerable amount of following-up and re-examination is, in fact, done by the tuberculosis dispensaries; for example, in Dresden all patients referred from sanatoria are examined at first every two months, then every three months, and subsequently at longer intervals which vary with the progress of the case. This does not obtain in all dispensaries, however, but varies with the keenness and energy of the medical officer concerned. The following-up of dispensary cases which have not received institutional treatment appears usually to be fairly well carried out, but the health visitors can never insist on their recommendations being adopted, and gain their ends mainly by means of persuasion and tact.

Fourthly, although certain provision is, in fact, made for *children*, they have no definite place in the organised scheme, and the importance of attacking tuberculosis among children does not appear to have been sufficiently realised except by certain individual workers. This may in part be due to the absence of a complete system of school medical inspection. The arrangements for medical inspection of school children vary widely in different parts of the empire, and though the organisation for the actual inspection may be fairly complete in some of the towns, in many if not most country districts there does not appear to be any medical inspection whatever. Moreover, the school doctors are usually busy general practitioners, there is little or no effective following-up, and there is no systematic provision for treatment except dental treatment. Thus, not only are comparatively few cases of phthisis discovered in the course of medical inspection, but the school doctor as such has usually little, if any, responsibility for the subsequent action taken in regard to these cases. If phthisical school children happen to attend a tuberculosis dispensary it is not a regular practice to inform the school doctor, though the school teachers are often notified. There are exceptions to this practice, however; for example, in Munich Dr. Ranke (who happens to be not only the chairman of the City Union of School Doctors but also a specialist in lung diseases and senior assistant at the tuberculosis dispensary) takes a keen interest in the problem of child tuberculosis, and not only refers at least 3-4 per cent. of the school children examined to the tuberculosis dispensary (where a special day is allotted for children) for further examination, but follows them up and obtains institutional and other treatment for as many as possible. It seems desirable that more systematic measures should be adopted for dealing with the disease among children. Lastly, the *medical officer of health* (*Kreisarzt, Stadtarzt*) appears to have little or no connection with the anti-tuberculosis campaign. His powers and duties in Germany are narrower and more restricted than is the case in England, but even so it would seem desirable to give him a definite place in the scheme.

(b) *Dispensaries*.—The great importance of the tuberculosis dispensary as the central factor in the organisation was universally realised and insisted upon, not only by persons connected with dispensaries, but also by others less directly interested. Professor von Müller, of Munich, for instance, with whom the question of "sanatoria benefit" in England was somewhat fully discussed, considered that the first and main requirement of any scheme for fighting tuberculosis was a sufficient number of dispensaries which must have power to give practical assistance as well as advice to patients. It was not considered necessary or desirable, however, that the dispensary should undertake treatment, except, perhaps, in the case of the administration of tuberculin. The general attitude towards dispensaries appeared to be closely in accord with the position taken up in the interim report of the committee.

(c) *Sanatoria*.—It is estimated that under present conditions not more than 10 per cent. of the total number of phthisis cases are afforded an opportunity of obtaining sanatorium treatment. This is partly due to the limited accommodation, partly to the relatively small number insured among those affected, partly to the fact that only cases in an early stage of the disease are accepted. The capital cost of sanatoria is in most cases unduly high; at any rate, as regards the treatment of insured persons. Beelitz sanatorium, for example, cost 750*l.* per bed, Hohwald 440*l.*, and Planegg, which was referred to as a model of cheapness, 273*l.* Single-bedded rooms are exceptional. There seems to be little or no desire to erect cheap and "temporary" buildings, but the feeling seems rather to be that when a sanatorium is built everything should be of the best. If this view continues to be held it is likely that the accommodation will necessarily remain restricted. The cost of maintenance is also somewhat excessive for the class of patient under consideration; 28*s.* to 30*s.* per week appears to be the lowest. Speaking generally, the daily regime seemed to be less strenuous than is the case in well-managed sanatoria for a similar class of patient in England. The discipline was less strict, and the patients appeared to spend a much greater part of their time in loafing and doing nothing. Although there were sufficient windows for effective ventilation and open-air treatment, in practice the patients appeared free to close the windows whenever they wished. At one sanatorium, for example, at 6 o'clock on a fine warm evening the windows in nearly every ward visited had been almost entirely closed by the patients who had just come back from walking, &c. The rooms were artificially heated, and were, without exception, stuffy. Generally speaking, in German sanatoria the windows appeared to be closed at night to a large extent. This failure to make full use of the available means of ventilation was noticed in every professedly "open-air" institution visited. Another marked feature was the almost complete absence of any form of graded work or exercise. A certain amount of walking was done by most patients, but apparently much less than would be expected under similar conditions in English sanatoria. Definitely regulated work, however, has no place in the treatment. This seems to be due to various causes. Some medical superintendents consider it dangerous to the patients' health; others, though thinking it good in theory, feel that in practice it would require an impossible amount of supervision from the medical staff; others state that they would willingly make use of the method but the patients would decline to co-operate. The last-named seems to be the main reason; the patients think that they come to sanatoria to have a rest and not to work, and the discipline is not sufficiently good to enable the medical staff to enforce work. A contributing cause, perhaps, lies in the fact that the sanatoria are in nearly all cases situated in pine forests, and that the soil may not lend itself readily to garden cultivation and farm work.

The provision for advanced cases is unsatisfactory. Most of such patients are at present nursed in their own homes until they die. In order to overcome the difficulty of persuading patients to enter hospitals for advanced cases it is thought

desirable by some administrators to provide accommodation for these patients in connection with the sanatoria for early cases.

(d) The remaining institutions, such as *forest camps*, appear to be doing useful work. It seems, however, that their value might be considerably increased without much additional expenditure if certain alterations and modifications were made in their organisation. For instance, many appear to work more or less independently, and as a whole they do not seem sufficiently closely linked up with tuberculosis dispensaries. Again, as regards classification of patients, medical supervision, medical reports, home visiting, after-care, &c., the methods employed do not appear to be systematic or sufficiently thorough.

Further sleeping accommodation and an extension of the night camps would seem to be desirable, and in some instance, at any rate, arrangements might, perhaps, be made to keep the camps open during the winter months. At present institutional accommodation other than sanatoria is greatly reduced during the winter from October to May, whereas it is a matter of common experience in England that consumptive patients often improve in a relatively marked degree under open-air conditions during cold and even severe weather.

GEORGE NEWMAN.
JANET M. CAMPBELL.
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May 1912.

MEMORANDUM submitted by the MEDICAL OFFICER of the LOCAL GOVERNMENT BOARD ON
MEDICAL RESEARCH, with special reference to TUBERCULOSIS.

Section 16 (2) (b) of the National Insurance Act renders available for medical research a larger annual sum than has hitherto been granted from national funds. The sum of 1,900*l.* (originally 2,000*l.*) has been granted and administered by the Local Government Board since the year 1870-71.

Important researches have been made by means of this small grant, the results of which have been published year by year in the annual report of the Medical Officer of the Board.

Among subjects investigated in the last five years or now being investigated are the following:—

1. Leucocytes and Changes in Bone Marrow in relation to Infection (Dr. F. W. Andrewes).
2. Protective Agents in Meningococcus Infections (Drs. Horder and Gordon).
3. The Bacteriology and Pathology of Mastitis in Cows (Dr. W. G. Savage).
4. The Differentiation of Streptococci by the "Goat" Test (Dr. Savage).
5. The Chemical Changes produced in Milk by Bacteria (Drs. Scholberg and Mackenzie).
6. The Bacterial Measurement of Milk Pollution (Dr. Savage).
7. The Gaertner Group of Bacilli: investigations as to their presence (a) in the animal intestine, (b) in prepared meats and allied foods (Dr. Savage).
8. The presence of Paratyphoid Bacilli in Man (Dr. Savage).
9. Carrier Cases of Enteric Fever (Drs. Thomson and Ledingham).
10. The Causes of Death in Measles (Dr. Thursfield).
11. Streptococci in Scarlet Fever (Dr. Gordon).
12. A Series of Investigations on Intestinal Organisms in relation to Diarrhoea, with special reference to Non-lactose Fermenters (by a number of workers).
13. Investigations on Rat Fleas in relation to Plague, and on Flies and the carriage of Infection (by a number of workers).
14. Investigations on Poliomyelitis (Dr. Gordon).
15. The Micro-organisms in Sewer and Drain Air (Dr. Andrewes).
16. The Prevalence of Hernia (Dr. B. Cook).
17. The Causes of Premature Arterial Degeneration in Man (Dr. Andrewes).
18. The Purification of Chalk Waters by Chemical Means (Messrs. Moor and Hewlett).
19. The Prevalence and Source of Tubercle Bacilli in Cows' Milk (Professor Delepine).
20. The relative Importance of certain Types of Body Cells in defence against the Tubercle Bacillus and the effect of Tuberculin upon their Activities (Dr. J. Miller).
21. A Study of Secondary Infections in Pulmonary Tuberculosis (Dr. Inman).
22. An Investigation of the incidence of Tuberculosis (jointly by the Medical Department of the Board and by the General Register Office).

(For other investigations as to tuberculosis, see p. 123.)

In nearly every branch of medicine additional research is continually needed; as it is evident that satisfactory treatment of each disease must rest on exact knowledge of its pathology. Research may for practical purposes be classified under two heads; research which is directed solely towards extending the borders of medical knowledge, by laboratory and other methods not directly related to the patient; and research which is based on a more complete examination of the pathology and clinical features of cases of disease and an analysis of such investigations than is practicable in ordinary clinical work.

I am of opinion that investigation under the second head is the immediately pressing need, and that only by proceeding to satisfy this primary need can future treatment be made as much superior to "club" practice as it ought to be. It is essential that all the possible aids to diagnosis and treatment which modern medicine gives should be rendered immediately available and that investigations on a wider scale into the causation of disease should be initiated in the directions indicated by the experience gained in the clinical and pathological laboratories which I hope will be formed to secure this end.

The immediate "research" work which can be undertaken is, I assume, not limited to tuberculosis; and I hope that at an early date it will be practicable to organise a linked-up group of large pathological laboratories in selected centres, dealing with disease as a whole, in which investigations needed by clinicians will be systematically undertaken. Among the work coming to these laboratories would be the examination of blood and of various secretions and excretions, and work in general for the diagnosis of obscure disease, and for the preparation of vaccines for treatment. This work will be additional to the pathological work carried out at tuberculosis dispensaries and sanatoria; though there will be great advantage in having some of the research laboratories attached to the more important sanatoria. It should be practicable to arrange for the diagnosis work of sanitary authorities (enteric fever, diphtheria, tuberculosis, &c.) to be done in these laboratories.

The entire pathological work of these laboratories will be under central control, the controlling body receiving and considering recommendations from clinicians and pathologists attached to the local laboratories, as to the directions in which special research is needed.

One of the main subjects of further research will be tuberculosis. This being so, it is desirable to summarise the work already done by the recent Royal Commission on Tuberculosis and now being carried on by the Local Government Board. It has to be borne in mind also that the Board of Agriculture and Fisheries have a permanent farm and laboratory for experimental research on animals, and that by means of money grants from the Development Commissioners experimental research on vaccination of cattle against tuberculosis is now proceeding.

Summary of Conclusions of the 3rd Royal Commission on Tuberculosis.

The work of this Royal Commission has to be read in the light of the results of the 2nd Royal Commission which reported in 1898. The 3rd Commission was mainly concerned with ascertaining whether Koch's famous statement as to the non-communicability of bovine tuberculosis to man was correct. The 3rd Commission having proved this statement incorrect, the recommendations of the 2nd Commission as to precautions against infected milk and meat, quoted on p. 8, resumed their importance.

In their first interim report (16th May 1904) the 3rd Commission reported:—

" . . . the result at which we have arrived, namely, that tubercle of human origin can give rise in the bovine animal to tuberculosis identical with ordinary bovine tuberculosis, seems to us to show quite clearly that it would be most unwise to frame or modify legislative measures in accordance with the view that human and bovine tubercle bacilli are specifically different from each other."

In their 2nd interim report (January 1907) full details are given of an investigation into 60 cases of tuberculosis in human beings and 30 cases of tuberculosis in cattle. The investigation was conducted on a very large scale and involved experimentation, by different methods, upon a large number of animals of different species.

After analysing their scientific data the Commissioners say:—

" These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source. A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli

Our results clearly point to the necessity of measures more stringent than those at present enforced being taken to prevent the sale or the consumption of such milk."

In their 3rd interim report (January 1909) the Commissioners say:—

" . . . we have thought it advisable to describe the results of a series of experiments which have been carried out by us with a view of obtaining information regarding the excretion or discharge of tubercle bacilli in the milk and faeces of tuberculous cattle.

None of the cows investigated showed any sign of disease of the udder during life

. we found that the milk of the cows obviously suffering from tuberculosis

. contained tubercle bacilli

We have found that even in the case of cows with slight tuberculous lesions tubercle bacilli in small numbers are discharged in the faeces, while as regards cows clinically tuberculous our experiments show that the faeces contain large numbers of living and virulent tubercle bacilli."

Their final report (June 1911) gives full details of their work on additional cases of human tuberculosis, including lupus; 59 cases of tuberculosis in swine; 5 cases of tuberculosis in the horse; five cases of spontaneous tuberculosis in other mammals, viz., one gnu, one antelope, one rhesus monkey, one chimpanzee, and one cat; nine cases of tuberculosis in birds.

Considering their results in relation to the questions formulated in the three terms of their reference, the Commissioners say:—

" The first question is:—Whether tuberculosis in animals and man is one and the same

. there would therefore remain only slight cultural differences on which to found the conclusion that the human and the bovine types represent two distinct organisms. We prefer to regard these two types as varieties of the same bacillus, and the lesions which they produce whether in man or in other mammals, as manifestations of the same disease. But while we regard the point which we have just considered as one concerning which there is room for difference

of opinion, there is an aspect in which tuberculosis in men and in cattle must unquestionably be pronounced one and the same disease. Whether one prefers to regard bovine tuberculosis and the cases of tuberculosis in man which are caused by the human type of bacilli as varieties of the same disease or as independent diseases, there can be no question that human tuberculosis is in part identical with bovine tuberculosis.

There remains the question whether avian tuberculosis and bovine tuberculosis, or avian tuberculosis and the tuberculosis caused by the human type of bacillus, are one and the same disease. In this matter there does not appear to us to be in the present sufficient ground for answering the question in the affirmative.

" In the second term of our reference we were asked:—Whether animals and man can be reciprocally infected with tuberculosis; that is, whether the disease known as tuberculosis can be communicated from man to animals and from animals to man. we

must conclude that mammals and man can be reciprocally infected with the disease (tuberculosis). Bovine animals are not completely immune to the human tubercle bacillus, and adult human beings can be infected with the bovine type, even the pulmonary form of the disease in man being sometimes caused by the bovine tubercle bacillus.

" The third question with which we are called upon to deal is:—Under what conditions, if at all, the transmission of tuberculosis from animals to man takes place, and what are the circumstances, favourable or unfavourable, to such transmission. *Avian Tuberculosis*

The pig is the only mammal in which we have found the avian bacillus in the lesions of naturally-acquired tuberculosis, but possible danger to man from this source would appear to depend on an ability not yet demonstrated of this animal to bring about modification or alteration of this type of tubercle bacillus in the direction of greatly enhancing its virulence for man. We must conclude, as the result of our investigations, that the unmodified avian tubercle bacillus is a negligible factor in the production of human tuberculosis. *Bovine Tuberculosis*

" The pig is, besides the bovine, the only animal commonly used for food by man in which during our investigation we have found the bovine tubercle bacillus producing the progressive lesions of the natural disease we would

urge that existing regulations and supervision of milk production and meat preparation be not relaxed; that on the contrary Government should cause to be enforced throughout the kingdom food regulations planned to afford better security against the infection of human beings through the medium of articles of diet derived from tuberculous animals."

The main result of the Commission's work has been to prove the correctness of the view that tubercle bacilli of animal origin are a cause of disease in man, more especially in children. New details brought to light are the existence of certain differences amongst the tubercle bacilli which occur in different cases of human lupus and the occurrence of similar peculiarities in some of the strains of tubercle bacilli derived from horses. Many other facts receive additional importance from the work of the Commission, e.g., the excretion of tubercle bacilli in the milk of tuberculous cows not suffering from tuberculosis of the udder and in the faeces of cows suffering from only a slight degree of tuberculosis, the occurrence of the avian type of tubercle bacillus in some cases of localised tuberculosis in the pig, the rapidity with which tubercle bacilli travel to distant parts of the body after subcutaneous inoculation.

Prior to the termination of the Royal Commission's work, arrangements were made by the Local Government Board to continue in a central laboratory investigations on tuberculosis bearing on the needs of public health administration, with a view to giving the Board

authoritative guidance in dealing with the administrative problems which the work of the Royal Commission had not embraced. Two of the principal workers of the Royal Commission, Dr. A. Eastwood and Dr. F. Griffith, were taken over by the Board and are now at work in the Board's laboratory.

In September 1910, eight months prior to the issue of the Commissioner's final report, in June 1911, work was begun at the Board's laboratory. The scheme of work contemplated was one that should deal with the following questions which need investigation for administrative purposes:—

- (a) The character of tuberculosis in pigs, especially in relation to the occurrence of avian tuberculosis in them;
- (b) the presence of tubercle bacilli in the milk of cows not manifestly diseased;
- (c) the distinctive characters of tubercle bacilli in human beings;
- (d) the contamination of milk by bacteria other than the tubercle bacilli.

Arrangements were subsequently made for the examination of imported milk and milk products for tubercle bacilli.

It was also arranged that, as opportunity allowed, investigations with regard to other diseases should be undertaken at the laboratory, and that Dr. Eastwood, the medical inspector in charge of the laboratory, should inquire into the conditions under which the pathological work of local authorities is conducted, with a view to aiding its co-ordination. Up to the present time, apart from certain special work in regard to plague, the limited staff hitherto authorised by the Treasury has been able to take up only the work on tuberculosis set out below.

Subjects under Investigation in the Pathological Laboratory of the Local Government Board.

The Board finds an increasing need for research under its direct control in connection with questions of administrative importance concerned with tuberculosis. It is anticipated that impending legislation on milk will greatly extend this need.

- (1) Since the beginning of 1911 continuous research has been conducted in the Board's laboratory upon the question of the possible infectivity of the flesh of pigs declared on inspection to be affected with merely localised tuberculosis. A report of the results attained up to March 31st, 1912, is now being prepared with a view to publication in the Medical Officer's Annual Report. Fresh facts of administrative and scientific importance have been brought to light. New information has been obtained relative to the statement of the Royal Commission that localised tuberculosis in the pig is sometimes due to the avian tubercle bacillus. The results open up wider questions, requiring continued investigation. This is already in hand.
- (2) The Board's study of the dissemination of tubercle bacilli in the pig, with or without manifest lesions, has shown the desirability of a comparative study of the dissemination of tubercle bacilli in human beings, commencing with children, and of the special characteristics of such bacilli as are found. Arrangements for this work in the Board's laboratory and for parallel investigations under the scientific grant to the Board are in hand.
- (3) An investigation is in progress in the Board's laboratory as to the specific action of tuberculin on laboratory animals, with reference to (a) the production of immunity against subsequent inoculation with tubercle bacilli, and (b) the cure or retardation of the disease in animals previously made tuberculous.
- (4) Imported milks, butters, and creams are being examined in the Board's laboratory with a view to ascertaining whether or not they contain tubercle bacilli. A report on this work is now in preparation.

- (5) More general questions as to the testing of milk, butter, and other dairy products for tubercle bacilli are also under investigation. Particular attention is being paid to the degree of value to be attached to negative results, as the administrative significance of a negative result obviously depends on the thoroughness of the search which has been made for tubercle bacilli. A preliminary report on this matter is now in preparation.

The Board's laboratory is already well organised although insufficiently staffed, and research work on tuberculosis has been carried on there since September 1910. Additional grants from the Treasury or from the new funds now available are alone needed to enable such work to be undertaken on a much larger scale.

Further Investigations on Tuberculosis.

The appended memorandum by Dr. Eastwood sets out some of the important considerations involved in the further investigation of tuberculosis.

In such further investigation of tuberculosis first place must, in my opinion, be given to clinical laboratories, closely related to the institutions where tuberculosis is treated.

Apart from bacteriological work that will be needed at each sanatorium or dispensary, research laboratories will be required for counties and county boroughs, or preferably for a number of these in association. These laboratories should, as already stated, combine work on tuberculosis with pathological research on other diseases. Each laboratory should be directed by a medical man who is a skilled clinician as well as a pathologist. The best results can be obtained only by close union between clinical and laboratory work (see also Dr. Eastwood's statement below.)

The experience acquired in these research laboratories on such subjects as the conditions necessary for very early diagnosis of tuberculosis, the discovery of means for distinguishing by other than clinical means latent and active tuberculosis in man, the constitutional factors favouring spread of the disease, the paths of infection, the relative frequency of bovine and human infection, methods of producing immunity or of curing the disease in man, and other problems, will show what further research is needed, and whether such research should be on a larger scale or in other directions.

Such further research would be undertaken by specially-appointed investigators, having all the necessary arrangements at their disposal. As the purpose of this research will be to throw further light on the treatment and cure of tuberculosis in man, it should be carried out after consultation with the clinicians and pathologists who are dealing with the more immediately practical aspects of the disease.

I have not enumerated in the above statement such important inquiries as investigation of the best methods for encouraging experimental schemes for the local eradication of tuberculosis from cattle; such researches as will be rendered possible by the records of sickness among insured persons; and analysis and classification of the results of treatment of tuberculosis under varying conditions; as I take it for granted that these will be initiated.

A. NEWSHOLME.

May 1912.

MEMORANDUM submitted by A. EASTWOOD, M.D., ON PROBLEMS LEFT UNSETTLED BY THE RECENT TUBERCULOSIS COMMISSION.

The main findings of the recent Tuberculosis Commission are that human tuberculosis is due in some cases to infection from milk or other articles of diet derived from tuberculous animals and that in other cases it is due to infection with "human" tubercle bacilli, *i.e.*, germs apparently derived from a previous human source. There are three possible methods of attempting to eliminate the disease in animals and in man:—

- (1) To prevent healthy animals and healthy human beings from coming into contact with the germs of the disease;

- (2) to make healthy animals and healthy human beings resistant to infection by the germs of tuberculosis;
- (3) to cure animals and human beings already tuberculous.

I.—Prevention.

Scientific research has already proved the seriousness of the danger arising from the transmission of tubercle bacilli from man to man, and the way is now open for administrative measures directed to prevent it.

Concerning the prevention of the transmission of tubercle bacilli from animals to man the Commissioners recommend that more stringent regulations should be enforced, and they insist that every "recognisably tuberculous cow, irrespective of the site of the disease," should be excluded from the milk supply. The previous Tuberculosis Commission, which reported in 1898, declared that all attempts to prevent the transmission of the disease from animals to man "must be regarded as temporary and uncertain palliatives, so long as no systematic attempt is made to reduce the prevalence of the disease among the animals themselves." They issued, further, a strong recommendation that the way to prevent the spread of the disease amongst cattle was to apply the tuberculin test to entire herds and to separate permanently all reactors from the stock found to be healthy.

In 1908 I was instructed conjointly by the Tuberculosis Commission and the Local Government Board to visit America for the purpose of studying the methods employed in the United States for dealing with the dangers arising from tuberculous milk. And in 1910 I was instructed by the Local Government Board to study the same problem in this country. I reported that in most of the American States which I visited not much really substantial progress has been made, the main reason being that the methods attempted were too ambitious and too drastic to be feasible.

Special attention was paid to American endeavours to help the farmer by applying the tuberculin test to entire herds and compensating for slaughtered reactors. These measures were often disappointing because, apparently, they were based on economically unsound principles. Compensation was given on the strength of the farmer's promise to keep his herd free from tuberculosis in future; the money was frequently wasted owing to the farmer's failure to keep his promise. The principle of paying compensation in anticipation of future results should, in my view, be replaced by the principle of paying after the results have been achieved and in proportion to the results. From my experience in this country I am of opinion that a scheme based on the latter principle could be organised, and I have, accordingly, officially submitted the details of such a scheme to the Local Government Board, of which a modification is appended.

II.—Immunity.

(1) The problem of vaccinating healthy cattle for the purpose of rendering them immune to tuberculosis needs consideration first from the purely agricultural point of view. Some experiments were made for the Tuberculosis Commission by Drs. A. S. and F. Griffith, who report as follows:—"These experiments clearly show that by the inoculation of large doses of living human tubercle bacilli, as well as by the inoculation of small doses of bovine tubercle bacilli, the resistance of a calf can be raised sufficiently to protect it against the inoculation of a dose of bovine tubercle bacilli which has been shown to be capable of setting up severe and fatal tuberculosis in a calf not so protected. They show further that this degree of resistance is not always produced, and that calves which have been vaccinated once, and even twice, with slightly virulent human bacilli, may develop fatal tuberculosis when inoculated with virulent bovine bacilli." The question arises whether there is an agricultural demand for further research on this subject. Vaccination of cattle on a large scale and by various methods has already been attempted abroad, particularly in Germany, Belgium, and America. The value of the work

is very doubtful; at all events there is no satisfactory proof that a reliable vaccine has been discovered. If this subject were investigated in England with the thoroughness of the work of the last Tuberculosis Commission, it would be a complicated and costly matter; and it would take many years' work before the final conclusions, which might be negative, could be established. The Bang system of dealing with the disease by isolation of reactors, which is simpler, cheaper, and known to be efficacious, seems to deserve prior consideration.

Closely connected with the above agricultural question is an administrative consideration of direct importance to the public health. Any milk offered for sale which has been obtained from cows vaccinated in earlier life with living tubercle bacilli must be very rigorously inspected. The danger of its containing living tubercle bacilli has been already indicated by Dr. A. S. Griffith in his experimental work for the Tuberculosis Commission.

At the same time it must be fully recognised that if cattle could be immunised with material innocuous to human beings, the treatment might be capable of application to the human subject.

(2) As regards production of immunity in man, the important problems involved are closely allied with the question of cure and are treated with the latter below.

III.—Cure.

(1) The question of cure raises an agricultural problem similar to that regarding immunity. No method of curing tuberculous cattle is at present known. The endeavour to find one would involve costly and protracted work and might not succeed. It might be desirable to attempt a cure in the case of valuable pedigree stock; but for ordinary stock the possible value of such attempts is more questionable unless the proposed cure were very simple and free from all risk of provoking a further dissemination of the disease.

From the public health point of view the milk products and the carcasses of beasts which farmers had attempted to cure would need inspection with especial care.

(2) The Tuberculosis Commissioners' reference did not include the question of curing human beings. The work which is primary and also of ultimate importance is the clinical study of curative measures. At the present time various remedies are being tried, including the use of tuberculins obtained from sources of high repute. Under the Insurance Act facilities for observation will be greatly extended. The encouragement of this clinical research and the collection and analysis of all the data available are of particular importance, because in no other way can it be ascertained whether and, if so, in what directions, substantial progress is being made.

It is essential that the clinical work should not be confined to clinical observations as to the apparent results of treatment. It must at the same time comprise the study in well-equipped clinical laboratories of the biological processes at work in the different stages, progressive, retrogressive, or stationary, of human tuberculosis. Special attention must be paid to modern methods of "immunity" research whereby examinations of the patient's blood and other procedures of a highly technical nature throw light, obtainable in no other way, upon the bodily processes which are combating the germs of disease. This method of clinical research demands a comparative study of the processes going on (a) in the healthy human body, (b) in tuberculous patients not treated with any special remedy, (c) in tuberculous patients divided into groups according to their treatment with one or other of the special remedies, such as tuberculin, the value of which it is desired to investigate.

IV.—Other Problems.

(1) The work of the Tuberculosis Commission has raised the question as to the extent to which mammalian tubercle bacilli are liable, during residence in the human body, to undergo modification of some of their biological characters, viz., capacity for growth on

artificial culture media and pathogenicity for experimental animals. Hence it is theoretically possible that some cases of the human disease may have been caused by bacilli of animal origin which, owing to modification, cannot be identified as such. This is a question of very considerable scientific interest and is receiving careful attention in numerous laboratories. Probably it will be a long time before it is elucidated, but fortunately the points remaining obscure are not of practical importance. It has been proved by the workers for the Tuberculosis Commission and by other observers that there are two sources, both dangerous, of human infection, viz., tuberculous human beings and tuberculous animals. It would be absurd to suggest that steps to prevent these dangers and to cure the human disease must be delayed because the relative proportions of these two dangers are not yet exactly determined.

(2) The warning of the Tuberculosis Commissioners as to the dangers of articles of diet derived from tuberculous animals raises many problems of direct administrative importance. The investigation of these problems has been transferred to the Local Government Board.

(3) It is highly probable that in the course of investigating the problems already mentioned other questions will arise. In particular, when the research work in the clinical laboratories is well established, the difficult problems of immunity there being investigated can be brought to a focus; and the question will then arise whether research in other directions is not required. Any such additional research might, according to its nature, either be apportioned amongst the existing laboratories or be assigned to a new laboratory specially constituted for the purpose.

ARTHUR EASTWOOD.

May 1912.

A SCHEME FOR INCREASING THE SUPPLY OF MILK FROM NON-TUBERCULOUS DAIRY STOCK.

This scheme is limited to special aspects of the milk problem. It is designed to meet the medical requirement that infants and sick persons fed on milk diet should obtain milk free from all suspicion of containing tubercle bacilli, and at the same time it is intended to stimulate farmers to the production of such milk in increasing quantities. Whilst not interfering in any way with the general plan of reforming the milk supply as a whole, which is contemplated in the proposed Milk Bill and the Order of the Board of Agriculture in connection therewith, the present scheme, it is thought, will facilitate such general reform by increasing the supply of non-tuberculous stock wherewith to replenish stock condemned under the general scheme.

The present scheme is intended to apply only to a relatively small number of farmers, because at the present time the great majority of farmers in the country are not in a position, even if aided by the State, to produce milk from non-tuberculous stock. The main reasons for such inability are (1) the wide prevalence of bovine tuberculosis, (2) the lack of education as to methods of dealing with it, (3) the insanitary condition of cowsheds and the impossibility of disinfecting them thoroughly, (4) the absence of sufficient accommodation for separating diseased from healthy animals, and (5) the unwillingness of the average consumer to pay an extra price for milk produced under conditions involving extra expenditure.

There are, however, some farmers who are completely eradicating tuberculosis from their herds by applying the tuberculin test to all their stock and eliminating the reactors. Such farmers are few in number, because the work of eradication is particularly difficult and costly when undertaken as a private enterprise. Were they provided with official veterinary assistance and some financial aid, more farmers of the better type would be willing to extirpate tuberculosis from their herds. Public assistance, in approved cases, appears justifiable because (1) the production of milk free from tubercle bacilli would be of medical advantage to the community; (2) an increase in the number of herds guaranteed free from tuberculosis would improve the condition of the live stock in the country; (3) it

would improve the quality of dairy products; (4) it would also act as an educational stimulus to other farmers who do not at present appreciate the desirability of getting rid of bovine tuberculosis.

The scheme proposed is intended to promote the interests of public health, and is considered, for the following reasons, to be compatible with and advantageous to the interests of the dairy farmer:—

(1) It has been abundantly proved that tuberculosis can be eradicated from a herd by rigorous exclusion of reactors to the tuberculin test, in conjunction with thorough disinfection of the cowsheds.

(2) It is more profitable to the farmer to keep a herd which is free from tuberculosis than to keep one, *ceteris paribus*, which contains the germs of the disease.

(3) In selling cattle, the farmer who can produce a guarantee that his herd has passed the tuberculin test possesses an important financial advantage.

(4) The increase of non-tuberculous stock is of great advantage to the dealer who exports cattle, since such cattle are usually required to pass the tuberculin test.

(5) The milk producer ought to find a clean herd advantageous to his trade. Fresh milk obtained exclusively from cows which have passed the tuberculin test is practically certain to be free from tubercle bacilli. This cannot be said of milk from cows not thus guaranteed. Milk not absolutely free from tubercle bacilli is medically considered to be particularly dangerous to infants and to sick persons fed on milk diet. There is thus a medical requirement for non-tuberculous milk which the enterprising dairyman might turn to his advantage.

In relation with this scheme the following considerations have to be borne in mind:—

(1) It is impossible, to begin with, to establish more than a relatively small number of clean herds.

(2) To be of permanent value, the work of cleansing a herd must be thorough.

(3) The financial aid rendered to the farmer should be conditional on the achievement of the desired results and should be proportionate to the results achieved. Payment in anticipation of results (*i.e.*, before the farmer has proved his capacity for maintaining a herd in a clean condition) is a feature of some foreign schemes of compensation, but generally leads to wastage of public money.

(4) Progress must be slow at first; but when the young stock in the clean herds has arrived at sexual maturity the increase of clean herds ought to proceed with much greater rapidity.

The following practical details are suggested for the execution of the proposed scheme:—

(1) An initial tuberculin test of selected herds to be offered, either free, or, preferably, on payment of a small fee as guarantee of good faith (2*l.* for every 20 beasts or fraction thereof) to applicants found after inquiry to be suitable (good cowsheds; no cows obviously diseased on clinical inspection; the farmer to be a breeder as well as a milk producer, and to be in a good financial position with a business reputation for honesty). The information obtained by this test to be the private property of the farmer.

(2) Six months later, a second test (free) to be applied if the farmer desires it and declares that no tuberculin has been administered to any beast on his premises during the last six weeks. If this test shows—

(a) that the herd is clean, a bonus of 10*s.* to be given for every beast over two years old;

(b) that the herd contains less than 5 per cent. of reactors, half the above bonus to be given;

(c) that the herd contains 5 per cent. or more of reactors, no bonus to be given.

(3) Third, fourth, fifth, sixth, and seventh free tests to be offered at intervals of six months. The bonuses to be on the results of the third test, as before; on the results of the fourth and fifth tests, 7*s.* 6*d.* per head for a clean herd, 3*s.* 9*d.* per head for less than 5 per cent. of non-reactors; on the results of the sixth and seventh tests, 5*s.* per head for a clean herd.

(4) After every test, subsequent to the first, revealing a clean herd, the farmer to be given an official certificate to that effect, valid for six months.

With reference to the extent of the scheme it is suggested that the aim should be to establish in four years' time completely clean herds, distributed in various parts of the country, which should contain a total of about 36,000 milch cattle over two years old. Reckoning the average annual yield per cow at 420 gallons, exclusive of milk used for feeding stock, the 36,000 cows should yield about 15,000,000 gallons per annum. With regard to the cost of a scheme of this magnitude:—As it is practically impossible for all reactors to disappear at the outset, the maximum total bonus per head (45s.) would not be earned in every case. The actual total bonus per head would not be likely to average more than 35s. This would amount to 63,000l. in the four years.

The testing should be done by full-time veterinary officers (salary 400l. a year). Each could perform on the average 2,500 tests every six months. The 36,000 animals would represent 252,000 tests, allowing seven tests for each herd. Allowing a margin of 48,000 for initial tests of herds which afterwards fall out of the scheme, and for contingencies preventing a veterinarian from doing his estimated number of tests, 15 veterinary officers, estimated as capable of doing 300,000 tests in four years, ought to be sufficient to meet the requirements. The salaries for these, for four years, would amount to 24,000l. Probably an additional 20,000l. for four years, would be required for their travelling and incidental expenses, and for occasional extra assistance.

Tuberculin, as produced by the U.S.A. Federal Government, costs them two cents (1d.) per dose, including working expenses, bottling, packing, &c. Perhaps it could not be produced so cheaply in this country, but 3d. per dose ought to be sufficient. At this rate, 300,000 doses could be produced for 3,750l. Thus the scheme would cost:—

	£
Bonuses for three years	63,000
15 veterinarians' salaries for four years	24,000
veterinarians' expenses for four years	20,000
Tuberculin (300,000 doses)	3,750
Total (for four years)	110,750
Cost per annum	27,687

Certain details of the scheme call for special comment:—

(1) *Disposal of Reactors.*—Participants in the scheme would be advised to dispose of their reactors by slaughter, after fattening, when fattening was feasible. In some cases farmers with a valuable stock, and with more than one farm at their disposal, might transfer to a separate farm the reactors not showing clinical evidence of disease, and, with proper care, might breed from these a considerable amount of healthy stock.

At the present time there are farmers who have applied the tuberculin test at their own expense, and have endeavoured to dispose of their reactors without financial assistance. In such cases there is a temptation to sell those reactors which on ordinary inspection appear sound without stating that the tuberculin test

has been applied with a positive result. To farmers possessing the advantages offered by the scheme there would be less temptation to resort to this practice, because (1) in three years' time the bonuses earned ought to meet the expense of replacing the reactors by healthy stock, and (2) intending purchasers would naturally ask a participant in the scheme to produce his veterinary certificate showing that the beasts he offered for sale had not reacted to tuberculin.

Apart from the mere number of the reactors eliminated, there would, in the course of a few years, be a very material advantage to the community in the creation of clean herds from which healthy stock were being bred.

The desire to get rid of reactors and to buy non-reactors would tend to raise the price of the latter in the home market, at least temporarily; this would provide a commercial stimulus to the breeding and maintaining of non-reactors.

(2) *The selection of Applicants.*—It has already been ascertained that there are farmers who would like to take up the scheme. There is not likely to be a very large excess of applicants, because the conditions to be imposed are too stringent for the majority of farmers. If the number of more or less suitable applicants proved too large, preference might be given, *ceteris paribus*, to those with the smallest proportion of reactors at the initial test.

(3) *Payment by Instalments and in proportion to Results.*—In attempts to eradicate bovine tuberculosis, the difficulty most usually met with is that the farmer becomes careless after his initial effort. Hence the present scheme is intended to make the farmer's advantages (compensation and the advertisement of a clean bill of health) commensurate with continued effort.

(4) *The Period of Compensation.*—After three years the farmer of good business ability ought to be sufficiently well established to find the retention of a clean herd profitable. Possibly a further offer of a free annual test for three additional years (without bonus) might be made.

(5) *The Economic Situation.*—At present there is something of a deadlock. The consumer who is prepared to spend a little extra money, is necessary, for the sake of his children's health, has some desire for pure milk, but this does not amount to an effective demand, mainly because the producer is not in a position to offer the desired commodity. The producer of the more enlightened type would be willing to furnish the desired article provided that the increased cost of production, which would be greatest to begin with, could be shown to be a good investment; but of this he has at present no guarantee. After the working for three years of the scheme proposed, this deadlock might be overcome, and then the ordinary laws of supply and demand might be an effective stimulus to the continued production of milk from tubercle-free stock.

(6) *Educational Influence.*—Every farmer would like to have a clean herd in preference to a doubtful one. The best way to make him try to get the former is to show him that those who possess such are making more money than he is.

MEMORANDUM submitted by the MEDICAL OFFICER of the LOCAL GOVERNMENT BOARD on the PATHOLOGICAL WORK undertaken by or on behalf of PUBLIC HEALTH AUTHORITIES and by VOLUNTARY HOSPITALS, and on the NEED for GREAT EXTENSION and for Co-ORDINATION of this WORK.

PART I.

PATHOLOGICAL WORK UNDERTAKEN BY PUBLIC HEALTH AUTHORITIES.

This work has hitherto consisted chiefly in examining specimens from suspected cases of diphtheria, enteric fever, and tuberculosis.

In a number of instances, however, material has also been examined in connection with the following and a few other diseases:—Cerebro-spinal fever and poliomyelitis puerperal septicæmia, anthrax, gonorrhœa, plague.

Some county councils and borough councils have undertaken examinations for ringworm, scabies, &c., in school children.

In special instances bacteriological examination of water supplies, and of milk supplies (especially for tubercle bacilli) is carried out; and, occasionally, investigations of outbreaks of food-poisoning have been undertaken.

There is some legal doubt as to whether sanitary authorities are empowered to undertake examination of bacteriological material unless this is required for the immediate prevention of spread of disease or the

investigation of an actual outbreak. It is regarded as still more doubtful whether county councils are empowered to established bacteriological laboratories. In actual fact, a number of them are doing so.

This last point needs to be remembered in reading Table A in the Appendix as to county councils. Also it must be remembered that many district councils obtain bacteriological help independently of county councils. In Table A the county of Middlesex is only credited with the examination of 89 specimens, or .08 per 1,000 of population, against an average for all the counties of 2.15 per 1,000. But the districts in Middlesex (omitting Willesden, for which no report has been received) had, according to the annual reports of the medical officers of health, examined in the aggregate 3,518 specimens, viz., 3,111 diphtheria, 66 enteric, 322 tubercle, 14 miscellaneous, and 5 milk for tubercle. A similar state of things probably applies in Surrey and Lancashire, the sanitary authorities of which have laboratories conveniently near to them.

The circular letter of inquiry was not sent to district councils, but one can say definitely that in the majority of county districts not much bacteriological work is done apart from what is undertaken by the county council. Exceptions to this rule are formed by a considerable number of municipal boroughs and autonomous education areas.

County Councils.

Table A summarises the information obtained in answer to Form A sent out on August 19th. It has been returned for London and 60 out of the remaining 61 administrative counties.

The number of specimens examined during the year 1911 averaged in these 59 counties 2.15 per 1,000 of population, varying from 15.4 in the county of Rutland, 3.5 in Worcestershire, 8.7 in Derbyshire, and 7.7 in the West Riding, to nil.

In 23 of the total counties, having an aggregate population of 11,167,781, more than 1 specimen per 1,000 population was examined by or on behalf of the county council; in 13 (aggregate population 4,175,174) a smaller number was thus examined; in 24 (aggregate population 5,201,837) but little if any provision was made; from 1 no return was received.

The specimens were examined—

- (1) in laboratories under the management of the county council, in Essex Derbyshire, Glamor-

gan, Kent, Monmouth, Rutland, Somerset, Wiltshire, Worcestershire, West Riding of York;

- (2) by arrangement with universities in Cambridge, Durham, Gloucester, Northumberland, Stafford, Warwick;

- (3) in private laboratories. In East Riding of York the Clinical Research Association is used.

Several county councils are on the point of starting county laboratories.

County Boroughs.

Table B summarises the information obtained in respect of 75 county boroughs.

The number of specimens examined during the year 1911 averaged in 75 county boroughs 9.1 per 1,000 of population, varying from 60.0 in Croydon, 30.6 in Derby, 30.2 in Leeds, 27.7 in Reading, and 26.7 in Brighton to almost nil.

In 64 of the 75 county boroughs, having an aggregate population of 9,734,140, more than one specimen per 1,000 population was examined by or on behalf of the county borough council; in nine, having an aggregate population of 1,019,091, a smaller number was thus examined; and in two practically no provision was made.

In county boroughs specimens are examined either in municipal laboratories or by arrangement with universities or institutes, such as the Lister Institute, or in private laboratories. The relative extent to which these different arrangements are used is shown in Table I.

London.

In London the number of specimens examined averaged 3.30 per 1,000, the number being intermediate between the average for the counties and for the county boroughs. Even including the total provision made by all the borough councils, the provision in London is much inferior to that made by county borough councils. For details see Table C in Appendix.

The number of specimens examined by or for county councils, county borough councils, and metropolitan borough councils is shown below:—

TABLE I.

Year 1911.

Number of Specimens examined.	Administrative Counties.	County Boroughs.	London.
In laboratory of county council or county borough council	30,930	38,740	4,734
Hospitals	682	32,044	429
Universities	10,238	19,478	7
Other public bodies	—	5,902	3,675
Private bodies (e.g., clinical research associations)	2,276	2,912	5,317
Total	44,126	99,076	14,162
Total per 1,000 of population	2.15	9.11	3.13

The examinations in hospitals are in the main made in public isolation hospitals.

As stated above, information as regards administrative counties is lacking.

It will be seen that, including the hospital specimens, the majority of the bacteriological work has been done by the authorities themselves.

A very considerable amount has been done also by universities or other public bodies. This arrangement

presents important advantages, and it will be noted that it occurs in counties around the universities of Manchester, Birmingham, Durham, Bristol, &c. Such reference to university laboratories is necessary in the class of cases in which animal experimentation is required. It is quite exceptional for a county or municipal laboratory to have an animal licence.

The number of specimens examined in proportion to the population in the aggregate of counties and county boroughs is shown in Table II.

TABLE II.

Counties or County Boroughs.	Counties.		County Boroughs.	
	Population affected, 1911.	No. of Specimens examined per 1,000 of Population.	Population affected, 1911.	No. of Specimens examined per 1,000 of Population.
Having a bacteriological laboratory or in which more than 1 specimen was examined per 1,000 of population (Class A).	11,167,781	3.90	9,734,140	10.13
Having no bacteriological laboratory but providing bacteriological facilities to the extent of less than 1 specimen per 1,000 of population (Class B).	4,175,174	0.17	1,019,091	0.44
No bacteriological facilities (Class C)	5,201,837	—	116,741	—
Total	20,553,792	2.15	10,869,972	9.11

Note carefully that within counties, some sanitary authorities make arrangements independently of county councils, and the figures for these districts are not included in the above return. This applies particularly to towns and urban districts near large centres of population.

Even when liberal allowance is made for this fact, it can safely be said that in administrative county areas the provision for bacteriological aids to diagnosis is very much smaller than it is in county borough areas. This is shown not only by the average rates in Classes A and B above, but also by the fact that administrative areas representing a total population of 5 out of 20½ millions in counties have no county arrangements for bacteriological work. In county boroughs this is true only for an aggregate population of 116,741 out of 10½ millions.

Even in county boroughs, the arrangements show extreme variations, which cannot be completely explained by the supposition that diphtheria (the disease *par excellence* in which bacteriological examinations are made) was exceptionally prevalent in certain areas. Collateral information confirms the conclusion that the differences in the rates per 1,000 in Bootle and Liverpool (2.56 and 11.15), Halifax, Huddersfield, Bradford and Leeds (0.81, 2.64, 5.40, and 30.2), Stockport, Salford, and Manchester (0.92, 2.81, and 18.6) cannot be thus explained.

The conclusions that (a) in county areas arrangements for bacteriological examinations are available to a less extent than in county borough areas, and that (b) the extent to which they are available varies enormously in county borough areas, are confirmed by an examination of the returns as to arrangements for examination of sputa. These returns are not very complete, but in 21 counties out of 59, with an aggregate population of 10,347,103, 3,928 specimens were examined, or only 0.38 specimens per 1,000 of population,* and in 64 out of 75 county boroughs† 12,536 specimens were examined for a population of 9,887,611, or 1.27 specimens per 1,000 of population.

The number of sputa examined officially in county boroughs varied from none in a considerable number, 4, 6, 9, 10, 13, 16, and 20 respectively in seven county boroughs, to 566 in Brighton, 738 in Bristol, 1,965 in Sheffield, and 2,256 in Manchester.

In London, in 26 out of 29 borough councils, with an aggregate population of 4,171,337, 3,410 specimens were examined, or .82 specimens per 1,000 population. As in the provinces, there are great variations in the supply of facilities for examination of sputa. In three metropolitan boroughs no specimens were officially examined.

After making free allowance for the varying extent to which practitioners examine sputa for themselves or have them examined in private laboratories, there can, I think, be no doubt that this aid to the diagnosis of tuberculosis is greatly neglected in a large portion of the country.

In a few centres milk is examined for tubercle bacilli, and this examination is made the means of

tracing out infected milk supplies and taking administrative action thereon. Except in London and in a few large towns and counties, this important measure is neglected. It can only be carried out efficiently in laboratories having a licence for animal experiments.

The following general summary and conclusions are justified:—

1. In county areas official bacteriological aids to diagnosis, except in a few counties, are only available to a small, though to an increasing, extent.

2. These aids have been limited in the main to enteric fever, diphtheria, and tuberculosis; examinations for other infective diseases having been exceptionally undertaken.

3. A certain number of municipal boroughs and urban and rural districts make arrangements for bacteriological examinations. These are not included in the statistics appended to the present memorandum.

4. Even if allowance be made for the independent official arrangements made by district councils in county areas, I am satisfied that in the majority of districts there is a large deficiency of provision of official bacteriological aids to diagnosis of disease.

5. In a number of counties this deficiency amounts to an almost complete absence of such arrangements, practitioners being left without any official help.

6. When practitioners are thus left to their own resources, the conditions of medical practice among the great mass of the population do not enable them to obtain bacteriological aids to diagnosis except in isolated instances. There is no reasonable doubt that, as a result of the failure to use these means of diagnosis, a considerable mass of disease remains undetected, or detected only after delay, and preventive measures are rendered relatively ineffective.

7. In county borough areas official bacteriological aids to diagnosis are provided to a large extent. In the aggregate the provision is more than four times that made by county councils for equal populations. The entire population of county boroughs, except 116,741, has official bacteriological facilities to some extent.

8. A separate return is given in the appendix for London. The arrangements for London are variable and often defective.

9. The arrangements in county boroughs vary between two extremes. In some county boroughs they are excellent for diphtheria and enteric fever, and for tuberculosis, except in regard to milk.

10. For 9¼ million population in county boroughs (Class A), 26 times as many specimens are examined per unit of population as for the 1½ millions in county boroughs in Classes B and C.

11. The average number of specimens examined among the 9¼ millions (Class A) in the year 1911 was 10.13 per 1,000 population.

In this best class there are enormous variations in the number of specimens examined, and it is evident that in a large proportion of the county boroughs in this class the arrangements for examination of morbid

* No entry under this heading was made in the returns from the remaining counties.

† No entry under this heading was made in the returns from the remaining 11 county boroughs.

material are insufficiently known or appreciated, and that consequently much disease fails to be promptly diagnosed and its spread prevented.

12. The undesirability of separating public health bacteriological work from more general pathological work will be considered later.

13. The form of return (Form A) on which the preceding statement is based is appended.

PART II.

PATHOLOGICAL WORK IN VOLUNTARY HOSPITALS.

Form B, appended, was sent out at the same time as Form A, asking for information as to general pathological investigations undertaken in each county and county borough area.

The information obtained does not lend itself to statistical summary. In many of the returns it has been erroneously assumed that only work similar to that done by public health authorities was intended to be mentioned.

A more detailed return has been obtained from many of the metropolitan voluntary hospitals. This is difficult to summarise statistically, owing to the varying degree of detail in different returns. The total amount of pathological investigation in a number of general and special hospitals during 1911 is stated below:—

	Total Specimens examined in 1911.
Guy's Hospital	5,326
St. Bartholomew's Hospital	5,117
London Hospital	4,204
Royal Free Hospital	3,580
St. George's Hospital	2,302
Westminster Hospital	1,963
Great Northern Central Hospital	1,071
Consumption Hospital, Brompton	5,405
" " Victoria Park	4,327
" " City Road	1,254
Hospital for Children, Victoria Park	281
" Women, Chelsea	706
" Skin Diseases, St. John's	965

I.—BARTHOLOMEW'S HOSPITAL.

Dr. Gordon has kindly analysed for me the pathological investigations at St. Bartholomew's Hospital during 1911:—

(a) Bacteriological	2,176
(b) Vaccines made	280
(c) Wassermann's test	928
(d) Cytological examinations (blood counts, pleural effusions, cerebro-spinal fluid, urinary sediments)	427
(e) Chemical examinations (test meals, faeces for occult blood, &c.)	450
(f) Sections of morbid tissues	856
	<hr/> 5,117

The above work is additional to a large amount of pathological work done in the hospital wards (over 700 beds).

Seven demonstrators are employed in this work, in addition to Drs. Andrewes and Gordon. Much of their time is spent in teaching. With a paid staff of laboratory assistants, more work could be done with a much smaller staff.

The following further examples of work done in the clinical laboratories of metropolitan hospitals are taken from special returns sent in answer to a circular letter of inquiry.

II.—LONDON HOSPITAL.

Report of the Work of the Clinical Laboratory for the Year 1911.

The total number of investigations carried out in the laboratory amounted to 4,204, being an increase of 1,229 over the previous year.

The nature of the various investigations is shown in the following list:—

<i>Blood examinations</i> , including ordinary examinations, those for malarial parasites, &c., and certain other investigations	570
<i>Blood sera</i> , including Wassermann's Widal's test, &c.	530
<i>Test meals</i> , chemical and other examinations of	451
<i>Urines</i> , including the chemical and microscopical examinations, together with bacteriological in some cases, and investigations such as the hæmo-renal indices	790
<i>Fæces</i> , mainly chemical and microscopical examinations	69
<i>Sputa</i> , mainly for tubercle bacilli	530
<i>Body fluids</i> , consisting of cerebro-spinal fluids	164
Pleural fluids	129
Ascitic fluids	48
Joint fluids	39
From cyst fluids	10
<i>Examination of pus</i>	173
<i>Examination of nasal discharges, &c.</i>	21
<i>Cultures of swabs for diphtheria bacilli</i>	334
<i>Cultures of blood and spinal cases</i>	63
<i>Vaccine preparations</i>	67
<i>Calculi, chemical investigations of</i>	25
<i>Sections of tissues for microscopy</i>	85
<i>Various examinations, including film preparations</i>	106
Total	<hr/> 4,204

III.—WORK OF BACTERIOLOGICAL AND VACCINE DEPARTMENTS OF GUY'S HOSPITAL, 1911.

Total number of specimens examined	6,480
In medical wards	705
" clinical	470
" surgical	874
P.M. room	177
Out-patient department	1,366
Casualty department	1,904
Unclassified	984

Number of special vaccines prepared (in-patients)	378
Number of out-patients treated by vaccines	314
" treated by tuberculin alone	89
" " autogenous vaccine	81

The diseases for which vaccine treatment was employed were as follows:—

Acne.	Otorrhœa.
Actinomycosis.	Periurethral abscess.
Axillary abscess.	Proptosis.
Bronchitis.	Psoas abscess.
Carbuncle.	Pyelitis.
Cervicitis and endometritis.	Pyodermia.
Chronic nasal catarrh.	Pyorrhœa.
Compound fracture of tibia.	Rheumatoid arthritis.
Conjunctivitis.	Rhinitis.
Cystitis.	Scleritis.
Dacryocystitis.	Septic hand.
Empyema.	Septic foot.
Fistula.	Septic ulcer of leg.
Frontal sinusitis.	Syphilis.
Furunculosis.	Thrombosis.
Gonorrhœa.	Tuberculous pneumonia.
Gonorrhœal arthritis.	Tuberculous Broncho-pneumonia.
Impetigo.	Tuberculous Choroiditis.
Irido-cyclitis.	" Epididymitis.
Iritis.	" Episcleritis.
Keratitis.	" Glands.
Lupus.	" Lesions.
Œdema of lip.	" Osteitis.
Optic neuritis.	" Peritonitis.
	" Synovitis.
	Vaginitis.

IV.—WESTMINSTER HOSPITAL.

(Extract from Dr. Hebb's Report in Hospital Reports, Vol. 17.)

During the year 1909, 1,963 examinations were made in the clinical laboratory:—

1. <i>Urine</i> :—		
Nature of deposit	182	
General examination	28	
Estimation of urea	42	
" " albumen	6	
" " sugar	17	
" " uric acid	2	
Presence of tubercle bacilli (22) and other organisms (27)	49	
Presence of acetone	3	
" " carbolic acid	1	
" " bile	9	
" " indican	5	
" " lead	1	
" " leucin and tyrosin	1	
Diazo reaction	2	
Pancreatic reaction	33	
	—	381
2. <i>Histological</i>		352
3. <i>Opsonic Index</i>		27
4. <i>Wassermann-Flemming reaction</i>		24
5. <i>Von Pirquet reaction</i>		4
6. <i>Vaccines for 50 cases</i>		50
7. <i>Blood</i> :—		
Full counts	208	
Leucocyte counts	88	
Bacteriological examination	15	
Typhoid reaction	24	
Coagulation time	11	
Malaria parasites	6	
Miscellaneous	7	
	—	359
8. <i>Sputum</i> :—		
For tubercle bacilli	103	
" organisms present	8	
" elastic fibres	2	
" Charcot-Leyden crystals	1	
" Curschmann's spirals	2	
	—	116
9. <i>Fluids</i> :—		
Cerebrospinal	91	
Pleural	39	
Ascitic	12	
Synovial	7	
Blister	3	
From cyst	4	
" gall-bladder	1	
	—	157
10. <i>Test Meals</i>		38
Vomits	21	
	—	59
11. <i>Pus</i>		142
12. <i>Swabs</i> :—		
From throat	156	
" nose	19	
" eye	11	
" ear	7	
" vagina	30	
" urethra	10	
	—	233
13. <i>Calculi</i> :—		
Nature of		11
14. <i>Miscellaneous</i> :—		
Discharge from tunis	4	
" " breast	1	
" " parotid	1	
Foreign body from knee	1	
Nature of ointment	1	
Substance from ear	1	
Silk sutures	1	
	—	10
15. <i>Feces</i>		46

Cultivations were made in 350 cases; 1,523 culture tubes and 49 flasks were used.

V.—BROMPTON HOSPITAL.

During the year ending 31st December 1911 the following routine examinations were carried out in the laboratory:—

Examinations of sputum for tubercle bacilli	4,843
Bacteriological examinations of pus	35
" " throat swabs	15
" " feces	11
" " nasal discharges	3
Cytological examinations of the blood	29
Blood cultures	4
Examinations of the urine	20
Special examinations	15
Tuberculo-opsonic index diagnosis test	274
Wassermann's test for syphilis	106
	—
	5,405

The evidence obtained from metropolitan hospitals and information derived from other sources appear to warrant the following conclusions:—

1. In voluntary hospitals, particularly those in which medical students are taught, a large amount of valuable pathological work is being done in aid of the diagnosis and treatment of disease.

2. In the last few years this work has very greatly increased in the light of increasing knowledge of bacteriology and its applications in the treatment of infective diseases.

3. The amount of this work varies greatly in different hospitals. It is probably especially inadequate in hospitals remote from large centres of population, and hospitals unconnected with medical schools.

4. Even in hospitals to which medical schools are attached there is need for a great extension of systematic continuous pathological work additional to that carried out by unpaid workers. Dr. Gordon is of opinion that at St. Bartholomew's Hospital, in which arrangements for pathological work are exceptionally complete, the 5,117 specimens actually examined in 1911 would have been doubled had the total number been examined in which such investigation was practicable.

5. Bacteriological investigation forms a very large part, and in many pathological laboratories the main part of the pathological work is carried out in connection with hospitals.

6. This is becoming increasingly so year by year, and it is likely that ere long no large hospital will be able to be regarded as satisfactory which does not undertake laboratory investigation of the pathology of all obscure cases of disease accompanied by fever which does not make systematic examinations of blood reactions in suspected syphilis, &c., and which is not prepared in suitable cases to prepare autogenous vaccines for its patients when suffering from certain diseases of infective origin. (See, for example, the list of cases treated by vaccines at Guy's Hospital.)

C.—PRIVATE MEDICAL PRACTICE.

In addition to the pathological work undertaken by or for local authorities and for hospital patients, a large but unmeasurable amount of similar work is done by or on behalf of private practitioners.

No official provision is made for this work except for a limited number of diseases and to a limited extent by local authorities. For well-to-do patients this may involve no privation, but for an immense majority of the total population it implies that pathological aids to diagnosis are unavailable. The lack of means for obtaining accurate knowledge of obscure cases treated in private and contract practice and the resultant delay or inefficiency of treatment must represent an enormous economic loss to the community and a great amount of unnecessary sickness.

Medical practitioners under present conditions cannot afford to avail themselves of these aids to diagnosis and treatment for the majority of their patients. It cannot be said that in all instances they fully avail themselves of such provision as is made. The patients resorting to hospitals obtain the advantage

of these facilities to a great extent, and the only practicable alternatives for bringing about a satisfactory improvement in the conditions of domiciliary medical practice, especially for wage-earners, appear to be either to extend the pathological facilities at hospitals, or for hospitals and local authorities to combine forces for the additional provision.

The problem has become more acute in view of the fact that one-third at least of private practice in the future will be contract practice under the Insurance Act. This practice will not be likely to be satisfactory unless patients under its conditions have the same modern facilities for diagnosis as are commonly available for hospital patients.

The problem cannot be satisfactorily considered for this section of the community alone. Below and above the level of the insured, and among their families, is a large population for whom payment for these pathological aids to diagnosis and treatment is impossible. Any provision that is made should, in my view, be available for the entire community.

Public Health Work and Pathology.—The Local Government Board have always impressed on medical officers of health a wide conception of their duties. These are not limited to communicable diseases. According to the Board's orders the medical officer of health must "inquire into and ascertain by such means as are at his disposal the causes, origin, and distribution of diseases within the district" and "inform himself as far as practicable respecting all influences affecting or threatening to affect injuriously the public health."

Pathological work forms an important means of ascertaining the distribution and character of disease in a district, and thus of enabling rational preventive measures to be taken. The total pathological work carried on in hospitals and elsewhere is work which local and central health authorities may legitimately carry on or subsidise from public funds. Such an extension of pathological work, and possibly also the regularisation of the present pathological work of county councils, may, however, involve further legislation.

Comparison of Work of Local Authorities and Hospitals, &c.—Much of the bacteriology work done for voluntary hospitals or at large general institutes or universities is similar in character to that done for local authorities; but the bacteriological work in the best organised hospitals and institutes has a wider scope and these places are better adapted for more difficult investigations than laboratories not possessing so complete an outfit, and possibly not having an equally skilled staff.

It is probable that county councils and county borough councils will continue to extend their present provisions for official laboratories for direct administrative work, either at a central laboratory or at their isolation hospitals or tuberculosis dispensaries, com-

binning forces with established universities, institutes, or hospitals for more difficult work. In other instances arrangements may be made for the last-named bodies to undertake the whole of the bacteriological work of local authorities.

Extension of Public Health Pathological Work.—The enlistment of the chief universities, institutes, and hospitals in this work, and the extension of the work to diseases not at present included, evidently implies the further expenditure of public funds for this purpose.

The contemplated work must be closely related to future research.

The work of pathological laboratories carried out in the closest partnership with the clinician forms the indispensable foundation for further knowledge of the means of preventing and treating disease, and must therefore be the starting point of future research work. The work of the laboratory itself forms an important portion of research work, if organised on satisfactory lines. For this purpose clinician and pathologist must be maintained in the closest relationship to each other, each having important functions of research, the great possibilities of which cannot be realised except by intimate co-operation.

Without formulating any scheme in detail for the suggested close correlation of voluntary and official pathological work, it may be suggested that in all probability it will be able to be most efficiently organised by the utilisation by public authorities of the well-equipped laboratories attached to medical schools and universities and certain large institutes.

Such a combination has the further advantage that it lends itself to the subsidisation by the State of the forms of research at these schools and universities which are most likely to prove fruitful. At many university and large medical schools there are men qualified for research, who are at present prevented from carrying it out owing to lack of funds.

A scheme of large laboratories at, say, 15 or 20 centres throughout the country would be likely to give better results than a larger number in which every county or county borough would have its separate arrangements (except for elementary routine work). It will be desirable that some of these laboratories shall be organised in the closest relationship to hospitals and sanatoria, in order that clinical and pathological investigations may be combined under the most advantageous circumstances.

In the above remarks, combination of forces between voluntary hospitals and local authorities has alone been mentioned.

In order that a satisfactory medical service may be secured throughout the country, facilities for work similar to that now being done in hospitals will need to be offered to medical practitioners generally.

A. NEWSHOLME.

October 1912.

APPENDIX.

FORM A.

Facilities for Pathological and Bacteriological Examinations and for Clinical Research generally.

County or County Borough of _____

	Year 1911.				
	Number of Specimens examined during the Year on behalf of the County Borough or the County Council, in Laboratories provided by				
	The County Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.
Total number of specimens examined in 1911					
Number of Widal reactions					
" Diphtheria swabs					
" Sputa					
" Examinations for other diseases					
Examination of milk for—					
(a) Tubercle Bacilli					
(b) Other foreign matter					

	Year 1911.				
	Number of Specimens examined during the Year on behalf of the County Borough or the County Council, in Laboratories provided by				
	The County Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.
Bacteriological examination of—					
Water					
Sewage					
Material from suspected food poisoning					
Examination for diagnosis of—					
Malignant disease					
Blood					
Wassermann reaction—					
Others					

FORM B.

Institutions, including Municipal and County Council Laboratories, known to be undertaking for (a) Public Health Authorities; (b) Hospital Physicians and Surgeons; and (c) Private Practitioners.

1. Examinations of material from patients for the diagnosis of disease (Diphtheria, Typhoid, &c.).
2. Bacteriological examination of (a) Milk; (b) Water; (c) Sewage; (d) Materials from food poisoning outbreaks.
3. Wasserman reaction.
4. Examinations of Urine.
5. Examinations of Blood.
6. Examinations of Morbid Tissues.

Name and Address of Institution.	Name of Director of Research Laboratory.	By whom is the Institution provided and managed?	For whom is the work done? (a) Public Health Authorities; (b) Hospital Physicians, &c.; (c) Private Practitioners.	Class of Work undertaken. (1 to 6 above.)

TABLE A.—ADMINISTRATIVE COUNTIES.

Summarised return of facilities for pathological and bacteriological examinations provided by county councils, classified as A., B., C.

- A. contains the names of counties which have established a county laboratory, or in which the number of specimens examined in 1911 by other means amounts to not less than 1 per 1,000 population.
- B. contains the names of counties which have no county laboratories and in which the number of specimens examined was less than 1 per 1,000 population.
- C. contains the names of counties which have made little or no provision for bacteriological examination.

A.

Name of Administrative County.	Year 1911.					Population of Administrative County.	Number of Specimens examined per 1,000 Population.	Remarks.
	The County Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.			
Cambridge	—	156	—	—	—	128,322	1·22	Cambridge University
Derbyshire	4,874	—	—	—	—	560,013	8·70	County Laboratory.
Devon	—	—	—	—	1,117	457,331	2·44	Exeter City bacteriologist.
Durham	—	1,962	—	—	—	929,214	2·11	Durham University.
Essex	2,365	—	—	164	—	1,061,851	2·66	Medical Officer of Health's Laboratory and London Hospital.
Glamorgan	894	—	—	—	—	742,998	1·20	County Laboratory.
Gloucester	—	2,033	—	—	—	329,014	6·18	Bristol University.
Hereford	—	—	—	—	—	114,269	?	County Laboratory being now established.
Kent	337 (2 months only).	—	—	—	—	1,020,965	0·33	County Laboratory.
Lincs. (Lindsey)	—	—	—	—	—	237,843	?	County Laboratory recently established.
Monmouth	447	—	—	—	—	312,028	1·43	County Laboratory.
Northumberland	—	1,524	—	—	—	371,474	4·11	Durham University.
Rutland	312	—	—	—	—	20,316	15·37	County Laboratory.
Salop	557	1,212	—	—	—	246,307	7·19	Birmingham University.
Somerset	2,672 (6 months only).	—	—	—	—	407,304	6·56	County Laboratory.

Name of Administrative County.	Year 1911. Number of Specimens examined during the Year on behalf of the County Council in Laboratories provided by					Population of Administrative County.	Number of Specimens examined per 1,000 Population.	Remarks.
	The County Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.			
Southampton . . .	—	550	—	—	—	433,566	1·27	Birmingham University. County Laboratory now established.
Stafford	—	1,832 (6 months only).	—	—	—	738,990	2·48	Birmingham University
Suffolk (East) . . .	68	—	—	—	—	203,223	0·34	Laboratory just started.
Warwick	—	800	—	—	—	408,227	1·96	Birmingham University.
Wilts	375	—	—	—	—	286,822	1·30	
Worcestershire . . .	5,763	—	—	—	—	427,026	13·49	County Laboratory.
Yorks (E. Riding) . .	—	—	—	—	997	154,768	6·43	Clinical Research Association.
Yorks (W. Riding) . .	12,117	—	—	—	—	1,584,880	7·65	County Laboratory.
Total	30,781	10,069	—	464	2,114	11,176,781	3·90	

The figures for London County Council are not specially classified. The information furnished on the return is as follows:—1,578 diphtheria swabs were examined and 2,926 specimens for ringworm or favus, 3,029 samples of milk were examined for tubercle bacilli.

B.

Bucks	10*	—	—	40	27	219,554	0·35	*Ringworm.
Cheshire	—	23	—	—	—	676,275	0·03	
Cornwall	—	—	—	—	34	328,098	0·10	
Cumberland	—	22	—	—	4	265,746	0·10	
Hertford	139	—	—	—	—	311,284	0·45	
Leicester	—	—	—	89	—	249,331	0·36	
Middlesex	—	—	—	89	—	1,126,165	0·08	Diphtheria swabs only.
Montgomery	—	24	—	—	—	53,146	0·45	Victoria University.
Norfolk	—	100	—	—	1	321,733	0·31	King's College, London.
Suffolk (West)	—	—	—	—	45	116,905	0·38	Clinical Research Association.
Sussex (East)	—	—	—	—	?	242,146	?	Medical officer of health examines diphtheria swabs.
Sussex (West)	—	—	—	—	13	176,308	0·07	Clinical Research Association.
Wight (Isle of)	—	—	—	—	38	88,186	0·43	County laboratory under consideration.
	149	169	—	218	162	4,175,174	0·17	

C.

Name of County.	Population.	Remarks. (Specimens examined in 1911.)	Name of County.	Population.	Remarks. (Specimens examined in 1911.)
Anglesey	50,928	Nil.	Lincs (Kesteven)	111,324	Nil.
Bedford	194,588	Nil.	Merioneth	45,565	Nil.
Berks	195,811	Nil.	Northampton	213,733	Nil.
Brecon	59,287	Nil. Laboratory under consideration.	Nottingham	344,194	Nil.
Cardigan	59,879	Nil.	Oxford	146,221	Nil.
Carmarthen	160,406	Nil.	Pembroke	89,960	Nil.
Denbigh	144,783	Nil. Laboratory under consideration.	Radnor	22,590	Nil.
Dorset	223,266	1 specimen sent to Lister Institute.	Soke of Peterborough.	44,718	No record.
Ely, Isle of	69,752	Nil.	Surrey	676,027	Nil.
Flint	92,705	Nil.	Westmoreland	63,575	A few specimens for the County Education Committee.
Hunts	55,577	Nil.	Yorks (North Riding).	314,779	Nil.
Lancs	1,739,320	Urine for B. Typhosus and specimens for poliomyelitis.	Total	5,201,837	
Lincs (Holland)	82,849	Nil.			

No return at the date of tabulation had been received for Carnarvon:—

County.	Population.
Carnarvon	125,043

ADMINISTRATIVE COUNTIES. SUMMARY.

	Year 1911.					Population of Administrative Counties.	No. of Specimens examined per 1,000 Population.
	Number of Specimens examined during the Year on behalf of the County Council in Laboratories provided by						
	The County Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.		
Class A.	30,781	10,069	—	464	2,114	11,176,781	3·90
Class B.	149	169	—	218	162	4,175,174	0·17
Class C.	—	—	—	—	—	5,201,837	—
Grand Total . . .	30,930	10,238	—	682	2,276	20,553,792	2·15

TABLE B.—COUNTY BOROUGHES.

Summarised return of facilities for Pathological and Bacteriological Examinations provided by Borough Councils classified in three groups.

A.—County Boroughs having a bacteriological laboratory or providing otherwise for the examination in 1911 of more than 1 specimen per 1,000. †

B.—County Boroughs having no bacteriological laboratory but providing bacteriological facilities in 1911 to the extent of less than 1 specimen per 1,000 population.

C.—County Boroughs providing no bacteriological facilities.

Class A.

Name of County Borough.	Year 1911.					Population, 1911.	Number of Specimens examined per 1,000 Population.	Remarks.
	Number of Specimens examined during the Year on behalf of the County Borough in Laboratories provided by							
	Borough Council.	Universities.	Other Public Bodies.	Hospitals.	Private Persons.			
Barrow	—	8	—	—	—	63,770	0·13	Borough laboratory just provided.
Bath	—	36	—	—	—	50,721	0·71	Free examination offered.
Birmingham	44	2,618	—	—	—	525,833	5·05	Birmingham University.
Blackburn	—	130 [†]	—	850	—	133,052	7·37	*Manchester University.
Blackpool	112	50	—	—	141	58,371	5·29	
Bolton	—	(a)277	—	—	(b)520	180,851	4·40	(a) Manchester University. (b) Public Analyst.
Bootle	155	24	—	—	—	69,876	2·56	
Bournemouth	—	—	8	—	649	78,674	8·35	Borough bacteriologist
Bradford	1,496	60	—	—	—	288,458	5·40	
Brighton	3,456	—	(a)46	—	—	131,237	26·71	(a) Lister Institute.
Bristol	—	†	(a)4,192	—	—	357,048	11·7	†Special arrangement with Bristol University for advanced work. (a) Public Analyst.
Burnley	525	21	—	—	—	106,322	5·15	
Barton-on-Trent . . .	26	—	586 [†]	—	—	48,266	12·67	‡522 by Lister Institute.
Bury	—	112	—	—	—	58,648	1·91	Manchester University.
Cardiff	694	—	—	—	—	182,259	3·81	
Chester	548	—	—	—	—	39,028	14·05	
Coventry	—	89 [§]	394	—	—	106,349	4·56	§Birmingham University.
Croydon	10,092	—	—	—	77	169,551	60·9	
Derby	—	41	26	3,694	—	123,410	30·58	
Devonport	250	—	—	—	—	81,678	3·06	
Eastbourne	233	—	—	—	—	52,542	4·44	
Exeter	—	—	6¶	—	(a)788	48,664	16·3	¶Lister Institute. (a) Public Analyst.
Gateshead	133	29¶	—	—	—	116,917	1·38	Durham University.
Gloucester	—	—	4	—	201	50,035	4·10	
Great Yarmouth . . .	572	—	—	—	—	55,905	10·23	
Grimsby	80	—	35	—	—	74,659	1·54	
Halifax	81	1	—	—	—	101,553	0·81	
Hastings	—	—	—	443	—	61,145	7·25	
Huddersfield	—	—	—	285	—	107,821	2·64	
Ipswich	210	—	—	—	—	73,932	2·84	
Kingston-upon-Hull .	1,682	—	—	598	—	277,991	8·20	
Leeds	—	1,285 [*]	—	12,186	—	445,550	30·2	*Leeds University.
Leicester	234	—	—	—	—	227,222	1·03	
Lincoln	722	—	28	—	—	57,285	13·1	
Liverpool	5,279	—	—	3,037	—	746,421	11·15	
Manchester	—	5,374	—	7,903	—	714,333	18·6	
Merthyr Tydfil	25	—	63 [†]	—	—	80,990	1·09	†King's College London.
Newcastle-upon-Tyne	—	2,495 [†]	—	1,686	—	266,603	15·7	†Durham University.
Newport (Mon.) . . .	606	—	—	—	—	83,691	7·24	
Northampton	—	—	231 [§]	—	—	90,064	2·57	§Mainly Lister Institute.
Norwich	1,646	—	9	—	260	121,478	15·76	
Nottingham	2,222	—	—	—	—	259,904	8·55	
Oldham	135	—	¶58	—	—	147,483	1·31	¶Manchester University.
Oxford	—	180	—	123	—	53,048	5·71	
Plymouth	12	—	—	953	—	112,030	8·62	
Portsmouth	1,157	—	—	—	—	231,141	5·01	
Reading	1,986	—	96	—	—	75,198	27·7	

Name of County Borough.	Year 1911. Number of Specimens examined during the Year on behalf of the County Borough in Laboratories provided by					Popula- tion, 1911.	Number of Speci- mens examined per 1,000 popula- tion.	Remarks.
	Borough Council.	Univer- sities.	Other Public Bodies.	Hospitals.	Private Persons.			
Rochdale	320	—	—	—	—	91,428	3.50	
Rotherham	560	—	—	—	—	62,483	8.96	
St. Helen's (Lanes)	1,109	—	—	—	—	96,551	11.48	
Salford	—	650	—	—	—	231,357	2.81	Manchester University.
Sheffield	—	3,751	—	—	—	454,632	8.24	Sheffield University.
Smethwick	—	552	—	—	—	70,694	7.81	Birmingham University.
Southampton	311	—	—	—	—	119,012	2.61	
Southport	—	79	—	—	—	51,643	1.53	Liverpool University.
South Shields	65	—	—	—	—	108,647	0.60	Municipal Laboratory.
Sunderland	—	1,174	—	—	—	151,159	7.77	Durham University.
Tynemuth	645	—	—	—	—	58,816	10.97	
Warrington	794	90*	—	—	—	72,166	12.24	Manchester University.
West Ham	—	—	—	—	—	289,030	1.04	
West Hartlepool	—	65	—	—	—	63,923	1.02	Durham University.
Wolverhampton	—	102	—	—	12	95,328	1.20	
Worcester	352	—	—	—	—	47,982	7.33	
York	174	—	—	—	111	82,282	3.46	
Total	38,740	19,293	5,782	32,044	2,773	9,734,140	10.13	

COUNTY BOROUGHS.

Class B.

	County Borough.							
Birkenhead	—	—	()	()	()	130,794	()	No systematic arrange- ments in force.
Dudley	—	3	—	—	—	51,079	0.59	Birmingham University.
Middlesborough	—	—	No records.	—	—	104,767	()	17 specimens in 1912 to August.
Preston	—	—	6*	—	—	117,088	0.51	* Clinical Research Asso- ciation.
Stockport	—	100	—	—	—	108,682	0.92	Manchester University.
Stoke-on-Trent	—	1	—	—	139	234,534	0.60	
Swansea	—	—	114	—	—	114,663	0.99	Cardiff and county labora- tory.
West Bromwich	—	20	—	—	—	68,332	0.29	Birmingham University.
Wigan	—	61	—	—	—	89,152	0.68	Liverpool University.
Total	—	185	120	—	139	1,019,091	0.44	

Class C.

Canterbury, population	24,626	No facilities.
Walsall, population	92,115	One specimen sent to Birmingham University.

116,741

SUMMARY FOR COUNTY BOROUGHS.

Total of Class A.	38,740	19,293	5,782	32,044	2,773	9,734,140	10.13
" " B.	—	185	120	—	139	1,019,091	0.44
" " C.	—	—	—	—	—	116,741	—
GRAND TOTAL	38,740	19,478	5,902	32,044	2,912	10,869,972	9.11

TABLE C.

London.

Borough	Numbers of Specimens.						Popula- tion 1911.	Number of Speci- mens examined per 1,000 of Popu- lation.	Remarks.
	Typhoid.	Diph- theria.	Sputa.	Milk.	Others.	Total.			
City of London	5	1	2	45	31	84	19,657	4.27	Hospitals.
Battersea	26	394	188	—	4	612	167,743	3.65	Private persons.
Bermondsey	14	526	291	—	12	843	125,903	6.70	Borough Labora- tory.
Bothal Green	34	47	27	—	—	108	128,183	0.84	Clinical Research Association, Li- mited.
Camberwell	21	241	238	—	2	502	261,328	1.92	Borough Labora- tory.

Borough.	Numbers of Specimens.						Population 1911.	Number of Specimens examined per 1,000 of Population.	Remarks.
	Typhoid.	Diphtheria.	Sputa.	Milk.	Others.	Total.			
Chelsea . . .	—	107	—	—	—	107	66,385	1·61	Lister Institute.
Deptford . . .	11	189	6	—	—	206	169,496	1·89	Clinical Research Association, Limited.
Finsbury . . .	19	221	52	—	1	293	87,923	3·33	Hospitals.
Fulham . . .	21	198	224	—	4	447	153,284	2·92	Lister Institute.
Greenwich . . .	9	1,926	81	—	—	2,016	95,968	21·02	Clinical Research Association, Limited.
Hackney . . .	21	248	132	—	—	401	222,533	1·81	Private persons.
Hammersmith . . .	—	17	—	—	—	17	121,521	0·14	Lister Institute.
Hampstead . . .	8	157	31	—	—	196	85,495	2·29	" "
Holborn . . .	3	71	54	—	—	128	49,357	2·59	Public Bodies.
Islington . . .	52	484	252	—	—	788	327,403	2·41	Lister Institute.
Kensington . . .	1	148	15	—	—	164	172,317	0·95	" "
Lambeth . . .	55	667	226	—	28	976	298,058	3·28	Borough "Laboratory."
Lewisham . . .	25	510	127	—	—	662	160,834	4·11	Private persons.
Paddington . . .	34	210	51	—	59	354	142,551	2·48	Lister Institute.
Poplar . . .	36	157	—	—	—	193	162,442	1·19	" "
St. Marylebone . . .	12	143	201	18	—	374	118,160	3·17	Private persons.
St. Pancras . . .	40†	152‡	93‡	20*	—	305	218,387	1·40	†Lister Institute. ‡Private persons. *By hospitals.
Shoreditch . . .	6	36	10	—	—	52	111,390	0·47	By hospitals.
Southwark . . .	15	179	253	—	—	447	191,907	2·34	Borough Laboratory.
Stepney . . .	47	122	374	—	256*	799	279,804	2·85	*Rats for B. Pestic.
Stoke Newington . . .	13‡	145‡	44‡	5‡	2‡	209	59,659	4·12	‡Lister Institute. ‡University College.
Wandsworth . . .	26	597	170	—	1	794	311,360	2·55	Lister Institute.
Westminster . . .	20	143	77	926§	1	1,167	160,261	7·29	Borough Laboratory. §Not for tuberculosis.
Woolwich . . .	20	705	191	2	—	918	121,376	7·59	Private persons.
Total . . .	594	8,741	3,410	1,016	401	14,162	4,521,685	3·13	

MEMORANDUM submitted by JAMES NIVEN, LL.D., M.B., at the request of the CHAIRMAN of the DEPARTMENTAL COMMITTEE ON TUBERCULOSIS ON THE WORK CARRIED OUT IN MANCHESTER UNDER THE VOLUNTARY NOTIFICATION OF PHTHISIS, AND HOW IT MAY BE ADAPTED TO FULFIL THE REQUIREMENTS OF THE INSURANCE ACT.

In the year 1899 a report was presented to the council of the city of Manchester, in which was outlined a scheme for the reduction of tuberculosis so far as it depends on human infection. Powers were obtained from Parliament in the same year for dealing with tuberculous milk.

It was pointed out that notification should include all open forms of human tuberculosis, but, having regard to the magnitude of the undertaking, notification of phthisis only was asked for the time being. (Annual Report on the Health of Manchester for 1898, p. 145.)

It was anticipated that three medical officers would be required for phthisis alone (*loc. cit.*). The council having adopted the report, first one and then another medical officer was appointed.

A form of inquiry was drawn up, on which the results of their investigations might be recorded, which has received one or two additions in recent years. It was assumed that, so far as householders were concerned, when they had made their inquiries, instructed the families as to personal precautions, and got necessary measures of disinfection carried out, the family would enter on a new period, in which, with due care, there need be no further danger of infection.

But it was also considered necessary for various reasons that the phthisical persons should continue to be visited by sanitary inspectors or health visitors to see that strict cleanliness was maintained and that the personal precautions advised were being carried out. At first these visits were fortnightly, but gradually an interval of a month was substituted. It was expected that the rooms inhabited by the consumptive would be cleaned

out every three months, the floors being cleaned with soap and water, and the walls, &c. with dough, a procedure which Esmarch had shown to be adequate, in the absence of spitting.

2. The forms of inquiry entered into a great many particulars, which can only be understood by means of one which has been filled up. (Herewith submitted in blank and filled up.)

They contained an account of the previous health of the patient, and of his personal habits, illnesses, accidents, &c.; also a statement as to the health of other members of the family. A statement was also made as to the family history, but it was not until recent years that this was systematised as on the form submitted. It is only in recent years also that a systematic statement has been made as to the name, age, sex and earnings of each member of the family.

The condition of the house was recorded, with the duration of residence; previous houses occupied, with the duration of stay in them, were also recorded, so that house infection could be traced. But it has not been found possible to make an examination of previous places of abode other than exceptionally.

The nature of the employment or employments pursued was recorded, with the places of work, including schools, and the period during which such employment continued. In this way it has been possible to ascertain in what classes of work, or under what conditions, phthisis has been most rife. Many workshops have been inspected. Samples of sputum have been collected for a large proportion of the cases, and submitted to Professor Delepine for examination. This has been done, more especially, in cases to which doubt might be

supposed to attach. But the absence of tubercle bacilli from the expectoration has not been held to negative phthisis. The history of the illness was taken, but only in recent years has this been systematically recorded.

The personal instructions given extended to the precautions to be taken outside the home. The disinfection carried out only referred to the house, and only recently have we been able to extend it to personal and bed clothing, under the orders of the Local Government Board.

Exposures to infection were ascertained, including the intimacy of contact and the period during which the exposure occurred. In this way many new cases of phthisis have been discovered as well as a large number of other forms of tuberculosis, in regard to which advice has been given as to precautions and seeking medical treatment.

The plan of pursuing these investigations by medical officers did not answer very well. After the early period of administration, when the subject was new and interesting, it was found that the officers appointed desired to employ themselves with general sanitary administration, and not with a limited branch of preventive work. Moreover, as one had learned from personal experience, these investigations require persistent training. The assistant officers appointed were men of ability who found positions elsewhere, and every new one who came had to go through a period of training. It appeared, therefore, better to engage sanitary inspectors, who would remain, and train them in the methods. Something is lost in medical precision, no doubt, but this policy has worked well. Recently a tuberculosis medical officer, with quite special knowledge of the subject, and who desires to pursue it, has been appointed, whose business it will be to clear up any doubt as to individual cases, determine the medical condition of families which require his attention, and advise as to the best treatment to be pursued in consultation with practitioners. Owing also to the great increase of notifications since the last Tuberculosis Order of the Local Government Board came into force, we have to divert a nurse from other work, and are about to engage another. The choice of officers, with a limited staff, is a very important matter.

3. The information collected by the special investigators is utilised to form three card indexes, one for addresses, a second for names, and a third for occupations. These are necessary in tracing the movements of persons following renotifications, pursuing the track of infection, dealing with workshops, and arranging the facts in a form easy of classification.

Other minor systems of card indexes are also formed, dealing respectively with hospitals, schools, and public-houses.

4. *Treatment.*—No domestic treatment has been given, nor, under existing conditions, would that be possible to any great extent. But when the history as recorded on the inquiry sheets has been scrutinised, it has to be considered in each case whether treatment is required and what treatment is possible. Cases are accordingly referred to a private practitioner, or are referred to the Crossley Sanatorium, Clayton Hospital, or one of the three union hospitals, according to circumstances. Many persons are naturally reluctant to go to the union hospitals, and it is often necessary to use pressure to that end. Or, they may be sent to the Children's Hospital, the Royal Infirmary, Ancoats Hospital, or the Northern Hospital. Whatever course seems best, pressure is applied on the family to take it.

The Corporation have now 69 beds in use at Clayton Hospital for advanced cases for adults and for children—20 for men, 24 for women, and 25 for children. They also have 20 beds at Crossley Sanatorium, to which, owing to their small number, restrictive conditions are attached. There must be a certain number of persons in the household, the patient must not be able to pay, and there must be tubercle bacilli in the sputum. Incidentally, we know that our cases are all certainly phthisical. The chief object in this requirement, however, is to insure that we get as much preventive advantage from these beds as possible. Patients admitted into the Crossley and Bowdon Sanatoria are instructed in the personal precautions to be taken, and also at Clayton Hospital. It is agreed

that similar instructions shall be given at the union hospitals. Quite as much reliance, I believe, may be placed on the instructions given at home by our special officers.

It is submitted that when the work done from the Public Health Office is taken in conjunction with the treatment at home, and at various institutions, especially at the consumption hospitals, but also at the other public hospitals, the total amount of assistance rendered is in kind and amount equivalent to that given under a system of dispensaries, with possibly more done in the way of prevention and possibly less in the way of treatment.

The provision of beds for cases of phthisis as given by the respective authorities is at present—

The Crossley and Bowdon Sanatoria for Manchester and district, 150 beds (of which 50 or more appear by the annual report of the Consumption Hospital for 1909 to be occupied by Manchester patients).

Clayton Vale Hospital	69 beds.
South Manchester Union	169 "
Manchester Township	186 "
Prestwich Union	44 "
Total	514

To these must be added an unknown number of beds occupied by tuberculous cases in the Royal Infirmary, Ancoats Hospital, the Northern Hospital, the Manchester Children's Hospital, Swinton School under the Education Department, the Bethesda Home for crippled children, and other homes. They may be taken to include the use of 40 beds for phthisis, of which perhaps 20 may be at the disposal of Manchester cases.

It is suggested that the dispensary has the advantage of ascertaining the existence of cases of tuberculosis. But that applies equally to all these institutions, which notify all ascertained cases of phthisis to the Public Health Office. This will readily be seen by referring to a statement of the sources of notification.

If, however, it is desired that the *domiciliary* treatment of phthisis should be undertaken, this could easily be done from the Public Health Offices, if the Corporation would undertake to supply the additional officers and buildings required.

From every point of view this would be an advantage, as it would bind closely the preventive and clinical work, and accurate research into the best means for arresting infection would be furthered.

5. *Instruction.*—The instruction of the community of Manchester has been in progress for a great many years. The subject was much under discussion in 1892 and 1893 in the Society of Medical Officers of Health, and Professor Delepine also addressed the medical practitioners in 1892 on preventive measures. Prior to this, however, under the guidance of Dr. Ransome, instructions were issued, and spit bottles supplied at a small charge, to out-patients of the Consumption Hospital. These arrangements continue up to the present.

On three separate occasions leaflets on the prevention of tuberculosis were distributed, through the good offices of the Chief Constable, to every house in Manchester. Since the adoption of notification, also by lectures, instruction in individual households, and training in hospitals, and otherwise, this instruction has been continued. Notices as regards expectoration have been distributed as far as possible to all factories and workshops, for suspension in the workrooms and closets. This has been done in the case of every workshop made known through the inquiry forms. Notices have also been suspended in every room of every common lodging-house, and in most of the public-houses. In all public places, including public halls, trams, &c., it is a legal obligation not to expectorate on the floor or walls, which, in the case of the trams, has been enforced.

So far as phthisical persons are concerned special attention is directed to these personal precautions:—

(a) The use of a spit bottle out of doors. Printed directions are given as to the manner in which it is to be utilised.

- (b) A cardboard box with lid, both varnished inside, is advised for use inside the house.
- (c) Wax tissue paper in square sheets is advised to intercept cough.
- (d) Special instructions are given in the care of the hands.

The materials advised are supplied from the Public Health Office to all persons who may be trusted to use them properly.

The printed instructions issued are included in the set of forms accompanying this memorandum.

6. Sanitary defects discovered in the house are remedied. The open window is advised where suitable bedding is attainable. Isolation is urged. If this cannot be obtained in separate rooms, the means whereby it may be carried out in rooms occupied by more than one person are pointed out, separate beds being insisted upon.

7. Where the means of the family do not suffice to maintain nutrition on a proper level, every effort has been made to direct the family into a channel by which aid may be obtained. Too often this has proved insufficient, but considerable aid has been afforded. The Insurance Act will greatly reduce the great risk involved in persons badly nourished living in the same house with phthisical persons.

8. The staff hitherto engaged in carrying on this work has consisted of a chief clerk, whom we were fortunate enough to secure at the beginning of our work, and by whom the classification and application of the inquiries has been organised, with four juniors. He also takes charge of the particulars relating to the supervision of the milk supply in connection with tuberculosis.

Two special officers, trained for the purpose, carry out the inquiries.

Examinations of families and of special cases are now conducted by the tuberculosis medical officer. One of the assistant medical officers takes charge of Clayton Hospital. Other examinations are conducted at the office by the medical officer of health and his assistants.

A veterinary surgeon is in charge of the work done under the Milk Clauses, and also of the cowsheds and inspection of cows within the city.

The special inquiries carried out in connection with the notification of phthisis are conducted by two sanitary inspectors specially chosen and trained to the work. More recently a nurse has been taken on.

Continued supervision of households invaded by phthisis is carried out by the district inspectors to the number of 33, and by health visitors, numbering 18, three of whom are trained nurses.

The district inspectors formulate on a record sheet the disinfection prescribed in the first instance on the inquiry sheet, and the health visitors often see that it is carried out.

9. The kind of work carried out will be seen on reference to the forms used in the office, which are given in the accompanying pamphlet, and a set of which is appended, and to the tables attached:—

Table 1 shows the number of new cases of phthisis notified year by year, and the sources from which they are derived. It will be seen that over the eleven years recorded 41 per cent. were from poor law sources.

Table 2 shows the sources of notification in more detail. Considerable alteration will be effected by the Order of the Local Government Board which came into operation on January 1st, 1912. From this table it will be seen that there is considerable seasonal variation in the numbers requiring treatment, and that the Consumption Hospital in the year 1910 accounts for only one-fifth of the notified cases.

Table 3 gives a summary of the administrative work so far as it can be expressed in figures. From the last line, showing the number of cases under observation, it would appear that 3,000 must be an under-estimate of the total number in the City.

Table 4 shows for the year 1910 the extent to which sickness benefit may be expected to raise families up to a living standard. From columns 1 and 2 it will be seen that the relief afforded will be considerable for a time, but that all cases will not be effectually reached.

It may be assumed that the above expenditure, and more, would still be required when the Insurance Act comes into force; for Clayton Hospital would then be used purely for children, who do very well there.

The provision in Crossley Sanatorium would be defrayed from the Insurance Fund, but administrative expenditure will be much increased in the Public Health Office, especially if notification is extended to other forms of tuberculosis.

10. The expenditure involved is considerable, and is estimated thus for the year ending March 31st, 1912:—

	£	s.	d.
One-tenth salary of the medical officer of health	105	0	0
One-fifth salary of the senior assistant	60	0	0
Tuberculosis medical officer (quarter of a year)	62	10	0
Special inquiry officers and clerks	614	18	0
Contribution to Thrift Fund	16	0	0
Proportion of work of the district inspectors and health visitors, say	300	0	0
Disinfection	1,150	0	0
Bacteriological reports	265	0	0
Medical notifications	300	0	0
Printing and materials	140	0	0
Clayton Hospital	4,383	0	0
Crossley Sanatorium	1,092	0	0
	8,488	0	0
To complete the statement of the sums now spent on the prevention of tuberculosis we must add the amount spent under the Milk Clauses	959	0	0
Total	9,447	0	0

The above expenditure by no means represents all that the public contributes to the treatment and prevention of tuberculosis.

We should have to add the voluntary contributions of Manchester people to the Consumption Hospital, the expense of treatment in the union hospitals, a part of the treatment given at the Manchester Children's Hospital and at the general hospitals, the expenditures of the Education Department on tuberculous cases at Swinton, the contributions to the Bethesda Home for cripples, &c.

10. In addition to the work which has been done in connection with the prevention and treatment of phthisis, a special service has been carried on since the year 1899 in connection with tuberculous milk.

It was assumed, in instituting this service, that, so far as infection from bovines was concerned, other sources were slight in comparison with tuberculous milk, and that tuberculous milk was due in the main and almost entirely to invasion of the cow's udder by tuberculosis. No reason has been found to doubt the validity of this assumption. When milk has been found to be tuberculous, it has been possible, in the majority of instances, to trace infection back to a particular cow or to particular cows suffering from tuberculosis of the udder. This, however, has only been possible because of the custom of milk dealers to draw their supplies from farms and not from companies, and to keep separate these supplies. The system pursued has been to take samples of milk from the incoming supplies, to submit them to examination by Professor Delepine, and, when he has declared them to be tuberculous, to send our veterinary surgeon to the farms, who has examined the herd and detected the udders responsible for the condition of the milk.

In the case of the cowsheds within the city, these have been systematically visited and the cows inspected. Any cow showing suspicious conditions of the udder has been milked by the veterinary officer and the milk examined.

Such a procedure requires great accuracy and skill on the part of the bacteriologist, and also great skill on the part of the veterinary officer.

The latter has to deal not only with facts, but with men, and the success attained depends largely on the instruction which he imparts to farmers, and on the extent to which he succeeds in getting them followed. At the same time he must be skilful in diagnosis. Just as with the officers in the notification work, such skill is only gradually acquired, even by the ablest men.

When the cow has been discovered, from the udder of which the tuberculous milk is derived, milk is drawn from it by the veterinary surgeon and submitted to Professor Delapine, who confirms the veterinary surgeon in his statement that the disease is now detected at a much earlier stage than was formerly the case. There has thus been a diminution of infection in milk altogether out of proportion to that shown by the percentage reduction of tuberculous specimens amongst the milks examined.

The milk supply is constantly changing, and a comparatively small change may greatly alter the proportion of tuberculous milks found, while leaving unaltered the improvement already effected in the larger and more stable supply.

It will be seen that the diagnosis of tuberculosis is made as much at the bacteriological laboratory as in the cowshed.

The examination of expectoration or of other material at the laboratory is also an integral part of the administration in connection with the notification of phthisis (Tables 5 and 6).

11. The ultimate test is the change in mortality from tuberculosis, and this is shown at six groups of age and also in infancy, from phthisis, and from other forms of tuberculosis, respectively, in the appended Tables 7 and 8. It will be seen that there has been an immense reduction in infantile mortality ascribed to tuberculosis other than phthisis. It must be admitted that some uncertainty attaches to diagnosis at this age, so that, especially where small numbers are concerned, too absolute conclusions must not be drawn. Nevertheless, it may not be considered unreasonable to connect this reduction, in part, with the work done under the Milk Clauses of 1899, although much work had been done in the same direction, prior to that date, within the city itself. These tables also show that a great reduction in the mortality from phthisis has occurred between the ages of 15 and 64. No doubt the work of the Public Health Department has contributed—to what extent it is not easy to say. No reduction, however, has occurred either in respect of phthisis or of other forms of tuberculosis at school ages. This may be ascribed partly to the increased strain imposed on scholars, partly to want of special attention directed to the prevention of phthisis in schools. Probably the former influence is the more important.

12. Great deficiencies have been manifest in our present system notwithstanding the advance made. These have consisted chiefly in these circumstances:—

- (a) The accommodation provided for cases of phthisis notified in Manchester has in every direction been inadequate, especially in the sanatorium provision and in the poor law provision, in South Manchester. But the provision for tuberculosis in childhood has also been very inadequate. All this notwithstanding the large number of beds in use in the various institutions.
- (b) The poverty and even misery often experienced in families when the head of the household has been attacked with phthisis has disinclined working men to accept the presence of that disease and to seek treatment at an early stage (see Table 4).
- (c) The early diagnosis of phthisis and the lay knowledge with regard to its approach are not either of them so clear as they may be made.

13. To some, though to an inadequate extent, these difficulties have been met in Manchester, especially as regards treatment. The proposal before the committee is to divide an urban community of the size of this city into three areas of 250,000 each, and allocate to each a dispensary, with a physician and three nurses, and a certain number of observation beds. In considering this proposal, the circumstances of each locality

would have to be taken into account. Such a system might be applicable to Glasgow with its population concentrated in tenements, and be much less applicable to Manchester with its cottage houses spread out over a great area.

In Manchester there is an excellent tram service converging by a series of main routes to the centre. It would be far more inconvenient for poor people to reach three eccentric dispensaries than to come into the centre of the city for advice. In any case they would have to use the tram service.

It would be far better to employ a central dispensary—in other words, to improve the existing outpatient department of the Consumption Hospital or replace it by a more convenient and larger building.

All cases of phthisis presenting themselves would in the future, as at present, be notified to the Public Health Tuberculosis Office and dealt with there. From the point of view of the Insurance Commissioners it is evident that they would wish every possible preventive method applied in all cases of open tuberculosis and not merely in cases of phthisis. But it is never possible to say when closed tuberculosis may be or may become open, and, therefore, they would wish all cases of tuberculosis dealt with. From the public health point of view this means that every case of tuberculosis, closed or open, will ultimately require to be notified, and it is the goal to which we are striving.

Supposing such a clinical centre established: of what should it consist and how should it be staffed? There would be offices, conveniences, waiting halls, one for men and one for women and children, a laboratory, a medicine-room, doctor's consulting-rooms with examination-rooms attached, a nurses' dressing-room, quarters for nurses to the number of, say, nine, and two observation-rooms for men and women respectively, with perhaps six beds each.

I do not think that four tuberculosis medical consultants, giving their whole time, would be too many.

If the consulting work and treatment of the insured persons is to be given to this staff, it is probable that they would not be able to do much more than attend to their clinical work, and that the arduous and time-consuming work of etiological inquiry and prevention would need to be separately done. It will be found difficult to combine the clinical and the preventive expert in one set of persons, in equal degrees. But the whole of the work might be co-ordinated under one department, and it might be found possible for the nurses employed to do much of the public health work, in addition to the clinical work. In that case, however, they would have to be in close relation with the Public Health Department, and to make reports to the medical officer of health, in addition to doing the clinical work connected with a central outpatient department. They would be employed by the corporation.

The number of beds allocated may appear small. But the real work of separation would be carried out at an institution. There would be great advantages in combining the treatments of early and more advanced cases on one site, especially if this were not the only site in use.

There is one difficulty in Manchester and some other towns. The existing consumption hospitals are staffed at present by honorary physicians, who give their services free, and who would probably object to be displaced. Some arrangement might, however, be come to, advantageous to both the administrative authority responsible for the centre and to these gentlemen.

Admitting that a staff of four tuberculosis officers giving their whole time to treatment and consulting work is, in theory, a better arrangement, it might, all the same, be better to retain the services of the six present physicians of the Consumption Hospital, and to appoint two whole-time physicians, gradually replacing vacancies in the part-time staff by whole-time appointments. In that case the whole-time officers might receive 500*l.* a year each and the part-time physicians 200*l.* a year each.

14. In considering what sanatorium provision would be required for the city of Manchester, we may proceed as follows:—

There were at the Census, 1901, occupied males and females between the ages 15 and 65—

Ages	15-	25-	45-	Total.
Males	51,691	79,291	34,247	165,229
Females	42,248	27,374	11,224	80,846
Total	93,939	106,665	45,471	246,075

If to the combined populations of working men and women we apply the death-rates of 1910, which were much lower than in previous years, we get—

Ages	15-24.	24-44.	45-64.	Total.
Deaths	102.4	232.5	142.3	477

This is a minimum, including neither deaths above 65 nor deaths in dependants.

One must remember that, owing to sickness benefit, there will be a great demand not merely for sanatorium treatment, but for treatment in sanatoria. Also, under the Insurance Act, which provides no sanatorium benefit for persons treated under the poor law, it is certain that the insured will insist on having sanatorium treatment outside the union hospitals.

The majority of the patients will require treatment outside their homes in Manchester.

If now we reckon that amongst the insured class the average duration of illness is three years, the number of insured persons at any one time requiring treatment would be, roughly, $480 \div 3 = 1,440$, or, allowing for the increase of population, 1,920.

If these could be taken in series and given each three months in hospital, the number of beds required for the insured alone would be 480. But neither assumption can be made. So far as chronic cases are concerned they require more sanatorium treatment in winter and spring than at other seasons, and three months' treatment would often be quite inadequate, though in other cases a shorter period would be useful.

As regards the treatment of early cases among the insured, however, the calculation is probably nearer the mark. If we might assume that the stream of early curable cases would keep pace with the deaths, we should need for insured persons 160 beds.

The total number of beds for the treatment of adult cases or cases suitable for systematic curative sanatorium treatment would, on the same hypothesis, be 250.

In my opinion unless treatment extends to six months the hoped-for benefit of treatment will not be obtained, and on the above assumptions there would be required from 250 to 500 beds for the treatment of early and curable cases.

Even, however, if we aim at a period of six months of treatment and training it is doubtful what proportion of cases will come under observation early enough to have a chance of cure, and we may be content on that hypothesis to aim for the present at 250 beds, the more so as a considerable proportion of the patients, perhaps one-half, will prefer to be treated at home.

Of these, 100 might by arrangement be provided at the Crossley Sanatorium and 100 by the Manchester Corporation.

As regards the treatment of more advanced cases, the number of insured persons suffering from phthisis in a more advanced form may be put at 2,000, of whom 1,280, roughly, will be insured persons and 720 not insured.

On the hypothesis of three months' treatment for each person, 320 beds are required for insured and 180 for non-insured persons suffering from chronic phthisis.

This does not much exceed the present accommodation, which is quite inadequate. But the period of treatment on an average would considerably exceed

three months. Also we may be under-estimating the number of consumptive cases.

Nevertheless, it is certain that an additional provision of 150 beds would make a great difference, and this it might be possible speedily to make.

It is put forward, then, that to meet the requirements of the Insurance Act—

1. A new out-patient department is needed in the centre of Manchester (clinical centre or dispensary), for the use of Manchester cases.

2. This should be adequately equipped in the usual manner and contain quarters for nine nurses and twelve observation beds.

3. An arrangement might be made whereby the clinical work should continue to be carried out by the existing staff with the addition of two whole-time tuberculosis consultant officers.

Perhaps the expense may be defrayed by the Corporation.

4. A combined sanatorium for early and more advanced cases may be provided by the Manchester Corporation capable of accommodating 150 beds for advanced and 100 for early cases. An arrangement could, perhaps, be made with the Crossley Sanatorium for 100 beds to be provided for early cases.

When the time prescribed for the treatment of advanced cases is up, what will become of them? Then, as now, the Union hospitals will have to come to the rescue.

It appears certain that for a considerable period we shall have to encounter the old difficulties, though in a mitigated form.

It is to be hoped that one of the uses to which benefits will be put by families will be to take a house, at a higher rental, in which isolation can be carried out.

ADDENDUM.

Although, in compliance with the request of the Chairman of the Committee, I have shown how the administrative arrangements of the Sanitary Authority of Manchester, and otherwise in force in this city, could be expanded to meet the requirements of the Insurance Act, I desire to record my opinion that the segregation of patients in sanatoria and kindred institutions is not necessarily, nor perhaps at all, the best way in which much of the annual provision of 1,000,000*l.* for the sanatorium treatment of consumption could be utilised.

I have used the scheme adumbrated in the Committee as a type to which we may have to adapt ourselves.

But it is probable that much better results would be attained ultimately, and perhaps in the immediate future, if the annual sum were used to grant, in carefully investigated cases, sanatorium benefit to families in sums of 10*s.* downwards, in addition to the sickness benefit under definite conditions.

These conditions would be that a good house was occupied, which would admit of isolation of the patient, that the instructions of the medical officer of health as regards personal and other precautions were carefully carried out, that adequate food and clothing were provided, and that the house was kept clean.

This is not too much to ask, having regard to the benefit conferred, and in this way the disease, if present in other members of the family, would be checked; if not yet present, would be prevented.

Given sufficient care there is no occasion for any consumptive to be a danger to others.

The necessary instruction could be given with the larger staff of visitors to be employed.

It is submitted that, having regard to the results so far obtained in sanatoria, and to the doubt as to whether patients believed to have been cured would not, in most cases, have recovered without recourse to sanatoria, this mode of dealing with the fund available should be considered. It would commend itself to many of the patients, and would, I believe, yield a maximum of results.

The memorandum submitted does not profess to touch on the many other questions concerned with the prevention of tuberculosis.

March 1912.

MEMORANDUM submitted by Professor J. PENBERTHY, F.R.C.V.S.

I assume it is desired that expression of my views be limited to that aspect of the question which relates to tuberculosis in the lower animals in its relation to tuberculosis in man.

It is generally assumed that tuberculosis of man is in some degree dependent on tuberculosis of the lower animals. "Man's liability to infection remains of necessity matter of inference only." The presumptive evidence is, however, too strong to be disregarded. Even if immense and frequent doses of bovine bacilli are in the majority of cases necessary for the production of the disease in man, meat and milk may not be regarded as negligible quantities in consideration of a general policy concerned with the prevention of tuberculosis.

Some importance attaches to a knowledge of the degree of danger of various factors in the spread of the disease. While fully realising that the bacillus of human or bovine strain is an essential element, the *causa causans* in production of the tubercle, I venture to express the opinion that other elements may be in operation in inducing or averting serious tuberculosis. This view is not advanced as an apology for the occurrence of bovine tubercle bacilli in milk or meat, nor as a reason for delaying action in making a serious effort to obviate such occurrence, but because I am convinced that the elimination of tuberculosis in cattle cannot be accomplished *par coup* and that any attempt to effect this by severe restrictive measures, often suggested, would end in failure, and defeat its purpose, by diminishing the supply and raising the price of articles of diet of the utmost value in the campaign against human tuberculosis.

Animal Flesh.—Prior to issue of the Report of the Royal Commission of 1908, the flesh of tuberculous animals was probably regarded as the most common medium by which tuberculosis was communicated from animals to man. Public opinion has been modified, and, I believe, it is now generally accepted that any danger therefrom may be practically averted by general adoption of the system of inspection carried out by our more enlightened authorities, and as regards imported meat, with the addition of the official certificates of inspection from the Government of the exporting country.

Milk.—The incrimination of milk, if not initiated, was materially accentuated by the evidence given to the Royal Commission of 1898 by Dr. Latham, of the General Register Office, who, after adducing statistics, said, "The rate of mortality for *tubercle mesenterica*, which "more than any other represents tuberculosis in infancy, has signally failed to undergo any noteworthy "diminution during the very period of sanitary progress which has been associated with such substantial "diminution from tuberculosis at all ages in England "and Wales, and this result has coincided with a "large increase in consumption of milk." The general deductions from this statement brought cows' milk into unenviable notoriety, and by many it became regarded the paramount factor in the causation of tuberculosis amongst humans. If, however, the figures then adduced admitted of such a conclusion, others from the same source, referring to later periods, certainly do not appear to justify its retention. Comparing 1901 and 1909, we find the death-rate from consumption (tuberculosis of the lungs) has dropped 14 per cent. and that from other tuberculous disease 19 per cent. The number of deaths of infants under one year from tuberculosis has fallen from 5,958 in 1901 to 2,658 in 1909, a diminution of 55 per cent. in nine years; and of all children under five years from 12,200 in 1901 to 9,407 in 1909, a diminution of 28.2 per cent. in nine years. In the same period the number of cows and heifers in calf in England and Wales had increased by nearly 200,000, adding about 100,000,000 gallons of milk to the annual supply, while the import of butter is greater by 45,000,000 lbs. than in 1901. Reports of medical officers of health give highly interesting information relating to the death-rate and the condition of the milk supply. Thus in Birmingham in 1901 the number of deaths from tuberculosis of infants under one year was 129, and in 1910 56, a diminution of

73 or 56 per cent., in the past ten years. In the year 1910, of the samples of cows' milk examined 10 per cent. were found "tubercular." In Manchester the death-rate from tubercular peritonitis and *tubercle mesenterica* has fallen from 0.20 per 1,000 of population in 1901 to 0.15 in 1910, and phthisis from 2.09 to 1.64, while of 4,225 samples of farmers' milk 352, or more than 8 per cent., were found to contain tubercle bacilli. Conditions in other towns are similar. In fact, the reports generally disclose a lowering death-rate, marked decrease in infant mortality from tuberculosis, and the great extent to which milk is contaminated with tubercle bacilli.

This of course cannot be regarded as proof that tubercle bacilli from bovine sources are not responsible for some portion of the tuberculosis of man, but I venture to express the opinion that the more recent figures do not admit of the inference drawn from the statistics brought into evidence before the earlier Royal Commission.

I cannot claim knowledge of an expert on the point, but am under the impression that, generally speaking, manifest tuberculosis of the young is more prevalent amongst those taking the minimum rather than the maximum of cows' milk. It is recorded that tuberculosis is rife among the young of the population of such countries as Japan, Lapland, Annam, and Arabia, where cows' milk is not used as an article of diet. While personal and family history so commonly indicate inter-human contamination, it has, I believe, been found very difficult to demonstrate in specific cases infection of humans by bovines. The Report of the latest Royal Commission says, "Certain cases "have been reported in which suspicion had arisen "that man had become affected through contact "with tuberculous cattle, but the evidence afforded "by these cases could not be accepted as unequivocally "positive in character."

Tuberculosis of young bovines is relatively uncommon, and the disease amongst cattle becomes prevalent as they more closely cohabit with cattle affected with open tuberculosis.

Whether the danger associated with the consumption of cows' milk be little or great, I think the time has arrived when an attempt should be made by the State to immediately minimise the danger and ultimately eliminate its source. The eradication of tuberculosis suddenly by such measures as were successful with cattle plague and pleuro-pneumonia is utterly impracticable. The removal from the milk supply of all cows reacting to the tuberculin test would entail insufferable loss to stockowners, withdrawal of probably one fifth of our dairy cows, and with them about 250,000,000 gallons of milk yearly, while alone it must fail to eliminate the source of danger to cattle and to man.

In the view that cows' milk rarely contains tubercle bacilli when the udder is not diseased, or when the cow is not otherwise clinically affected I have the support of at least one member of the latest Royal Commission. Under this conviction, supported by experience of the effect on the milk supplied by the herd, by removal of the appreciably tuberculous cow, I believe the contamination of cows' milk with tubercle bacilli, and the risk of such inducing tuberculosis in man, would be very materially reduced by adoption of the provisions of the Tuberculosis (Animals) Order, 1909, which was drafted as a complement to Mr. Burns's Milk and Dairies Bill, 1909, and withdrawn with it. This Order was, I believe, regarded with satisfaction by the agricultural community, except as to the source from which the money for compensation was to be derived. The personal element is of such great importance in securing the success of any attempt to raise the standard of purity and increase the supply of milk that I think every effort should be made to secure the co-operation of the cow-keeper. I append an excerpt from a paper recently read by me to the Farmers' Club, which I think represents views of agriculturists generally:—

"Enactments aiming at the elimination of bovine tuberculosis (on which probably the porcine disease to a large extent depends) should be framed with due

regard for the fact that the animal with open tuberculosis is the paramount factor in maintaining and spreading the disease amongst its fellows, and that its removal and the disinfection of contaminated matters are the essentials, and not the palatial cow-house, specified amount of air-space, floor-space, &c. Experience has yielded numerous examples of almost entire infection of whole herds in model cowsheds, and occasionally entire freedom in herds kept under converse conditions. It is my opinion that the demands in the direction of providing 'model' cowhouses, &c., have had a deterrent effect on local authorities and private individuals, and that measures unnecessarily restrictive and onerous, if generally enforced, may have the effect of suddenly and seriously reducing the supply of milk, raising its price, and inflicting great hardship on the poorer classes, by placing beyond their reach an article of diet on lack of which many of the most serious effects of tubercle infection depend. In evidence given to the Viceregal Commission on the Milk Supply in Ireland, it is stated by the inspector of one local authority that 25 to 30 cowkeepers in his district had gone out of business during the last five years owing to the conditions enforced.

"I am strongly of opinion that legislation on this matter should be made uniform and generally applicable to the whole country. The effect of 'special powers' exercised by one local authority means removal of its tuberculous cows or tuberculous milk into the area of another authority not possessed of similar powers. Necessity for the invasion of the area of one authority by the officers of another authority should be averted by enforcing uniform conditions throughout the country.

"The Milkshops and Dairies Orders should be withdrawn and a comprehensive Act brought into operation giving the Local Government Board, after agreement with the Board of Agriculture and Fisheries, power to make such orders as are by their common consent fit for carrying the provisions into effect. The executive authority should be the county council."

The inspection of cows, cowsheds and dairies should be carried out by properly qualified persons; all matters in which consideration of the hygiene and disease of animals is entailed to be under the direction of a qualified veterinary surgeon acting in consort with but not subject to control of the medical officer of health.

"The principle of compensation for loss of confiscated animals has been established by the Tuberculosis Animals Order of 1909. Unfortunately, I think, the funds to meet the cost were to be derived from local rates. This arrangement has met with opposition from agriculturists and cowkeepers generally; but, setting aside for a moment the undoubtedly national character of the question and the special interest of the stockowner, it is most unreasonable to ask the rural non-stockowner to bear the burden of providing food and security for the dwellers in large towns and cities outside their local rate areas. The object of a Milk Bill is the improvement of the health of the people, surely a national object of the very highest importance. The protection of public health is not only the real but the ostensible reason for promulgation of the Order. The agriculturist has not sought legislative action for his own protection or the benefit of his industry, but he has joined in the crusade against tuberculosis, and assented to take his part in removing any possible danger which may be associated with his animal products used as food of man. To the stockowner the

compensation received for confiscated cows will be but partial relief. In complying with demands which any sound Milk Bill is likely to make, the stockowner, with the landowner, will have to contribute the lion share, and should be relieved of the extra burden, which, if charged on the local rates, would mainly fall on his shoulders.

"It has often been urged against compensation for animals seized for tuberculosis that the public are entitled to an article of diet which is pure and free from danger to health. With this I agree, but it must be realised that milk is not a manufactured article whose composition and quality are under our immediate and certain control. Live-stock essentially differs from any other stock-in-trade in that it is not artificially constructed and cannot be artificially re-constructed to meet immediate requirements. Not only milk, but tuberculosis of cattle, is a natural product. The dairykeeper can claim no right to supply milk containing the germs of this disease, whose occurrence in his cattle has been no more under his control than the weather. The condition has grown with the stock of the country, and, although the process was unrecognised, and, in fact, unrecognisable, the prevalence of tuberculosis has been established as a result of efforts to comply with a public demand for a bountiful supply of the most valuable and cheapest article of diet, which on all hands is deemed desirable for the sustenance of the nation.

"The dairying branch of the agricultural industry, important as it is to the national welfare, is not so flourishing as to be able to bear any extra burdens. The imposition of any further cost in the production must be followed by a higher price of milk and a reduction in the amount available for consumption. A higher price for milk and a smaller supply would be a national calamity. Expansion of the milk supply and safeguarding the milk supply can never be accomplished by rendering the production of milk more expensive.

"The Treasury has provided funds for compensation and other costs in dealing with such diseases as cattle plague and foot-and-mouth disease, when the health of animals only was concerned. The National Insurance Act provides for the use of imperial funds for the provision of sanatoria for the cure and amelioration of this very disease, which, it is held, would to a considerable extent be averted by the operations of a Milk Bill and Tuberculosis Order. For the success of any measure directed to the elimination of an evil of the nature of tuberculosis the goodwill and co-operation of the stockowner are absolutely essential. I am convinced that these would be more readily and certainly secured if stockowners and the local authorities were absolved from contributing the whole cost from the local rates. The intelligent farmer who has studied the question must realise that the removal and slaughter of cows with tuberculous udders or emaciated from tuberculosis would not render his herds clean of tuberculosis if this were carried on for indefinite periods. The operation would undoubtedly have the effect of largely reducing the number of tubercle bacilli in milk, and so considerably lessen the numbers of bovine tubercle bacilli ingested by human beings, but experience tells us that this is not the process by which tuberculosis is to be eliminated in a reasonable time from our herds."

I believe the application of the Tuberculosis (Animals) Order of 1909 would have an educational effect of very great value.

March 1912.

STATEMENT regarding the FUNCTION and VALUE of the FARM COLONY in the TREATMENT of TUBERCULOUS PATIENTS, by Sir R. W. PHILIP, M.D., Edinburgh.

In responding to the request that I should submit a statement regarding the function and value of the farm colony in the treatment of tuberculous patients, I would premise that the remarks which follow are not based on *a priori* considerations, but are the outcome of observations at the Royal Victoria Hospital Farm Colony, Edinburgh.

It was the progressive experience of 25 years in the development of the sanatorium and the tuberculosis dispensary that led me to institute the farm colony as an element of importance in the Co-ordinated Anti-tuberculosis Scheme. Further experience has made it abundantly clear that the farm colony is of value as a factor in the after-care of selected cases.

While many patients are discharged from the sanatorium fit to return to their ordinary calling after varying periods of three to six months, there is a certain number in whose case such early return is apt to lead to relapse and corresponding economic waste. It is especially for such persons—constituting perhaps 20 per cent. of the whole—that the farm colony is serviceable. The colony is further helpful to persons whose state precludes their return to their ordinary occupations and for whom training in outdoor occupations will prove valuable.

Site, Buildings, and Conditions of Life.

The farm colony may form a separate institution or be contiguous to the sanatorium, by which it may be administered. It should consist of land which will admit of experience in the various departments of farming operations and gardening. The residential buildings should be of simple construction. The conditions of life should be such as the workers can readily realise for themselves after leaving the colony.

Staff.

The staff should include a medical superintendent. If the colony be contiguous to the sanatorium, this may be the physician to the sanatorium. The essential

point is that he be versed in tuberculosis and have a knowledge of farming operations. He should be assisted by a working steward or grieve. The domestic side of the establishment should be supervised by a matron who has had sanatorium training.

Economic Aspects.

The colonists contribute their labour, and in return have lodging and board under favourable conditions, medical direction, training in domestic and farm economy, working clothes and washing.

The produce—live stock, eggs, vegetables, and flowers—is used in part at the colony; the remainder is readily disposed of, either to the sanatorium or hospital or in open market. The experience of Edinburgh has been that there is no difficulty with regard to the sale of such colony produce. With a view to obtaining a profitable market it is desirable that the farm colony be within easy access of a large centre.

Further details regarding the activities of the Royal Victoria Hospital Farm Colony will be found in the following Memorandum, which has been prepared at the Chairman's request by the Physician Superintendent, Dr. A. H. Macpherson.

R. W. PHILIP.

May 1912.

MEMORANDUM submitted by A. H. MACPHERSON, M.D., Physician-Superintendent of the Royal Victoria Hospital Farm Colony.

The farm colony is an essential factor in the Edinburgh co-ordinated scheme for the control and eradication of tuberculosis, and is closely linked with the other institutions included in the scheme. It was the last element to be added. Its need was determined by, and its methods were based on, many years of sanatorium experience.

I.—Origin of the Colony and Date of Inauguration.

Early in the development of the Edinburgh Scheme, which was commenced in 1887, it was noted that an alternation of work and rest produced excellent results. For the majority of cases the sanatorium afforded all that was required. It was observed, however, that a percentage of discharged patients (some 20 per cent.) tended to relapse after return to their former occupations and insanitary homes. It was for this class of case that the farm colony was established. Its inauguration on the 2nd July 1910 was the completion of a definite and concerted plan.

II.—Persons eligible for the Colony and Duration of Stay.

The persons eligible for the colony comprise men and women in whom the disease has been reduced to dormancy and who are capable of doing at least three to six hours' work per day. They are selected from the sanatorium patients and, on admission to the colony, sign an undertaking to conform to the rules of the colony (copy of which is herewith enclosed), and to remain for such period, up to one year, as may be thought desirable by the Medical Committee.

III.—Treatment at the Colony.

On transference from the sanatorium, the patient becomes a "colonist." He is examined carefully and his condition recorded. He is subsequently overhauled once a fortnight, or oftener should occasion arise, Dr. Philip visits frequently and confirms the treatment. The principles of hygiene are carefully practised so that very quickly every colonist comes to perform automatically what was taught in the sanatorium and has been further enforced at the colony.

In return for work the colonist receives:—

- (a) Housing under favourable conditions and full nutritious board of a kind readily available on return to his home.
- (b) Medical supervision and education in hygiene.

- (c) Training in domestic and farm economy, with a view to a fresh and suitable start in outdoor employment.
- (d) Special clothing suitable for his work.
- (e) Laundry.

IV.—Time-table. Allocation of Work.

The daily routine of the colony begins at 6 a.m. in summer, 7 a.m. in the winter months (see time-table herewith). At that hour the colonists rise, bath, dress, and make their beds before proceeding to the dining-hall, where they are served with tea and bread and butter. Work commences immediately thereafter.

All out-door work is definitely prescribed by the Physician-Superintendent and is carried out under the direction of a farm grieve (working-foreman). The work inside is arranged and supervised by a matron who herself was trained as nurse at the sanatorium. She instructs the women in housework. Out of doors the women are employed in the garden and fields.

V.—Working Industries. Adaptability of Sanatorium Patients. Discipline.

The industries are:—

- (a) Market gardening, including both vegetables and flowers.
- (b) Poultry.
- (c) Pig-rearing.
- (d) General farm work (potatoes, turnips, oats, &c.).

The experience of the colony has been that there is practically no difficulty in getting patients from the sanatorium, whatever their former occupations may have been, to adapt themselves to the colony regime. Already at the sanatorium, they have been taught to understand that measured work, carried out under medical supervision, is beneficial for their health—indeed, plays an important part in their recovery. The colony regime is a complete expansion of this principle on economic lines.

Firm discipline is needful. As a rule, it will be found that such colonists work willingly and recognise quickly the benefit derived from the regime.

VI.—Disposal of Produce.

The produce of their work is partly consumed at the colony and partly supplied to the Royal Victoria Hospital, while the surplus is marketed. No difficulty has been experienced in finding a market, and the

produce raised by the colonists is equal to any in the district. The difficulty is rather the other way, namely, how to supply the growing demands for the colony produce.

VII.—Prospects of Time-expired Colonists.

From the moment of his entrance to the colony, the future of each worker becomes the subject of study and care. Everything that is possible is done to prepare the colonist and to assist him in finding suitable work when his period of residence is expired. In some cases arrangements are made for emigration. Indeed, the prospects of emigration are encouraging. The reports to hand from four men who have already gone out to the colonies are very satisfactory. All of them obtained excellent situations on arrival. They are employed on farms, receiving wages of 5*l.* per month and good food, all found. Several others purpose going out when their time expires. The others have found suitable outdoor employment in this country.

VIII.—Financial Aspect.

The colony aims at being self-supporting. It has been necessary to expend much labour in breaking up the ground, which had not been under cultivation previously. Housing for stock had to be prepared and fencing erected. Stock had to be raised. Until the end of the third year it is difficult to state exactly the economic possibilities of the colony. So far, the return has come up to expectations. The committee are now considering the extension of those departments which are promising well and have proved most useful to the colonists from an educative point of view, as fitting them for earning a livelihood in suitable environment.

It is clear that the farm colony has an important practical place in a concerted scheme for the treatment of tuberculosis. Most persons who have had experience of sanatorium treatment and its results recognise the need which exists for prolonged after-care and supervision in a certain proportion of cases. The point is how to combine this practically with the economic side of the problem. The farm colony meets both issues.

The sanatorium patient, so soon as he is transferred to the farm colony, becomes a productive member of the community, contributing largely to his own maintenance. The tuberculous individual is restored to his place socially as a trained working unit in physically fit condition, with greater certainty than is otherwise possible, and with the risk of relapse reduced to the minimum.

A. H. MACPHERSON.
May 1912.

RULES FOR COLONISTS AND TIME-TABLE.

Colonists are reminded that the rules and time-table have been arranged in their interest with Medical Authority.

Rules for Colonists.

1. On admission, colonists agree to comply with all the rules of the colony. Strict obedience to the

Physician-Superintendent is required. Any breach of the rules renders the colonist liable to dismissal.

2. Every colonist must have a cold bath daily, unless otherwise directed by the Physician-Superintendent.

3. Work is regulated by the Physician-Superintendent, according to the physical condition of the colonist, and is carried out under the direction of the matron and grieve.

4. No colonist is permitted to go off the estate without a permit from the Physician-Superintendent. Permits may be granted on special occasions, and should be applied for at the office between 9.30 and 10 a.m. On return after leave, the permits must be handed to the matron, whose duty it will be to report any irregularity.

5. Hours for rising and for meals are given in the annexed time-table. Punctuality is essential.

6. Lights are extinguished at 10 p.m., by which hour every colonist must be in bed.

7. Smoking is allowed outside for half an hour after each meal, and either outside or in the dining hall from 6.30 p.m. onwards.

8. Spitting in the grounds or any of the buildings is strictly forbidden. Any breach of this rule should be at once reported to the Physician-Superintendent.

9. Relatives and friends of colonists will be admitted on Saturdays from 2.30 to 5 p.m. on presenting a card of admission. Such cards, to the number of two for each colonist, may be had on application to the Physician-Superintendent.

10. On Sundays Divine Service will be held every afternoon in the recreation room at 3 p.m., when colonists are expected to attend.

Time-Table.

(To be followed by Colonists save when directed otherwise.)

6	a.m.	Begin to rise: bath: dress.
6.45		Tea, bread and butter.
7		Begin work.
9		Breakfast.
9.45		Resume work.
1	p.m.	Dinner.
2		Resume work.
5		Work ceases: dress.
5.30		Supper.
6.15		Prayers.
6.30		Recreation.
8.30		Cup of cocoa.
9.45		Retire to bed.
10		Lights extinguished.

Sundays.

8	a.m.	Begin to rise: bath: dress.
9		Breakfast.
1.30	p.m.	Dinner.
5		Supper.
8.30		Cup of cocoa.

By order of the Committee.

MEMORANDUM submitted by Sir R. DOUGLAS POWELL, Bart., K.C.V.O., M.D.

In reply to your invitation that I should send a memorandum of any views I hold respecting the problem of tuberculosis in its preventive and curative aspects for the information of the Committee recently appointed by the Chancellor of the Exchequer, I think the subjoined remarks fairly cover them, and the views sketched probably will be found not to differ widely from those held by many members of the Committee.

I would premise any details by two propositions which in my opinion are of fundamental importance:—

- (1) Improved home conditions of the poor is the bottom factor in the whole remedial problem. All sanatorium and other educational and treatment measures are of supplementary value.

- (2) Sanatorium treatment in any thoroughness is only adapted for the 30,000 or so new cases of tuberculosis that arise annually—a number that will gradually diminish with time. For the 200,000 or 300,000 residual cases other measures more or less on sanitary lines are required. (*Vide infra* B. advanced cases.)

“The ‘sanatorium benefits’ should therefore be so widened as to cover the treatment of these other cases under certain prescribed conditions. This would secure an immensely increased safety to the public, a greatly diminished yearly accession of fresh cases, and a gradual diminution of the whole tuberculous population, without trenching upon the rights of citizens or dragging

them into compulsory exile from their homes." (Extract from letter to "The Times," July 15, 1911.)

(A.) Sanatorium treatment for closed and early stage Tuberculosis:—

- (1) Garden shelter or tent (for certain cottages);
- (2) Garden shelter or tent colony with administrative block (for each group of villages and for country towns);
- (3) Suitably constructed buildings (for large towns and cities).

The village group, country town and garden sanatoria should be medically supervised by a visiting staff of one or two medical practitioners selected from the neighbourhood by the Health Committees, and should be provided with visiting and resident nurses. (N.B.—Of utmost public importance that the interest and education of medical practitioners throughout the country in recognition and treatment of tuberculosis cases should be stimulated and maintained.)

The large institutions should be supervised by a resident officer and a consulting staff from the towns concerned.

(B.) Advanced cases:—

I. Country.—Many country cases can be treated at their own homes:—

- (1) In garden tents or shelters.
- (2) In a separate room properly arranged.

For advanced cases which have not facilities for 1 and 2—

- 3) A wing of some already existing institution should be especially and attractively arranged with necessary comforts and sanitation.

II. Towns.—For certain patients unwilling to leave home, sick benefit allowance should be made on condition—

- (a) that they can occupy a separate room;
- (b) that the hygiene of the room is adequate;
- (c) that the personal hygiene of the patient, care of sputa, &c., is properly carried out;
- (d) that the patient and family observe the directions of the doctor and the district nurse.

Failing such observances, allowance should be discontinued and institutional treatment urged. (Note the importance of respecting and guarding the civil and municipal rights of these sick people.)

(C.) After Care.—It should be borne in mind that factory and indoor workers cannot return to their employment without the practical certainty of relapse and the chronic danger to others that such relapses entail. Labour measures for treatment adapted to the cases should be directed to fitting them for some outdoor life.

It is important to look ahead at least 25 years for results, the numbers will gradually diminish and their efficient treatment (for the moment impossible) will become more and more easy:

- (a) with better housing of the poor;
- (b) with care and education of incipient cases; and
- (c) with hygienic management of advanced cases.

(D.) Continued research in regard to pathology, bacteriology and methods of treatment should be carried on. These researches should, however, be undertaken only at a few large centres. But there should be some central bureau (e.g., the Royal Society of Medicine), where reports of all such work should be sent to be sifted and examined, and whence practical information of value should from time to time be circulated to all medical men connected with the treatment of the disease.

R. DOUGLAS POWELL.

March 1912.

MEMORANDUM submitted by SIR WILLIAM H. POWER, K.C.B., F.R.S.

THE TUBERCULOSIS PROBLEM IN CERTAIN OF ITS ASPECTS.

From the point of view of general policy in dealing with tuberculosis "in sanatoria or other institutions or otherwise," there would seem to be advantage in antecedent knowledge on a variety of questions relating to the disease and the bacillus the essential cause of it; questions which still remain obscure.

For instance, as regards—

1. *Tuberculosis in man*.—The lesions of fatal tuberculosis, more especially of pulmonary tuberculosis, in adolescents and adults yield in the majority of instances abundance of bacilli of the human type, thus indicating that in these cases bacilli of the type in question have by their multiplication and dissemination in the tissues caused death of the patient. And, commonly, it has been assumed that the type of bacillus predominant in the tissues at death has been the agent (operating months, perhaps years, before) of primary infection in every such instance. This, however, appears to be by no means certain, the Tuberculosis Commission having now and again found the same animal body to yield both the bovine and the human type of bacillus, sometimes from different, sometimes from the same, lesions.

It is desirable, therefore, to ascertain—particularly in cases where there are indications that the original and primarily infecting lesion and the later generally disseminated and fatal lesions have been widely separate in time—by observation extended over a large number of cases, not only the status of the predominant bacillus, but whether or not more than one type of tubercle bacillus can be obtained (by plate culture or otherwise) from the same or from different lesions in the dead body.

That scrutiny in this sense of tuberculosis is called for is sufficiently indicated by the experience of the Commission in the matter of lupus. Of some 20 cases of this skin tuberculosis only one yielded a bacillus culturally and pathogenically identical with the bovine bacillus, and no more than other two or three yielded bacilli corresponding to the human type:

all the remaining cases yielded bacilli which failed to conform completely to either the bovine or the human type, while certain of them on passage through the calf became modified at once as regards virulence—reverting seemingly to the bovine type. Experience such as this obviously raises question whether other human tissues besides the skin may not possess like power of modifying tubercle bacilli, of determining, that is, the type of bacillus which shall be evolved when, instead of completely suppressing (inhibiting) the bacilli invading them in small amount, they permit such bacilli to propagate locally in them, slowly and during a considerable period of time.

2. *Tuberculosis in swine*.—The Royal Commission's experience of naturally acquired tuberculosis of the pig did not extend beyond 59 cases. All of these animals, being considered in good health and condition, had been consigned to a slaughter-market the custom of which was known to entail veterinary examination of pigs before as well as after death, with condemnation of animals found to be tuberculous. The differing proportion, therefore, of bovine, human, and avian tuberculosis (85, 5 and 8 per cent. respectively) found by the Commission in these 59 animals may not be taken as indicating the relative amounts of these several expressions of tuberculosis among pigs of the country generally.

Further, the experience that generalised tuberculosis was only noted in pigs affected with bovine tubercle is subject to the fact that not always was it possible to scrutinise the viscera of pigs the carcasses of which exhibited only local tuberculosis. And the circumstance that in the few pigs which were the subjects of human tuberculosis the disease had not become generalised, is discounted somewhat by the fact that among pigs experimentally infected by the Commission with human bacilli instances were noted in which the infecting agent had become dispersed in the animal's body.

The above considerations, especially the fact that the pig has been shown susceptible of tuberculosis of the human type, suffice (the pig supplying much food to the working classes) to indicate need for further

research on tuberculosis of swine. Such research being undertaken, an additional pig-fact will doubtless get attention and possibly elucidation, namely, that certain pig lesions submitted to the Commission yielded strains of tubercle bacilli of virulence corresponding neither to the bovine nor to the human type.

3. *Tuberculosis in the bovine animal.*—The Commission did not find among some 30 instances of tuberculosis naturally occurring in the bovine animal any instance in which the human tubercle bacillus was obtainable from the tuberculous lesions. And, generally, it has been found in this and other countries that tuberculosis as it seriously and fatally affects the bovine animal is essentially of the bovine type. Nevertheless, the bovine animal, adult as well as calf, can be made, though with difficulty, to harbour the human type of tubercle bacillus. Usually the induced tuberculosis, even when large doses of culture are employed in setting it up, is local and trivial; but occasionally the human tubercle bacilli administered experimentally to the animal may be found dispersed through its body. In any case, however, the animal rarely suffers in health or condition, nor is its life endangered. An interesting and perhaps important feature of experiments of the class in question is the circumstance that human tubercle bacilli on being injected in large doses into the milch cow make their escape into her blood stream, and that the bacilli thus wandering abroad are apt to become excreted along with the cow's milk, and this without her mammary apparatus suffering in any degree from tuberculosis. A parallel result was also obtained with calves under six months of age, the milk sinuses of their undeveloped udders yielding tubercle bacilli when the animals were killed some three to four months later.

Having regard to the above facts, and in view also of a perhaps growing practice of seeking to render calves immune to bovine tuberculosis by injecting them with culture of human tubercle bacillus, some systematic observation appears called for of the types of tubercle bacillus contained in cow's milk ascertained to be tuberculous. The guinea-pig, which usually serves as the test-animal for milk suspected to be tuberculous, reacts equally to the bovine and the human bacillus, and accordingly is not, though it dies duly, to be trusted to determine the presence or absence of the tubercle bacillus (that of human type) which has come to be regarded as most dangerous to man.

Prevention of Tuberculosis in the Individual.

Though the tubercle bacillus may not, except in rare instances, be prenatally transmitted from mother to offspring, liability, *i.e.*, susceptibility, to tuberculosis is to be regarded as in this country practically universal. The degree, however, to which individuals are liable to the disease differs widely; some appear to be absolutely resistant to it, whereas others acquire it readily. How far extra, and dangerous, susceptibility to tuberculosis is a matter of inheritance of tissues especially prone to foster the tubercle bacillus, and how far such susceptibility is a condition which may be more or less readily acquired in the life of the individual, is of small moment beside the consideration that such persons above all others demand safeguard against tuberculous infection. Unless access to them of the tubercle bacillus be in practice wholly prevented by suppression altogether of that infective agent they require to be so far fortified against its assaults that its ubiquity may be to them matter of indifference.

As above indicated, some persons already possess, whether by inheritance or by acquired character, tissues almost absolutely resistant (completely immune) to the tubercle bacillus, and the aim, therefore, of science must needs be discovery of means for artificially inducing in susceptible individuals permanent resistance to the tubercle bacillus equivalent to that inherited or naturally acquired by their more fortunate comrades. Already research in this sense as applied to lower animals has been initiated by the late Royal Commission and by other bodies and persons, and alike in its

scientific and in its administrative aspects such research demands encouragement and subsidy.

Cure or Arrest of Tuberculosis.

It has been regarded as the reproach of science, at least of medical science, that so little has been achieved in the direction of curing, arresting or controlling tuberculosis, more especially pulmonary tuberculosis, in the individual patient. At the present day expectation of cure, except of incipient not very actively progressing cases, has been practically abandoned, and arrest of the disease alone hoped for; and sought less by means of drug administration than by control of the conditions of existence in such way as indirectly to afford nature assistance in her attempts at fortifying the tissues of the patient in their inherent resistance to the hostile activities of the tubercle bacillus. Unfortunately, measures of this sort are of practical avail for comparatively few (*i.e.*, the persons proper for reception in sanatoria) of the total cases of pulmonary tuberculosis in the phase in which they commonly come first under official notice, and it is greatly to be desired not only that means should be found for directly supplementing nature in fortifying the tissues of sanatorium patients, but means also of arresting completely and permanently the progressing and fatal activities of the tubercle bacilli infesting the tissues of advanced and advancing pulmonary tuberculosis in persons who otherwise must needs perish at an early date.

For both these objects research is necessary, as before, initially on lower animals. Investigation of the sort referred to under "Prevention" would doubtless prove of value in this connection; as also systematic research respecting the comparative merits in an inhibitory sense, on the one hand of tuberculins of differing pedigree, on the other of emulsions of animal tissues which, having been definitely invaded by the tubercle bacillus, have withstood and finally overcome it.

Apart altogether from questions remaining to be settled (as, for instance, the sources and channels of tuberculous infection and their relative proportions and importance), the absence alike of trustworthy therapeutic means of immunising the population against tuberculosis, and of direct remedies in cure, or at least arrest, of the disease in persons attacked by it, would seem to require that such persons should be so dealt with that any intrinsic resistance to the activities of the tubercle bacillus possessed by the individual may be fortified and supplemented in all practical ways.

In seeking to determine, in the present and as regards pulmonary tuberculosis, means to be adopted to this end, the question will necessarily arise for authority concerned as to whether the administrative measures contemplated should be directed solely or mainly to serving the health interests of the individual, or should be extended towards securing the community as completely as may be against such personal infectiveness as the tuberculous individual may possess.

There is not, it is to be observed, unanimity of opinion as to the degree to which the subjects of pulmonary tuberculosis are to be regarded as dangerous to other persons. At opposite poles are authorities holding that pulmonary tuberculosis is highly infectious from man to man, and authorities wholly unconvinced in this sense—disposed indeed to regard case to case infection by the disease as a negligible quantity. According as the one or the other of these views is dominant in a given area (say county or county borough) so will the measures contemplated for adoption in protection of the community against personally disseminated tuberculous infection be severe or lax, and the cost of them great or comparatively trivial.

Accepting for present purposes the assumption that pulmonary tuberculosis is so far infective that safeguarding the community is contemplated against persons the subjects of the disease, consideration is given in what follows to the interests in this connection on the one hand of the individual, on the other hand of the community.

March 1912.

MEASURES IN ARREST AND IN REPRESSION OF PULMONARY TUBERCULOSIS.

Applicability of the several adoptable Measures of Column 1 in the Interests—	
Measures adoptable in Control of Pulmonary Tuberculosis.	Of other Persons in Relation (Direct or Indirect) with such Subjects.
<p>DOMICILIARY VISITATION AND SUPERVISION, plus DISPENSARY MINISTRATIONS.</p> <p>These measures together afford means for sorting out the various cases of pulmonary tuberculosis coming to the knowledge of authority; of classifying them roughly (say) as follows:—</p> <p>(a) Phthisis, incipient or threatened only (? contact cases).</p> <p>(b) " " early, but definite and progressive.</p> <p>(c) " " confirmed and advancing.</p> <p>(d) " " confirmed, but chronic.</p> <p>(e) " " advanced and advancing.</p> <p>And means also for securing to members of each class the advice, instruction, education, treatment, supervision, &c. appropriate in the interests of the individual.</p>	<p>Of the actual Subjects of Pulmonary Tuberculosis.</p> <p>The (a) Class, though treated (under instruction and supervision) without removal from their homes, must in any case be regarded in an infective sense as a negligible quantity; they have no expectation (or very little), and they do not therefore disperse in the environment tubercle bacilli. Moreover, they are by hypothesis under supervision and education such as should reduce to a minimum any risk to other persons possibly arising through their malady.</p> <p>The (b) Class, though theoretically less negligible than Class (a) as regards capacity for shedding tubercle bacilli, will be patients who, above all others, will obtain (whether treated at home, at dispensary, or in sanatorium) sustained instruction and supervision in the ordering of their lives, and to a corresponding extent may be held the less liable to disseminate infectious particles. In so far, indeed, as they secure sustained sanatorium treatment they may be regarded as forthwith (and, if their disease is to be arrested by such treatment, practically permanently) rendered, as infective agents, absolutely negligible.</p> <p>The (c) Class, though in turn theoretically less negligible than Class (b), is nevertheless in much the same category as regards danger to other people. Sanatoria, however, will not probably (except temporarily for instruction purposes) regard persons of this class as suitable for admission.</p> <p>The (d) Class will comprise in considerable proportion persons who, whether or not sanatoria be willing to receive them, will object to go to such institutions seeing that nothing like cure can be promised them, and that hitherto during many months (perhaps years) of invalidity their personal freedom in mixing with their neighbours has remained unrestricted. Some will be capable, to a varying extent, of work, and some, whether so capable or not, will be unwilling to resume their occupations; but generally these persons are likely to prove a source of much trouble to administrative authority, for they will perceive that attempts to bring them under discipline are for the sake less of themselves than other people. On the other hand, since this (d) class will contain many cases of chronic phthisis in phases of renewed activity, sanatoria may be deemed of service in so far as these institutions remove active tuberculosis for a while from the community.</p> <p>The (e) Class is of course by hypothesis the most dangerous of all, seeing that the lungs of these people are breaking down generally, and that their expectation is therefore abundant and constant. Owing to their feeble physical condition, however, they are for the most part confined to the house and even to bed, and the range, therefore, of mischief they can do to the community limited practically to their own families. In this sense they are in strong contrast with members of Class (d) above, the range of whose deleterious influence can be in many cases much wider; to the general public, indeed, Class (e) may be regarded as less dangerous than Class (d). Furthermore, in so far as at an earlier stage of their malady Class (e) has been under education at dispensary or sanatorium, members of it should be especially competent in minimising such risk as they entail on their home-mates, in co-operating, that is, to this end with their families under supervision of authority. Nevertheless, their families are likely, in many instances, to prefer to be rid of the burden and responsibility of practically moribund relatives, if only duly-equipped asylums are provided for them; and though the patient might prefer to end his days in his home, such hospitals or asylums for the dying would not want for inmates once their advantage to home-dwellers with advanced phthisis cases on their hands had become generally appreciated.</p>

SUMMARY.

	<p>So far as domiciliary and dispensary ministrations are concerned, it is to be anticipated that the officials of the health authority and the dispensary officers, acting as they will be in concert, will find their intervention well received by persons threatened by phthisis or the subjects of its earlier manifestations. For obviously these ministrations will be greatly (and mainly) in the interests of the persons affected. But it may be doubted whether phthisis persons of the other classes—(c), (d), and (e)—will be grateful for similar official supervision. For equally obviously ministrations bestowed on these other tuberculous classes will be much less in the interests of the patients than in that of the community; and in so far as they extend beyond the homes of the patients and follow these persons at their occupations, these ministrations of authority, unless very tactfully bestowed, are likely to be resented as causing the recipients of them to be regarded with suspicion alike by their employers and their fellow-workers.</p>
<p>SANATORIA</p>	<p>The sanatorium may be expected to co-operate with the dispensary in classifying, in the sense above indicated, pulmonary tuberculosis coming under official notice, and in determining in particular cases if any and what institutional treatment is called for. For instance—</p> <p><i>Class (a)</i> (very early) cases might, some of them, be judged proper for admission to sanatorium, for a short while for educational purposes; and</p> <p><i>Class (c)</i> (confirmed and advancing) cases also might in particular instances be received into sanatorium and retained long enough to ascertain (while under instruction there) whether or not there existed prospect of arresting their progress.</p> <p>But—</p> <p>Mainly the sanatorium would be devoted to the retention during considerable fractions of a year of <i>Class (b)</i> cases of early but definite and progressing pulmonary tuberculosis; and to ensuring such persons, after their disease had become arrested, gradually to sustained physical or other labour. It is, indeed, for the treatment, education, and after-care of <i>Class (b)</i> cases that sanatoria have so far been found of special advantage.</p> <p><i>Class (d)</i> (confirmed but chronic) cases are not likely to be in request by sanatoria; and commonly, seeing that these institutions cannot (if willing to receive such cases) promise persons in this phase of tuberculosis restoration to health, cases of this (<i>d</i>) class will not probably, except perhaps during periods of exacerbation of their malady, be generally pressing for sanatorium regime. Mainly they may be expected to resort to dispensary treatment and domiciliary supervision, and many doubtless will be intolerant of what they will regard as interference if attempt be made to supervise them outside their homes.</p> <p><i>Class (e)</i> (advanced and advancing) cases will probably be generally rejected by sanatoria.</p>
<p>HOSPITALS</p>	<p>In view of a growing tendency to regard sanatoria as proper for none but cases of pulmonary tuberculosis giving promise of at least arrest of their disease with restoration to the patient of practically full capacity for work, "Hospitals for Consumption," in some form or other, appear to be called for. The extent to which such hospitals will be provided must depend largely on the view adopted as to the functions these institutions are to exercise. If use of them is limited to treatment for a while of cases by no means hopeless, though not sufficiently promising for sustained sanatorium treatment, and to temporary medical relief of chronic phthisis in persons subject to periodic sub-activity of their malady, hospital provision for "in-and-out" patients of these two classes need not be large. But, if with the object of protecting the community against personally distributed tuberculous infection, practically all confirmed, especially all advanced, cases are to undergo sustained segregation—if that is, asylums for incurables are determined on—"hospital" provision for tuberculosis will need to be on a very extensive (and costly) scale.</p>
<p>CONVALESCENT HOMES.</p>	<p>Establishment of institutions of this class is no doubt contemplated, and such institutions should prove of much value in combating tendency to phthisis in persons who have inherited, or who have acquired, a tissue condition non-resistant to the tubercle bacillus—as, for instance, members of families in which pulmonary tuberculosis has recently declared itself who, though not themselves "notifiable," are nevertheless in a phase of ill-health threatening development in them of tuberculosis at no distant date.</p> <p>In the above connection it deserves to be borne in mind that in the case of tuberculosis other than pulmonary, convalescent homes would be likely to prove of great advantage, as, for instance, for children and adolescents the subjects of non-acute (closed) tuberculosis of glands, bones, or joints. They might usefully serve, too, in comparatively promptly restoring to health persons recently the subjects of a number of non-infectious maladies of temporary character which left the sufferers in condition of health precluding them from returning to their daily duty or employment.</p>

MEMORANDUM submitted by J. A. D. RADCLIFFE, M.D.

In this short memorandum it is necessary to leave out of account all question of heredity, and to assume that prevention of infection will be equivalent to prevention of tuberculosis.

If this premise be granted, very great stress must be laid on the proper carrying out of all measures likely to diminish the chances of infection.

In a general policy for dealing with the problem, all aspects of the question should be attacked, but only the broad outlines of a scheme can be laid down, as conditions vary so much in different districts that local modifications will be necessary.

Perhaps the best way to outline such a scheme is to deal with it in sections, and afterwards to sketch in the essentials in a skeleton plan.

A complete plan for dealing with tuberculosis can be divided into three sections:—(1) *Research work*; (2) *Preventive measures*; (3) *Curative agencies*.

In practice it is not possible to draw such hard-and-fast distinctions, as curative agencies will become excellent preventive measures in proportion to their successful fulfilment of the cure of the already infected. Also, both prevention and cure are dependent on the acquisition of knowledge acquired in the course of research work.

Here, however, it will be better to deal with the sections separately.

(1) *Research Work*.—One of the most important parts of a comprehensive scheme ought to be the establishment of a central institution in which scientific investigations of the disease could be carried out on broad lines.

That the provision of such an institution is a fundamental necessity for the effective dealing with the problem may perhaps best be shown by the enumeration of some of the most important questions in which our knowledge is still either incomplete or undecided.

- 1) The frequency and importance of infections by the bovine type of bacillus.
- (2) The portals of entry of the bacillus, and the paths of infection and spread.
- (3) Immunity in tuberculosis.
- (4) The frequency and importance of "mixed infections" in the course of tuberculous disease, especially of the lungs.
- (5) The influence of heredity and environment.
- (6) The influence of certain trade diseases on the origin and spread of pulmonary tuberculosis—stonemasons' lung, grinders' rot, &c.
- (7) Epidemiology.

In addition, such a laboratory would undertake all the statistical work in connection with the scheme, and the results obtained, and carry on continued work on the production of more efficient curative agents, both bacterial and chemo-therapeutic.

The laboratory would also be available for the establishment of the diagnosis in cases where this could only be done by complicated methods, e.g., inoculation of animals.

Such an institution would also obviate the necessity of equipping the dispensaries and sanatoria with laboratories, and would relieve such institutions of work which they are not intended to carry out.

(2) *Preventive Measures*.—In this direction very important work remains to be done, and as tuberculosis has now been made a notified disease, the following measures can be instituted:—

- (1) Education of the public by means of lectures and travelling museums (described later).
- (2) Home supervision of cases, leading to improvements in personal and domestic hygiene.
- (3) Careful examination of all "contacts," leading to the earlier detection of cases and their treatment.
- (4) Removal and segregation of advanced hopeless cases as far as possible. (See later under German experiences.)

(3) *Curative Agencies*.—

- (1) Home treatment, carried out by special dispensaries.
- (2) Sanatoria, especially with attached farms, where graduated labour can be carried out.
- (3) Special open-air schools for children.

Before drawing up any complete scheme for dealing with the whole question of tuberculosis in this country, it may be of interest to mention some of the work which is being carried out by the Deutsches Zentralkomitee zur Bekämpfung der Tuberkulose, as I had an opportunity of seeing some of this work very recently.

The work of this committee is largely conducted along preventive lines, but the treatment of cases also plays a prominent part.

The activities of this organisation may perhaps be most clearly shown under separate headings.

(1) *Discovery, Selection, and Grouping of Patients*.

(1) Spread of knowledge about tuberculosis. This is being very largely advanced by the increased number of travelling museums, which become of use in proportion to the interest taken in them by the doctors of each district. They show methods and appliances for home treatment, advocate personal and domestic hygiene, distribute literature, &c. They are regarded as a very important part of any comprehensive scheme.

(2) Care stations and information dépôts for patients. These are being very largely increased in number, not only in the towns but also in the rural districts. It is pointed out that these stations represent the beginning and end of modern methods against tubercle, and a special commission has been appointed by the Zentralkomitee to further their establishment.

The functions of these institutions are—

- (1) Advice to, and care of, the patient.
- (2) Examination of the family.
- (3) Education.
- (4) Treatment of sputum and soiled clothing.
- (5) Isolation in the home.
- (6) Disinfection of the dwelling.
- (7) Material support.
- (8) Scientific investigation of the material collected in the stations—especially statistics.

It is stated that these stations are doing good work, and becoming more esteemed by the public. Failure is often due to careless working, or to an attempt to run such a station on stereotyped lines; the point is emphasised that a station suitable for a large city may be quite unsuitable to rural districts, where it is impossible to wait until the suspected cases come to the dispensary. They must be followed up to their homes and searched out. For this work the general practitioner, district nurses, voluntary workers, and clergy must be asked to help. In small rural districts the nurses can also do other work, as tuberculosis alone would not give enough work.

It is now being proposed that these stations should undertake treatment of patients by tuberculin, but very little has yet been done, although it is recognised that this is very desirable. This is due to opposition by the doctors, and at present patients are only advised to go for such treatment to some place outside. If the doctors in a district agree, the station itself undertakes this work.

(3) *Institution of Compulsory Notification*.

(4) *Observation Stations*.

These have been established by the Insurance Committee for the examination and selection of patients for sanatorium treatment. These stations are situated either at the care stations, the poly-clinics of the university, or at hospitals.

The Landes-Versicherungsanstalt, Berlin, has erected a special station in Lichtenberg, which also carries on the after-treatment (by tuberculin) of those patients who have been already treated successfully with tuberculin in the Heilstätte Beelitz. This has proved so valuable that it is to be enlarged. Other institutions are following suit.

(2) *Sanatoria* are regarded as the most hopeful curative measure, but particular stress is laid on after-care by the care stations and continuous after-treatment (by tuberculin). Emphasis is laid on the fact that patients leaving the sanatorium are not fit to resume arduous toil in unhygienic surroundings, and special work stations are advised, where they could be gradually brought up to full work.

This could probably be better done in a labour colony or farm at the sanatorium, as has been done at Frimley.

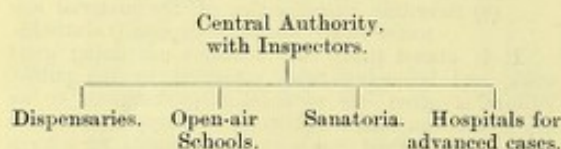
(3) *Care of Advanced Cases.*—The transfer of such cases to special hospitals has been a failure. "The attempt to transfer these patients to invalid homes or special departments of general hospitals must be regarded as a complete failure, such institutions are looked on as 'death houses' and avoided by patients." Such an attempt has only met with some success in the Franziskus Heim, M. Gladbach, and is due to the fact that this is run by Catholic Nuns, and the patients go to them willingly, but still more to the fact that they are conducted exactly like a sanatorium, and some not too far advanced cases are also taken, so that a certain measure of success in treatment can be attained. In this Home, patients often remain even several years, "in general it must be admitted that the question of the transference of advanced cases of phthisis, and their isolation apart from their families, is still in the largest part of the Empire an unsolved problem."

It is advised that this side of the question should be enlarged, and as many as possible persuaded to go in. Every influence should be brought to bear on the patient, and treatment should be thoroughly carried out in such institutions.

N.B.—The quotations given above in inverted commas are taken from "Geschäftsbericht für die XV. General-Versammlung des Zentral-Komitees am 10 Juni 1911, zu Berlin."

Scheme.

The next step is to draw up in outline a scheme which could be established in England to deal with every side of the problem, and to co-ordinate the different activities necessary. This scheme ought to have the following branches:—



A few more detailed points about each branch may now be given.

(1) *Central Authority.*—This body should have general control of the whole scheme, and be responsible for its efficient working. They should have a number of inspectors to visit and report on each district periodically, and investigate any cases of dissatisfaction, such investigations to be embodied in a report to the central authority.

This body should also finally sanction the appointments of medical officers, and a medical officer should have the right of appeal to it in cases of dispute.

(2) *Subsidiary Departments.*—

(a) *Dispensaries.*—These are undoubtedly the most important part of the scheme, and the medical officer in charge must be accustomed to dealing with patients

in every way. On him rests the responsibility for making a correct diagnosis in each case, for the proper grouping of the cases, and their selection for the most suitable line of treatment, i.e., in sanatoria, hospitals, or at home.

He will be in charge of all the treatment carried out at the dispensary, and ought to be well grounded in the principles of treatment by the tuberculin; be responsible for sputum examinations, and the keeping of accurate records of all cases. He must be responsible for the carrying out of home supervision, and the examination of contacts. The patients after their discharge from the sanatorium will also pass into his care, and it will be part of his duty to continue their treatment and to generally supervise their progress.

All records collected in the dispensaries should go to the Statistical Bureau in the Research Institute.

(b) *Sanatoria.*—Should be large and serve a wide area, thus reducing as far as possible the cost per bed. I do not think that it would be advisable at first to erect large numbers of sanatoria, until we are in possession of more accurate information about the total numbers of patients, and the percentage likely to be benefited sufficiently by this extensive form of treatment. I would rather advocate the immediate foundation of an efficient dispensary and preventive service, and hold back the construction of sanatoria until we have sufficient information accumulated to give definite knowledge about what will be required. If the immediate provision of sanatoria is insisted upon, I think that only a very few beds per hundred patients will be necessary, and patients could be passed quickly through them, the sanatorium being merely an educative factor. When the dispensary scheme is operating satisfactorily it will be time to consider the establishment of sanatoria with attached labour or farm colonies, where patients could remain long enough to complete a cure.

(c) *Hospitals for Advanced Cases.*—These should be close to towns, and existing institutions should be made use of if possible. Every inducement should be given to advanced cases to go to these hospitals, and treatment in them should be as far as possible the same as in a sanatorium, so that patients may not regard them as homes for the incurable. Accurate records must be kept.

(d) *Open-air Schools.*—A hospital should be established in connection with these, where cases of bone and joint diseases could be efficiently treated on modern principles, before the affected children have been permanently incapacitated.

Remarks.—I am of opinion that the ultimate solution of the tuberculosis problem lies in the prevention of infection, and for this purpose there can be no question that an efficient dispensary service (which includes treatment, supervision, and education of the people) is by far the most important agent: every method being adopted to enlighten the public about how they must live if they wish to avoid infection. The enormously important housing question is outside the scope of this memorandum.

March 1912.

MEMORANDUM submitted by G. REID, M.D., D.P.H., Medical Officer of Health, Staffordshire County Council.

As requested by the Chairman of the Committee appointed by the Chancellor of the Exchequer to inquire into this matter, I have prepared the following memorandum setting forth, shortly, my views as to the machinery necessary for undertaking the work of prevention and treatment of tuberculosis and how that machinery may best be provided.

The machinery for dealing with tuberculosis should, in my opinion, embrace the following:—

i. Sanatoria:

(a) for the treatment, educational and otherwise, of early cases;

(b) working colonies to which such patients who are capable of doing a certain amount of light work of a suitable character,

or whose regular employment is of a nature detrimental to their health, may be drafted;

(c) hospitals for the reception of advanced cases whose home conditions do not permit of their remaining with their families without risk. These hospitals might also be used as sorting hospitals for the temporary reception of patients in order to determine whether the cases are such as require sanatorium treatment, treatment at the working colony, or transference to dispensaries.

ii. Dispensaries, or clinics, under the charge of whole-time medical officers, for the purpose of the lengthened treatment, by tuberculin or otherwise, of persons capable of attending

such dispensaries, and from which, as occasion arises, patients may be drafted to sanatoria or hospitals. The medical officer of the dispensary, with the assistance of health visitors, would be in constant touch with tuberculous families, not only paying regard to known cases, but searching out for other cases in the incipient stage.

- iii. The provision of health visitors, working under the medical officers of health and in association with the dispensaries, who would instruct tuberculous families in the observance of needful precautions, keep a look out for any signs of ill-health among other members of the family, and generally act the part of health visitors.

As regards the extent of the provision to be made, the question is a difficult one, because we have no reliable information regarding the number of tuberculous cases in the population, or to what extent the present estimate may increase when the machinery for discovery of incipient cases is available.

Again, as regards sanatorium provision, the requirements will also be governed by the mean duration of retention of the patients in such institutions. Of course, in the case of advanced cases this period would be a prolonged one. On the other hand, in the case of patients who are capable of engaging in work, which number will probably be found to be considerable, it would be a mistake, in my opinion, to make use of the sanatoria otherwise than for educational purposes, and for a limited period of residence, the cases afterwards to be transferred to the dispensaries for continued treatment with the aid of home shelters if need be.

It is of the utmost importance that patients should be taught the advantages of an open-air life, and I am quite certain that in the majority of cases this cannot be accomplished through health visitors only. On the other hand, numerous visits to sanatoria have satisfied me that almost without exception patients become so convinced of the advantages of open-air treatment that they prefer to sleep in shelters even in the most inclement weather. To achieve this, combined with other useful knowledge which short residence in a sanatorium will impart, is in my opinion of vital importance, and such educational treatment should in most early cases precede dispensary and domiciliary treatment.

In view of the term "sanatorium benefit" in the Act, there is a risk that insured persons may expect to be provided with long-continued treatment in sanatoria irrespective of qualifying considerations, and I think it is important that an authoritative announcement should be made that "sanatorium benefit" does not necessarily mean residence in a sanatorium until a cure is effected, but may mean residence for a short period for educational purposes or even no residence at all, but merely dispensary or domiciliary treatment.

In determining how far authorities shall go in providing for institutional treatment, I think it is important that the demands in the first instance should be moderate, thus allowing for such subsequent extension as experience may dictate.

It is also important that extravagance in the erection of buildings should be avoided; with the exception of the administration blocks and one or two wards for special cases, the buildings should be of a temporary character, the mass of the patients being

treated in shelters as nearly approaching in design what would be capable of imitation at home. At the same time, it is important that the administration blocks should be of sufficient size to allow of the extension of the patients' accommodation.

No scheme of tuberculosis prevention will in my opinion be complete which does not pay regard to bovine tuberculosis, and it would be of the greatest possible value to utilise a portion of the money available for research work for the carrying out of a well organised experiment regarding tuberculosis in cows as affected by the miserable conditions under which the animals are now housed.

It would appear from experiments conducted at the Harper-Adams Agricultural College, Shropshire, at the instance of the County Councils of Staffordshire and Shropshire, that by keeping cows absolutely in the open throughout the year, merely providing them with shelters for voluntary use, the yield of milk as regards quantity and quality is improved and the cost of production lessened, results which have subsequently been confirmed by similar experimental work conducted by the Highland and Agricultural Society of Scotland. I have over and over again failed to induce farmers even to listen to such a suggestion; if, however, the facts could be proved by a large scale experiment conducted under Government auspices, it would be possible to more or less compel belief among farmers, and thus break down once and for all the existing appalling housing conditions of cattle, with, of course, incalculable benefit from the point of view of tuberculosis as well as general cleanliness of milk supply. It would then be worth while to free the existing herds from tuberculous cows under a compensation scheme, terminating within a specified period, because it would be a comparatively simple matter under open-air conditions, or in sheds so constructed as to practically comply with open-air conditions, to keep the subsequent herds free.

As regards administration, it is of vital importance that duplication of authorities should be avoided, and it is clearly to the public interest that public health authorities should be recognised as the bodies to provide and administer the machinery. On the face of it, except in the case of large county boroughs, this will mean union of authorities (county councils and county borough councils) for the purpose and the formation of joint boards covering, in the majority of cases, geographical counties. I am aware that such union is sometimes advocated for the purpose of sanatorium provision, but I do not see why it should be so restricted, and would strongly advocate the inclusion of the whole machinery, down to the provision of health visitors for the most distant parts, under one central administrative body, legally constituted, and on whom the duty of making the needful provision would be imposed. It is unnecessary to give examples of how such joint action would lead to economical administration, the avoidance of overlapping, facilitate the cutting-up of the area into units for special purposes irrespective of artificial boundaries, and the unification of the whole preventive machinery. Of course, the central authority could if thought desirable constitute local sub-committees, and the officers of the joint board would be in constant touch and act conjointly with the medical officers of health of the constituent authorities.

G. R.
March 1912.

FURTHER MEMORANDUM submitted by G. REID, M.D., D.P.H., Medical Officer of Health, Staffordshire County Council.

As requested, I have framed the following summary of points which, in my opinion, should be taken into serious account in considering any legislative proposals for controlling the milk supply from the point of view of the public health:—

Legislation.

1. It is an undoubted fact that the present machinery for controlling the milk supply has proved

utterly inadequate and has completely failed in its object.

2. The chief causes of failure in my opinion have been—

- (a) Inadequate and badly framed regulations governing production and distribution;
- (b) Inadequate inspection of dairies and cowsheds by health officers; and

(c) Default on the part of local authorities, especially of small urban and rural districts, in administering the law as it now stands, imperfect though it is.

3. I am quite convinced that the evils will not be got rid of if in county areas the administration, no matter how the law may be amended, is left in the hands of the district councils, and I would strongly urge that the work should be entrusted to county and county borough councils only.

4. At the present moment what should, under proper management, be the cleanest food available is perhaps the dirtiest, and, in so far as this is injurious in a public health sense, it can easily be remedied by legislation, but as regards the serious injury resulting from tuberculous milk, more drastic changes in legislation are needed. To pave the way for these it is desirable that a carefully conducted inquiry should be instituted in order to demonstrate conclusively, by evidence now available, supplemented by further properly organised experiments, whether or not tradition, which is responsible for the present unhygienic treatment of milch cows, can be broken down.

Arguments in support of suggested Inquiry.

I advance the following arguments in support of the suggestion I have made (*see* Memorandum to Tuberculosis Departmental Committee), that part of the money available for research work under the National Insurance Act should be utilised for conducting the suggested inquiry:—

- i. It is impossible to over-estimate the importance from a public health point of view of making a determined attempt to secure a milk supply which is free from the infection of tuberculosis. To do so we must not only be in a position to justify, by knowledge, new legislative enactments with that object, but our position must be so strong that it cannot any longer be successfully attacked by dairy farmers whose knowledge is too often based upon mere tradition.
- ii. No one who has not had occasion to inspect cowsheds officially can have even a faint idea of the disgusting and filthy conditions met with, and it is staggering to find that no amount of argument serves to convince the farmer that everything is not as it should be. He is ignorant of any published records which prove that, even from his point of view, it would be advantageous to improve matters, and is satisfied that in order to secure a good yield of milk he must keep his cows in a warm, and, therefore, suffocating atmosphere. Again, so little importance is attached to cleanliness at this stage, that the lowest class of workman is considered good enough to be employed as a milker.

The published evidence at present available which discredits the tradition that warmth in cowsheds (and, consequently, foul atmosphere) is essential to profitable milk production will be found in the following:—

1. Field experiments, Harper-Adams Agricultural College, 1901-4.

This experiment compared the results obtained in the case of cows kept in the open during the cold weather with those in which the ordinary practice was followed.

2. Experiments by Science Committee of the Highland and Agricultural Society, 1908-9.

This experiment made similar comparisons in the case of cows housed in freely ventilated and badly ventilated sheds, and, consequently, low and high temperatures respectively.

3. Experiments by Pennsylvania State College during the winters of 1902-3 and 1903-4.

By this experiment the results as regards fattening steers in the case of animals kept in closed and open sheds respectively were compared.

In all these experiments the results were very startling, although quite in accord with scientific expectation unblinded by tradition.

The problem of eliminating tuberculosis among cattle would be a comparatively simple one if it could be shown that, having eliminated it for the time being, the trouble need not recur. To achieve this, one of the chief essentials would be insistence upon a revolutionary change in present conditions, to ensure that in future the animals shall be kept under conditions as nearly approaching open-air life all the year round as possible. If the present conditions are maintained, in my opinion, any systematic effort in the direction of eliminating tuberculosis among cattle would result in failure.

The large scale experiment I have recommended would determine whether or not insistence on the proposed radical change would be feasible from every point of view, and if this should be determined in the affirmative it would be possible to frame regulations, the observance of which would entitle agriculturists to claim compensation for loss entailed in complying with certain conditions set forth in the scheme. What these conditions might be may shortly be summarised as follows:—

- i. That all milch cows shall be tuberculin tested, to detect those which are tuberculous.
- ii. That all such cows responding to the test shall be separated from the sound animals; those found to be suffering from tuberculosis of the udder to be immediately dried off, and the others to be dried off as soon as practicable, preparatory to being fattened for sale.
- iii. That information be given to the responsible authority by the owners of such cows as to their ultimate disposal, in order that the meat may be inspected for the purpose of determining whether, and to what extent, it is fit for human food.
- iv. That, if found to be unfit, the meat shall be destroyed.
- v. That, conditional upon the observance of these regulations, and providing model regulations governing the housing, &c. of the healthy stock and the handling and distribution of the milk are rigidly observed, the owner of the tuberculous cows shall be compensated for the loss he can clearly prove he has sustained—(a) by drying off the cows and selling the meat which has been approved as being fit for human food; or (b) by destroying the meat which, upon slaughter, is pronounced to be unfit for food.
- vi. That, as regards the compensation scheme, a time limit, say, of three to five years, be imposed, after which it shall come to an end unless the time be further extended by Government on its being established that, on public health grounds, and having regard to then existing conditions, such as extension was indicated.

To sum up the above sketch of the position as I view it, it is no doubt possible to effect considerable improvement on existing conditions, especially as regards securing a cleaner milk supply, by legislation now, but before much can be done in the direction of freeing the milk supply from the infection of tuberculosis we must be fortified by information of a definite and authoritative character as to the extent to which the principle of keeping cows in the open or in freely ventilated sheds throughout the winter may be enforced. In my opinion this information can best be acquired by an inquiry conducted by a special commission or committee composed, in part at any rate, of experienced farmers, veterinary surgeons, and medical officers of health who have had ample experience in the administrative control of the milk supply in county and urban areas.

GEO. REID.
July 1912.

MEMORANDUM submitted by JAMES RITCHIE, M.D., Superintendent of the Research Laboratory of the Royal College of Physicians, Edinburgh, and Joint Secretary of the Pathological Society of Great Britain and Ireland; formerly Professor of Pathology in the University of Oxford.

In elaborating a scheme for distributing money in aid of research relating to tuberculosis, it is advisable to consider the nature of the problems which require investigation. The more pressing of these may be grouped under the following heads:—

1. Questions relating to the existence and prevalence of different types of tuberculosis. The most important question here relates to the necessity for further investigation regarding the incidence of bovine tuberculosis in man, and it is necessary that extended investigations should be made in the different great centres of population in the country as there is evidence that the relative prevalence of the human and bovine types of the disease is different in different places. The actual work must be done locally, as each investigator must collect his own material. Another line of inquiry here is the collection of data regarding the subsequent history of those who have suffered from tuberculosis in childhood, as this bears on the question of whether an immunity is thereby established against the disease.

2. Questions relating to the means of diagnosis (*e.g.*, the *v.* Pirquet method, the significance of changes in opsonic index, &c.) in early cases, especially of pulmonary tuberculosis, and the correlation of observations made during life with post-mortem findings in fatal cases. These questions must be studied in relation to the light thrown on the investigation by the consideration of serological changes and the phenomena of hypersensitiveness in other diseases.

3. Questions relating to treatment.—(*a*) The effects of vaccine therapy. Here there are two aspects: firstly the clinical, and, secondly, the scientific, in which the principles underlying the treatment have to be elucidated in the light of the application of the method not only to tuberculosis, but to the other diseases in which it has been used. (*b*) The possibility of acting on the tubercle bacillus by substances other than those concerned in the natural reaction of the body against the disease, the analogy here being the treatment of syphilis by the means of salvarsan. For this inquiry the co-operation of the pure chemist, the pharmacologist, and the pathologist is essential. (*c*) The investigation of the scientific principles underlying sanatorium treatment. The main inquiry here relates to the effects which sanatorium life has on the metabolism of the body, and is largely one for physiologists who are qualified to deal with this aspect of their subject.

4. Statistical inquiries. These include not only the consideration of the ordinary statistics relating to public health, but also the collection and working up of data relating to special aspects of the tuberculosis question, such as the success of vaccine therapy and the efficacy of means of diagnosis.

It is evident even from such a brief review that in the near future the clinician, the pathologist, the bacteriologist, the pharmacologist, the physiologist, and the statistician will probably be concerned on the tuberculosis problem.

If we now consider the natural history of scientific progress we find that advance is characterised by two chief movements. Firstly, there is the breaking of new ground by a man of eminence and the development of his ideas by the group of, usually young, men he gathers round him. The pioneer is generally a man who has had experience in subjects cognate to that in which his discovery is made, and he is frequently (as in the case of Koch himself) concerned in the elucidation of several subjects at the same time. Secondly, there is the confirmation and free criticism of results which come from work at the same subject in different independent laboratories. Any organised attack on tuberculosis must thus provide for both the original and the confirmatory work being done.

It will at once be further evident that the problems of tuberculosis cannot be fruitfully considered apart

from those of infection generally. As an example, the case of the tuberculin reaction discovered by Koch in 1890 may be cited. The principles underlying this are only now beginning to be understood, and the first light on the subject came from the observation of a similar phenomenon in relation to diphtheria. It is thus the men with the widest knowledge of the principles underlying infection who are best fitted to throw light on tuberculosis, and also who are best fitted to judge as to what lines of research are most hopeful.

It is further to be noted that in the future, as in the past, spontaneous work on the subject will go on in the different centres of medical education in the country. Such work may easily be hindered if the organisation to be brought into existence is not sufficiently elastic to permit of facilities being freely given to any man to work out his ideas. Many of the investigators will be young men who have been working in related departments of science, and who are looking forward to holding clinical and scientific positions unconnected with tuberculosis research.

The scheme which I consider would best meet the somewhat complicated circumstances of the case is as follows:—

The allocation of the money should be in the hands of a central body which I shall call the executive committee. To secure the greatest co-ordination it would be well that it should control the organisation of the work in the districts of all four Insurance Commissions subject to the proviso that in each year each district should receive the amount due in respect of the number of insured persons it contains. The executive should contain amongst its members experts in the various branches of medical science, and they should be drawn from all parts of the kingdom. They should be elected for a fixed term of years and should not be eligible for immediate re-election. Power should be given to co-opt other experts to give advice in special cases. The experts should not constitute more than half of the executive.

The functions of the executive would be as follows:—

- To consider the problems most requiring investigation at any particular time.
- To communicate their views to heads of laboratories and hospitals, and to consider offers from these to organise research under any particular heading.
- To consider all subjects of research proposed either by heads of laboratories or by other workers. (In the case of a young worker the superintendence of the research by the head of his laboratory would require to be arranged for.)
- To subsidise (on occasion) men of experience in sciences cognate to medicine, *e.g.*, chemistry, statistics, for the elucidation of special problems.
- To provide special facilities in the shape of laboratory accommodation where such was not available.
- To give grants in aid of the publication of researches carried on under the scheme.

The executive would thus generally be in touch with all the resources for research in the kingdom. It would be in a position to give help to all promising work, and would secure the co-operation of existing laboratories by enabling these to maintain their independent position under conditions of adequate financial support.

In conclusion I may say that the advantages of such a scheme as I have sketched may in several respects be exemplified in the working of the Research Scheme of the Carnegie Trustees, to whom for several years I have had the honour of acting as one of the advisers.

JAMES RITCHIE.

November 1912.

MEMORANDUM submitted by PROFESSOR E. EMRYS-ROBERTS, M.D., Professor of Pathology and Bacteriology, University College of South Wales and Monmouthshire, Cardiff.

Research is an essential part of any scheme which has for its object the prevention and combating of tuberculosis.

The scientific value of any campaign of this description is measured largely by the character of the research work carried out.

Research may be divided under two headings:—

- (1) That undertaken at the bedside or clinic.
- (2) That undertaken at a pathological laboratory, having, preferably, an experimental farm attached.

With regard to (1), research undertaken at the bedside or clinic is practically implied when it is understood that tuberculosis is to be investigated and treated by specialists in special institutions. With regard to (2), research indicated under this heading is, perhaps, the form of research generally understood by such reference. This is best undertaken at a laboratory attached to, and working in harmony with, an established school of medicine, more especially when the school of medicine is an integral part of a university or university college, for the reason that research work demands from time to time specialised knowledge only obtainable from experts in the several branches of knowledge; for instance, it is no uncommon occurrence in the course of an investigation into disease for the researcher to consult experts in physiology, anatomy, chemistry, zoology, botany, and physics, apart from those colleagues who are more or less intimately associated in the elucidation of the particular disease. In like manner it is essential for the researcher to have at his disposal the available literature of such a corporate body, as well as, if needs be, access to instruments and apparatus from which he might otherwise be barred.

Apart from the foregoing considerations there is also to be borne in mind the interacting value both to the research and to the corporate body at which the research is prosecuted. The advantages accruing to the research by reason of its association with a seat of learning are complementary to the accession of strength to the institution resulting from the presence, within its precincts, of men of high attainment and capacity.

The subject of tuberculosis is of such vast importance that the United Kingdom might with advantage

be divided into the four kingdoms for purposes of research; it might even be thought advisable to subdivide the larger areas for these purposes. So far as Wales is concerned, the conditions obtaining point to the necessity for determining its position as a unit in any contemplated division. At all events it would appear to be essential that there should be some attempt made to co-ordinate and organise the work as a whole, and it might be suggested that the several directors of research should themselves form a body in order to prevent unnecessary reduplication of work, without at the same time interfering with what, after all, must be considered the province of the individual director.

The nature of the research at any given centre must be largely governed by circumstances, as applicable to the district, and would include such aspects of the study of this disease covered by terms indicating researches into it from the standpoints of pathology, bacteriology, vital statistics, industrial occupations, geographical distribution together with the factors of heredity, housing, hygiene, and so on.

It would be conducive to the objects of the research were bulletins issued, when thought necessary, embodying the results attained and the work projected; at the same time it ought to be understood that the value of these records is largely credited or discredited according to the scientific attainments of the researchers. This opens up the question of personnel.

Research work of this advanced type should be in the hands of men of the very highest attainments, and monetary inducements of a commensurate character should be forthcoming in order that the men best qualified to undertake this class of work may be secured. It ought to be understood in schools of medicine that the career of scientific research opens up possibilities for graduates as important as the other avenues of the present day; incidentally it may be remarked that scientific research is nowadays undertaken, generally speaking, more as a means to an end than as a life-work.

E. EMRYS-ROBERTS.
March 1912.

SUPPLEMENTARY MEMORANDUM submitted by PROFESSOR E. EMRYS-ROBERTS, M.D., Professor of Pathology and Bacteriology, University College of South Wales and Monmouthshire, Cardiff.

In considering the most effective and economical methods of dealing with the funds available for the research, regard should be had to the personnel and to the locale.

With respect to the former, the director of the research should, preferably, be, concurrently, a member of the teaching staff of the university or university college, as the case may be: since, by combining the two posts, not only would there be an opportunity for the creation of a Chair of Preventive Medicine, carrying with it higher and post-graduate bacteriology, but there would also be established an intimate relationship between the research and the institution at which it is to be conducted, a desirable consummation. In addition, the combining of the two posts would enable the research to be under the direction of a capable and qualified individual, at the same time it would enable the holder of the chair to keep in close touch with advancing knowledge. Under the director would be appointed, in order to undertake specified portions of the work as bacteriologists, chemists, statisticians, and so on, whole-time research fellows, together with research scholars who would not, of necessity, be whole-time workers. Thus there would be built up a machinery not only for the efficient

conduct of the research, but also for the training of researchers.

With respect to locale, it follows, from what has gone before, that the work is best undertaken in laboratories of medical schools attached to universities or university colleges. In many instances, no doubt, facilities are already existent, but even where not already to hand the knowledge that funds were available for these purposes would result in facilities being provided, either by private benefaction or otherwise. In any case it may safely be said, if research is to be efficiently carried on apart from such institutions, it would mean the provision of a staff and equipment not far removed from that of the science side of a modern university.

Now that preventive medicine is being placed upon a proper footing, it should be recognised that research work in tuberculosis is not the end-all, and that, in contemplating measures for dealing with funds allocated for this special purpose, the wider vision should embrace the inevitable research work that must be undertaken in the near future into other diseases, and should plan accordingly.

E. EMRYS-ROBERTS.
November 1912.

MEMORANDUM submitted by JOHN ROBERTSON, M.D., B.Sc., Medical Officer of Health for Birmingham, on the PRESENT METHODS of dealing with PULMONARY TUBERCULOSIS IN BIRMINGHAM.

1. The present population of Birmingham is 851,000.
2. The average number of deaths from pulmonary tuberculosis within the extended area of Birmingham during the past 10 years, 1901 to 1910, was 989.
3. A system of voluntary notification of pulmonary tuberculosis was commenced in the old Birmingham area in March 1905. Since sanatorium accommodation was provided the number of notifications has increased rapidly. From November 9th, the date of extension of the city, over 1,500 notifications have been received, equal to 5,000 per annum.
4. In May 1906 I outlined a scheme for the provision of (a) a sanatorium for the treatment of cases in the earliest stages; (b) the provision of accommodation for educational treatment of consumptives; and (c) the provision of accommodation for advanced cases. I also indicated other measures which were desirable, such as compulsory notification, day and night shelters, &c.
5. Towards the end of 1908 Salterley Grange Sanatorium, near Cheltenham, was opened. This has accommodation for 40 patients. In order that only early cases of pulmonary tuberculosis should be sent there and that unsuitable cases should be excluded, the services of one of the physicians at the Queen's Hospital were obtained at an honorarium of 100*l.* per annum, to whom all cases were referred. More recently this arrangement has been abandoned, and all the patients have been sent to Yardley Road Sanatorium, Birmingham, in the first instance, and, if suitable, have been afterwards transferred to Salterley Grange Sanatorium.
6. In October 1910 Yardley Road Sanatorium was opened with Dr. W. H. Wynn as visiting physician and Dr. Godfrey Brookes Dixon as medical superintendent.
7. The Health Committee, in making this arrangement, had in view two main objects, viz., (a) the educational treatment of the patient, and (b) the tuberculin treatment of the patient with a view to ascertaining definitely whether what had been advocated in many of the German and Swiss sanatoria was effective when applied to poorer consumptives in the town. It was in order to test the value of this mode of dealing with the patients that the two physicians above-named were selected.
8. Since the opening of Yardley Road Sanatorium 600 patients have completed their course, and the results have been so good that on my advice the Public Health and Housing Committee were prepared to largely extend the treatment, and but for the passing of the Insurance Act this would have been done ere now, as we feel quite certain that we get, considering the class of patient we have to deal with in Birmingham, really valuable results.
9. The treatment consists in what has been outlined in the attached memorandum by Drs. Wynn and Dixon, with a complete course of tuberculin afterwards.
10. Home visitation of consumptives is carried out by four specially appointed tuberculosis visitors, three of whom are fully trained nurses, while the fourth is a man who has devoted himself to this work for the past seven years. This was the number employed in the old Birmingham area, but at the last meeting of the sanitary authority instructions were given for the services of four additional visitors to be obtained, so that systematic visits could be made at short intervals to all consumptives requiring such visits.
11. Sleeping shelters for recovering consumptives who have completed their course at the sanatorium have not been provided by the municipality. In the case of the suburban areas round the city, the majority of houses have good gardens, and a considerable proportion of the consumptives have purchased or built shelters for themselves in which they sleep. A good shelter can be purchased in Birmingham at a cost of 3*l.* 10*s.*, and is found to be a great aid to treatment.
12. At the present time we are considering the provision of a first open-air night sanatorium for the recovering cases in the centre of the city, so that the poorer consumptives who have to live near their work, and who cannot get reasonable accommodation in their homes, can for a small payment have a bed in the open air and a breakfast.
13. Advanced cases are not at present provided for. The various boards of guardians do a little for such cases, but it is not at present a part of their function to induce patients to stay in the infirmary; it is too frequently the case that as soon as the patient is able to move about the ward it is suggested to him that he might go home.
14. A tuberculin station is provided at No. 116, Edmund Street, Birmingham, which is in the centre of the city, where there are a waiting room and clinical room. The work has increased so much that additional accommodation has been secured and is now being prepared. It will consist of a large hall, with the necessary dressing rooms and clinical rooms. All tramways in Birmingham lead to the centre of the city. This tuberculin station is therefore centrally placed, and will probably be more easily available than three or four stations placed at different places at the periphery.
15. On notification, the medical practitioner recommends or otherwise the patient for admission to the sanatorium. His name is then placed on the list, and about once a week such patients are seen at the tuberculin station, and are divided into two classes, viz., (a) those in which sanatorium treatment would benefit the patient, and (b) those in which there would be either definitely or probably no benefit. This has been necessary, because the accommodation is at present so limited. At the present rate of application from 350 to 400 beds would be required to deal with all the patients who apply for admission for the first time.
16. The tuberculosis visitor makes a report upon each freshly notified case. This report indicates, among other things, the condition of the other occupants of the house. It is the duty of the tuberculosis visitor to point out any members of the family, other than the patient, who appear to be failing, and these persons are visited by one of the four assistant medical officers of health. Where there is a doubt as to the existence of tuberculosis, the patient may be taken into one of the special beds for tuberculin testing at Yardley Road Sanatorium.
17. The whole of the anti-tuberculosis work is administered from the Health Department, with the exception of what is done by boards of guardians, hospitals, dispensaries, Hospital Saturday Fund, and private practitioners. Since the provision of efficient treatment, and more especially since the notification of all cases of consumption was made compulsory, the interest of the community in the prevention of the disease has been increased to such an extent that I feel confident that real progress is being made.
18. I have not detailed any part of our work in connection with the eradication of bovine tuberculosis, but a commencement has been made. There are now 13 herds of cows, some of them large ones, which are completely free from tuberculosis, and which supply Birmingham with milk free from the tubercle bacilli. The corporation in each case pay for the testing of these herds twice a year.
19. The experience of the last few years in dealing with notified consumptives emphasises the infectiousness of the disease, and the necessity, therefore, for isolation of a certain proportion of all the cases. In a few cases nothing short of compulsion will enable us to deal with refractory patients who, while themselves in an extremely infectious condition, do nothing to prevent the spread of the disease.

I have outlined above very briefly the problem which we have on hand. In the accompanying memorandum Drs. Wynn and Dixon have set out in some detail the methods of treatment which are now being carried out.

JOHN ROBERTSON,
March 1912.

MEMORANDUM UPON THE TREATMENT OF PULMONARY TUBERCULOSIS.

We desire to preface our remarks upon the treatment of pulmonary tuberculosis as carried out at Yardley Road Sanatorium, Birmingham, with a brief statement of the principles which seem to us to underlie our practice.

The cause of recovery from tuberculosis, as from any other infection, is the production of specific immunity. For this two main conditions are necessary: (a) adequate stimuli to the production of antibodies; (b) adequate powers of response to these stimuli upon the part of the infected organism. Some degree of immunity occurs naturally in every case of chronic pulmonary tuberculosis, as is shown by the fact of chronicity in spite of the enormous number of tubercle bacilli in the lungs and by the rarity of generalisation of the infection, although bacilli frequently escape into the blood stream. When, however, the disease has advanced so far as to be recognised clinically, sufficient immunity for absolute cure is not the rule, and the defensive forces need assistance.

This assistance can be offered in two directions: (a) we can aim at assisting the powers of response; (b) we can attempt to control the stimuli.

Ordinary sanatorium treatment, by which we mean thorough exposure of the patient to the open air, regulation of rest and exercise, and suitable food, is mainly concerned with the former; vaccine treatment with tuberculin with the latter.

By sanatorium treatment the patient is placed in that environment in which his physiological functions will work best, and his general health improves. This is often loosely thought to be equivalent to the production of immunity, but the power of resisting infection and the general state of the health are not necessarily associated. An improved circulation, digestion, and metabolism do not produce immunity. The organs concerned in the production of immunity, however, participate in the general well-being and become more and more capable of responding to specific stimuli if these be forthcoming. This is especially seen in those febrile cases in which excessive autoinoculations had previously overtaxed the mechanism of immunity, but in which, by absolute rest and the control of cough, the mechanism has been restored to a more normal condition.

The true function of these general sanatorium measures is, in our opinion, to bring the mechanism of immunity into better working order so that it will respond more effectively to the specific stimuli, but alone they are insufficient, as the stimuli themselves are left to chance. In respect of immunising stimuli, patients can be classed roughly into three groups: (1) those of excessive stimuli which tend to exhaust the mechanism of immunity—progressive febrile cases; (2) those with insufficient stimuli—chronic cases with little activity and little tendency to cure; (3) those with adequate stimuli—improving cases. By suitable treatment those in class 1 can often be transferred to classes 2 or 3. Those in class 3 require no other treatment so long as the stimuli remain adequate, but experience shows that very few cases have adequate stimuli for a period sufficiently long to get rid entirely of the infection, and that most cases tend to gravitate into class 2. Many of these cases can be said to be "arrested." But an "arrested" case has always the danger that at any time from the effects of intercurrent disease, under-nutrition, unwise exercise, &c., the amount of immunity which had previously sufficed will fall below the level of safety, or that the infection will break through its barriers and no longer be localised.

We would urge, therefore, that for effective treatment it is necessary to add to the general measures of treatment some method of providing adequate stimuli

which will raise the level of immunity sufficiently to get rid of the infection. For this purpose two methods are advocated: (a) graduated labour; (b) tuberculin treatment. We believe the latter to be by far the more effective, and our belief is based upon practical experience of both methods and not merely upon theoretical considerations.

Advocates of graduated labour maintain that it is an advantage to use the patient's own tuberculin in the form of autoinoculations, and that it is possible to increase gradually the dose of tuberculin by careful graduation of exercise and work. There is no proof that it is an advantage to use the patient's own tuberculin, and the fact that it is possible to immunise a patient equally well by administering either bovine or human tuberculin shows that the source of the tuberculin is of little importance. Our experience leads us to doubt that by graduated labour increasing doses of tuberculin are given, for it seems clear that slight exercise at the beginning of treatment may produce a larger autoinoculation than severe labour at a later stage when the lesion is more circumscribed and less active, and we maintain that to get the highest degree of immunity progressively increasing stimuli are necessary. Autoinoculations are concerned with living bacilli and their products, and an excessive autoinoculation may therefore produce an extension of the disease. We are aware that in skilled hands such excessive autoinoculations are uncommon, but in others we have known pleurisy and hæmoptysis not infrequently caused. There is evidence that antibodies are, at any rate in part, produced at the seat of inoculation of the antigen, and it seems wiser, therefore, to inject the tuberculin into healthy subcutaneous tissue rather than, as in autoinoculations, into the tissues in the neighbourhood of the lesion whose vitality is depressed. We have tested patients who have undergone a course of graduated labour, and have found that they reacted to small test doses of old tuberculin, showing that the degree of immunity produced was not great. Graduated labour can only be given for comparatively short periods and is limited in scope.

Our experience has shown that patients under tuberculin treatment improve more quickly and more certainly as regards both their general and pulmonary condition than do those under graduated labour alone. It has also been our experience that patients who have relapsed several times after sanatorium treatment given at intervals for several years have finally reached after tuberculin treatment a higher level of health than at any time since treatment was begun.

There are many methods of giving tuberculin, but we believe the most effective to be that which aims at reaching massive doses, such as one cubic centimetre of old tuberculin or its equivalents. One of us has used tuberculin for eight years, and has tried extensively the method of giving minute doses, advocated by Sir A. E. Wright, and has had the opportunity of comparing the results obtained by this method with those by the intensive method, and is convinced of the great superiority of the latter in the treatment of pulmonary tuberculosis.

At Birmingham patients in all stages of the disease are taken into Yardley Road Sanatorium for a period of six weeks. By lectures, personal instruction, discipline, and the force of example they are instructed in the care of their sputum, the prevention of infection by coughing, the taking of temperatures, the economic choice of foods, the need of systematic rest, and the other details necessary for the prevention of infection and the care of their own health. Advice is especially given upon the application of these methods to their home conditions.

Most patients are kept in bed for the first week, and we regard this preliminary rest as of great importance. Many cases have a slight degree of fever upon admission which disappears during the first week's rest. When necessary, absolute rest is ordered, and the patients kept in bed until all fever has disappeared. A few cases remain febrile at the end of six weeks, and it is desirable that such cases should be removed to an institution specially set apart for advanced cases.

Patients not kept in bed are given gradually increasing exercise and work in the grounds of the

sanatorium. We believe it of great importance that patients should be usefully occupied when not resting. Discipline is better kept, the mental outlook is improved, and they leave the sanatorium more fit for work than if the time had been spent idly.

Tuberculin is given to afebrile cases three or four days after admission, and to febrile cases when the temperature has reached or nearly reached normal. The varieties of tuberculin used are P.T.O., P.T., old tuberculin, and bacillary emulsion. In every case a positive diagnosis is made either by finding tubercle bacilli or by test inoculations of old tuberculin before tuberculin treatment is commenced.

Tuberculin treatment is continued after the patients leave the sanatorium. They attend twice a week at a tuberculin clinic for several months. We endeavour to reach a dose of 1 c.c. of old tuberculin, and this maximum dose is repeated several times before treatment is discontinued. After several months' interval the patients are again tested with large doses of tuberculin, and, if necessary, a short course of treatment with tuberculin is again given.

On leaving the sanatorium most of the patients return to the same work as before admission. They are impressed with the importance of applying at home the facts learned at the sanatorium, and during the whole course of their after-treatment such matters are continually emphasised. We find that patients greatly appreciate and seek the advice which is given.

By this combination of educational sanatorium with the out-patient tuberculin clinic we can utilise the best of both systems without neglecting any of their essentials. Both are interdependent parts of the same scheme and not rival institutions. We believe that if a large number of patients suffering from pulmonary tuberculosis in its various stages is to be treated effectively both must be fully utilised.

The out-patient treatment has made it possible to reduce very greatly the period of time which until recently was considered necessary for sanatorium treatment. With facilities for after-treatment with tuberculin a stay of several months in a sanatorium is not only unnecessary but wasteful, and the time can be reduced to a few weeks without interfering with the ultimate success of the treatment. While we suggest six weeks as an average period for educational sanatorium treatment there should be some elasticity; for while four weeks may be sufficient for some patients it would be more profitable to keep others for eight weeks.

Some patients when notified may be in a condition to respond at once to tuberculin, and then the preliminary sanatorium training may be unnecessary, and such cases will become more numerous with the general improvement in diagnostic skill. We know from our own experience that many such patients can be treated successfully without interruption to their work, and it might be a hardship to compel them to undergo even a short period of sanatorium treatment. This question, however, must be considered not only as it concerns the individual patient, but as it concerns the wider question of prevention. So far as the recovery of the individual is concerned, sanatorium treatment may be unnecessary in these early cases, and if there is no sputum it is not even necessary for the public health. But a "closed" case may become an "open" one, and, therefore, infectious, and then, although sanatorium treatment may be unnecessary for the individual, it is advisable for the sake of the public health. Again, we think it would be wise to use discrimination. If the money at disposal is sufficient to give sanatorium treatment to all notified patients, nothing but good would result from the education they would receive; but if sanatorium treatment is only available for a proportion of the patients, then we maintain that they should be chosen on two grounds—(1) infectiousness; (2) inability to respond to tuberculin without preliminary treatment. Those patients who are not infectious and can respond to tuberculin could then be treated entirely as out-patients. Again, if there is much delay in obtaining admission to the sanatorium it is often advisable to begin tuberculin treatment as soon as possible after notification.

At present, among notified cases there is a very large number that cannot be satisfactorily treated without initial sanatorium treatment. Such are the early acute pyrexial cases, those complicated with secondary infections and those in poor general condition. Such cases cannot be treated in a tuberculin dispensary, but a few weeks in a sanatorium enables them to profit by the after-treatment.

It is unnecessary for us to emphasise the great value of educational treatment of the consumptive. Apart from the prevention of infection and the care of his own health, each patient so educated becomes an apostle of fresh air and cleanliness, and brings into his home a knowledge of hygiene, the sources of infection, the economic choice of food, the dangers of certain occupations and how to guard against them, which is certain to have a wide-reaching influence upon the health of the community. It is also no small thing that for a few weeks the patients should have been subjected to discipline and orderly routine.

We need not enter here upon the details of tuberculin treatment or its scientific aspect. We would state, however, that the class of patients suitable for tuberculin treatment is a much larger one than is generally held by those who have not had experience of tuberculin treatment upon a large scale and among patients who are occupied with their ordinary work. The great limitation of the treatment is an inability to respond to the immunising stimuli, and this is practically coincident with the presence of severe mixed infections. While early cases are most successful and show very few failures, yet the most striking results are seen in those with advanced disease. Although most of the patients in Yardley Road Sanatorium are in the second and third stages, it frequently happens that every patient is receiving tuberculin.

Tuberculin administration can never become a matter of routine. It demands considerable experience of the clinical features of the disease, and special training in the use of the agent. Tuberculin is not for the careless man. It should, however, be possible to train a large number of men who have the necessary qualifications to administer it successfully.

One hindrance to the wider adoption of tuberculin is the undue fear of reactions. We have given many thousand injections of tuberculin and have never seen any harm result. Most patients at some period of treatment obtain reactions, although in skilled hands these are rarely severe. The inexperienced man is apt to think that a case which shows reactions in the early stage of treatment is unsuitable for tuberculin, but with care the sensitiveness can be overcome and larger and more effective doses reached. Many of our most successful patients have shown considerable sensitiveness in their early stages. It is certainly easier to begin tuberculin treatment in a sanatorium than at an out-patient dispensary. Reactions have less importance when the patient is under constant supervision than when he is left to his own resources away from the reassurances of doctor and nurse. During the six weeks' treatment in a sanatorium, the most trying stage of tuberculin administration is passed, and the patient can be treated afterwards as an out-patient with little if any interference with his occupation. Many patients have never lost a single day's work, although tuberculin has been given in increasing doses for many months.

Very few patients can change their occupation on leaving the sanatorium; the majority must return to the same occupation as before admission. With tuberculin treatment this is of less importance than with ordinary sanatorium treatment. Much of the disappointment with ordinary sanatorium treatment is caused by the fact that the patient must return to an unsuitable employment. If the patient is highly immunised relapse is improbable.

We would like to urge the wider adoption of tuberculin for the diagnosis of early cases. Consumption first attracts attention by means of such symptoms as lassitude, poor appetite, loss of weight, flushing and sweating, influenza-like attacks, persistent cough, &c. Although when these symptoms are present slight physical signs can usually be found, though often with difficulty, by an expert, most medical

men would fail to find them. The tendency is then to say that the patient is "run down" and needs a holiday or a tonic, and diagnosis is postponed until the lung signs are sufficiently definite to be recognised by the non-expert. The subcutaneous tuberculin test, by producing a general and local reaction, in our experience rarely fails to reveal the true nature of the case. It is not suggested that the tuberculin test should be applied indiscriminately, and that every person who reacts should be treated, but that the presence of certain suggestive symptoms should lead to the performance of a diagnostic test. The combination of such symptoms with a tuberculin reaction is the earliest guide we possess to the diagnosis of pulmonary tuberculosis.

Finally, we would add some observations upon sanatorium administration. It is our opinion that the more strictly discipline is enforced in a sanatorium the better will be the results. Discipline is rendered more easy by a course of educational lectures which makes the patients understand the principles of the treatment and the objects to be attained, and so wins their co-operation. Occasionally we find patients who are disobedient and break the necessary rules. If after due warning they persist in their disobedience they should at once be discharged. One unruly patient soon breeds discontent in others, and proper administration is interfered with. In such cases it is essential that the medical officers should have the entire support of the Committee responsible for the institution. Sometimes for mistaken reasons of sentiment members of a Committee are inclined to disapprove of the necessary discipline, and to prefer a state of affairs more suited to a convalescent home than to a sanatorium engaged in the serious work of treating consumption.

Recreation halls, billiard and reading rooms seem to us quite unnecessary when the period of treatment in the sanatorium is a short one. An hour daily for recreation is quite sufficient, and this should only be allowed under strict supervision, otherwise harmful excitement and exercise may occur. It is a good rule to permit no form of recreation which cannot be indulged in upon a verandah or in the open. In very few institutions for the treatment of other grave diseases is such provision made for recreation, and we fail to see why it has been considered necessary in

sanatoria for consumptives. In the short period of educational treatment the maximum amount of good must be obtained in a short time, and nothing should be allowed to interfere with this serious undertaking.

In sanatoria for the treatment of the artisan class we find it much better for the maintenance of discipline, as well as for economy of administration and the number of nurses and servants required, to conduct them more upon hospital lines than is generally done. For this purpose, and also to provide better ventilation, we prefer large wards to single rooms. Indeed wards are only necessary for patients acutely ill and requiring constant attention, and it is doubtful if such should find a place in an educational sanatorium. A wide and high verandah with dining room, dressing room, kitchen and lavatory accommodation is all that is necessary. If this plan were adopted less money could be spent upon buildings and more upon actual treatment and home visitation, and patients would live much more in the open air than they do in many of our large sanatoria at present.

Educational sanatoria should be erected within easy access to the area which provides the patients. Patients and their relatives are much more impressed with the fact that successful treatment can be given in the neighbourhood of their own homes than they are when such treatment is given on an ideally situated site, and they are more encouraged to continue the treatment afterwards. A patient who has been treated on open moors or among pine woods is apt to be discouraged when he returns to the depressing surroundings at home, and to doubt the usefulness of continuing his open-air habits.

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MEMORANDUM submitted by Sir RONALD ROSS, K.C.B., F.R.S., M.D., D.Sc., LL.D., Professor of Tropical Medicine, University of Liverpool; a Vice-President of the Royal Society; Member of Advisory Committees of the Colonial Office, &c., on the best ORGANISATION of RESEARCH ON TUBERCULOSIS.

1. Prefatory.

The Secretary of the Departmental Committee on Tuberculosis has asked me for a short memorandum on the subject of research in connection with tuberculosis, in connection with the sum of 60,000*l.* per annum which is made available by the Insurance Act for the purpose. In reply to questions of mine, he agreed that my memorandum should deal principally with the organisation of the proposed researches; and he indicated several special points upon which the Committee might desire to obtain my opinion. I have long felt that the time was approaching when this country would expend much more money on medical research than it has done in the past, and have therefore already pondered several schemes of organisation for large-scale investigations. The Secretary, however, wished for my memorandum to be sent in at an early date; and I am therefore obliged to discuss each point more cursorily than if more time had been allowed, and to submit only a dictated memorandum.

2. Sufficiency of the Money.

I have heard it suggested by some that the sum of 60,000*l.* per annum is not sufficient, and by others that it is too much. In my view it will certainly not be found to be too much when all claims upon it are considered, especially if, as I believe is contemplated, researches on other medical subjects can be commenced

later on. At the same time, the sum is much larger than has hitherto been given in this country for medical research, and, if properly used, should add much to our knowledge of all diseases.

3. Laboratory Accommodation.

As a large number of laboratories are already in existence in the British Isles, where researches on tuberculosis can be commenced, I would strongly deprecate any expenditure of money upon bricks and mortar at present. If hereafter it is found that additional laboratory accommodation is imperative, the grant may allow of a fund for building and maintenance being accumulated year by year. Hence, in order to meet this possible call, I would suggest that 15,000*l.* be put by yearly for the purpose. It may be, however, that a fund for building will be otherwise forthcoming, as, for instance, in connection with the sanatoria. My main point is that building is certainly not called for at the commencement of the research, and that it would be great waste of money to begin building without very strong necessity. I suppose, also, that each sanatorium and perhaps dispensary will possess a laboratory.

4. Centralisation or Decentralisation of the Researches.

For a large-scale research of the kind contemplated, a single central laboratory would be inconvenient for

the reason that sufficient material cannot be easily obtained for such even in the midst of the thickest population, as has already been experienced in connection with other investigations. Also, apart from the mere quantity of material available, there is frequently a feeling amongst medical men in the provinces that they would like to keep their cases and facts for their own or for local studies. Thus a central laboratory might not do as much as may be supposed to stimulate further investigations all over the country. The next question is whether a single laboratory may not be placed at the disposal of each of the four different Insurance Commissions; but I think that for the reasons just given even this will be too centralised a scheme. On the whole, therefore, I am strongly of opinion that it would be advisable to commence (at least) with a wide decentralised scheme, and then to centralise later on if this be found advisable after several years' experience. I am also strongly driven to this opinion by the fact that, owing to the number of existing laboratories, centralisation is sure to cost more in bricks and mortar than decentralisation. I am referring here to the actual working laboratories, and not to the central bureau and directorate to be referred to presently.

5. *Subsidised Private Researches.*

It is well known to all students of science that many of the most important discoveries have been made by amateurs, or at least by private workers who are free to follow their own bent—and, in fact, Koch was such a worker when he made his great original discovery on tuberculosis. It is, of course, impossible to guarantee the presence of scientific genius anywhere, but I am strongly of opinion that the contemplated scheme should keep an open eye for such. Thus there are throughout the country a large number of able medical men who have much to do with tuberculosis and who may find time to carry out special studies on lines suggested by themselves. I am aware that small subsidies have already been granted to such men by various donors, without much result. Of course the greatest care must be taken that money shall not be given merely as a kind of advertisement to the recipients; but, if such care is taken, I think that a certain sum, say 2,000*l.* a year, might be allotted to help selected men who require a little pecuniary assistance. It is true that the result might not be very satisfactory; but in any case the whole scheme will always have to remain in view of the possibility that much of its funds will have small result, because only a fraction of scientific work done ever bears valuable fruit. I think that the scheme would be incomplete if it were to refuse any assistance to private workers, and, therefore, would strongly advise the allotment referred to, at least to commence with.

6. *Subsidised Part-time Laboratory Researches.*

By this I mean grants in aid to laboratory workers all over the country who can devote *part* of their time to the work, and (a) who might wish to carry out studies along lines suggested by themselves, or (b) might be engaged to carry out studies for the directorate. Such workers will be largely young men who have just passed through medical schools and who have some years to spare before entering upon their final clinical work. We have found these young men to be of the greatest assistance in researches on tropical medicine. They are generally very well informed and keen to distinguish themselves by research. Some are to be trusted to follow their own line, while others require direction from above—but in both cases they are extremely valuable as soldiers of the army of research. At the present moment numbers of such workers can be obtained at all the universities and medical schools. The pay they require is usually very small, varying from 50*l.* to 150*l.* per annum—provided that their laboratory expenses are given. As a rule also these laboratory expenses merely consist of small subsidies for room, gas, apparatus, &c., in already established laboratories—so that for a few thousand pounds a year a very intelligent and large research force may thus be established. As a rule each research worker should be engaged only for one to three years;

and, in fact, it is not fair on such workers to employ them for much longer unless they wish to make investigation their future means of livelihood. I say it is not fair after much experience. Medical men must always, in fact, tend ultimately to do clinical work for a living, and if they postpone practice for too long a period it is they themselves who suffer most—and they suffer in the cause of science. It seems to me, therefore, improper for any large national scheme of investigation to exploit such workers for too long periods.

7. *Whole-time Temporary Researches.*

These will be done by men who are paid exclusively for the work of the scheme, and in most cases the men will be selected from amongst those who are referred to in the last heading. The rate of pay must be higher, as few of the workers will have other means of subsistence. In most cases I think these whole-time workers should be engaged to carry out specific lines of research which are allotted to them by the directorate (though sometimes lines of research suggested by themselves might be adopted, as is done with some other large researches). The pay should vary from about 200*l.* to 400*l.* a year with laboratory expenses; and the remarks made under the last heading regarding length of employment should still hold in the case of these whole-time workers. That is to say that they should be encouraged to continue in the work only if they are found to have qualities which are likely to ensure them success in research as a final means of livelihood.

8. *Whole-time permanent Researches.*

We come, lastly, to a class of workers who will be engaged upon the investigations on tuberculosis or other diseases as a permanent profession. Such men will be gradually selected from amongst those referred to in the two previous headings and should, of course, be the very best men available. The scheme should, therefore, contemplate giving them adequate and rising pay and pension. Of course the number of permanently employed research workers of this type will be much less than the number of temporary workers already referred to, and they will generally be employed in directing or at least in assisting those of the previous groups. Their age would, therefore, rise from about 25 years; and their pay should increase from about 300*l.* a year to the best pay available under the scheme, together with bonus or pension after given periods of service. In the case of the highest permanent workers, such pay and pension should be liberal, because it must be remembered that research work on tuberculosis is not likely to lead to other employment. The small payment made even for the most valuable scientific work is notorious; and the new researches should set an example by making some amendment.

9. *Departments of the Research.*

I have indicated what appears to me to be a good classification of the workers, and will now proceed to indicate what I think would be a good classification of the work. I think that the following departments will be required:—

1. Bacteriological and Veterinary Department.
2. Therapeutical Department.
3. Epidemiological and Statistical Department.
4. Publishing and Bibliographical Department.
5. Directorate and head office.

Department 1 will be engaged upon the studies indicated by its title, that is, on all bacteriological research work in connection either with human or with animal tuberculosis and in connection with the bacteria external to the living body.

Department 2 should, I propose, deal with the immunity reactions, and with all possible means of cure of tuberculosis both in man and animals.

Department 3 is one which is now becoming absolutely necessary in all such work. It will require a highly scientific director, trained statisticians, and, in my opinion, well-qualified subordinates to estimate the prevalence of the disease in local areas, and to investigate the epidemiological laws governing the spread of the malady both amongst men and amongst animals.

Department 4 should manage the publishing business—which I assume will be very considerable. I do not know whether the research department will be engaged in publishing leaflets for the propagandism of the insurance scheme, but if so, such publications ought to be in the hands of this department. I think also that the scheme should bring out a monthly tuberculosis bulletin, something on the lines of the Tropical Diseases Bulletin issued under the auspices of the Colonial Office—a publication which will be of the greatest utility to all the workers under the scheme. Possibly also a monthly journal of reports of all work done might also be contemplated; and an expert bibliographer must, of course, be employed, and, perhaps, a library collected.

Department 5 will be the directorate and head office.

It is outside this memorandum to enter into further details on these branches, though this could easily be done. Other schemes of division or subdivision might be suggested, and I have merely given the one which appears to myself to be perhaps the best.

10. Organisation of each Department.

I would recommend that each department should consist of workers under Headings 5, 6, 7, and 8, under a general director of the department and, if this be found advisable, with local sub-directors. Thus each department will possess a head who will be, I suppose, one of the most distinguished men in the country on the special line of work under consideration. Under him there may possibly be sub-directors at some of the principal local centres—though this question of the employment of sub-directors will require consideration. I presume, also, that the Director of Departments 1, 2, and 3 will each have a small office, and that he will receive the reports of the workers, and will be free to visit them when necessary. Department 3 should, I think, possess, besides the statisticians engaged upon their proper work, men who can be called upon to visit various areas for the collection of epidemiological material; and here, again, as already stated, a highly expert director will be required. The "Bulletin and Journal" will require to have a full-time editor.

I do not think it will be possible to place each department under a separate committee. The work of each is sure to cover an extremely large field, requiring a large and very detailed correspondence; and if any committee were appointed to deal with this business, it would have to meet once a week, or more often. On general grounds, moreover, I doubt whether any committee will possess as much initiative as should be possessed by a well selected director.

11. The Directorate.

This must obviously manage the whole of the scheme. That is to say, it will be called upon to select the workers and to give a general approval of the lines of work being followed in each department. It will also be concerned with the payments and the general disposal of a large sum of money. I presume, therefore, that it will require secretarial and accountant branches.

The question arises whether the Directorate had better be placed in the hands of a single person or in the hands of a committee. Personally I think that if each department of the research is under a Director, as just described, the general Directorate had better be placed in the hands of a committee of two branches, one branch to be specially concerned with the scientific work, and another branch to be specially concerned with the finances, the two branches together constituting the whole committee.

If the Directorate were to consist of a single director he would still have to be made subordinate to some kind of committee, so that the organisation would ultimately result in precisely the same scheme as I have just given, with the addition of a high payment for a chief official. This will scarcely be necessary; but on the other hand the managing committee must be very carefully selected.

The branch of the committee concerned with finances should contain a proper proportion of business

men; but this work will not differ in any important particulars from that of many other similar committees. On the other hand the scientific committee must be constituted very carefully. I must here draw attention to the fact that such committees are frequently constituted very improperly in this country. In fact they often consist of men who have not done very great work in science and who, whatever may be their abilities in other directions, often possess little scientific initiative, or even knowledge in the special department concerned, and are not personally acquainted with the great difficulties of such work. I would therefore strongly urge that the scientific committee should consist *only* of a few of the very best scientific workers in the country—principally of the best workers in the pathological line, associated with a few of the best workers in some other lines of science, including chemistry, physics, statistics, and physiology, with one or two clinicians.

I think that the general selection of lines of study, the choice of the men under Headings 5 and 6 and the management of details should be left to the directors of the departments, but that the scientific committee should chose the whole-time workers and exercise a general supervision over the lines of research and meet, say, only once a month. The directors of each department should at least attend the meetings of the committees and should perhaps be members of it. Possibly also the director of one of the branches may be made chief director of the whole scheme under the committee, if a chief director is ultimately found to be necessary, and the director of the Epidemiological Department would *primò facia* be the one most suitable for this post—but I would postpone making such an appointment until experience has been gained upon the general working of the scheme.

12. Advisability of pooling or breaking up the Fund.

It has been asked whether the administration of the fund should be kept centralised or whether it should be divided amongst the four different Insurance Commissions in proportion to the number of insured persons in different parts of the United Kingdom. I think that it would be highly undesirable to break it up at first, but that if experience shows the advisability of devolution, suitable arrangements can easily be made later. Conversely, if the four Insurance Commissions are entrusted with research from the beginning, it will be very difficult to get them to give it up later, in the event of the devoluted scheme not being found to be working properly. Moreover, I may remark that under the scheme as drawn up above, the work will be entirely decentralised and will be spread all over the country, whereas the *direction* will be centralised. This will tend to combine the advantages both of decentralisation and centralisation, and will also tend to get rid of the defects of both. I am convinced that for large-scale scientific work the *direction* should be centralised and the *researches* should be decentralised—just as suggested. Now, if each Insurance Commission were to become absolute master of its own researches, there would be no general direction, the work would frequently clash, there would be disputes and jealousies, and certainly a very considerable waste of funds over the brain power of the organised body. I think that *medical practice* should certainly be placed under each Insurance Commission, but it is another thing entirely with *research*—which corresponds to the intelligence department of an army, and must by its very nature be centralised in its higher branches. It might be possible, if it is strongly desired to give the four Commissions some say in the matter, to form a general (as distinct from an executive) committee, which will consist of members taken from all the Commissions, and which will sit once a year to consider the general report of the research scheme. This is a point upon which I am not competent to speak at present, as I am not fully acquainted with various details of the insurance scheme.

13. Prizes.

I believe that since the time of Jenner, the British nation has never once paid for public services rendered to it by private researches, although these services have sometimes been of the very greatest value to the

nation. This is specially true of medical researches, which have greatly increased the average length of life of people in this country and which have, I believe, never once been paid for, although it is work of a professional nature. I think that the scheme of research on tuberculosis should make a new departure in this respect by giving, say, an annual prize of 500*l.* or 1,000*l.* for the best work done during the year (if any has been found to be good enough). It should also lay by every year the sum of 1,000*l.* to accumulate for the purposes of a large prize to be given, say, every five or seven years. The only large prizes of this nature now given are the Nobel Prizes, but the Nobel medical prize is open to work in the whole domain of pathology and physiology, and it is therefore extremely seldom that one will fall to the lot of any worker on tuberculosis. Of course if no major discovery is made the major prize can be indefinitely withheld; but I certainly consider that it is a kind of national obligation to give some professional reward for great professional work in the line of medical research.

14. *Résumé.*

The scheme suggested by me will therefore consist—

- (a) Of a Directing Committee formed of two sub-committees, a scientific sub-committee, and a financial sub-committee, the entire body being the ultimate authority;
- (b) Of a Chief Director under the Directing Committee (but only if this post is found after experience to be necessary);
- (c) Of four departments as described above, each under a special director to manage the details of his department. One of these departmental directors may be the chief director, and in any case all four are to work under the Directing Committee.
- (d) Each departmental director to have his office, special workers, and possibly some available laboratory accommodation near at hand immediately under him.
- (e) The bulk of the investigations to be carried out at available laboratories and places in different parts of the country as described in Headings 5, 6, 7, 8, but always under the criticism, guidance, and control of the departmental directors and the Directing Committee.

- (f) Additional laboratory or office accommodation to be built *if necessary*.
- (g) Prizes to be given for the best work.

15. *Costs.*

It is premature to offer any detailed estimate of costs under the above scheme. If 15,000*l.* are put apart for possible claims for buildings, 45,000*l.* would be left for the actual investigations. Of this sum, I think the four directors and their offices and subordinates would account for quite 10,000*l.* a year (and would be quite worth it). A similar sum would have to be put apart for many incidental expenses such as the secretarial and accountant branches, and for large bills for travelling expenses, &c. Quite 5,000*l.* a year would be required for laboratory expenses; and this would leave 20,000*l.* for the decentralised researches described under Headings 5 to 8, and for the prizes. Hence it will be seen that the allotted sum is by no means too large (as it had been thought by some to be) for tubercle research only, and I therefore would certainly not advise any attempt being made at first to widen the field of investigation. If, however, experience shows later than this can be done with the money, the machinery described could easily be extended to a wider field.

16. *Remarks.*

I will conclude with some general remarks which I feel it my duty to submit. I have had many opportunities of making inquiries about the value of medical investigations in various parts of the world, and am obliged to state that British investigations in this line are not generally thought to hold a very high place at present, except, perhaps, in the line of tropical medicine. As a measure of this I may, perhaps, mention that out of 11 Nobel Medical Prizes which have been allotted (with the greatest impartiality) since 1901, only a single one has come to British workers. I think that there are some radical defects in our organisation of medical research. Not enough is paid for the work to the workers, the direction of the work is put under men who have not themselves been greatly distinguished in the line, and, in fact, there is not a great show of intelligence in the organisations, even where funds are available. Now that this most important, new, and well-financed scheme is about to be set on foot, I would earnestly beg for a reconsideration of the whole system of subsidised medical research now adopted in this country.

November 1912.

MEMORANDUM submitted by L. E. SHAW, M.D., F.R.C.P., Physician to Guy's Hospital, late Assistant Physician to Victoria Park Hospital for Diseases of the Chest.

I. The force with which we have to secure our victory is the main body of the profession, the general practitioner. The main place of combat is the patient's home. All the new machinery must be so devised as to co-operate with and strengthen the general practitioner and to supplement his work. Every arrangement which might compete with or supplant him will ultimately be detrimental, whatever temporary or individual success it may appear to secure. Arrangements which compete with and supplant the practitioner are not only detrimental to the special work of controlling tuberculosis, but weaken the whole power of the profession in dealing with all forms of disease. The loss of the experience provided by dealing with the varied forms of disease produced by tubercle would be a calamity to any practitioner and his patients.

Moreover, the general practitioner is the agency most easily available to deal with the patient in his own home, and for permanent results constant supervision in the home is necessary.

II. The general practitioner will require help in diagnosis and in treatment, and this help should be available under conditions which should make him anxious and willing to obtain it in all cases.

Such conditions are:—

- (1) Expert help should be given by practitioners who are recognised authorities in the special subject.
- (2) It should be given by practitioners who are debarred from other forms of practice and cannot in any circumstances become competitors with the attending practitioner.
- (3) The practitioner or department from whom such help is to be obtained should not be available to any patient *directly* but only through the application of an attending practitioner.
- (4) Any special remuneration for the treatment of the tuberculous should only be obtainable when the diagnosis is confirmed by the expert and the treatment carried out has his general approval and comprises in every case visits paid at stated intervals to the patient in his home.
- (5) Unless the case is of a nature to require removal to a residential institution, the treatment should be carried out in the patient's home by the attending practitioner notifying the case and seeking expert assistance.

- (6) In cases of disagreement between the expert and the attending practitioner as to the necessity for residential institutional treatment, provision should be made for further expert opinion.

III. The tuberculosis expert, a whole-time officer with a salary from 5000. to 8000. a year, must be the centre and chief organiser of a tuberculosis unit. Each unit will be in direct association with the general practitioners in a defined area. Through the unit arrangements will be made for obtaining laboratory tests and special therapeutic agents. Arrangements will also be necessary for securing, in suitable cases, still higher expert advice than that of the chief officer. He can hardly be expected to be a specialist in surgery, laryngology, and other departments, experts in which are often required in tuberculous cases. Help in such directions may be obtained from consultants either in their private capacities or as officers of voluntary hospitals. To a small panel of such consulting specialists an appeal might be made in any case in which a patient advised to go to a sanatorium objected and claimed to be treated in his own home. The tuberculosis unit must be organised on lines that will make its advice and help readily sought both by general practitioners and patients, and patients must feel that they are not without appeal from its chief officer's decision that they are to be separated from their homes and relations.

IV. It is generally assumed that the tuberculosis expert and his unit will be centred in a "Dispensary." It is clear there must be an office for records, and to it should be attached consulting rooms, and X-ray department for elaborate examinations, and a store for keeping and distributing therapeutic materials. But it is most undesirable that this should be regarded as the normal place of contact between the expert and the suspected patient. The expert and the attending practitioner should in every case once at least, and in most cases at further stated intervals, examine the patient together *in the patient's home*. Economy and efficiency would be promoted by the tuberculosis unit's building being attached to some other medical institution. Where such is available it would be advantageous that it should be attached to a hospital, especially if this were connected with a medical school. Voluntary help might thus be obtained in investigating cases, and valuable experience might be afforded to students. One must not lose sight of the fact that improved conditions in the treatment of tuberculosis may, unless care is taken, do harm to the cause of general medical education. Where no hospital or medical school is available the units' buildings might be associated with such offices or dispensaries as may be instituted in connection with the National Insurance service, or in county districts with a sanatorium.

V. The question of the expert's medical assistants demands consideration. Should they be general

practitioners giving part of their time to their duties or whole-time officers? The proposal that they should be general practitioners seems based on the idea that their duties will be mainly connected with treatment. But if treatment as above suggested is given over to general practitioners as such much is to be said in favour of duties of inspection and assistance in treatment being given by whole-time officers. Such whole-time junior officers would seek promotion in the sanatorium service and would look forward to becoming chief tuberculosis officers. They would be available to inspect and report on cases already seen by the chief expert, and would be the means of ensuring that cases being treated in their own homes were being efficiently looked after and ran no risk of becoming dangerous to those in contact with them.

VI. Institutional (residential) treatment :—

- (a) Whenever possible institutional treatment for tuberculosis should be grafted on to existing medical institutions. This will promote economy. It will tend to efficiency. The association with practitioners working in other departments will keep the outlook of the tuberculosis specialist wider. It will promote consultations with other specialists. It will facilitate transference when surgical or other complications arise. It will lessen the harm which must follow the loss of experience entailed on the general physician and surgeon by the specialisation of tuberculous treatment.
- (b) While tuberculous institutional treatment should be associated with treatment of other forms of disease, all forms and types of tuberculous cases should be dealt with in the same institution. The isolation and segregation of the hopeless cases in separate institutions is an unnecessary cruelty to such cases and their friends. Homes for the dying are founded by philanthropists without imagination.
- (c) An incidental advantage of combining tuberculous with other treatment is that it enables a greater number of tuberculous centres to be provided at a stated cost than is possible if they are independent institutions for tuberculosis only. This is most important, because it makes the patient more accessible to his friends. No tuberculous patient should be required to undergo institutional treatment at such a distance from his home that his friends cannot visit him once a week. In suitable cases funds should be provided to enable the necessitous to meet the cost of friends travelling to visit tuberculous patients.

March 1912.

MEMORANDUM submitted by the SOCIETY OF MEDICAL OFFICERS OF HEALTH.

1. The provisions of the National Insurance Act relating to tuberculosis raise questions of great importance to medical officers of health. For years past medical officers of health, as officers of the public health authorities, have been actively engaged in work calculated to secure control over tuberculosis. That work, which, it may fairly be claimed, has already been fruitful in results, has recently been greatly developed and extended in scope, and in many districts the medical officer of health at the present time is the head of a highly organised administrative system for the control of tuberculosis. The work of the public health authorities has now become so considerable that it must form an important part in any effective arrangements that may be made for the administration of the sanatorium benefit; and the object of the Society of Medical Officers of Health in submitting this memorandum is to indicate the lines on which, in their opinion, such arrangements should be carried out in order that the best results may be secured.

2. Tuberculosis is an infective disease in which the receptivity to infection depends on the condition of health of the individual and the dosage of infection. The sources of infection in human tuberculosis are practically two: (1) the milk, and, to a lesser degree, the meat of tuberculous animals; and (2) the discharges from human patients with "open" tuberculosis. Preventive measures may, therefore, be grouped under two heads: (1) those which improve the general health and resisting powers of the individual; and (2) those which limit the production of infecting material or destroy it after it has been produced.

3. During the past 50 years there has been a marked decline in the mortality from tuberculosis in this country. It is unnecessary to discuss the relative importance of the many factors that have undoubtedly contributed to bring about this decline, but it will be agreed that one of the most important is the administration of the Public Health Acts by local authorities. The hygiene of the dwelling-house has been enormously

improved. Overcrowding has diminished. Great advances have been effected in the sanitary construction of dwellings, particularly in the prevention of dampness, the amount of open space round houses has been increased, improved systems of water supply, drainage, and refuse removal have been introduced, the smoke nuisance has been brought under some measure of control, and a comparatively high standard of cleanliness, civic and domestic, has been attained. These sanitary reforms have not only raised the resisting powers of individuals exposed to infection, but they have also tended to destroy the infecting material in the discharges from tuberculous patients. Importance must also be attached to the considerable improvements that have been effected in the food supply. The adulteration of food has diminished. Special attention has been paid to the milk supply, especially in relation to tuberculosis. By means of private Acts many authorities have obtained special powers to prohibit the supply of tuberculous milk within their areas. But although much work on these lines has been done in the past, much still remains for future achievement. In the control of tuberculosis much will depend in the future, as in the past, on the thoroughness and efficiency with which medical officers of health carry out their duties under the Public Health Acts and the Housing Acts.

4. But during the past 12 years the work of the medical officer of health in relation to tuberculosis has greatly developed and passed far beyond merely regulating the sanitary condition of the environment and the food supply. One authority after another has adopted the voluntary notification of consumption; several authorities by means of private Acts have obtained powers to require compulsory notification, and now by successive regulations of the Local Government Board the compulsory notification of consumption is in operation throughout the whole country. Notification has been made the basis of important administrative measures. The patients are visited in their homes by health visitors working under the direction and supervision of the medical officer of health. The visitors distribute advisory leaflets, &c., prepared by the medical officer of health, and supplement the printed instructions by oral advice and teaching. Sputum flasks, disinfectants, and, in some cases, open-air shelters are supplied free by the authority, and, where necessary, disinfection is carried out. This system of domiciliary visitation is of great value and must continue to play an important part in any effective scheme for the control of tuberculosis.

5. Many public health authorities have provided sanatorium accommodation for consumptives, especially with the object of training patients, under conditions likely to secure permanent success, in the precautions to be observed against the spread of infection. The usual practice is to utilise one or more wards in the local isolation hospital for this purpose, but in some districts sanatorium accommodation for treatment of early and advanced cases, as well as for educational purposes, has or is being provided.

6. A complete scheme for the control of consumption involves the provision for the early recognition of the disease. Most public health authorities afford free facilities for the bacteriological examination of specimens from suspected cases of consumption, and during the last year or two several authorities have established anti-tuberculosis dispensaries, partly for the discovery of early cases and partly for the home treatment of consumptive patients. The recent regulations of the Local Government Board have empowered local authorities to undertake the home treatment of patients, in addition to their previous powers to provide institutional treatment. The number of municipal anti-tuberculosis dispensaries shows every likelihood of rapidly increasing in the near future.

7. It is unnecessary to describe in detail all the measures that public health authorities are now taking against tuberculosis; enough has been said to show that at the present time the medical officer of health is the executive head of a comprehensive system for the control of the disease. All cases of consumption in the district must be notified to him. His authority possesses statutory powers to deal with the conditions

of environment that favour the spread of the disease, to protect the food supply, to abate overcrowding, to require disinfection, to afford facilities for the early recognition of the disease, and to provide domestic and institutional treatment—educational and curative. This work, which is already large and rapidly increasing, must still be carried on by the public health authorities however the sanatorium benefit may be administered for the insured, inasmuch as a large number of tuberculous patients will be uninsured persons, and there would be obvious advantages in carrying out the sanatorium benefit as part of the same administrative scheme. The existence in the same district of two distinct systems of administration, one under the public health authority for the uninsured and one under some other authority for the insured, would manifestly lead to overlapping, unnecessary expense, and inefficiency. The Society of Medical Officers of Health are strongly of opinion that the arrangements for dealing with cases of tuberculosis, both among the insured as well as the uninsured, should form part of one administrative system, having the medical officer of health as its chief executive officer. It is not intended in this memorandum to elaborate in detail such a system, but it should include the following measures:—

- (1) The efficient administration of the law relating to public health in order to protect the food supply and secure the best possible conditions of environment.
- (2) Facilities for bacteriological assistance in diagnosis.
- (3) The home visitation of patients by properly qualified officers, with the object of tracing the source of infection, advising as to the measures to be adopted against the spread of infection, and the conditions favouring infection, &c.
- (4) The distribution of appliances, such as sputum flasks, open air shelters, &c., which help the recovery of the patient, and tend to prevent the spread of infection.
- (5) Disinfection of infected dwellings as required.
- (6) The establishment of a tuberculosis clinic, to serve as a centre for the examination of suspected cases, the home treatment (including the administration of tuberculin in suitable cases) of patients for whom institutional treatment is unnecessary or unavailable, and the selection of suitable cases for treatment in appropriate institutions.
- (7) The provision of institutions for—
 - a. Early cases in which there is a reasonable prospect of a lasting cure.
 - b. Cases of established disease, in which, although the prospect of cure is not hopeful, much valuable work may be done by teaching the patients the advantages of an open air life, and how to avoid spreading infection.
 - c. Advanced cases, in which there is no hope of cure. Such cases form the most dangerous source of massive infection when adequate domestic nursing and attention cannot be secured. For such cases institutional treatment is chiefly necessary in order that the patients may be segregated from non-tuberculous persons.
- (8) The provision of special educational institutions, such as open air schools, country schools, &c., for the education of children of school age who are either tuberculous or threaten to become so.

8. The scheme of agencies outlined above obviously requires co-ordination. Each agency is so closely connected with the others that the work of all must be carried on under serious disadvantages unless all form part of one administrative system under one head. The work of the tuberculosis clinic, for example, is intimately related to the sanitary ordering of the dwelling on the one hand and to the provision of institutional treatment on the other, and the clinic cannot achieve its full measure of usefulness in the absence of the information as to the prevalence of the tuberculosis, which only the medical officer of

health, who receives the notifications, is able to give. The control of tuberculosis is so vast and serious a problem that the fullest possible use should be made of every measure taken against the disease, and the measures, indirect or sanitary, and direct or therapeutic, are so closely related that they cannot be separated without serious detriment to efficiency and economy. In concluding this memorandum the Society of Medical Officers of Health would emphasise the view that all the agencies employed for the control of tuberculosis, including those in operation at the present time, and those that may subsequently be

introduced in consequence of the National Insurance Act, should be unified in one system of administration, with the medical officer of health as the chief executive officer.

Signed on behalf of the Society of Medical Officers of Health.

WM. A. LAWTON,
Secretary,
April 1912.

A. BOSTOCK HILL,
President.

MEMORANDUM submitted by T. J. STAFFORD, C.B., F.R.C.S.I., Medical Commissioner of the Local Government Board for Ireland.

Provision of Sanatoria, Hospitals, Dispensaries, &c., in Ireland for the Treatment of Persons suffering from Tuberculosis.

I.—*The legal powers of Local Authorities with regard to the provision of Sanatoria, Hospitals, Dispensaries, &c., for the treatment of Tuberculous Patients.*

Section 155 of the Public Health (Ireland) Act, 1878, and section 4 of the Tuberculosis Prevention (Ireland) Act, 1908.

Section 155 of the Act of 1878 is as follows:—

"Any sanitary authority may, with the sanction of the Local Government Board, provide for the use of the inhabitants of its district hospitals or temporary places for the reception of the sick or convalescent, and for that purpose may itself build such hospitals or places of reception, or contract for the use of any existing hospital or part of a hospital, or place for the reception of the sick or convalescent, or may enter into an agreement with any person or body of persons, having the management of any hospital for the reception of the sick or convalescent inhabitants of the district, on payment of such annual or other sum as may be agreed upon."

The provisions of Section 4 of the Act of 1908 are as follows:—

"(1) A county council may, if they think fit, provide hospitals and dispensaries for the treatment of inhabitants of their county suffering from tuberculosis, and for that purpose may—

"(a) themselves establish and maintain such such hospitals and dispensaries; or

"(b) enter into an agreement with any person having the management of any hospital or dispensary for the reception, maintenance, and treatment in the hospital or for treatment in the dispensary, as the case may be, of any such inhabitants of their county as aforesaid.

"(2) Two or more county councils may combine in providing a common hospital or dispensary for the purposes of this section.

"(3) For the purpose of establishing a hospital or dispensary under this section a county council shall have all the powers which are conferred on county councils by subsection one and subsection two of section 10 of the Local Government (Ireland) Act, 1898, and those subsections shall apply accordingly.

"(4) A county council may borrow money for the purposes of this section in like manner as they may borrow for the purposes of a lunatic asylum under article twenty-two of the schedule to the Local Government (Application of Enactments) Order, 1898.

"(5) A county council shall, for every hospital or dispensary established by them, appoint—

"(a) a medical superintendent having the prescribed qualifications at such salary as may be approved by the Local Government Board; and

"(b) such nurses having the prescribed qualifications, and other officers and attendants, as are necessary for the requirements of the hospital or dispensary, at such respective salaries as the county council think proper, and may dismiss any person so appointed as they think fit, excepting the medical superintendent, who shall not be dismissed without the concurrence of the Local Government Board."

II.—*The extent to which Local Authorities have availed themselves of the above powers, i.e., the number of beds provided in Sanatoria, &c.*

Under an arrangement with the authorities of Forster Green Hospital, the Corporation of Belfast have had 35 beds in that institution allocated for the treatment of consumptive patients from the county borough.

Galway County Council have by a contribution of 300*l.* secured to each Board of Guardians (10) in the county power of nomination in respect of one bed in the Clifden Health Home, the county council to be liable for the maintenance of the ten beds in question.

The Clare County Council have agreed to maintain the Cottage Sanatorium at Ennis (six beds) erected by Lady Inchiquin and equipped by the Women's National Health Association. The institution is to be opened in April next.

Shelters for consumptive patients have been provided by the following councils:—

Antrim Rural District Council.
Ballymena Rural District Council.
Cookstown Rural District Council.
Cookstown Urban District Council.
Monaghan Rural District Council.
Omagh Rural District Council.

* III.—*Table showing Extent of Accommodation provided in Ireland for Persons suffering from Tuberculosis.*

Name of Person, &c. providing Accommodation.	No. of Beds.	Institution.	Any Observations.
Cork County and City Joint Hospital Board.	77	Heatherside Sanatorium, Doneraile	Supported out of rates.
Dublin Joint Hospital Board	50	Crooksling Sanatorium, Brittas	" "
Belfast Corporation	35	Forster Green Hospital, Newtownbreda	By arrangement.
Galway County Council	10	Clifden Health Home	" "

* This return refers to the provision made up to March 1912. Since that time considerable progress has been made in providing accommodation for insured persons.—T. J. S., February 1913.

Name of Person, &c. providing Accommodation.	No. of Beds.	Institution.	Any Observations.
Clare County Council	6	Cottage Sanatorium, Ennis	By arrangement.
Royal National Hospital for Consumption.	106	Hospital, Newcastle, co. Wicklow	Early stages.
Board of Management, Forster Green Hospital.	38	Hospital, Newtownbreda.	
Royal Hospital for Incurables	41	Royal Hospital for Incurables, Donnybrook.	Incurable cases
Boards of Guardians	1,597	See annexed Return.	
Women's National Health Association	12	Sanatorium in connection with County Hospital, Maryborough.	Incipient cases.
" " " "	38	Allan A. Ryan Hospital, Pigeon House Road, Dublin.	Second stage cases.
" " " "	6	Ennis Cottage Sanatorium	Incipient.
" " " "	?	Clifden Health Home	Incipient, probably children.

In addition, the Women's National Health Association have opened the P. F. Collier Tuberculosis Dispensary, Charles Street, Dublin, and maintain a home at Sutton, co. Dublin, as a Preventorium for cases threatened with but not actually suffering from consumption. The association have provided shelters for consumptive patients in different parts of the country (about 12) and in certain large centres of population they have also secured rooms for the purpose of segregating from families any members suffering from tuberculosis. In Dublin, for instance, a number of such cases have been dealt with in this way. (See Memorandum from Countess of Aberdeen.)

In Belfast, a tuberculosis dispensary, with a staff of three medical practitioners and a nurse to visit patients at their homes, has been established by the committee of the Forster Green Hospital.

HOUSING.

In view of the importance of house accommodation in connection with the campaign against tuberculosis, it may be well to give a brief summary of what has been done in Ireland to improve the dwellings of the labouring classes.

Through the administration of the Labourers (Ireland) Acts, 40,000 cottages, with garden plots ranging up to a statute acre, have been built for rural labourers by rural sanitary authorities at an outlay of about seven and a half million pounds. Under the latest financial arrangements, advances for a term of 68½ years are made by the Government to rural sanitary authorities for the purpose of building labourers' dwellings at 3½ per cent. covering principal and interest. In addition, 36 per cent. of the cost is paid by the State, reducing the annual charge in respect of loans to 2*l.* 1*s.* 7*d.* per cent.

In towns progress has also been made in providing healthy dwellings for the working classes under the Housing of the Working Classes Acts. About 6,000 houses or tenements have been erected in Irish towns by local authorities at an expenditure of approximately one million sterling. Under the Housing of the Working Classes (Ireland) Act, 1908, the limitation on borrowing powers of local authorities has been withdrawn, so far as artisans' dwellings are concerned—a maximum period of 80 years for the repayment of housing loans having been authorised. The procedure for the compulsory acquisition of land for housing purposes in towns has been simplified and expedited. By these and other means, encouragement has been given to town authorities to deal more actively with the housing problem. In the year ended the 31st March last, borrowing to the extent of close on 150,000*l.* for urban dwellings was sanctioned by the Local Government Board.

COMPULSORY NOTIFICATION OF PULMONARY TUBERCULOSIS.

At present notification of pulmonary tuberculosis is adoptive in Ireland, with the result that only a minority of sanitary authorities have availed themselves of their statutory powers to obtain information

as to the occurrence of phthisis in their respective districts. At the same time, notification is in force in 38 sanitary districts, including the county boroughs of Belfast and Dublin, and one-fourth of the population of Ireland is subject to its operation. Sufficient practical experience has been gained to disprove the forebodings of oppression and hardship in which the opponents of notification were wont to indulge when the question was under discussion in Parliament in 1908.

The mere introduction of the notification system appears to have useful effects upon the public mind, as pointed out by the Medical Superintendent Officer of Health for Belfast County Borough in his report for 1910, where it is stated: "Formerly a great difficulty was experienced in convincing the people that phthisis was an infectious disease, but the very fact of the Act having been adopted seems to have had considerable influence in convincing them of the infectious nature of the disease." The universal application of the system of notification, as has now been carried out in England, would have a good effect in Ireland in demonstrating that notification is regarded by the legislature as a necessary weapon in the campaign against tuberculosis. The option at present given to Irish sanitary authorities in regard to the adoption of notification seems necessarily to imply a degree of disbelief in the value of the institution, and the removal of this impression could not fail to be attended with beneficial results. As the notification of tuberculosis in Ireland has formed the subject of special legislation, and having regard to the limitations imposed by Parliament in 1908 upon the operation of notification, the Local Government Board for Ireland are not free to deal with the matter under the provisions of the Public Health Act, as has been done by the English and Scotch Boards. In view of what has taken place, the extension of notification of tuberculosis to every sanitary district in Ireland can only be accomplished by specific statutory enactment.

COUNTY MEDICAL OFFICERS.

The Public Health Service in Ireland has suffered in the past from occupying the position of an adjunct to the poor law administration of medical relief under the dispensary system. Every dispensary medical officer is ex-officio medical officer of health for his dispensary district, so that the dispensary office alike in creation and in emolument is the primary appointment, to which sanitary functions have been appended as it were by way of afterthought. This arrangement, when originally made by Parliament, no doubt commended itself on the grounds of economy and simplicity, and it has worked well enough, so far as concerns the grosser and more obvious nuisances which might readily come under the cognisance of a dispensary medical officer in the course of his public practice.

But with the growth of a clearer appreciation of the value of sanitary administration, the multiplicity of petty health officers, and the parochial views which the restriction of areas tends to engender in medical officers of health have come to be realised as obstacles

to sanitary reform. The needs of the community call for a more liberal-minded treatment than is likely to be secured from officers to whom the removal of manure heaps and the protection of open wells have appealed as the main sphere of their sanitary activities; a wider area of administration is needed, and a higher type of man than is to be found in the average candidate for a dispensary appointment.

With this end in view, county councils should be required to appoint county medical officers of health to supervise the entire sanitary administration within each county. They should be whole-time officers and should possess the same professional qualification as is now prescribed for the office of Medical Superintendent Officer of Health.

It is to be remembered that, at present, county councils in Ireland have no functions in relation to sanitary administration, and further legislation will be required to empower them to appoint and pay county medical officers of health.

INCIDENCE OF TUBERCULOSIS IN IRELAND.

The accompanying diagram depicts the curve of the mortality rate from all forms of tuberculosis in England, Scotland and Ireland for the period, 1864 to 1909.

So far as Ireland is concerned, the general effect is unfavourable, inasmuch as up to the year 1906 tuberculosis had actually gained ground, the rate rising from 2.4 per thousand in the year 1864 to 2.6 in 1906. In comparison with England and Scotland, Ireland, which in the past possessed the lowest death-rate from tubercular disease, now possesses the highest rate.

The downward tendency, which is to be observed in the incidence of tuberculosis in England and Scotland, has up to 1904 been replaced in Ireland by an upward tendency, and even the improvements effected during the past five or six years have only left this country upon the same level from which she started 45 years ago.

In the progressive reduction of tubercular mortality, Ireland stands 10 years behind Scotland and 19 years behind England. For the year 1909, the English death-rate from tubercular disease was 37½ per cent. below the Irish rate. Scotland occupies an intermediate position. Upon the basis of these figures Ireland is called on to provide for and treat eight tubercular patients for every five that occur among an equivalent population in England. It is thus clear that in the distribution of the sanatorium grant according to the standard of population, Ireland fares badly, taking into account the greater prevalence of tubercular disease. If the needs of the Irish population are to be dealt with on equitable lines, an additional grant of 84,000*l.* would do no more than provide for the excess incidence of tuberculosis in Ireland, quite apart from any question that might be raised as to the relative resources of the two countries. A broad comparison between England and Ireland, in point of weekly agricultural wages and of the gross income tax assessment, gross capital (for death duty purposes), and railway traffic receipts, per head of population, seems to suggest the conclusion that the average resources of the population of Ireland do not amount to more than one-half the resources of the population of England.

According to the present allocation of the sanatorium grant under the National Insurance Act, Ireland's share will amount to 145,000*l.* in round figures. That sum would, at 70*l.* a bed, represent institutional accommodation for 2,000 tubercular patients at any given time, or a total of 8,000 individuals in a year, taking three months as the average duration of each patient's course of treatment. The recorded deaths in Ireland from tubercular diseases amount to over 10,000 a year. Assuming that 2,000 beds are required and are provided, there will be no surplus funds to apply towards the establishment of dispensaries or other forms of non-institutional treatment and prevention of tuberculosis.

It will be evident from the foregoing remarks that the circumstances of Ireland in regard to the prevalence of tuberculosis require to be specially considered, and it is to be apprehended that unless

financial facilities are afforded for the adoption of exceptional measures for the treatment and prevention of tuberculosis, serious embarrassment may arise in the administration of the sanatorium benefit under the Act in Ireland owing to its financial provisions being based upon a normal incidence of tubercular disease. In particular, in order that a reasonable standard of health may be secured among young persons passing to the insurance age, much will need to be done to improve the physical conditions of children attending at national schools, and this aspect of the case is dealt with more fully in a separate memorandum.

SUMMARY.

So far as Ireland is concerned, the following are needs of pressing importance:—

- (1) Legislation prescribing the universal notification of tuberculosis.
- (2) Legislation requiring the appointment of county medical officers of health.
- (3) Arrangements for the medical inspection and treatment of school children.
- (4) A special grant towards the expenses of Nos. (2) and (3).

TUBERCULOSIS.

Voluntary Work in Ireland.

Work of great value and of a varied character has been carried out in the campaign against tuberculosis by voluntary effort, under the auspices of Her Excellency the Countess of Aberdeen.

The following memorandum contains a record of the diverse activities of the Women's National Health Association of Ireland, of which the Countess of Aberdeen is president:—

MEMORANDUM ON THE ANTI-TUBERCULOSIS WORK OF THE WOMEN'S NATIONAL HEALTH ASSOCIATION OF IRELAND submitted to the Members of the Departmental Committee on Tuberculosis, by the COUNTESS OF ABERDEEN, President of the W.N.H.A., by request of T. J. STAFFORD, C.B., F.R.C.S.I., Medical Commissioner of the Local Government Board for Ireland.

The Women's National Health Association of Ireland was formed in 1907, with the following objects:—

1. To arouse public opinion, and especially that of the women of Ireland, to a sense of responsibility regarding the public health.
2. To spread the knowledge of what may be done in every home, and by every householder, to guard against disease, and to eradicate it when it appears.
3. To promote the upbringing of a healthy and vigorous race.

Its formation was largely due to the impression made by the grave warnings issued in successive years by the Registrar General, the Irish Local Government Board, and the medical profession as to the distinct tendency to an increase in the already high death-rate from tuberculosis in Ireland.

In 1864, when the registered births and deaths was first started on a regular footing, Ireland had a lower death-rate than either England or Scotland. Since that time, up to 1907, owing to active measures of repression being taken in the latter two countries, the death-rate steadily went down, while Ireland remained about the same, but with an upward trend. See following diagram:—

Tuberculosis.

* Diagram No. 3, showing the Death-rate in Ireland, as compared with England and Scotland, during each of the 43 years 1864–1906.

[Reproduced from the 43rd Annual Report of the Registrar-General for Ireland, by permission of the Controller of His Majesty's Stationery Office.]

* This diagram has already been published by His Majesty's Stationery Office, and is consequently not re-printed in this volume.

On looking into this matter it also appeared that the general standard of health in Ireland was very unsatisfactory, owing largely to under-feeding, bad feeding, unhealthy houses, and the fact that a large proportion of the healthy young men and women emigrated to America, leaving the more feeble to carry on the race.

In July 1899, branches of the National Association for the Prevention of Consumption had been formed in Ireland, but their efforts disclosed a curious apathy and feeling of hopelessness on the subject, and it was felt that the only way of arousing the country would be to make a direct appeal to the women, in whose hands the remedy really lay.

Very early in the history of the association it was perceived that the road to success lay in attacking the problem from every standpoint, and that to carry on a tuberculosis campaign really meant a campaign in the interests of general good health, and included the education of mothers in the care of their children from their birth; the watching over the interests of children through infancy, childhood, and youth; the education of the public generally as to the importance of the selection of nourishing food and its preparation, the urgent necessity of fresh air and healthy surroundings of the home, as well as good and sanitary housing.

(1) Tuberculosis Exhibitions.

The first step taken by the association in 1907 to arouse public opinion was the formation of a Tuberculosis Exhibition, following the example of similar undertakings in the United States and on the Continent. By the authority of the Local Government Board, representatives of all the health authorities in Ireland were invited by the Women's National Health Association to a Conference and special view of this exhibition in Dublin in order that they might decide if they would like it to visit different districts in the country. The immediate response to this invitation necessitated two exhibitions being formed, and later on a travelling caravan, to visit outlying parts who could not afford a visit from the exhibition. In every place a local committee was formed, generally composed of a combination of representatives of the local health authorities and voluntary workers, this local committee working in co-operation with the central committee, drawing up attractive programmes of lectures and demonstrations. The medical men of Ireland, and others from England and Scotland, most generously came to the aid of the association by giving a large number of free lectures, the railway companies allowing the travelling expenses of all connected with the exhibition to be charged at half price. In nearly all cases the local committee paid these expenses, printing, advertising, &c. The exhibition visited about 90 centres, and was everywhere attended by eager crowds, and the caravan about 150 more.

In order to make the lessons of the exhibition permanent, an endeavour was made to form a permanent branch of the Women's National Health Association wherever the exhibition or caravan visited, with the result that about 150 branches of the association, on which are found representatives of all churches, and all political parties, together with medical men, district councillors, and others, were established.

(2) Functions of the Central Association.

The central association endeavours to give its branches as much liberty as possible, and encourages local initiative in planning health work to suit the needs of each district, rather than laying down definite schemes which must be adopted. At the same time, the central association strives to promote unity of action by drawing attention to successful efforts for the promotion of health, by spreading literature of all kinds bearing on health subjects, and by issuing a magazine of its own ("Slainte") in which is reported successful health work in other countries, as well as in the United Kingdom.

Central conferences are also held twice a year in Dublin, which bring the representatives of the branches together for discussion of various health problems, and at which the policy of the association is formed and guided.

It is always recommended that branches should have a general council composed of men and women, with a working committee mainly composed of women.

The report for 1911 is now being prepared, but the accompanying summary of report for 1910 gives an idea of the various activities carried on by the association. A few copies of the full report, with lists of local branches and officers, and other information, are in Dr. Stafford's hands, and can be had if required.

The central association deems it to be its duty to carry out various experimental object lessons for the promotion of public health, which the branches can watch and imitate and adapt to their own needs if desired. It also aims to establish a unity of effort between all its branches regarding the means to be adopted for the direct prevention and treatment of tuberculosis.

(1) Sutton Preventorium and Holiday Home.

We, therefore, instance first our little preventorium at Sutton, where a disused coastguard station was adapted for this purpose. Women and girls, and boys up to ten years old, are received here who have been exposed to the infection of tuberculosis, or who are so run down in health that their medical attendants deem them to be in danger of contracting the disease. They must, however, bring a medical certificate stating that they are not definitely suffering from tuberculosis. Twenty-two residents can be received.

The experience of this institution for pre-tubercular patients is that an enormous amount of preventive work could be done if it could be extended, and if other like institutions could be started in different parts of the country, both for men, women and children.

A few weeks of good air, good food, and freedom from anxiety works wonders.

We are considering the extension of the system by obtaining a list of respectable and careful women who would lodge and look after patients of this description in districts where there is a trained district nurse who could visit and supervise their treatment, diet, &c. Such a system is working well in France.

We find the cost per head for food alone for this institution comes to 10d. per day, and the cost per head for all expenses of every kind, 2s. per day.

A report of the Sutton Preventorium accompanies this memorandum, and a specimen menu of food provided.

(2) P. F. Collier Memorial Dispensary for the Prevention of Tuberculosis.

This dispensary is modelled on that of Dr. Philip's Royal Victoria Dispensary in Edinburgh, and is the first of its kind in Ireland. It is hoped that it will become a clearing house for tuberculosis cases in Dublin.

The Women's National Health Association have been able to found this dispensary in consequence of a kind gift of Mr. Robert J. Collier of New York of 5,000l., paid in five yearly instalments, for the establishment of a memorial to his late father. The King opened this institution in August, and it began active work in November, 1911. It has now 224 patients on the roll, and is evidently proving itself acceptable to the necessitous persons for whom it was intended.

Hot milk and Plasmon biscuits are provided for the patients whilst waiting for examination, and the roomy flat roof has been made into a garden waiting room, to be used in fine weather.

The families of the patients who attend are invited to attend for examination to discover early cases. Patients are attended in their own homes by the Women's National Health Association nurses, who for the last three years have been attending consumptive patients in Dublin in their own homes, under the supervision of a committee composed of representatives of all the 10 clinical hospitals in Dublin, and the poor-law dispensary.

A similar advisory medical committee has been formed for the dispensary.

This dispensary was built and equipped at a cost of 2,300l. It is too soon yet to be able to give an estimate of the cost of maintenance. The medical staff consists of a full-time medical superintendent, an

assistant medical superintendent, an honorary throat specialist, and an honorary bacteriologist.

Milk is provided by the dispensary as a medicine, and is generally sent from the association's Pasteurised milk depôt.

(3) *A Samaritan Committee.*

A Samaritan Committee of ladies in connection with the Dublin branch of the Women's National Health Association undertake to supply the needs of the patients in order to enable them to carry out the doctor's orders, and work in conjunction with other charitable institutions in Dublin with the view of caring for the families of the patients, preventing danger from infection, and keeping the home together. A large proportion of the families of these patients are found to be living in one room. Separate beds must often, therefore, be provided, and an extra room if necessary. Groceries, nourishment, clothing, and bed coverings, &c., are given as required, and suitable patients sent on to sanatoriums and hospitals, and children who should be removed from the danger of infection are sent to the country, or to Sutton Preventorium.

A sewing guild in connection with the Samaritan Committee gives invaluable help, and provides a large number of clothes.

Some of the Dublin hospitals have been most kind in taking in patients from the country pending their admission to hospitals.

(4) *Treatment of Early Cases placed under care of W.N.H.A.*

The central association sends the early cases constantly under its supervision from different parts of Ireland to various sanatoriums in Ireland, but principally to the Royal National Hospital for Consumption at Newcastle, co. Wicklow, where their maintenance is very often paid for either by the central association or by its branches.

The new sanatorium under the Dublin Joint Hospitals Committee at Crooksling, co. Dublin, has only been open for a few months, and some of the patients from the dispensary have been sent there, and others to Heathside in co. Cork, others to the Foster Green Hospital at Belfast.

Two branches of the Women's National Health Association have built small sanatoriums of their own—one at Maryborough, through the efforts of Lady Coote, the local president, has been added to the county hospital as an annexe, providing for 12 patients, the hospital undertaking maintenance. The average cost for food per day is 2s. 11½d. per patient, and 4s. 4½d. for all expenses.

Another sanatorium for co. Clare is about to be opened at Ennis, and has been built by the generosity of the President of the branch, Lady Inchiquin, the county council undertaking to provide for the maintenance of the patients, and the Women's National Health Association providing the equipment and furniture. Yet another is being adapted for early cases at Clifden, where the disused coastguard station is being made suitable for this purpose, the Galway County Council contributing to the expense and undertaking to maintain 10 patients out of the 20 beds available.

There are also a large number of patients scattered over Ireland, which the different branches endeavour to help, either in their own homes or by providing shelters. In some cases the board of guardians have provided the shelters, in other cases the branches themselves, and in others the central association. The central association is now able to provide a very inexpensive type of shelter which can be taken down in sections, and which costs 6l. 10s. to manufacture, and which is hired out for 10s. a quarter. Better shelters, constructed like rooms, can be had for 12l. 10s. Shelters are found most satisfactory for those who have gone through a sanatorium course.

(5) *Tuberculosis District Nurses.*

Tuberculosis nurses are employed by the Women's National Health Association, not only in Dublin, but also in Belfast, Cork, Ballymena, and elsewhere.

At Ballymena the district council provided the nurse, under the provisions of the Tuberculosis Act.

In addition to special tuberculosis nurses, the branches of the association maintain about 40 district nurses who have special instructions to look after tuberculosis cases in their own homes, and who are generally supported by local nourishment funds or Samaritan Committees.

(6) *Advanced Cases.*

In most districts in Ireland, the only provision for advanced cases is to be found in the poor law infirmaries, where it is very often difficult to persuade the patients to go.

The Women's National Health Association feel that the strong wish of sick people in Ireland to die in their own homes must be regarded as a fruitful cause for the spread of infection. The Hospital for Incurables, the Rest for the Dying, and the Hospice for the Dying provide accommodation for these sad cases, which is eagerly sought for and accepted, but it is quite inadequate to meet the need.

Allan A. Ryan Home Hospital for Consumption.

The Women's National Health Association has accordingly used a generous contribution given by Mr. Allan A. Ryan of New York, for equipping a hospital for cases in the second stage of the disease, too far advanced for sanatoria, and yet not hopeless. The corporation of Dublin gave the association permission to use the isolation buildings at Pigeon House Road, on the understanding that these must be vacated at very short notice in case of need. Here 38 patients can be received, the first claim on this institution being patients in Dublin. The gift of some extra strongly-built shelters enables the association to take in others, and there is a great demand for admission. The place is very healthily situated, and most extraordinarily good results have been obtained even with regard to patients whose chances when they arrived did not seem very bright. Treatment by tuberculin is given in suitable cases both here and at the dispensary, and it is generally these patients who make such marked improvement.

The expense of this institution, which was started in November, 1910, is 11d. per head per day for food (including food for nursing staff), and 2s. 10d. per patient per day, including all expenses of every kind.

Adjacent to the hospital is some vacant land which is lent out to suitable persons for cultivation while the land is lying waste. A portion of this has been allotted to the hospital, and is cultivated by the patients.

The association would very much like to extend the usefulness of the institution by erecting a further building on this adjacent land for the accommodation of further patients, and will desire to make application for a grant for this purpose.

When the poor are living in such a crowded condition as they do in Dublin, so many of our patients being found in one-roomed tenements, it seems of the most urgent importance to provide accommodation for advanced cases.

Day Camp for Tuberculosis Patients treated in their own Homes.

The central branch of the Women's National Health Association has further projects in view which it is most anxious to start this year, the first being the acquisition of suitable open spaces not far from the dispensary, where an open-air day camp can be carried on for patients being treated in their own homes. Negotiations are now being carried on with a view to acquiring the necessary space for this, and also for a night camp for elder boys from overcrowded homes where consumptive patients are sleeping.

Farm for Cases where Disease is Arrested.

The other project is the acquisition of a farm where patients who are sufficiently well to return to work can be trained to out-door work in the same way as is done at the Farm Colony in Edinburgh.

(8) After-care of Patients.

This necessary part of tuberculosis work is kept in view by the Women's National Health Association and its branches. The homes of the patients who are sent to sanatoriums are visited during their absence with a view of making proper provision against their return and enabling them to have a separate room or bed to themselves, also the open windows and good food which are so necessary to establish the arrest of the disease. Constant communications go on between the central association and the various committees all over Ireland with a view to helping in this direction, and it would take too long in this brief summary to describe the ways with which this is being affected. Each case is different, and the resources of the association are taxed to the utmost by these individual cases.

Over 500 such cases had to be dealt with last year.

The other special undertakings in charge of the Central Branch of the Women's National Health Association are:—

(9) Pasteurised Milk Depôt.

The Pasteurised Milk Depôt, Sitric Road, founded in 1908, sends out approximately 70 gallons of milk daily, and it provides also modified pasteurised milk for delicate infants who cannot be nursed by their mothers, and who are sent to the depôt by doctors.

The results of this depôt can best be summarised by a report which is included by Dr. Lumsden, showing that the death-rate amongst delicate infants on taking this milk is $4\frac{1}{2}$ per cent., as against the 14 per cent. infant death-rate which is about the average for Dublin.

(10) Transformation of Derelict Spaces into Garden Playgrounds.

These are obtained from the corporation or other owners at a nominal rent, and they can be used in various ways in crowded spaces in Dublin, providing a place where young babies can be taken out of doors, and left in charge of an elder girl, where infants have sand-pits to play in in safety, and elder children have a resort out of school hours. This effort is in its infancy, but is already promising most excellent results, not only in its direct effects, but in its indirect effect on the houses around. Ladies are arranging to attend these playgrounds at certain hours to teach the elements of gardening, games, &c. A joinery class for making seats, swings, &c., has been started.

(11) Babies' Clubs.

Babies' clubs are an institution much favoured by the Women's National Health Association, and are run on similar lines to the English Schools for Mothers. There are five in Dublin, four in Belfast, one in Cork, one in Bray, one in Tullamore, and one in Coleraine, one in Limerick, &c. The connection of the institutions with the anti-tuberculosis campaign may not at first be apparent, but seeing that children in Ireland specially suffer from the disease, it is evident that the mothers should be given every assistance to build up their constitution from the very outset. Irish mothers generally nurse their babies, which is a great help, but like mothers elsewhere, need much instruction regarding the undesirability of giving a bite of everything to their infants, on the value of open windows, suitable clothing, &c.

At these clubs the mothers attend once or twice weekly, paying generally a penny a week for the privilege of belonging to the club, and having a cup of tea and a bun. A nurse is attached to the club, who visits in the homes of the mothers, and a doctor meets the mothers once a week when the children are weighed, and advice is given, and the emulation which is created regarding the progress of the babies has a most healthy effect.

It may be stated that during last summer when the infant mortality rose so alarmingly as a consequence of the extreme heat, only three babies died amongst the many hundreds of babies who were attending the Dublin, Belfast, and Cork clubs.

In connection with these clubs there are nearly always classes and clubs for the elder girls, giving them general health instruction, and especially on the care of the infants for whom they are so often responsible.

Boys' clubs are also being started in connection with these institutions.

The Women's National Health Association is confident that, through its babies' clubs and infant nurses, a great deal of preventive work in connection with the anti-tuberculosis campaign is being effected. During the dangerous autumn weeks of 1911 the association, at the request of the Local Government Board, provided special infant nurses attached to each dispensary district in Dublin.

(12) Health Lectures.

Lecturers are sent out all over Ireland by the Central Association to give courses of lectures on various subjects connected with health generally, accompanied by lantern slides, the local branches paying expenses. The results of these lectures, added to those given in connection with the travelling exhibition and caravan, have most certainly had the result of making the people of Ireland understand the value of open windows, and visitors to Ireland now remark on the great change in this respect, and compare Ireland very favourably in this matter with other countries.

The use of oatmeal and cocoa is also largely on the increase, and the use of tooth brushes, as a result of the lectures and the distribution of literature.

The local branches pay travelling expenses and 5s. a lecture.

(13) Children suffering from Tuberculosis.

One of the great anxieties of the Women's National Health Association is concerning the care of children suffering from various forms of tuberculosis, as there is very little accommodation for child invalids of this description, and there is no specific institution taking in children suffering from tuberculosis of the bones and joints. On the other hand, the children's wards in the various hospitals throughout Ireland and the children's hospitals in Dublin and Belfast tell us that two-thirds of the cases have connection with tuberculosis in some form or another.

Sanatoriums for Children and Seaside Homes are therefore a most urgent need.

Our health workers believe that the opinion expressed by the Local Government Board in its report for the International Tuberculosis Congress at Washington, that the high death-rate amongst young people in Ireland from tuberculosis points to the disease being contracted during school life is very well founded. There is no medical inspection of school children whatever. There are a large number of school buildings totally unsuitable and unsanitary, although recently a good many up-to-date schools have been built. The custom in Ireland has been in favour of long successive hours in school, with only a break of half an hour between 9.30 and 3.30 p.m., and no regular mid-day meal. No open-air schools for delicate children have been started although we hear now of some teachers taking their classes out of doors in the summer.

(14) School Meals.

The association and its branches have been trying to do what they can in a small way to remedy this state of things. In a large number of schools now our branches have made provision for a mid-day meal of hot cocoa and milk, the children keeping their bread or biscuits to eat with it. It is found that this can be done on a self-supporting basis.

In Clonmel the Women's National Health Association branch has opened a very successful dinner depôt for meals at low prices for both adults and children.

(15) *Disinfection of Schools and Health.—Instruction given.*

A great many branches have provided disinfecting sprayers and disinfecting fluid to be used in the schools. The Belfast Municipality took up the idea, and supplied sprayers to all the Belfast schools.

Health talks have been given to the children in a great many schools by our lecturers, essays being subsequently written, and sometimes guilds of good Health formed. The Belfast branch has established "Horts" for children whose parents are employed in factories between 4 and 6 p.m., with excellent results.

(16) *Dentists for School Children.*

One or two branches are now making provision for dentists for the children.

(17) *Milk Supply.*

A great scarcity of milk in many districts having been brought to the notice of the Women's National Health Association by its lecturers and by various branches, a petition was sent in for the appointment of a Vice-Regal Commission to inquire into the causes of the alleged scarcity of milk, and how it can be remedied, and also into the danger for contamination and infection from milk, and remedies for this. The Vice-Regal Commission was in consequence appointed last December, and is gathering together a most valuable amount of evidence. Meanwhile, a certain number of branches (about ten) have opened milk depôts supplied by farms where the cows are inspected, and from which milk in small quantities is sold to meet the needs of working-class people. These milk depôts are proving a great success and promise to become self-supporting.

(18) *Goat-keeping.*

The association is also interesting itself in the improvement of the breed of goats in Ireland, believing this to be the solution for outlying districts, these animals being generally immune from tuberculosis, and the Department of Agriculture and Technical Instruction has now taken up the matter, and an Irish Goat Society is being formed.

(19) *Heating and Cleaning of National Schools.*

The Women's National Health Association has identified itself with the movement for urging a grant from the Treasury for the heating and cleaning of national schools, there having been no fund available for this purpose unless the managers and teachers of schools provided the means out of their own pockets.

After long negotiation this grant was accorded last year (1911), and is in force during this winter, on the understanding that the local school managers provide half the expense.

(20) *Tuberculosis Prevention (Ireland) Act.*

The Women's National Health Association was also greatly interested in the promotion of the Tuberculosis Prevention Act passed in 1908. The association was early convinced of the necessity of compulsory notification of tuberculosis in order that the sufferers might be cared for, and the public protected from danger. In its passage through the House of Commons the compulsory clauses in this Bill were made permissive which greatly decreased its usefulness. The association hope that an amending Act may now be brought forward making the notification clauses to the Act compulsory, in view of the operation of the Insurance Act, and that the other provisions of the Act may become better known.

(21) *Housing and Town Planning.*

The Women's National Health Association is closely identified with the movement for better housing and town planning in Ireland. It brought across to Ireland last year, at an expense of 300*l.* the Town Planning Exhibition formed by Professor Geddes, after the Town Planning Conference in London in 1910, and this exhibition has made a deep impression

upon many persons, so much so that a Housing and Town Planning Association has been formed for Ireland, and the Women's National Health Association has formed a small collection of housing and town planning exhibits for its Health Exhibition which is now visiting various parts of Ireland.

Illustrations of the usefulness of the visits of the Health and Housing Exhibition can be given, as for instance, the housing scheme carried out at the little town of Roscrea after a visit of the Tuberculosis Exhibition two or three years ago. The paper describing this scheme and showing the contrast between the houses as they were, and as they are, accompanies this memorandum.

(22) *Health and Industries Exhibition.*

I cannot close this memorandum without alluding to a health and industries exhibition held on a large scale in Dublin last year by the Women's National Health Association, intended to illustrate all the organised methods of the association. Every phase of health work was shown in a practical and popular form. Great stress was laid on the food section; nursing; babies; how to keep a house clean; the danger from flies; danger from fire, &c.

The Department of Agriculture and Technical Instruction co-operated in a splendid way, showing the great advance being made by Ireland in matters of agriculture and how closely these were related to questions of health.

There was also a large exhibition of Irish industries and numberless amusements. I ought, perhaps, to add that the provision of attractive amusements and the encouragement of home industries, and the smaller agricultural and horticultural industries is very strongly supported by the Women's National Health Association of Ireland and its branches, as a means of health, and of increasing the interest of the young people in making their homes bright, attractive and healthy.

The exhibition, called *Ui Bresail*, which was managed by the Countess of Carrick, proved an extraordinary success. It lasted for a fortnight, and was visited by over 172,000 people. From a financial point of view it was also gratifying, inasmuch as it brought in over 1,800*l.* to the Central Association, and over 600*l.* to the local branches who ran side shows.

(23) *Co-operation with Health Authorities.*

The members of the local branches of the Women's National Health Association are in constant communication with the health authorities of their own district, and we have had many testimonies of the value and help that these voluntary workers have proved to be in the promotion of local health reforms.

The Central Association has always had the advantage of the kind support and co-operation of the Medical Commissioner of the Local Government Board, and it is under a deep debt of obligation to the medical profession, to the local health authorities in Ireland, and to the clergy of all denominations.

Being in close touch with its branch committees in every part of Ireland, and having a membership of 18,000, it is in a position to obtain any information that may be required, and can initiate any general scheme that may be found desirable.

With the exception of a grant of 300*l.* from the Department of Agriculture and Technical Instruction for printing and distributing educational literature, it relies entirely on voluntary contributions. It has been able to collect about 4,000*l.* a year, including kind contributions from American friends, and its branches raise about 4,000*l.* for their own local purposes also. It has willingly lent a hand in helping the Welsh campaign to start its work by sending over its exhibition for three months, and it has been gratified by being invited to help other tuberculosis exhibitions in Great Britain.

The Women's National Health Association had the honour of being bracketed with the tuberculosis section of the A.O.S. in New York, as occupying the front rank amongst voluntary associations all over the world, who had been most effective in their anti-tuberculosis work between 1905 and 1908, thus gaining half

of the \$1,000 First Prize at the International Congress held at Washington, 1908, and this prize was thus awarded on account of the Women's National Health Association having endeavoured to attack the problem from all sides, carrying preventive work into every department of life.

The following diagram shows the death-rate from all forms of tuberculosis for the past 11 years, and the marked decrease since 1907 has given the greatest encouragement to all health workers in Ireland.

TUBERCULOSIS MORTALITY.

*Diagram showing the Death Rate in Ireland during 11 Years, 1900-1910.

(Diagrams reproduced (in part) from the Report of the Registrar-General for Ireland, by permission of the Controller of His Majesty's Stationery Office.)

Deaths from all forms of tuberculous disease (1907)	11,679
Deaths from all forms of tuberculous disease (1908)	11,293
Decrease	386

Deaths from all forms of tuberculous disease (1908)	11,293
Deaths from all forms of tuberculous disease (1909)	10,594
Decrease	699

Deaths from all forms of tuberculous disease (1909)	10,594
Deaths from all forms of tuberculous disease (1910)	10,016
Decrease	578

Total decrease for three years - 1,663

1907—Death-rate per 1,000 of estimated population.	
From all forms of tuberculous disease	2.7
1908—Death-rate per 1,000 of estimated population.	
From all forms of tuberculous disease	2.6
1909—Death-rate per 1,000 of estimated population.	
From all forms of tuberculous disease	2.4
1910—Death-rate per 1,000 of estimated population.	
From all forms of tuberculous disease	2.3

The following deductions may be made from these figures:—

- I. That the death-rate from tuberculosis, viz.:— 2.3 per 1,000, is the lowest recorded since 1864, the year in which registration of deaths was introduced.
- II. That there has been a decrease of one-seventh of the total number of deaths from tuberculosis in three years.
- III. That there were 32 fewer deaths each week from tuberculosis in 1910 than in 1907. Or,
- IV. That in every two days in 1910 there were about nine fewer deaths when compared with 1907.
- V. As it is generally recognised that there are about seven or eight patients suffering from tuberculosis for each death, the decrease in mortality shows that there were about 12,000 fewer people suffering from tuberculosis in Ireland in 1910 than there were in 1907.

* This diagram has already been published by His Majesty's Stationery Office and is consequently not re-printed in this volume.

Local Government Board—Ireland. Accommodation in Workhouses for Tuberculosis Patients.

Unions.	Cases where the Guardians have set aside a portion of the Workhouse Buildings or separate Wards exclusively for Tuberculosis Patients.	Beds.
Antrim	Wards for both sexes, with modern windows. Verandah on F. side.	8
Ardee	Wards for both sexes, with sleeping shelters attached to each.	8
Athlone	Two wards on each side of the house, one for early and one for advanced cases.	16
Athy	Engineer preparing plans for chalets for males; females to be accommodated in wards attached to the hospital.	10
Ballina	One ward set apart for males.	2
Ballinasloe	One ward set apart for males, with verandah; no provision yet for females.	4
Ballinrobe	Medical officer has set apart wards on each side of the house.	8
Ballycastle	Wards for both sexes (in fever hospital). No tuberculous patients at present.	20
Ballymahon	No definite arrangements, but wards in new male infirmary available.	—
Ballymena	Medical officer uses as far as possible two small wards.	4
Ballymoney	Wards for both sexes (unoccupied).	4
Ballyvaughan	Wards for both sexes. Only used exclusively when there are tuberculous patients.	12
Baltinglass	Wards for both sexes. Incipient cases sent to Newcastle.	8
Bandon	Wards for both sexes	10
Bantry	Wards for both sexes	5
Belfast	Separate wards for 152 cases; also the Abbey auxiliary, 265 beds.	417
Borrisokane	One ward set apart	4
Callan	Wards for both sexes	5
Carlow	Wards for both sexes, and two chalets in workhouse grounds unfurnished).	20
Carrickmacross	Wards for both sexes, but not exclusively for tuberculous cases.	12
Carrick-on-Shannon	Wards for both sexes, but not exclusively for tuberculous cases.	—
Cashel	Wards for both sexes	12
Castleblayney	Wards for both sexes, and revolving shelters.	8
Castlecomer	Wards for both sexes	6
Castlereagh	Wards for both sexes	4
Castletown	Ward for males; none for females.	3
Celbridge	Wards for both sexes	13
Clogheen	Ward for males	5
Clogher	Wards for both sexes	6
Clonakilty	Ward for females, but none for males.	8
Clones	Wards for both sexes	8
Coleraine	Wards for both sexes	10
Cork	Under consideration. Guardians propose to provide proper hospital and airing grounds.	—
Croom	Top wards in fever hospital set aside for males and females.	16
Delvin	Ward for males	2
Dingle	Wards for both sexes	13

Unions.	Cases where the Guardians have set aside a portion of the Workhouse Buildings or separate Wards exclusively for Tuberculosis Patients.	Beds.	Unions.	Cases where the Guardians have set aside a portion of the Workhouse Buildings or separate Wards exclusively for Tuberculosis Patients.	Beds.
Donegal	Wards for both sexes (infirmary has been enlarged).	12	Swineford	Ward for males (unoccupied)	5
Downpatrick	Wards for both sexes	12	Thurles	Wards for both sexes	6
Drogheda	Wards for both sexes, but female ward not exclusively.	10	Tipperary	Wards for both sexes in fever hospital; also ward for females in infirmary.	21
Dublin, North	Wards for both sexes in Roman Catholic Hospital. None for Protestant Hospital.	60	Tralee	Wards for both sexes	17
Dublin, South	Two hospitals specially erected for tuberculous cases.	157	Trim	Wards for both sexes	5
Dungannon	Wards for both sexes	6	Tuam	Wards for both sexes	6
Dungarvan	Wards for both sexes	9	Tullamore	Wards for both sexes	24
Dunmanway	Wards for both sexes (unoccupied).	8	Waterford	Wards for both sexes, and a shelter on female side (provided by Women's National Health Association).	27
Dunshaughlin	Wards for both sexes	10	Westport	Wards for both sexes	10
Edenderry	Ward for males; females also separated as occasion arises.	10	Wexford	Wards for both sexes	19
Ennis	Wards for both sexes	10	Youghal	Wards for both sexes	11
Enniskillen	Wards for both sexes (no separate entrance).	5		Total beds	1,597
Ennistymon	Wards for both sexes	12			
Fermoy	Wards for both sexes	10			
Glennamaddy	Wards for both sexes (at present only one bed in each).	2			
Gorey	Ward for males	4			
Inishowen	No patients; guardians contemplate setting aside wards if necessary.	—			
Kanturk	Wards for both sexes	12			
Kilkenny	Wards for both sexes	11			
Killarney	Wards for both sexes	17			
Kilmaethomas	Wards for both sexes, and a shelter.	8			
Kilmallock	Wards for both sexes	13			
Kilrush	Wards for both sexes	24			
Kinsale	Wards for both sexes	10			
Larne	Wards for both sexes	7			
Letterkenny	Wards for both sexes	4			
Limavady	Wards for both sexes	4			
Limerick	Wards for both sexes	28			
Lisburn	Wards for both sexes	12			
Lisnaskea	Wards for both sexes	6			
Listowel	Wards available when required	11			
Londonderry	Wards for both sexes	14			
Longford	Wards were set aside, but now used for other cases.	—			
Lurgan	Ward for males; old small-pox hospital used for females.	37			
Macroom	Wards	10			
Magherafelt	Wards for both sexes	10			
Millstreet	Wards for both sexes and revolving sun box.	18			
Mohill	Wards for both sexes	10			
Mountbellew	Ward for males	1			
Navan	Two shelters (three beds each), and "Isolation Hospital" (12 beds).	18			
Newcastle	Wards for both sexes	10			
Newry	Wards for both sexes (at present only three males and no females).	30			
Newtownards	Wards for both sexes with yards.	8			
Oughterard	Wards for both sexes	4			
Rathdown	Wards for both sexes	15			
Rathkeale	Wards for both sexes	10			
Roscrea	Wards for both sexes	8			
Scariff	Contract just entered into; separate accommodation will be provided.	8			
Shillelagh	Wards for both sexes	5			
Skibbereen	Wards for both sexes	14			
Sligo	Wards for both sexes. Open-air balcony in course of erection.	14			
Stranorlar	Ward for males	3			
Strokestown	Ward for females	4			

List of the County Boroughs in Ireland with their Populations according to the Census of 1911.

Name.	Population.
Dublin County Borough	309,272
Belfast County Borough	385,492
Cork County Borough	76,632
Londonderry County Borough	40,799
Limerick County Borough	38,403
Waterford County Borough	27,436

List of the Counties of Ireland with their Populations (Census, 1911.)

County.	Population.
Leinster—	
Carlow	36,151
Dublin	167,637
Kildare	66,498
Kilkenny	74,821
King's	56,769
Longford	43,794
Louth	63,402
Meath	64,920
Queen's	54,362
Westmeath	59,812
Wexford	102,287
Wicklow	60,603
Munster—	
Clare	104,064
Cork	314,558
Kerry	159,268
Limerick	104,443
Tipperary (North Riding)	63,958
Tipperary (South Riding)	87,993
Waterford	56,336
Ulster—	
Antrim (1901 Census)	196,090
Armagh	119,625
Cavan	91,071
Donegal	168,420
Down (1901 Census)	205,889
Fermanagh	61,811
Londonderry	99,822
Monaghan	71,395
Tyrone	142,437
Connaught—	
Galway	181,686
Leitrim	63,557
Mayo	191,969
Roscommon	93,904
Sligo	78,850

The populations given for the Counties of Dublin, Antrim, Down, Cork, Londonderry, Limerick and Waterford do not include the populations of the County Boroughs situate therein.

T. J. STAFFORD,

March 1912.

MEMORANDUM submitted by T. J. STAFFORD, C.B., F.R.C.S.I., Medical Commissioner of the Local Government Board for Ireland, on CHILDREN AND SCHOOL MEDICAL INSPECTION.

The aggregate number of children in Ireland under the insurance age, according to the census of 1901, was 1,445,008—composed of 733,749 males and 711,259 females. The corresponding figures for 1911 are not yet available, but having regard to the maintained birth-rate and to the lessened death-rate, there is no reason to suppose that the total has undergone any material alteration.

Accordingly, children under 16 years of age may be taken as constituting roughly one-third of the entire population of Ireland.

Of the juvenile population, 700,000 (or close on one-half) are enrolled on the school registers as attending at the primary schools under the supervision of the Commissioners of National Education in Ireland.

Comparing England and Ireland, it appears that during the five years 1901-5, there were annually 4,932 deaths from all causes per 150,000 in England for the age period 0-5, as compared with 3,601 deaths in Ireland. It is to be observed that mortality in infancy and early childhood was appreciably greater in England than in Ireland—a circumstance which does not seem to indicate any unusual weakness of constitution in Irish children at birth.

In the two following age periods covering the school age, Ireland at first slightly, and then more markedly, shows to disadvantage; the details are as follow:—

Deaths per 100,000, 1901-5.

Age Period.	England.	Ireland.
5-10	369	415
10-15	215	322

The result of this examination of the vital statistics below the insurance age shows that the advantage which Ireland holds in regard to mortality in the earliest age period is steadily lost at the two succeeding stages of childhood.

A similar conclusion follows from a study of the comparative figures relating to tuberculosis. Contrasting the decade 1871-80 with the quinquennium 1901-5, it is found that the percentage variations of the rates of mortality from all forms of tuberculosis in England and Ireland have at the age periods covering infancy and childhood been:—

Age Period.	England.	Ireland.
0-5	- 40.5 per cent.	- 24.4 per cent.
5-10	- 23.0 "	- 4.8 "
10-15	- 37.0 "	+ 17.9 "

In this series the most striking features for the present purpose are the trifling decrease in Ireland at the age period 5-10 and the substantial increase in the following age period. It is noticeable that in the earliest age period the rate of diminution in Ireland has been appreciably slower than in England, but nevertheless, the decrease has been considerable, and reflects an important saving of infant life from tubercular diseases. But in the succeeding period (5-10), which is coincident with the beginning of the school age, the decrease in Ireland is almost arrested, while for the close of the school age a positive increase is encountered.

These results are distinctly disquieting and directly raise the question whether there may not be some features in our educational arrangements which exercise a pernicious effect upon the health of the school-children.

The following is an extract from an address, which I delivered in August last before the Preventive

Medicine Section of the Royal Institute of Public Health at their meeting in Dublin:—

"Our school system compels the attendance of children at primary schools at 10 o'clock in the morning, to leave at 3 p.m. Let us consider for a moment what this means to the child. If there is a distance to walk to the school, as there is in most cases in country districts, it means breakfast at 8 a.m., and nothing to eat between that hour and 4 or 5 o'clock p.m. Tired, hungry, possibly wet, working their brains all day in probably ill-ventilated schoolrooms, in company with a crowd of children similarly circumstanced, how can such children grow up healthy men and women? Whatever be the difficulties, they must, in the interests of the health of the rising generation, be faced and dealt with. The schools must be made in every respect sanitary, and the children taught proper physical exercises and the elements of hygiene. Some means must be found to feed the children at the schools. It is impossible to imagine that children who have to walk a distance to and from school, and who eat nothing between a meagre breakfast at 8 a.m. and their dinner at 4 or 5 o'clock, can resist disease. The pressure to send children to school regularly grows stronger every year, and rightly so; but it is obviously unwise to insist upon underfed children being pressed to work, especially in surroundings which are not healthy. This matter is so obvious that I need hardly labour it, yet it has been so long neglected and consequently caused so much illness, death and physical deterioration, that it is necessary that we should, on occasions like the present, direct attention to a matter which goes to the very root of the public health aspect of our educational system.

"Why in this country should we not have a proper system of medical inspection and treatment for school-children? I know of no country where it is more necessary. Go into any of our National schools and examine the children's eyes, ears, noses, throats, teeth and chests, and what proportion of them do you suppose would be passed as sound in all respects? The teeth alone would probably be found extremely defective in 30 per cent.* of the children. Yet dental caries is a fruitful source of ill health!

"I am slow to suggest anything that would increase the overwhelming burden imposed upon the teachers in primary schools in this country, but our first aim as thinking men responsible for the health of the community must be to produce a healthy race, and we must realise that education at the expense of the health of the nation may be too dearly bought. It may be that other subjects in the education curriculum must be dropped, but of this I am convinced, that the health of the children is of more importance than anything in the teaching of the child. I desire to lay stress on the fact that the school age is the susceptible age for contracting disease, and that the most deadly of all diseases, tuberculosis, is for the most part contracted during that age. As I have already shown, Ireland, which commences with a low tuberculosis mortality in infants, has during the school age a markedly increased mortality as compared with England. It is during the age of, say, from 5 to 16 years that the seeds of most of the subsequent illness of life are contracted, so that not only the mortality in this age period is high, but the subsequent damage to health is enormous and incalculable."

* Some important results were recently obtained from a thorough examination of the teeth of 200 children attending a national school in the West of Ireland, which through the public spirit and generosity of Viscount Gough was undertaken in 1909 by two distinguished dental practitioners. In 32.5 per cent. of the children, the condition of the teeth was classified as "very bad" while in only 4.5 per cent. was the description "sound" applied.

The responsibility for the maintenance and conduct of Irish primary schools rest with the manager, who is as a rule a minister of religion, and he appoints the teacher and carries on the financial business of the school. A Government contribution from moneys voted by Parliament is paid in respect of teachers' remuneration, and the heating, lighting and cleansing of school premises, but apart from these subventions, any expenses of school management have to be defrayed by the manager out of any funds that may be at his disposal. These are entirely of a voluntary character.

It will thus be seen that there is no local control and no rate aid towards primary education in Ireland, and the system is not co-ordinated with any of the institutions of local government.

In the absence of correlation between the educational system and county or sanitary administration, there is no possibility of adapting any existing local machinery for the purpose of introducing a system of medical inspection and treatment of school-children. Such inspection, if instituted, must be organised *de novo* in regard alike to scope, finance and supervision. The local authorities, in view of their present severance from the educational system, could scarcely be made responsible for the medical inspection and treatment of school-children, and would no doubt resent being required to contribute out of their rates towards the cost. Further, the Church authorities, with whom, as already mentioned, the provision of primary education mainly rests, have hitherto adopted an uncompromising attitude towards any proposal for the participation of local bodies in the control of public instruction, and would probably regard any municipal system of inspection of school children in the light of an encroachment upon their prerogatives. The school managers have not at their disposal any defined revenue or surplus funds which could be assigned for this service, and moreover, in view of the multiplication of school areas (there are 8,000 schools in Ireland), the absence of uniformity and of facilities for collating and comparing the results of inspection would be a serious objection to any such arrangement.

The Central Government, therefore, remains as the only authority associated with the educational régime of Ireland, which would be in a position to inaugurate

and control medical inspection and treatment of school children with any reasonable prospect of efficient administration and of satisfactory results.

I append a statement kindly supplied to me by the Resident Commissioner of National Education in Ireland, containing the outlines of alternative schemes for the institution of a system of medical inspection and treatment of school children in Ireland. The cost involved is estimated as ranging from 60,000*l.* to 70,000*l.* a year. But whether the arrangements contemplated are to be organised by the Central Government, or by local bodies, they could not be carried into effect under existing statutory powers without Parliamentary sanction.

Pending the adoption of a complete scheme for the medical inspection and treatment of school-children in whatever form it may be ultimately introduced, it might be possible to allocate a proportion of the Sanatorium Grant for institutions specially dealing with children; but it should be borne in mind that the amount which could be applied to this purpose would be relatively small, and moreover that, as it must necessarily be of a capital character, it would be of importance to see that provision, either by local authorities or by voluntary associations, is made for the maintenance and upkeep of these special institutions.

T. J. STAFFORD.

March 1912.

IRELAND.

Deaths from Tubercular Disease.

	1909.	1910.
Phthisis	8,051	7,527
Tuberculous meningitis	728	701
Tuberculous peritonitis and tabes mesenterica	401	386
All other forms of Tuberculosis	1,414	1,402
Total	10,594	10,016

	1909.				1910.			
	Under 5.	5-10.	10-15.	Total.	Under 5.	5-10.	10-15.	Total.
Phthisis	166	130	338	634	112	96	308	516
Tuberculous meningitis	348	160	85	593	322	162	95	579
Tuberculous peritonitis and tabes mesenterica	181	60	29	270	165	46	43	254
All other forms of tuberculosis.								
Lupus	—	—	1	1	—	—	1	1
Tubercle of other organs and general tuberculosis	350	110	115	575	347	105	130	582
Scrofula	6	3	1	10	2	3	2	7
Total	1,051	463	569	2,083	948	412	579	1,939

SYSTEM OF MEDICAL SCHOOL INSPECTION FOR IRELAND.

(1) Centralised—without Local Rate.

In this scheme the system of school inspection would be provided entirely out of parliamentary grants, and carried out by officers appointed by the Commissioners of National Education.

The staff required would consist of school medical officers stationed at convenient centres, with four chief medical officers for supervision and general control of the administration. It is probable that the number of medical officers necessary would be at least as large as the number of inspectors at present required. This would mean a staff of about 70 school medical officers, with 4 chief medical officers, making 74 in all.

The salaries of these officers would be paid entirely by the Commissioners. The following might be the scale, viz. :—

4 chief medical officers, 350*l.*—20*l.*—700*l.*
70 district medical officers, 200*l.*—10*l.* and 15*l.*—500*l.*

These would cost in salaries 15,400*l.* for the first year, and the cost would gradually increase to about 30,000*l.*, at which figure it would probably remain constant.

There would besides be the cost of travelling and personal expenses, which would approximate closely to the charge under this head of school inspection, viz., 15,000*l.* per annum.

The total cost of medical inspection on this basis would amount to 30,000*l.* in the first year, increasing gradually to about 45,000*l.*

As the medical staff would be fully occupied in school inspection, they would be whole-time officers, and would not be allowed to undertake private practice. Their duties of inspection would also so occupy their time as to leave them no time available for treatment of cases, or of general medical work. This might prove an objection to whole-time officers, inasmuch as they would tend to get out of touch with practical treatment of disease.

Each doctor's district would contain about 120 schools, or about 10,000 pupils. Each school would be visited at least once a year. Inspection might, as in England, be confined to the three classes of pupils, known as (1) "entrants," (2) "leavers," and (3) "specials." The "entrants" would comprise all pupils admitted since the last medical inspection; the "leavers" all those in the sixth or higher standards, or others expected to leave in the coming 12 months, and the "specials" are such pupils, not included in the other two classes, as appear to be suffering from disease or of weak constitutions.

In England these three classes of pupils have been found to approximate in number to one-third of the pupils.

As medical inspection does not appear to be of much benefit unless supplemented by provision for the medical treatment of the pupils found to be sick or weakly, further arrangements for "following up" the cases of sickness or disease would be necessary. In England this part of the work devolves generally upon the school nurse, who keeps in touch with the child and visits its home to see that it is getting the necessary attention. It is questionable whether a staff of school nurses should be appointed and paid by the central authority. The "following up" work would necessitate keeping closely in touch with the child, and would hardly be practicable if the nurse lived at a centre 15, 20 or, perhaps, 30 miles away from the child's home. Nurses provided by some local authority and employed part-time only in attending to school children would best deal with such cases. The State might contribute a capitation rate per pupil to their salaries, or better, perhaps, make a fixed contribution to the local authorities towards the salary of each nurse employed in school work.

The school medical officers might be assisted by an advisory local committee consisting of school managers nominated by the Commissioners, these committees to have power to co-opt other suitable persons, men or women, up to, say, one-fourth their number.

The cost of the service of school nurses on the basis of a fixed payment of 20*l.* per annum to each nurse would amount, perhaps, to 12,000*l.* a year. This sum would allow for 600 nurses, *i.e.*, one for every two dispensary districts. The nurse would, of course,

have other duties to perform besides those connected with the school children.

The total cost of the school medical service on the lines here suggested would come to about 60,000*l.* per annum, all out of parliamentary grants.

(2) *Decentralised—with Local Rate.*

Under this plan, the administration of the school medical inspection and treatment would be delegated to local school health committees. The Commissioners would make grants-in-aid equivalent to the sums raised from the rates, and would supervise the work through their medical officers, six in number.

The health committees would be constituted, as to one half the members, of school managers nominated by the Commissioners, and as to the other half, of representatives nominated by the county council. In large counties two or more committees would be necessary, but the rural districts would, as a rule, be too small a unit for a single committee.

The county councils would have power to strike a rate not exceeding 1*d.* in the £ for this service. The valuation of all Ireland being 15,698,532*l.*, a rate of 1*d.* in the £ represents 65,410*l.*, so that a rate of ½*d.* in the £ ought to be sufficient to meet the expenses of medical inspection of school children.

Each committee would have its school medical officer, and would support or help to support a staff of school nurses. A part-time officer, as paid secretary, would also be required.

In electing a school medical officer, the local committee would be required to advertise and make a panel of suitable candidates of, say, six in number; the final selection would be made from one of these six by the Commissioners.

The duties of the school medical officers would be the same as in the centralised scheme. Copies of their reports to the committees would be submitted to the Commissioners. The scale of salaries for the school medical officers would be submitted for approval to the Commissioners.

On the basis of the salaries set forth in the other plan, and allowing for a somewhat increased cost of administration, the joint expense of the medical service might be estimated in its fullest development at 70,000*l.* per annum, of which the Commissioners would pay half, *viz.*, 35,000*l.* In the earlier years of the service the full amount would not reach more than 50,000*l.*, and less if the inspection were not generally adopted throughout the country. Parliamentary powers enforcing its compulsory adoption ought to be obtained.

In addition to the grants-in-aid, the Commissioners would pay the entire salaries and expenses of six supervisory medical officers at a scale of 350*l.* to 700*l.* This would cost about 3,300*l.* in the first year, rising to 5,500*l.* eventually.

MEMORANDUM submitted by E. J. STEGMANN, M.B.

The Royal Commission on Tuberculosis, appointed at the end of the year 1901 to inquire into the relationship between animals and man with regard to tuberculosis, issued its Final Report in July 1911, and has now to all intents and purposes ceased to exist, though its Secretary will continue to act till the remaining volumes of the Appendix to that Report have been presented and issued. The active labours of the Commission ended with the signing of the Final Report, but the work it had to do and would like to have done is unfinished, although in many directions it has pointed out most clearly where further research is needed both for scientific and administrative purposes.

It is doubtful whether any temporary body, such as a Royal Commission, is the best organisation for carrying out a scientific inquiry necessitating long-continued experimental investigation and prolonged original research. The Tuberculosis Commission did not, it is true, follow strictly the precedent set by previous scientific and other Commissions, since it never sought the opinions of other observers, but

based all its reports on facts verified or discovered in its own laboratories. But so long ago as 1907, soon after the issue of the Second Interim Report, it had become apparent to the Commissioners that it would be impossible for them adequately to investigate all the problems contained in their reference (especially those implied in the third term of it) unless they continued their experimental work at Stansted for a prolonged and indefinite period. Further experience confirmed this view, but certain hitherto unknown facts that were discovered in connection with the work on lupus and on tuberculous disease in pigs strengthened the conviction of the Commissioners that it was of urgent importance to the public health that the investigation generally should be continued. Under these circumstances, towards the end of 1908, they submitted to the Local Government Board outlines of a scheme by which the Royal Commission as such would cease to exist, while its work would be carried on without a break under a different organisation. It is not necessary here to enter into the details of this

scheme, but it may be said that its most essential feature was the retention by the Government of the farm and laboratories at Stansted that had been occupied and erected by the Commission—a retention that the owner, Lord Blyth, was willing and eager to facilitate.

It may, perhaps, be safely assumed that the necessity for further and extended experimental research in connection with the problem of tuberculosis does not need to be insisted on, but till something more definite is decided it might be premature to enter into minute detail on either the definite and indefinite questions to be investigated or the administrative and practical parts of the investigation. The following general idea of the problems to be investigated and the methods of investigation may, however, be suggested.

1.—*The Problems to be investigated.*

1. Continued research in connection with lupus, with a view to ascertaining whether any other living human tissue in addition to the skin is capable of modifying types of tubercle bacilli. The Commission has already produced evidence suggesting that the human skin can do this in cases of the lupus form of tuberculous disease.

2. Investigation into the whole subject of tuberculin and careful experiment on living animals to test the effects of the different forms of tuberculin at present known and in use with a view to discovering, if possible, some form of tuberculin that can be used as an effective remedy for the disease in man.

Also to carry out an investigation into the use of tuberculin as a means of diagnosing the presence of tuberculous disease in man, whether by subcutaneous injection or otherwise, with a view eventually to standardising the manufacture of tuberculins.

3. Investigation into the question of the possibility of naturally acquired or artificially produced immunity to infection caused by the tubercle bacillus of one type by a previous infection from the tubercle bacillus of another type, and in this connection to study the possibility of a small infection by the bovine tubercle bacillus received in infancy or childhood protecting against a larger infection in later life by the human tubercle bacillus.

4. Research into the possible danger of milk-producing cows or heifers that had been vaccinated when calves with vaccines made from human tubercle bacilli, eliminating later on human tubercle bacilli in their milk, though themselves apparently healthy.

5. Continuation on a large scale of the investigation commenced by the Commission into the presence of the bovine tubercle bacillus in cases of human consumption (pulmonary tuberculosis) by means of the examination of cultures of living tubercle bacilli obtained from the sputum of such patients.

The results of the preliminary investigation into this subject by the Commission showed that uncomplicated pulmonary phthisis in adults may be caused apparently by the bovine tubercle bacillus alone.

6. An elaborate and long-continued investigation on living animals should be carried out in continuation of the work of the Commission to throw light on the following matters of great practical and administrative importance as well as of scientific interest:—

- (a) The means of access to the human body of tubercle bacilli of the various different types, and the channels by which the infection is spread.
- (b) The amount and frequency of the dose necessary to produce infection.
- (c) The danger to man by ingestion of the flesh of tuberculous animals.

2.—*The Methods of Investigation.*

1. The appointment of a small advisory committee of expert scientific men to act much as the members of the Royal Commission did, but without the limitations of Terms of Reference.

The committee should include at least one person with experience of Local Government Board administration.

The committee would consider and discuss the various problems requiring investigation, and their

relative practical and administrative as well as scientific importance, devise the general outline of the experiments, and keep in close touch with their progress. It would receive the scientific reports from the actual investigators and publish, whenever considered necessary or expedient, bulletins as well as possible periodical reports.

2. The provision of a fixed annual sum of money to meet all the expenses of the investigation. Experience gained during the investigations of the Royal Commission has clearly proved the necessity of a fixed sum. Extreme difficulty frequently arose in framing estimates to meet the expenses of experiments the extent and results of which could not possibly be forecast often fifteen months ahead. With a fixed annual income the Committee would work with more economy and greater security, and its expenditure would, of course, be subject to Treasury criticism and Government audit.

3. The establishment of a suitable place for the experimental work is absolutely necessary. The place must be fairly isolated and have sufficient land round it.

It must include suitable buildings for animals and have a well-equipped laboratory with the necessary additions, such as a destructor for disposing of infected material, &c.

The farm in the occupation of the Royal Commission at Stansted, though perhaps not ideal, was adequate and convenient as adapted by the Commission. This place, Blythwood Farm, is still unoccupied. The laboratories, &c., erected by the Commission remain, and the animal buildings built or adapted are still there.

The scientific apparatus has been transferred to another Government laboratory, but some of the things not needed there have not yet been removed.

The present views and intentions of the owner, Lord Blyth, are not known, but even if this place is not available, it would serve as a model for what is wanted, and possibly the main laboratory building could be transferred elsewhere.

A resident staff would be required. Provisionally this should consist of one highly qualified and experienced scientific investigator, with the necessary subordinate officers and a sufficient number of laboratory assistants, farm hands, &c.

The suggestion may perhaps be allowed that it would be of the very greatest advantage if Dr. A. Stanley Griffith, of whose work as scientific investigator the Royal Commission could not speak sufficiently highly, could be appointed to this post.

4. It is important that co-operation should be established between sanatoria and hospitals for tuberculous patients and the experimental establishment. For instance, in the systematic examination of a large number of cases the material, either clinical or post-mortem, would be collected by the doctors in charge at the sanatoria with proper care, and clinical symptoms and family histories of the patients would be accurately recorded by them. The specimens would be sent to the central laboratory for examination, and the data thus obtained would be valuable and complete. It is not suggested that experiments on either animals or patients should be carried out at sanatoria or at hospitals, though in many cases cultures could be made at the bedside when the doctor in charge had the necessary skill. But it has been found that tuberculous patients are always willing to assist in scientific investigation of their own cases. The effect of different tuberculins could be tested as at present, with the enormous additional advantage that the tuberculins could be made at the laboratory, would have known pedigree and be of definite origin, while the effects would be noted on patients whose individual disease was caused by a tubercle bacillus the cultural characters and virulence of which would be also accurately known.

In making the above outline suggestions it has not been forgotten that a laboratory has been established in connection with the Local Government Board for the investigation (amongst numerous other matters) of certain tuberculosis questions. This laboratory is under the direction of a highly qualified man, and no adverse criticism whatever is intended. But it may be said at once that the situation of the laboratory in a crowded

street, its small staff and entire lack of accommodation for anything but a small number of small animals, together with a large amount of other work of a routine and administrative character that has to be carried out there, make it absolutely unsuitable for properly investigating the wide and difficult problems of tuberculosis.

3.—Financial.

It is difficult to fix the actual amount of the annual grant of money necessary to cover the cost of research into tuberculosis, as obviously the sum required must largely depend on the scope and extent of the work to be done. But provisionally it is estimated that to carry out the suggestions above made an annual income of about 8,000*l.* would suffice, at all events for the first few years. This sum is equivalent to about one-tenth of the maximum total that it is supposed will be available for research generally under the

provisions of the Insurance Act (section 16 subsection 2 (b)). This estimate does not include any capital outlay that will be required for establishing the central farm and laboratory, but the accounts of the Royal Commission are available and can be referred to for estimating any preliminary or capital expenditure.

Of the suggested income, about 5,000*l.* would be necessary for the expenses of the central farm and laboratory. The balance of 3,000*l.* would be required for payments in connection with a few small laboratories (non-licensed) that should be maintained in one or two of the larger sanatoria or institutions, for the collection and preliminary preparation of specimens. It would also probably suffice to cover the cost of travelling and obtaining material for examination from general hospitals (for surgical cases) and other institutions not limited to the treatment of tuberculous patients only.

March 1912.

MEMORANDUM submitted by H. J. STILES, M.B., F.R.C.S. Edin., Surgeon to the Royal Edinburgh Hospital for Sick Children, and to the Chalmers Hospital, Edinburgh.

During the 13 years that I have been full Surgeon to the Royal Edinburgh Hospital for Sick Children I have had exceptional opportunities of studying the surgical forms of tuberculosis which are met with during childhood. Although I have not attempted to prove the fact by statistics, it is my belief that, per head of the population, these forms of tuberculosis occur with exceptional frequency in Scotland.

The situations in which surgical tuberculosis is most frequently met with in children are the bones and joints, and the lymphatic glands. I shall confine myself, therefore, to these diseases.

From the clinical experience I had already gained at the Royal Edinburgh Hospital for Sick Children I was not disposed to accept the statement made by Koch in the memorable paper which he read in London in 1901, in which he stated that "the bacillus of human tuberculosis was incapable of producing tuberculosis in bovines," and that "the bacillus of bovine tubercle was to be considered as practically incapable of transmission to man, and that consequently the danger of contracting phthisis from the milk or meat of tuberculous bovines need no longer be guarded against." I had come to the conclusion that clinical evidence strongly supported the idea that tuberculous milk was a common means by which infants and young children became infected with bone and joint and gland tuberculosis. After hearing Koch's paper I investigated the matter still more closely, and the more I did so the more I became convinced not only of the error of his teaching, but also of its harm to the community.

The following histories will serve to illustrate the kind of clinical evidence I refer to:—

- (1) A child, aged nine months, operated on for multiple osseous tuberculosis. On inquiring into the family history it was found that the parents were free from tubercle, as also were the older children. The child had been brought up on milk obtained from a small farm in the neighbourhood. Dr. A. P. Mitchell, on paying a visit to the farm, discovered that the byre contained six cows, two of which had tubercular udders. The milk from both these animals was found to be teeming with tubercle bacilli.
- (2) Another example refers to a child, 18 months old, who suffered also from multiple osseous tuberculosis, along with tuberculosis of the cervical and mesenteric glands. Death occurred six months later from tuberculous meningitis. The parents as well as the older children were all free from tubercle. I was informed that two cows were kept on the home farm for the special use of the household, that they had both been tested with tuberculin six months previously, and that neither of them reacted.

I suggested that they were probably too tuberculous to react, and I advised the father, who was a wealthy man, to destroy them. This was done, with the result that both animals were found to be suffering from general tuberculosis, and one of them had a tuberculous udder.

- (3) A third instance is that of a child, aged one year and five months, who was brought to the Surgical Out-Patient Department of the Royal Edinburgh Hospital for Sick Children suffering from multiple osseous tuberculosis. Dr. Mitchell elicited the following appalling history from the mother:—The baby had been bottle-fed with milk obtained from a small dairy farm. The mother had been informed by the child's grandfather, who worked on the farm, that soon after the birth of the child one of the cows had "gone wrong." He told how the animal had rapidly wasted and become so weak that it was unable to stand. It was actually milked lying on the ground, and this milk was used for human consumption. By this time it was thought expedient to call in a veterinary surgeon who, finding the animal suffering from generalised tuberculosis with marked involvement of the udder, at once ordered its destruction and burial.

Thanks to the excellent work done by the British Royal Commission on Tuberculosis, we are now able to say in a given case whether the disease is of bovine or human origin. The number of cases, however, of surgical tuberculosis investigated by the Commission was not sufficient to enable a general statement to be made as to the relative frequency of the two forms of infection. No doubt the relative frequency will be found to vary in different districts, depending on the extent to which raw milk is used as a food, and on the prevalence of tuberculosis amongst the cows that supply it.

With the wealth of tuberculous material at my disposal,* it occurred to me that it ought to be utilised to supplement the work of the Commission in this respect. I accordingly arranged with Dr. John Fraser and Dr. A. P. Mitchell, two of my former house surgeons who had shown special aptitude for scientific investigation, to undertake the work. Dr. Fraser, who is also my private assistant, undertook the investigation in regard to the bones and joints, while Dr. Mitchell

* During the year 1911 694 patients were admitted into the surgical wards of the Royal Edinburgh Hospital for Sick Children, and of these 173 (25 per cent.) suffered from surgical tuberculosis. In practically all of them the disease was so severe and advanced that operation was called for. Besides the cases admitted into hospital large numbers were treated in the Out-Patient Department.

concerned himself with the cervical lymphatic glands and the tonsils. Dr. Mitchell also endeavoured, as far as possible, to trace the source of the milk infection in the bovine cases.

I may state that the material for these investigations has been derived almost entirely from cases operated on by myself at the Royal Edinburgh Hospital for Sick Children. The advantage of this combination is that we have been able to correlate the pathological findings with the histories and clinical features of the cases. I should state also that the scientific work of these two gentlemen has been carried out at the Laboratory of the Royal College of Physicians of Edinburgh, where they have received every encouragement and assistance from Dr. James Ritchie, the superintendent.

The methods they have employed for distinguishing between the two forms of infection are the same as those used and recommended by the Tuberculosis Commission.

RESULTS OF DR. FRASER'S INVESTIGATIONS TO ASCERTAIN THE RELATIVE FREQUENCY OF BOVINE AND HUMAN INFECTIONS IN CHILDREN OPERATED ON AT THE ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN FOR TUBERCULOUS BONE AND JOINT AFFECTIONS.

Dr. Fraser has just embodied the results of his very important and laborious investigations in the form of a thesis to be submitted for the Degree of Doctor of Medicine of Edinburgh University. He has kindly supplied me with a copy of the table (*hereto appended*) he has drawn up showing the results obtained in the cases whose investigation he has completed. It will be seen that these amount to 70. When it is pointed out that, in addition to the histological and culture work, each inoculation experiment extends over three months, the Committee will realise the labour which the research has entailed.

I have also forwarded a copy of Dr. Fraser's conclusions. It will be seen that 60 per cent. of the cases of bone and joint tubercle investigated were due to the bovine bacillus, that 37 per cent. were due to the human bacillus, and that in 3 per cent. both forms of bacilli were present.

Of the 29 cases in which the human bacillus was found, it is important to note that in 18 (62 per cent.) there was a history of pulmonary tuberculosis in one or other parent, and in these it is only reasonable to infer that the child was infected from the parent. The necessity for some form of segregation in these cases is obvious.

Conclusions of Dr. Fraser's Thesis.

1. It is possible to distinguish absolutely between human and bovine tuberculosis.
2. The most satisfactory test in the differentiation of the organisms is the inoculation of a rabbit with .01 mg. of tubercle bacillus intravenously. In the case of the bovine bacillus this produces a rapid dissemination of tuberculosis and death; in the case of the human bacillus the lesions are limited and retrogressive.
3. By the ingestion of cows' milk infected with the bovine bacillus, it is possible to infect human beings with bovine tuberculosis.
4. In children we have found that the occurrence of bone and joint tubercle which is due to the bovine bacillus amounts to 60 per cent.
5. The occurrence of bone and joint tubercle which is due to the human bacillus amounts to 37 per cent.
6. Those cases which are due to infection with the human bacillus are those which have become infected by residence with a consumptive.
7. In 3 per cent. of the cases we have found that both the human and the bovine bacillus were present.
8. The occurrence of the enormous proportion of bovine tuberculosis is the inevitable result of an imperfect legislation, and a still more imperfect system of dairy and milk inspection.
9. The human element in the infection could be largely eliminated by the proper isolation of consumptives.

RESULTS OF DR. MITCHELL'S INVESTIGATIONS TO ASCERTAIN THE RELATIVE FREQUENCY OF BOVINE AND HUMAN INFECTIONS IN CHILDREN OPERATED ON AT THE ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN FOR TUBERCULOUS CERVICAL ADENITIS.

The total number of cases of tuberculous cervical adenitis under investigation is 110. Up to the present time the observations have been completed in 27, with the remarkable result that in all the infection has been of bovine origin. Dr. Mitchell has also completed the investigations of three adult cases with the same result, namely, that they were all bovine.

Forty out of the 110 patients from whom the cervical glands were removed had their tonsils excised as well, and of these, 38 per cent. were found to be tuberculous by histological examination and experimental inoculation. Up to the present in only five has the type of bacillus been ascertained, and of these one was human and the others bovine.

As far, therefore, as Dr. Mitchell's investigations have gone, all the tubercular cervical gland cases he has examined have contained the bovine bacillus—a fact which cannot be too strongly emphasised.

The fact, too, that the tonsils were found to be tuberculous in 38 per cent. of the patients in which they were removed goes to confirm the view generally held that the faucial and pharyngeal tonsils are important portals by means of which the bacilli gain access to the glands. No doubt also the majority of cases of bone and joint tuberculosis in children are hæmatogenic infections secondary to tuberculous disease of the lymphatic glands.

According to information furnished me by Dr. Mitchell, it would appear that in Scotland, at any rate in the smaller towns and villages, there is practically no veterinary inspection at all, while in the larger towns it is totally inadequate. For example, in Edinburgh, one veterinary surgeon of the Public Health Department is expected to examine the 2,800 cows in the city byres (approximately 80) at intervals of not more than three weeks. In addition, he endeavours to inspect those in the 250 byres outside the city. Referring to the City report for the year 1910, one finds that 1,439 inspections of the city byres are recorded as against only 30 inspections of the byres beyond the city. As a result of these inspections, 36 cows which contributed to the city's milk supply were ordered to be removed on account of their tuberculous condition. In 20 of these the udder was involved, and in each tubercle bacilli were found in the milk.

Under the provisions of the Public Health (Scotland) Act, 1897, and the Edinburgh Municipal and Police (Amendment) Act, 1891, the owner of such an animal is ordered to have it removed within a specified time, viz., 24 hours after the official notice is served, but it is left entirely to his own discretion to dispose of the diseased cow as he may think fit. As no method of branding such animals is employed, there is no reason why a tuberculous cow may not be transferred to another herd in or outside the city, in which case it may continue to contribute to the city's daily milk supply. Quite frequently such tuberculous animals find their way to the north of England.

Although it is an undoubted fact that tuberculous milk is much more dangerous than tuberculous meat, yet the extraordinary anomaly still exists, viz., that, while the local authorities have power to seize and destroy tuberculous animals exposed for sale for food purposes, they have no power to destroy cows suffering from general or "open" tuberculosis, not even those with tuberculosis of the udder, the milk from which may be literally teeming with tubercle bacilli, so much so that one such animal may very seriously infect the mixed milk of a whole herd.

In this relation I may mention that in several cases in which Dr. Mitchell has traced the milk supply of more than one tubercular child to the same dairy, he has succeeded in discovering a cow with tuberculosis of the udder amongst the herd which supplied the dairy.

In view of these findings it becomes a question as to how far it will become necessary to institute a system of compulsory notification of surgical tuberculosis, at any rate in young children.

It is to be hoped that before long investigations similar to those which are being carried out by Drs. Fraser and Mitchell will also be undertaken with the object of ascertaining the relative frequency of bovine and human infection in the two most important medical forms of tuberculosis in childhood, namely, tuberculous meningitis and pulmonary tuberculosis.

As far as surgical tuberculosis in childhood is concerned, it is evident from the researches of Drs. Fraser and Mitchell that the bovine bacillus plays a far more important rôle in the causation of the disease than does the human bacillus.

Since the prevalence of bovine tuberculosis in milch cows has now been proved to be the main cause of surgical tuberculosis in children, it is to be hoped that the Government and Local Public Health Authorities will now realise their responsibility in the matter and take the necessary steps to gradually stamp out bovine tuberculosis, and meanwhile to reduce to a minimum the possibility of the public being supplied with milk poisoned with tubercle bacilli.

With regard to the treatment of existing cases of surgical tuberculosis in children, it is to be pointed out that some of the cases which, under present conditions, have to be treated by operation in our large urban hospitals would get well without operation if suitable institutions were provided where they could receive conservative treatment in an open-air hospital suitably situated in the country. Although it would suffice perfectly well to have such institutions inexpen-

sively built and economically staffed, yet it must be remembered that to bring about a cure of the disease the treatment must be prolonged over many months, and it is for this reason that a policy directed towards prevention by the stamping out of bovine tuberculosis would be the more economical in the long run.

Besides the general importance of the considerations I have put forward in relation to the health of the community, there are two aspects of the situation which appear to me noteworthy from the special standpoint of the Committee:—

- (1) The majority of the children who suffer from disease of bovine origin, especially bone and joint disease, grow up to be wage-earners. Their capacity for work may, however, be seriously diminished by the permanent alterations in the bones and joints resulting from disease in childhood. Further, in the earlier years of adult life recrudescence of the tubercular mischief is not uncommon, and this may necessitate sick benefits being claimed. Preventive measures directed against bovine tuberculosis are thus of great economic importance.
- (2) The results obtained in Edinburgh make it very advisable to ascertain, by the application of research methods, the degree of prevalence of the preventable bovine type of tuberculosis in different localities and in different classes of the population.

March 1912.

ANALYSIS OF CASES.

COPY OF DR. JOHN FRASER'S TABLE, SHOWING THE RESULTS OF HIS INVESTIGATIONS INTO THE TYPE OF INFECTION IN 70 CASES OF BONE AND JOINT TUBERCULOSIS OPERATED ON BY MR. HAROLD J. STILES, F.S.C.S. ED., IN THE ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN.

No.	Case.	Age.	Disease.	Family History.	Milk Supply.	Culture.	Organism.			Inoculation.	Result.
							Morphology.	Special Test.	Smith's Test.		
1	H. M.	10 4	T.B. Hip	Pul. Tubercle	Breast fed	Human	Human	Human	Human	Human	Human
2	A. T.	2 6	T.B. Hip	Pul. Tubercle	Breast fed	Human	Bovine	Human	Human	Human	Human
3	M. C.	6 0	T.B. Hip	Pul. Tubercle	Breast fed	Human	Human	Human	Human	Human	Human
4	W. B.	7 1	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
5	J. E.	7 0	T.B. Knee	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
6	B. P.	3 6	T.B. Elbow	Nil	Breast fed	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
7	M. L.	7 3	T.B. Knee	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
8	M. C.	10 0	T.B. Dactylitis	Pul. Tubercle	Breast fed	Human	?	Human	Human	Human	Human
9	J. F.	0 11	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
10	D. D.	5 0	T.B. Knee	Pul. Tubercle	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
11	J. F. G.	1 7	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	Bovine	Bovine	Bovine
12	J. V.	3 0	T.B. Ankle	Pul. Tubercle	Mixed	Human	?	Human	—	Human	Human
13	A. M.	2 10	T.B. Femur	Nil	Mixed	Bovine	Bovine	Bovine	—	Bovine	Bovine
14	H. T.	6 6	T.B. Tarsus	Nil	Breast fed	Human	Human	Human	—	Human	Human
15	G. Y.	2 10	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	?	—	Bovine	Bovine
16	M. G.	0 9	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
17	M. S.	0 10	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
18	F. B.	3 0	T.B. Knee	Nil	Breast fed	Bovine	Bovine	Bovine	—	Bovine	Bovine
19	A. R.	0 7	T.B. Dactylitis	Nil	Bottle fed	Bovine	Bovine	Bovine	—	Bovine	Bovine
20	G. S.	4 7	T.B. Tibia	Pul. Tubercle	Mixed	Bovine	Bovine	Bovine	—	Bovine	Bovine
21	K. R.	3 0	T.B. Skull	Nil	Breast fed	Human	Human	Human	—	Human	Human
22	W. B.	2 6	T.B. Dactylitis	Nil	Mixed	Bovine	?	Bovine	—	Bovine	Bovine
23	D. D.	1 7	T.B. Ankle	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
24	A. N.	1 10	T.B. Humerus	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
25	W. B.	8 0	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
26	J. L. P.	6 0	T.B. Knee	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human
27	J. R.	2 4	T.B. Ankle	Viscous T.B.	Breast fed	Bovine	?	Bovine	—	Bovine	Bovine
28	G. N.	3 0	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
29	A. M.	2 0	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
30	M. P.	4 0	T.B. Dactylitis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
31	G. B.	10 11	T.B. Elbow	Nil	Cows' milk	Human	Human	Human	—	Human	Human
32	M. E.	1 5	T.B. Tarsus	Nil	Cows' milk	Human	Human	Human	—	Bovine	B. & H.
33	D. A.	1 3	T.B. Knee	Pul. Tubercle	Cows' milk	Bovine	Bovine	Bovine	—	Human	Human
34	A. D.	7 0	T.B. Hium	Nil	Mixed	Bovine	Bovine	Bovine	—	Bovine	Bovine
35	M. D.	3 0	T.B. Tarsus	Nil	Mixed	Bovine	?	Bovine	—	Bovine	Bovine
36	D. D.	1 5	T.B. Ankle	Pul. Tubercle	Breast fed	?	?	Human	—	Human	Human
37	J. G.	12 0	T.B. Malar	Pul. Tubercle	Cows' milk	Bovine	?	Bovine	—	Bovine	Bovine
38	J. R.	1 4	T.B. Tibia	Nil	Breast fed	Bovine	Bovine	Bovine	—	Bovine	Bovine
39	J. C.	8 0	T.B. Hip	Gland T.B.	Breast fed	Human	?	Human	—	Human	Human
40	A. M.	2 8	T.B. Elbow	Nil	Breast fed	Bovine	Bovine	Bovine	—	Bovine	Bovine
41	W. S. C.	3 0	T.B. Femur	Pul. Tubercle	Cows' milk	Bovine	?	Bovine	—	Bovine	Bovine
42	W. B.	7 1	T.B. Jaw	Pul. Tubercle	Cows' milk	Human	Human	Human	—	Human	Human
43	J. F.	1 8	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
44	D. S.	4 0	T.B. Hip	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human
45	W. W.	2 11	T.B. Skull	Nil	Cows' milk	Human	Human	Human	—	Bovine	H. & B.
46	W. H. S.	2 0	T.B. Hip	Nil	Mixed	Bovine	?	Bovine	—	Bovine	Bovine
47	H. M.	10 11	T.B. Hip	Pul. Tubercle	Breast fed	Bovine	?	Bovine	—	Bovine	Bovine
48	H. C.	7 0	T.B. Hip	Nil	Cows' milk	?	Bovine	Bovine	—	Bovine	Bovine

No.	Case.	Age.	Disease.	Family History.	Milk Supply.	Culture.	Organism.			Inoculation.	Result.
							Morphology.	Special Test.	Smith's Test.		
		Y. M.									
49	P. M.	1 3	T.B. Hip	Pul. Tubercle	Cows' milk	Human	Mixed	Human	—	Bovine	H. & B.
50	P. M.	5 0	T.B. Knee	T.B. Meningitis	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
51	A. D.	4 0	T.B. Femur	Nil	Breast fed	Bovine	Bovine	Bovine	—	Bovine	Bovine
52	J. F.	5 8	T.B. Hip	Nil	Breast fed	Human	Human	Human	—	Human	Human
53	P. M.	3 6	T.B. Dactylitis	Nil	Breast fed	Human	Human	Human	—	Human	Human
54	R. S.	3 6	T.B. Dactylitis	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human
55	K. C.	7 0	T.B. Knee	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human
56	J. F.	3 0	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
57	R. F.	5 0	T.B. Ankle	Pul. Tubercle	Breast fed	?	Human	Human	—	Human	Human
58	B. S. C.	5 0	T.B. Femur	Nil	Breast fed	Human	Human	Human	—	Human	Human
59	J. R.	47 0	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
60	E. F.	30 0	T.B. Dactylitis	Tubercle	?	Human	Human	Human	—	Human	Human
61	N. C.	25 0	T.B. Vertebra	Nil	?	Human	Human	Human	—	Human	Human
62	A. C.	24 0	T.B. Ankle	Tubercle	?	Human	Human	Human	—	Human	Human
63	P. D.	3 0	T.B. Femur	Gland T.B.	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
64	P. R.	4 0	T.B. Tibia	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
65	R. C.	8 6	T.B. Ankle	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human
66	S. N.	4 0	T.B. Hip	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
67	D. S.	2 0	T.B. Os Calcis	Nil	Cows' milk	Bovine	Bovine	Bovine	—	Bovine	Bovine
68	W. B.	8 0	T.B. Hip	Nil	Mixed	Bovine	Bovine	Bovine	—	Bovine	Bovine
69	T. F.	47 0	T.B. Hip	Nil	Breast fed	Human	Human	Human	—	Human	Human
70	R. F.	5 0	T.B. Ankle	Pul. Tubercle	Breast fed	Human	Human	Human	—	Human	Human

Footnote.—It may be noted that in four out of the five adult cases recorded in this table, the infection was of human origin.

MEMORANDUM submitted by Sir WILLIAM J. THOMPSON, M.D., Registrar-General for Ireland.

PREVENTIVE ASPECT.

Regarding the problem of tuberculosis in general, and particularly in its preventive aspect, it is now universally admitted:—

- That, from the moment of birth, the individual is open to infection from the disease;
- That, under conditions which enable a normal and healthy existence, the bacillus is unable to make a permanent establishment in the human body.

Admitting these premises, the following objects should be aimed at:—

Birth.—Into a healthy home with sanitary surroundings.

Infancy.—Nursing by mother if possible, and if not, a guaranteed supply of milk.

School Age.—A well-appointed school, rooms with perfect ventilation and sanitary accommodation. The school hours should not be excessive or the distance from home too long. A meal should, if necessary, be provided in the school. Open-air schools should be established for delicate children.

All these conditions are deplorably lacking in many parts of Ireland. The death-rate for children up to 15 years of age is high, and often the germ of the disease which is implanted during childhood develops later on.

The following appointments would markedly facilitate improvement, and steps should be taken to have them carried into effect as soon as possible:—

- The appointment of a whole-time medical officer of health for each county (at present there are only two such, one in Dublin and one in Belfast).
- Compulsory medical inspection of schools.

If these measures were adopted I feel certain the number of deaths from tuberculosis amongst children would rapidly fall and future illness be prevented.

Adolescence.—What should be aimed at would be a life so regulated as to keep the constitution strong and able to resist infection. This would mean living in healthy homes, proper dieting, reasonable work hours and recreation, working under favourable hygienic conditions, &c. There is at this period of life a large emigration of both sexes from Ireland, generally of the most energetic of their number, which has a weakening effect on the population of the country. In reference to this emigration it is a well known fact that patients having developed tuberculosis in the United States and Canada are deported; these unfortunates not being

credited to the population of Ireland and their deaths largely increase our death rate. This condition appears to demand public attention as it is a danger to the community. It cannot be too strongly urged that some arrangement should be made whereby the central or local authority should be notified of their return.

Education.—An extensive educational propaganda including hygiene, public and personal sanitation, food, &c., specially for the young, should be formulated and carried out, with the object of enlightening the people and laying particular stress on the incidence of tuberculosis. Of late, the public, generally, has taken a greater interest in this subject than some years ago, and it only requires proper organisation to be productive of lasting benefits in the way of prevention.

Special educational facilities should be afforded to poor people, with instructions as to the best and most nourishing dietary suitable to their different stations of life.

In addition, the central and local bodies should have strict control over the food supplies, more particularly that of milk.

After Care.—This is an important section of preventive work which should be developed. (At present there is only one organisation in Ireland which does any work in this direction).

Preventorium.—These are institutions for the benefit of debilitated people who have been subject to the infection of tuberculosis, and who have not yet contracted the disease (this applies particularly to children and young people). By rest, good food, and fresh air, their strength is so built up that they are able to resist the disease, which otherwise doubtless they would have contracted.

Research in Tuberculosis.—No special work has been done (except voluntary) in Ireland in this direction. Some arrangements should be made for this important branch of prevention in tuberculosis.

CURATIVE ASPECT.

As regards the curative aspects of tuberculosis, it is agreed that patients should come under medical observation in the early or incipient stage, as it is such cases that are best fitted for sanatorium treatment. The difficulty is to get the patient at this early stage, and to facilitate the discovery of early cases; the notification of tuberculosis should be compulsory. The medical officer of health or other medical practitioner should follow up the the family from which a case is notified and examine each individual member. In this way incipient

cases can be traced and even those persons who are in a pre-tubercular state can be dealt with. If it were practicable to deal with each family in this manner, it would be possible, at least, to arrest the disease in those members of the family who have already contracted it and are in the first stage, and to prevent other members developing it. All incipient cases should get sanatorium treatment, even if only for a short time, as, in addition to the curative benefits received, it is an educational factor which cannot otherwise be gained. It is possible that some individuals, those with suitable residences, surroundings, &c., might be treated by the "Home" method. Even these, if they could have a short stay in a sanatorium, would be better able to carry out "Home treatment," and would not be such a care to the doctor and nurse, and would be more helpful to themselves.

Together with sanatoriums there should be tuberculosis dispensaries throughout the country, where, in addition to the ordinary work of the dispensary, difficult or doubtful cases could be sent in order to have the diagnosis verified. In large towns the dispensary is an absolute necessity, for it is by means of these institutions that all the members of the consumptive's family can be examined and dealt with, and cases followed up and traced, &c.

There should also be homes for cases in the second stage of the disease, as it is shown that, a fair proportion of such cases improve as a result of treatment.

If it were found impossible to deal by means of institutions with all cases, "Home treatment," with its adjuncts, day and night camps, should be carried out, as mentioned before, in selected cases. The patients at home would require careful medical and nursing supervision, and when this is done and the instructions given are properly carried out, with suitable dietary, &c., the results are surprisingly good. One advantage of this method is that as the nurse visits the home frequently, she instructs the patients and members of the family as to the value of fresh air, food, &c.

Tuberculin should be used in all suitable cases.

THE PROBLEM OF THE TREATMENT FOR TUBERCULOSIS IN IRELAND STANDS AS FOLLOWS:—

Within four months the National Insurance Act comes into force, with the provision that consumptive patients are to receive the benefits of sanatorium treatment at once.

The number of deaths from tuberculosis in Ireland for 1910 was 10,916, and this means that there are about 80,000 consumptives in the country. It is calculated that over 1,000,000 persons in Ireland will be insurable. Proportionately the Insurance Committees would have to deal with about 20,000 consumptives, but as the average death-rate amongst the insurable class is higher than for the rest of the community, 25,000 would be a more accurate estimate of the number of tuberculosis patients to be dealt with by these committees.

Out of this 25,000 about 4,000 might be reckoned as advanced and incurable cases. These should be provided for in special homes for such cases. Between 7,000 and 8,000 would be suitable cases for sanatorium treatment, and the remainder could be looked after at home, through the medium of the tuberculosis dispensaries, specially trained nurses, health visitors, &c.

In Ireland at present (outside the Poor Law) there are only about 200 beds available for advanced cases, and 400 beds for sanatorium treatment. To deal with 4,000 advanced cases, up to 1,000 beds would be necessary, and to provide sanatorium accommodation for between 7,000 and 8,000 patients about 2,000 beds would be required. These numbers are only approximate, but after careful consideration I think the estimate will be found to be fairly accurate.

It would be impossible for Government and Local Bodies to deal with the matter of providing sufficient accommodation within the time available before the Act comes into operation by the erection of new buildings.

RECOMMENDATIONS.

Sanatoriums.—I would suggest that the managers of different sanatoriums, and other organizations now at work in the anti-tuberculosis campaign, be approached, and arrangements made for the erection and maintenance of an increased number of beds. Again, that negotiations should be entered into with the County Infirmaries in Ireland, with a view to the erection of shelters within their grounds. In this way from 800 to 1,000 beds could almost be ready by July, at the cost of, say, about 40*l.* per bed.

Homes for Advanced Cases.—To deal practically with beds for advanced cases seems a little more difficult. The present institutions for such cases could be enlarged and suitable houses, where bed accommodation could be extended, taken in different parts of the country. It might be possible to utilise the buildings of the unused isolation hospital in some of the Poor Law Workhouses, but only where these buildings are situated a considerable distance from the main building. In this way, these isolation hospitals could be totally cut off from the workhouse. These institutions should be called "Homes," and made as homelike as possible, so that the rooted objection of going to an institution may be removed.

Dispensaries.—In Ireland there is only one tuberculosis dispensary in Dublin, and one in Belfast, in connection with the Foster Green Hospital for Consumptives, and, as a beginning, one should be established in each of the remaining 20 urban districts with a population of 10,000 or over. These could be gradually extended, so that, ultimately, there would be one in each county. The medical officer attached to the dispensary would become a consultant or expert in the matters of diagnosis, recommendation as to treatment, advice for after care, and such like.

Home Treatment.—With specially trained nurses under strictly medical supervision, good work could be done, principally amongst those patients who are in the late second stage of the disease and who are such a source of infection to other members of their families.

THE WOMEN'S NATIONAL HEALTH ASSOCIATION.

This is the only organization in Ireland capable of dealing in a comprehensive manner with the tuberculosis problem.

The Association has at present got a tuberculosis dispensary in Dublin, a preventorium at Sutton, co. Dublin, with 22 beds, 38 beds in the Allen A. Ryan Home Hospital (which institution is used for cases in the second stage), 12 beds in the Queen's County Sanatorium at Maryborough (an annexe to the County Infirmary, erected by the local branch of the Association), 6 beds at Ennis, also erected by the local branch, while preparations are being made to open a sanatorium at Clifden to accommodate 24 patients.

There are 150 branches of the Association throughout Ireland, and about 40 nurses, some of whom are specially trained in tuberculosis work and devote all their time to consumptive patients, others deal with school children, &c.

There is also a Health Exhibition, including sections in tuberculosis, nursing, infant care, food milk, housing, &c., ready to be taken to any large centre, and this has proved most successful from an educational point of view. Several of the branches have established classes for mothers, babies' clubs, help for expectant mothers, after-care committees, and such like.

It is thus seen that the Association embraces all conceivable health work.

For the past 2½ years it has dealt with the sum of about 20,000*l.* in carrying on all these different organizations. It is, therefore, in a position, if financially assisted, to render valuable help in this matter.

SUGGESTED FINANCE.

I would strongly urge that a certain proportion, say, 25 per cent. of the money apportioned to Ireland, out of the 1,500,000*l.* given by the Chancellor of the Exchequer for the erection of sanatoriums, &c., should

be allocated to the Women's National Health Association. This money would be expended with the approval of some Government authority.

With this financial assistance given to the Central Council, with the 150 branches ready and willing to co-operate, more preventoria would be established—

- “Sanatorium beds made available (by the extension of the Allan A. Ryan Home Hospital, at least 100 beds could be provided;
- Tuberculosis dispensaries could be opened;
- Individual cases could be looked after in the houses selected by the branches;
- Tuberculosis nurses could be employed;

- “Health lecturers engaged;
 - “Provision made for the prevention and cure of the disease amongst children;
 - “Attention paid to the production of pure milk and food supplies”;
- and all the other branches of health work of the Association now carried on could be augmented.

Besides, the organisation of the Association is so perfect with its central council and branches, that all these auxiliary departments could be in full working order within a few months.

WILLIAM J. THOMPSON.
March 1912.

MEMORANDUM submitted by A. H. TUBBY, M.S. (London), F.R.C.S. (England), Consulting Surgeon to the Evelina Hospital for Sick Children, to Christ's Hospital, the Sevenoaks Hospital for Hip Disease, and the Stockwell Orphanage; Surgeon to the Westminster Hospital and Royal National Orthopaedic Hospital, to the Lord Mayor Treloar Hospital, Alton; President of the Hunterian Society; President of the Section for the Study of Disease in Children, Royal Society of Medicine; Author of “Deformities, including Diseases of the Bones and Joints,” &c.

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A REVIEW OF THE METHODS AND RESULTS OF THE TREATMENT OF SURGICAL TUBERCULOSIS.

Definition.—By “surgical tuberculosis” is meant tuberculous disease of bones, joints, glands, and skin. Other rare manifestations of the disease are met with in children, affecting the kidneys and bladder.*

Age.—It appears to me that in this connection we should regard the age of childhood as extending to

the fifteenth year, because that is the time when the active growth of bone ceases and its extreme liability to tuberculous infection diminishes. Certainly, up to the age of 15 years, and sometimes for a year longer, bone retains the characteristics of early life and its reaction to tuberculous infection.

Relative Frequency of Surgical Tuberculosis.—In 1902 I obtained returns from four children's hospitals in London; and I found that during the year 1901 2,040 children were admitted to these hospitals for all causes, and of them no less than 218, or over 10 per cent., were affected with tuberculosis of the bones, joints, glands, and skin. Of them 115 were females, and 103 males. The average age of the patients was five years and eight months. Ninety children had affections of the joints, 64 had the bones affected, or 154 of the 218; 45 had tuberculous glands, 10 had tuberculosis of the skin, and 9 had other forms of surgical tuberculosis. The minimum stay in hospital was 5 and the maximum was 76 days, or an average of nearly six weeks.

Results of Treatment, which was largely Operative, in Urban Hospitals.—On these 218 patients 415 operations were done, that is, nearly two operations on each patient. In one case it is recorded that a child was operated on 18 times, in another 12, in another 11; and in one instance I met with in a surgical clinic in Germany in the year 1888, a child had been operated on 35 times, and was apparently as far off cure as ever.

As a result of all this suffering of the children and expenditure of time and labour by the surgeons, only 68 of the 218, or 31·2 per cent., were said to be cured; 128, or 58·6 per cent., were relieved—and relief is no cure in tuberculosis, since half cures are worse than none at all. In 13 cases the result was doubtful or the condition of the patient unchanged, and nine patients are known to have died in hospital.

Results so disappointing as these led me to reconsider the whole question, and in 1903† I expressed the views that—

- I. Urban hospitals are not suitable places for the treatment of tuberculous children.
- II. Operation as a routine treatment has failed.

(Footnote—continued.)

culosis,” *Brit. Med. Jour.*, Feb. 21st, 1903; “Is the Urban Hospital Treatment of External or Surgical Tuberculosis Justifiable?” *The Practitioner*, Sept. 1903; “The Treatment of External or Surgical Tuberculosis in the Country,” *Brit. Med. Jour.*, Nov. 19th, 1904; “Tuberculous Cripples,” by A. H. Tubby in Kelynack's *Tuberculosis in Infancy and Childhood*, London, Baillière & Co., 1908, p. 188; “The Indications for Surgical Interference in the Treatment of Tuberculous Joint-Disease in Children, with Remarks as to After-Results,” *Proc. Roy. Soc. Med.*, 1912, and *Lancet*, Jan. 6th, 1912.

† The Urban Hospital Treatment of Surgical Tuberculosis, *Brit. Med. Jour.*, Feb. 21st, 1903; also, Is the Urban Hospital Treatment of External or Surgical Tuberculosis Justifiable? *Practitioner*, Sept. 1903.

* The statements in this Memorandum are based upon the results of investigations made by the author, and set forth in detail in the following articles, some of which have been sent to the Chairman and Secretary of the Committee:—“The Urban Hospital Treatment of External or Surgical Tuberculosis,” *Brit. Med. Jour.*, Feb. 21st, 1903; “The Treatment of External or Surgical Tuberculosis in the Country,” *Brit. Med. Jour.*, Nov. 19th, 1904; “Tuberculous Cripples,” by A. H. Tubby in Kelynack's *Tuberculosis in Infancy and Childhood*, London, Baillière & Co., 1908, p. 188; “The Indications for Surgical Interference in the Treatment of Tuberculous Joint-Disease in Children, with Remarks as to After-Results,” *Proc. Roy. Soc. Med.*, 1912, and *Lancet*, Jan. 6th, 1912.

- III. Other methods of treatment must be found.
 IV. Treatment conducted in urban hospitals is wasteful and dangerous. Wasteful because the financial resources of the hospital are not used to the best advantage, considering the results attained; and dangerous because such children are often sent from the hospital with tuberculous discharges, which are a cause of dissemination of the disease amongst those around them.

Contrast of the Urban with the Extra-Urban Hospital Treatment.—Owing to the position which I have been fortunate enough to occupy since 1900 as Consulting Surgeon to the Hip Hospital at Sevenoaks, I have been enabled to compare the results of that hospital, small though it is, with those at the Urban Children's Hospitals. Taking the cases in 1901 I obtained the following statistics. I must, however, premise that many of the cases which were under treatment at Sevenoaks during that year, as in previous and subsequent years, had been sent from London after operative treatment had been tried and failed, and thus the country hospital has not had a fair choice of cases, i.e., of what may be termed "early" cases.

The Sevenoaks statistics were as follows:—42 cases were under treatment in one year, the average age of the children was a little over six years, 30 had joint disease, in 10 the bones of the spine were affected, and two suffered from enlarged glands. The average duration of stay in hospital was 10½ months and the total number of operations was three. The results of treatment showed 14 cures, 24 patients were relieved and many cases were progressing satisfactorily and promised thoroughly well. Three were discharged as incurable, and one died of tuberculous disease of the kidneys.

Contrasting these statistics with those obtained from the London hospitals we find that the duration of stay in the country hospital was 45 weeks as compared with 26 weeks in London; the proportion of cures was 33 per cent. as compared with 31 per cent. in London; the deaths are under 2 per cent. as compared with 4 per cent. in London; the percentage of operations in London as compared with those in the country were as 19 to '07, or nearly 30 times more. Incidentally, I may mention that so successful has the conservative and climatic treatment proved at Sevenoaks that three patients, who had been under treatment there for hip-joint disease, subsequently enlisted and served with the infantry throughout the South African War.

Lest an erroneous impression should be given by the statements which I have made, I should like to say that I am not prepared to aver that operation is entirely avoidable, even if the climatic treatment of tuberculosis is carried out from the first in the country or at the seaside. But I do say *explicitly* that, if climatic and conservative methods are adopted from the first, the necessity for operation is enormously diminished and the final results are better.

Causes of the Change in Surgical Opinion in the Treatment of Surgical Tuberculosis.—During the last decade the conception of this disease has been undergoing a great change. Whereas, formerly the affection was regarded simply as a local disease, to be treated as such, experts now look upon it as a loss of resistance to the tubercle bacilli, manifesting itself as an inflammation and degeneration of one or more bones and joints; or, to put the matter in another way, the idea from, say, 1880 to 1902 of the nature of the affection was that the joint was the head and forefront of the affection, and the general condition was a secondary and superficial matter, being merely a sequela of the joint or bone disease. The present idea which is supported by the great majority of experts is that the general condition of health and the power to resist are all-important and the local affection will recover, if the health is improved and the resistance is increased. Whilst these remarks are true in the case of adults, they are much more apposite in dealing with the children. If we contrast the reaction of adults and children to tuberculous affections, we observe in the latter that the local disease does not become circumscribed so readily as in adults by the natural processes. C. F.

Painter,* of Boston, says, "this conclusion is apparently antagonistic to the fact that tuberculosis tends to become more spontaneously arrested in children than in adults. Nevertheless in children, when an operation is performed, the wider vascular and cellular spaces are opened with the knife and chisel, and dissemination of infection into new and unguarded localities takes place." In fact, whilst in adults the healing of tuberculosis is accompanied by the formation of a barrier of dense fibrous tissue, the young and rapidly growing tissues of children do not take on this limiting action to anything like the same extent. It follows then that the *fundamental method of treatment* in a child must be one which increases the power of general resistance to the disease.

Factors Involved in the Improved Treatment of Tuberculosis of Childhood.—The factors in the improvement of tuberculous disease in children are four in number—

- I. The wide recognition of the beneficial effects of climatic treatment.
- II. The employment of Röntgen rays in diagnosis and occasionally in treatment.
- III. The improved use of tuberculins, and the estimation of methods designed to check and control their action.
- IV. The better education of surgeons in the use of supporting apparatus, and the greater ingenuity which is constantly being displayed in the invention of new apparatus or in modifying old ones to meet various conditions of deformity.

Climatic Treatment: what it is.—By the term "climatic treatment" is meant the treatment of "surgical tuberculosis" in children either at the seaside or in the country. Climatic treatment is open-air treatment in fresh air with as much sunshine as possible. And at present I regard it as the best means we have of combating the disease.

I have already referred to this matter and contrasted the results of urban and extra-urban treatment in my statistics gathered in 1902; and, now I pass on to more recent statistics gathered from foreign sources.

J. W. Severt† has given us comparative statistics on these points. One hundred and one cases of disease of the ankle and tarsus were operated upon in City hospitals, involving 45 excisions of the astragalus, 14 removals of the lower end of the fibula, and 11 removals of the lower end of the tibia. Good movement of the part followed in 29, slight in 22, none in 47. In only 7 there was no subsequent deformity. In 65 thickening remained about the malleoli; in 29 some definite distortion of the foot followed. The average duration of the disease from its onset, in the operative cases, until treatment was discontinued was 19·8 months—and of treatment itself 10·1 months.

For comparison, results in 88 non-operative cases treated by the open-air method are tabulated. Motion was good in 32, slight in 23, and none in 33. Deformity was entirely absent in 4, thickening was present in 63, and distortion was present in 21. The average duration of disease until the cessation of treatment was 16·1 months in 99 cases; the average duration of treatment itself was 6·8 months, giving an average in favour of the non-operative series of 3·3 months from the beginning of the treatment, until it was no longer necessary. The figures show that "there was a distinct gain in time, also in the function and lack of deformity of the foot in the non-operative series."

In the United States of America so widely has the principle of the climatic and conservative methods been recognised that a country hospital was established by the City of New York in 1900; in the State of Pennsylvania, by the generosity of the late Mr. Widener in 1904, and I note that a further sum of 400,000, or 2,000,000 dollars has been given by one of the same family to support an extension of the work. The States of Massachusetts, Nebraska, Ohio, and Minne-

* *American Journal of Orthopedic Surgery*, January 1905, p. 26.

† *Journal of the American Medical Association*, December 16th, 1910, pp. 2128-33.

sota are proceeding on the same lines. In the statistics of the New York State Country Hospital I find that from its establishment to 1910 there have been 197 patients treated; they remained in the hospital on an average of four years, and the results are that 55, or 36.42 per cent., of the children were thoroughly cured, 85, or 56.9 per cent., were improved, 7 were found to be unsuitable for further treatment, 1 was removed by the parents, 3 died from acute illness other than tuberculosis, and the remainder are still in hospital.

These results are typical of other country hospitals.

In England, private effort has done a certain amount; and we have amongst others the Treloar Hospital at Alton, the Royal Sea-bathing Infirmary at Margate, the Liverpool County Hospital at Heswall, and many convalescent homes. These, however, are totally insufficient to grapple with this pressing problem; and those who are keenly interested earnestly hope that means will be found of effectually dealing with the matter. If they are, I am convinced that we shall obtain results in this country which are second to none.

When I had the honour of opening the discussion in December 1911 at the Children's Section of the Royal Society of Medicine on the "Indications for Surgical Interference in the Treatment of Tuberculous Joint Disease in Children, with Remarks as to the After-results," it was found in the discussion that the opinions of the experts present were unanimous in concluding that climatic and conservative treatment is better than aggressive and operative measures.

The Diagnostic Use and Therapeutic Value of X-rays.—The X-rays are invaluable, because by employing them, from the first, we are able to see the beginnings of the disease, we can watch its progress, note the effects of treatment and check and regulate our methods; also, without doubt, in some resistant forms of tubercle, such as synovitis and the early stage of enlarged glands, the use of X-rays has been instrumental in checking the disease.

I venture to suggest that a certain portion of any sum allotted for research should be devoted to elucidating and settling on a scientific basis the use of X-rays in the diagnosis of tuberculosis, and their value in treatment.

The Use of Tuberculin.—Much controversy is going on, not only as to which kinds of tuberculin are efficacious and which are not, but also as to the dosage and the after-results. A very wide field of research work is thus open.

The foregoing statement is an attempt to present to the Committee the state of affairs as it is to-day and the general trend of expert opinion. It remains to formulate a plan by which the benefits of the new scheme can be used to the greatest advantage in the treatment of tuberculous children; also, how existing means can be adapted for the purpose, and on what lines new machinery should be provided.

THE LEADING PRINCIPLES OF A SCHEME FOR DEALING WITH SURGICAL TUBERCULOSIS IN CHILDREN.

It may be asked, What are the leading principles which should guide us? They are—

I. *The Registration* of every case of Tuberculosis in children throughout the country. The means by which this can be done will be discussed in detail.

II. The treatment of such children by *climatic* methods in suitable places.

III. Such places must be *conducted on Hospital lines* and not on those of Convalescent Homes or Houses of Refuge. The Hospitals should be under the supervision of medical men who have received special training in this subject.

IV. The *admission* to such Hospitals must be rendered as easy as possible, and without any unnecessary routine; the tender age of a child should be no bar to its admission.

V. The question of the *duration of stay* in Hospital is to be decided solely on the curability of the case.

VI. The *following up* of all cases, after leaving the Hospital, is to be arranged for.

VII. The *education* of the child is to be provided for during its stay in Hospital.

VIII. Tuberculous *Cripples* to be taught suitable trades.

IX. Special provision to be made for *incurable cases*, and precautions taken to prevent their becoming a source of infection to healthy individuals.

Research must occupy a prominent place, and a scheme is suggested on page 185.

Administration will also be discussed.

SUGGESTIONS FOR CARRYING OUT A SCHEME FOR DEALING WITH SURGICAL TUBERCULOSIS IN CHILDREN.

I. *Registration.*—In order to obtain as complete a register as possible, the co-operation of:—(A) All those official bodies which now deal with tuberculosis in some form should be secured; such bodies are county councils, sanitary authorities, joint hospital boards, local education authorities, poor-law authorities, Metropolitan asylums boards, the medical officers of health, and, when the Insurance Act comes into force, the insurance committees; (B) the co-operation of voluntary and philanthropic bodies; some such are the Invald Children's Aid Association, the Ragged School Union, the Pleasant Sunday Afternoon Association, the Voluntary Hospitals, and the District Nursing Association.

By their means a complete register will gradually be secured, and by its aid the whole course of the child will be followed from the time it first comes under observation, until it is cured or otherwise. The register will be effectual in simplifying the general problem of treatment; it will not only prevent waste and overlapping, but will also be a means of noting the progress which a child makes under systematic treatment. It will also be useful in following up the child after it has left the Hospital; and, in fact, it will be the basis of what may be called a "clearing house" between various districts.

A carefully compiled Register is, in essence, the basis of the whole scheme, which I have the honour to suggest.

II. *The CLIMATIC Treatment of Tuberculous Children in SUITABLE PLACES.*—We have already said the essence of successful treatment must be that it is carried out in fresh pure air, and the more nearly treatment is outdoor in character the more likely it is to succeed.

Following the experience gained in England and America, it seems that the ideals to be aimed at are "colonies" of children housed in: (A) Inexpensive buildings, preferably of wood with brick foundations, each ward holding not less than 12 and not more than 20 children. Each building should be fully windowed, facing south and west, where the children may be during the day, and sleep at night if the weather is inclement; (B) The plan adopted in America of using what are called "shacks"—that is, light structures of wood and glass, just sufficient to prevent undue exposure to cold and wet; (C) Tents for general use in the summer months. In fact, a wider use of tents is indicated, as they can be made available for the purpose of segregation and of guarding against the spread of infectious disease. Some patients pass their whole time in tents, and in the winter it is found there is no difficulty in warming a tent.

Each colony will be a separate unit in each administrative area. It may, however, be deemed wise where certain facilities already exist to utilise them. By "certain facilities" I mean the sunny ground-floor rooms of Cottage Hospitals with verandahs, also the existing voluntary institutions.

In the early stages of carrying out the scheme, I venture to express the opinion that it will be better not to spend money on permanent and expensive brick or stone buildings, for it is quite certain that modifications in methods of treatment will be introduced as the result of experience and research. As to the question whether a portion of an adult sanatorium

should be utilised for treating tuberculous children, I can see no grave objection to it, provided that the children's pavilions are kept apart, that no great expense is incurred in their erection, that the climatic conditions are sound, that they are under skilled surgical supervision, and that the treatment of the children is not made subsidiary to that of the adults.

III. *Such Places must be Conducted on Hospital Lines and not on those of Convalescent Homes and Houses of Refuge.*—These places and the method of treatment should be under the immediate supervision of a surgeon, who should have been specially trained to the work and have particular knowledge of the subject in all its branches. Such officers are also to be fully acquainted with the modern pathological technique and the methods of clinical research. They should be capable of carrying out details of scientific investigation at the wish and under the guidance of the Chief of the Central Clinical and Bacteriological Laboratory, which for purpose of convenience should be in the immediate neighbourhood of the central institute (see page 7). The surgeons must also be skilled radiographers.

It follows from the nature of their duties that the whole of their time should be devoted to them; and the salary to secure the whole time of reliable officers should be about five or six hundred pounds per annum. There is, however, little or no doubt that we do not possess in this country more than a few men, and certainly a totally inadequate number of them, who are capable of performing these duties. It will therefore be necessary to train such a body of men under surgical experts specially appointed for the purpose. These experts may be either members of the Advisory Committee (see page 9) or be appointed for training purposes by the advice of the expert members of that body. It is also suggested that the surgical officers of the local institutions should have opportunities from time to time of studying methods carried out abroad; and, for this purpose leave with full pay should be granted.

In considering this scheme it is presumed that the treatment of surgical tuberculosis in children will be dealt with either by the Insurance Committees of each county or by the county councils.

IV. *Admission to the Hospitals.*—Admission to hospitals should be hedged in with as few restrictions as possible. The mere fact of the existence of the disease before the age of 15 years shall be the ground for admission; further, patients shall not be kept waiting for a vacancy. When a case is sent, the surgical officer shall decide whether it is curable or not and shall deal with it accordingly. If incurable, special provision shall be made for the case (see page 7). If curable, the consent of the parents to the stay of the child in hospital for at least one year shall be obtained, after they have had the advantages of treatment pointed out to them; and, at the beginning of a second year the permission of the parents shall be renewed, and so on as long as necessary.

Tender age should be no bar to admission; because, the younger the child is, the more responsive it is to the influences of climatic surroundings, plentiful food, fresh air, and local treatment of the disease.

V. *Duration of Stay.*—The duration of stay in hospital of the patient shall be decided only by the progress he makes and the question of his curability, with the exception of that of attaining the age of 15 years. If the patient, at the age of 15, years is in the way of cure, special arrangements may be made for his further stay so as to complete it.

VI. *Following up Cases.*—An essential feature in the ultimate success of climatic and conservative treatment is the following up of patients by officers appointed for the purpose, after the patients leave the hospital. The object of following up is to ascertain if the patients' surroundings are suitable, and if there are signs of relapse; herein is one of the many values of thorough and complete registration of all cases.

VII. *Education of Children whilst under Observation.*—The education of the children shall continue to be under the direction of the Board of Education or of

the Education Committee of County Councils, and will probably follow the plan now in work at the Royal National Orthopaedic Hospital in London.

VIII. *Teaching Trades to Tuberculous Cripples.*—As the ultimate objects of the Scheme are to convert diseased into healthy individuals, and dependent, or partially dependent into independent self-sustaining men and women, who will become useful members of society, it is necessary that each should, if possible, be taught a trade. Special teachers and methods are required for those who, being crippled, cannot be restored to perfect physical conditions; and instruction in particular trades must be provided, if they are to be enabled to earn a satisfactory livelihood. The State of Nebraska has recognised these facts, and, since 1905, 450 children have been treated for their diseases, educated and trained. Among the trades may be mentioned carpentry, leatherwork, trunk-making, basket-weaving, printing, photography, metal-work, sewing, and typewriting.

IX. *Special Provision for Incurable Cases.*—Here we approach a difficult side of the subject. Some parents will, no doubt, welcome kind and considerate care for their afflicted children provided that they have free access to them, others may object. For the former class of children, a few hospitals for incurables should be provided; for the latter, some of the most pressing indications may be met by arranging for visitors to look after their welfare, to see that their surroundings are as healthy as possible, that they have necessary comforts, and medical aid, and to ensure that they are not a source of transmission of infection to others.

Number of Beds Required.—From the experience gained here and in America, it is clear that, when hospitals for tuberculosis are generally provided, the number of cases suitable for admission will be found to be out of all proportion to that which could possibly have been anticipated. Assuming that there are 7,500,000 children under the age of 15 years in this country, provision should at first be made for one bed in 5,000. This means there should be 2,500 beds. I venture to think, however, that the number of children under the age of 15 years is nearer 10,000,000 than 7,500,000. If we, however, accept 7,500,000 as the number of children under 15 years of age in this country, I believe the number of 2,500 beds will be found too small, and I am inclined to think that 4,000 beds may be required when the Scheme is in full work. Since, however, under efficient treatment the number of children affected with tuberculosis in this country will decrease, this number of 4,000 beds will be lessened ultimately.

Prime Cost of Beds.—From the statistics given in the reports of various institutions in this country and America, we find that the highest average prime cost of hospitals is 150*l.* per bed, so that to provide for 2,500 beds 375,000*l.* may be required, or if 4,000 beds are in working order, the prime cost may be 600,000*l.* The average prime cost ought not to exceed 100*l.* per bed, and therefore these estimates may be reduced by one third.

Cost of Maintenance.—It is found that the cost of maintenance of an invalid in such an institution averages 65*l.* to 75*l.* per bed per annum, so that the average cost of maintenance of 2,500 beds will be 175,000*l.* a year, and of 4,000 beds 280,000*l.* I am, however, of opinion that with efficient management the cost of maintenance should not exceed 50*l.* per bed per annum.

RESEARCH.

There are at least four problems of immediate urgency, they are:—

- I. The development of tuberculosis in cattle and other animals and the means whereby it can be eradicated.
- II. Methods of entrance of bovine bacilli into human beings, and of infection of human beings by the tubercle bacillus of man, and how prevention can be obtained.
- III. The values and uses of the many forms of tuberculins.

IV. The diagnostic uses and therapeutic application of Röntgen rays.

These problems can be attacked by a well-organised Central Research Department consisting of (a) a clinical laboratory, (b) a bacteriological laboratory, (c) a veterinary department including an experimental farm, (d) a Röntgen ray department.

(a) and (b) may be combined under a Superintendent or Chief Research Officer, who should have clinical experience and be a bacteriologist with wide experience and sympathies. He should devote his whole time to the work, and a salary of 600*l.* to 800*l.* a year will be found effectual in securing a first-class man. Under him there will be a bacteriologist of the laboratory who will carry out the more scientific bacteriological investigations, whose salary might be placed at 400*l.* a year; and these officers will require the services of three or four assistants at salaries of 200*l.* to 300*l.* per annum. The veterinary department should be under the superintendence of the Chief Research Officer and he should have under him a skilled veterinary surgeon. The laboratory should be centrally situated and in the immediate neighbourhood of a tuberculosis hospital; probably the best situation will be near London, in a healthy open site. At the laboratory opportunity should be provided for the surgical officers of the local tuberculosis hospitals or clinics to learn details of clinical examination, of pathological research and of bacteriological methods; and these officers will be required to make investigations in the local tuberculosis hospitals, and work under and receive guidance from the Chief Superintendent of the Central Research Laboratory. The expenses of such a Central Laboratory for attacking the problem of tuberculosis, in children only, may be estimated at about 7,000*l.* to 8,000*l.* a year.

The question of scholarships or research students will arise. I venture to think the present time is not ripe to entertain this question, but eventually provision of 1,000*l.* to 2,000*l.* a year might be made for this purpose and scholarships offered when the above Scheme is in full working order.

ADMINISTRATION OF THE SCHEME.

Presuming that it is the intention of the Act to place the administration of the whole question of the treatment of tuberculous children in the hands of a body of experts nominated for that purpose by the authorities, and not in the hands of an existing Government Department, then the suggestions I beg to offer are as follows:—

The central direction and control of the Scheme shall be in the hands of an Advisory Committee, and on the Advisory Committee the following elements shall be represented:—

- (a) Registration and Statistics.
- (b) Finance.
- (c) Building and Accommodation.
- (d) Expert Surgical.
- (e) Research.
- (f) Educational.

COPY OF LETTER RECEIVED FROM DR. R. W. LOVETT, SURGEON TO THE BOSTON, MASS., CHILDREN'S HOSPITAL.

DEAR MR. TUBBY,

May 22, 1912.

I can answer certain of your questions, but our cost of patients will mean nothing to you at all, because the cost of living is so different here. I will, however, furnish you with some figures in the matter from the State School for Cripples at Canton, which has 230 children and is run by the State, and from the Convalescent Home of the Children's Hospital at Wellesley, where we have an outdoor hospital to which we send our cases. We have come to the conclusion here that the monitor-top shed gives us the best form of construction, and we disregard entirely cubic space because we have all outdoors to draw from.

It is upon this plan that the new Children's Hospital is to be constructed, and there we have put a very definite limit on the size of the wards, not on account of the outdoor air, but in order to prevent the spread of infectious diseases. Each pavilion is to hold 20 cases, but they are to be separated into two distinct colonies of 10 each, and never to come in contact with each other, so that if we have scarlet fever or measles start they can be limited to 10 children.

At Canton we have had dormitories holding, I should think, 30 patients each, and there we have not been troubled by the spread of infectious disease because the outdoor air is so good that there seems less tendency to communicate disease from one to the other.

I should be glad to give you further information in the matter, or to send you any photographs that you may desire. I hope this information is what you want.

I am, &c.,

R. W. LOVETT.

P.S.—The maintenance cost at the Convalescent Home at Wellesley is 7.50 dollars per patient per week. I enclose a letter from Dr. Fish, of Canton, in regard to the cost at that institution.—R. W. L.

A. H. Tubby, Esq.,
68, Harley Street,
London, W., England.

Canton, Massachusetts,

DEAR DR. LOVETT,

May 23, 1912.

Our dormitories were built by contract with no resident superintendent to supervise, and in my opinion cost more than they should. They were built at a cost, including central school, play and toilet rooms, of 33,450.92 dollars each, to accommodate 60 children, or 557.51 dollars per bed, exclusive of furnishings.

Our infirmary accommodates 25 patients and 25 nurses, at a cost per bed of 476.99 dollars, including operating room, clinical laboratory, diet kitchen, dental and X-ray rooms, reception rooms, &c.

You may be interested to know that the average cost per bed for buildings of fireproof or slow-burning construction in Massachusetts is from 600 dollars to 1,000 dollars.

Very respectfully,

JOHN E. FISH, Supt.

Dr. Robert W. Lovett,
234, Marlborough Street,
Boston, Mass.

MEMORANDUM submitted by E. WALFORD, M.D., Medical Officer of Health for the City of Cardiff.

In compliance with your request I beg to submit to you the following memorandum upon the subject of the inquiry of your Committee.

In the following remarks I have omitted all mention of the control and supervision of food supply, assuming that your Committee is not directly concerned with this aspect of the question, and have dealt as far as possible with the prevention and

treatment of phthisis in connection with the district with which I have administrative concern.

The population of the city of Cardiff, estimated to the middle of the year 1912, is 184,636.

The number of deaths from all forms of tuberculosis during the year 1911 amounted to 316, including 235 from pulmonary tuberculosis.

The mortality from phthisis since the year 1880 is given in the following table :—

Year.	Death-rate per 1,000.	Year.	Death-rate per 1,000.	Year.	Death-rate per 1,000.
1880	3.21	1887	2.72	1903	1.28
1881	2.96	1888	2.80	1904	1.44
1882	2.86	1889	2.79	1905	1.36
1883	2.67	1890	3.18	1906	1.31
1884	2.97	1891	2.78	1907	1.25
1885	3.58	1892	1.82	1908	1.22
1886	2.78	1893	1.68	1909	1.30
				1910	1.19
				1911	1.28

The following table shows the number of cases of pulmonary phthisis notified during the year 1911 :—

	At all Ages.	Under 1.	1-5.	5-15.	15-25.	25-45.	45-65.	65 and upwards.
Under Tuberculosis Regulations, 1908	170	—	—	15	24	84	45	2
Under Tuberculosis Regulations, 1911	34	—	1	4	5	21	3	—
Voluntary	162	6	7	33	34	67	14	1
Totals	366	6	8	52	63	172	62	3

The preventive measures which are at present in operation comprise :—

- The notification of all cases of phthisis.
- Domiciliary visits by one whole-time and two part-time health visitors.
- The instruction, verbally and by printed memoranda, of persons suffering from the disease, and of those who are in contact with these persons, in domestic hygiene and the prevention of infection.
- The disinfection and cleansing of infected houses and articles after removal or death of patient.
- The prevention of overcrowding and attention to the ventilation of living and sleeping rooms.
- The supply of sputum flasks to those requiring them.
- The free bacteriological examination of sputum for medical practitioners at the Cardiff and County Public Health Laboratory.
- The systematic examination in the Public Health Laboratory of samples of milk for the presence of tubercle bacilli.
- The establishment and maintenance of a Municipal Dispensary for the treatment and instruction of poor persons suffering from phthisis.
- The provision of an open-air school for children attending the public elementary schools is now under the consideration of the Education Committee.
- The improvement in the ventilation of existing school buildings and the greater attention to physical exercises.
- The provision of meals to underfed and physically defective children.

The Municipal Dispensary was opened in October 1910 in rooms set apart for the purpose in the City Hall. Dr. E. F. Thomas, the Assistant Medical Officer of Health, has direct charge of the Dispensary under the Medical Officer of Health. A trained nurse and dispenser attends at the Dispensary, and also acts as health visitor. Two other health visitors in the Public Health Department devote part of their time to visiting the homes of the patients attending the institution. The Dispensary is used not only for the treatment of cases, but as a centre for instruction in domestic hygiene and in the special precautions necessary to prevent the spread of infection. Districts inhabited by the poorer classes are selected for visitation by health visitors, who are in constant touch with the

Health Department and the Dispensary. Dr. Thomas has treated several cases attending the Dispensary with tuberculin and speaks hopefully of the results. He has supplied me with the following information.

Number of Attendances of Patients at the Tuberculosis Dispensary.

	First Attendances.	Subsequent Attendances.
1910		
October	126	—
November	113	82
December	61	84
1911		
January	107	167
February	144	154
March	158	245
April	60	189
May	117	178
June	56	133
July	20	16
August	83	145
September	116	306
October	106	353
November	74	444
December	54	337
Totals	1,395	2,833

During July 1911 the Dispensary was only opened one evening weekly.

Condition of Patients at end of December 1911.

Much improved	37
Improved	446
Stationary	22
Worse	16
Died	46
	567

Tuberculin Cases.

Much improved—able to work	-	15
Improved	-	17
Stationary	-	8
Attended the Dispensary for consultation only	-	423
		1,030

Tuberculin used for diagnostic purposes.

Positive.	Negative.
8	5

"Tuberculin as an aid to diagnosis has been found exceedingly useful, particularly in children where sputum for test purposes is not readily obtained and in cases of closed tuberculosis in adults. Both the human and bovine forms of tuberculin are used in treatment, and Koch's old human tuberculin for diagnosis. The results of treatment by the extensive method is distinctly encouraging, and 15 patients who have undergone the full course of treatment are able to undertake work."

The following list shows the number of dispensary cases which have been received in sanatoria, convalescent homes, &c., and the institutions that have received such patients:—

Porthcawl Rest	18
Mount Vernon Consumption Hospital Sanatorium, Northwood	3
Devon and Cornwall Sanatorium for Consumption, Didworthy	6
Dulwich House, Convalescent Home, Cardiff	4
Middlesex Hospital, London	2
Brompton Hospital for Consumption and Diseases of Chest, London	4
Clacton-on-Sea Convalescent Home and Sanatorium	1
National Children's Convalescent Home and Orphanage, Holt, Norfolk	2
King Edward VII. Sanatorium, Midhurst	1
Queen Alexandra Sanatorium, Davos Platz, Switzerland	2
The Mount Sanatorium, Bromsgrove, Worcestershire	2
St. Michael's Convalescent Home, Axbridge, Somerset	3
Metropolitan Convalescent Home for Railway Servants, Weybridge	1
Victoria Park Hospital for Consumption and Diseases of Chest, London	1
Treloar's Convalescent Home for Cripples, Alton	1
Worcestershire Sanatorium, Knightwick	1
Sanatorium in Egypt	1
Eversfield Sanatorium, St. Leonards-on-Sea	1
National Convalescent Home, Bournemouth	-

Further recommendations in connection with the Insurance Act.

A joint committee consisting of representatives of the Sanitary Committee of the administrative county of Glamorgan and of the Health Committee of the Cardiff Corporation have recently been appointed to take into consideration the question of joint action in connection with the prevention of consumption generally and its relation to the provisions of the Insurance Act.

In the event of this committee deciding upon a joint scheme, application will probably be made under section 64 (3) to the Local Government Board for the appointment of a statutory joint committee or joint board for the purpose of carrying out the provisions of the Insurance Act relating to the provision of sanatoria and other institutions for such area of the administrative county of Glamorgan and the city of Cardiff as may be decided upon. In this case the committee will probably unite under one body all the

organisations now under the separate authorities having jurisdiction in such area. The arrangements of the Cardiff Municipal Dispensary would be extended and completed in order to cope with the work necessary in connection with the sanatorium benefit and with the enlarged area which it would serve; and in due time such committee would, in connection with the dispensary, make provision for the treatment of early cases of phthisis in a sanatorium, for advanced cases in hospitals, and for the several modes of treatment which experience may dictate.

The committee would doubtless take advantage of and utilise to the full any voluntary agencies which may exist or which may in the future be established with the object of preventing the spread of phthisis or of treating the disease. The co-operation of such voluntary agencies with the authorities responsible for administrative measures will doubtless form an essential feature in the policy of the Cardiff authority and of any joint committee which may hereafter be constituted.

This district and the whole of Wales is particularly fortunate in this respect in having in its midst a most useful agency of this kind. Through the great generosity of the chief promoters and others connected with the National Welsh Memorial to King Edward VII, a substantial fund has been raised for the purpose of assisting, so far as a voluntary agency can assist, in the provision of sanatoria and other institutions, and in the several educational methods which may be from time to time considered necessary in any general campaign against consumption. The Memorial Association is now applying for a charter to enable it to carry on this work, which, if obtained within 12 months of the passing of the Insurance Act, will enable it to co-operate to some extent with local authorities. It is probable, therefore, that the Cardiff Sanitary Authority either with or without the co-operation of the county authority will invite the co-operation of the Memorial Association in undertaking certain measures which may be suitably undertaken by a voluntary agency. Possibly this co-operation would be best obtained by the co-opting on any joint committee of representatives of the Memorial Association.

While welcoming this co-operation of voluntary agencies, the Cardiff Sanitary Authority is strongly of opinion, an opinion which is shared by their Medical Officer of Health, that the councils of counties and county boroughs and not other persons are the proper bodies to provide and administer the necessary machinery required under the Insurance Act for dealing with the prevention and treatment of consumption. There are, of course, many obvious reasons why this course should be followed. The Sanitary Authority is already dealing with the matter in its general aspect and in its relation to all classes of the community, and in the future it will not be desirable or economical to set in motion one machinery for dealing with the insured and a similar machinery for dealing with the uninsured. Further, it would appear that the councils of counties and county boroughs may be responsible to some extent for any deficit which may arise in connection with the administration of the sanatorium benefit, a responsibility which they are not likely to appreciate without control over this administration. Moreover, these bodies usually have upon their official staff medical officers trained in preventive medicine and conversant with public health administration.

With respect to the alleged prevalence of pulmonary tuberculosis in certain rural counties of Wales, I would beg to submit to your Committee the desirability of instituting a complete inquiry from statistical and etiological points of view owing to the possibility of erroneous conclusions being drawn from the incomplete information which is at present available, particularly that which is derived from the returns of the Registrar-General which are of necessity incomplete and unreliable on account of the large proportion of deaths uncertified by medical practitioners in these counties and to other well recognised causes.

EDWARD WALFORD,
March 1912.

MEMORANDUM submitted by L. WILLIAMS, M.D., the County Medical Officer of Health for Denbighshire.

I have no special views regarding the treatment of tuberculosis; that, of course, is a matter for the experts on the Committee.

As a public health administrator, I may state that I am of opinion that the following suggestions should prove valuable from the preventive aspect. It seems to me that there is a great necessity for co-ordinating all the agencies that have at present to do with the problem of tuberculosis. This will prevent overlapping and unnecessary expense. The most convenient unit is the county, which is also the area of the new Insurance Committees; therefore, the county medical officer of health should be asked to formulate a scheme and suggest, to his council the necessary machinery for carrying out the work.

The notification of pulmonary tuberculosis is now a statutory duty, and has to be made to the district medical officer of health, but these notifications are open to the county medical officer and school medical officer.

Health Visitors.

A health visitor should be a fully qualified nurse, and specially trained in hygiene and the best methods of preventing the spread of tuberculosis. It is essential for the sake of economy and efficiency that such work should be organised on a large scale, therefore I suggest that they should be provided for the county area and should work under the guidance and supervision of the county medical officer of health. Their duties would be drawn up by the county medical officer in conjunction with the district medical officers of health. It would be necessary to communicate with the district councils and inform them that the health visitors have been appointed and that they are ready to undertake the following duties:—

1. Visiting the homes of all cases notified as suffering from consumption.
2. Instructing the patient and the family in detail with regard to carrying out preventive measures and open-air treatment.
3. To prepare a list of all school children attending elementary schools, living in an infected house; such list to be sent to the school medical officer.
4. To make a note of all contacts and to recommend them to seek medical advice, possibly at a tuberculosis institute or clinic. (I consider the medical examination of contacts, that is, those living in the same house as consumptives, absolutely essential to the success of any movement for stamping out consumption.)
5. To report to the medical officer of health on printed forms, any sanitary defect found in the house, e.g., dirt, darkness, dampness, over-crowding, &c.
6. To collect specimens of sputum, and to transmit the same to the public health laboratory.

I am of opinion that the same health visitors could act as school nurses under the education committee, and possibly do a certain amount of work under the Notification of Births Act, and thus take a part in the reduction of infantile mortality.

Tuberculosis Institute or Sorting Hospital.

I consider such an institute an indispensable part of the machinery; indeed, it should be the centre of our organisation.

All notified cases if in any way suitable for institutional treatment should be sent to this institute for exact diagnosis. They should be examined by an expert physician who would decide as to their future. If in an early stage and with every hope of permanently arresting the disease, they should be sent to a sanatorium; if the case is established it would be well to keep them in the tuberculosis institute for six weeks or so to give them an opportunity of being instructed how to avoid infecting their relations and fellow-workers. They would also be trained in open-air life, and to appreciate living under healthy conditions, and to adopt a suitable and nourishing dietary. Advanced

cases could also be isolated in this institute. These patients are a real menace to their relatives, unless they have proper accommodation in their own homes. I am afraid that many of these advanced cases will be troublesome—a number of them will undoubtedly refuse institutional treatment. I am strongly of opinion that if these advanced consumptives wilfully neglect to take precautionary measures, or if they live under such conditions as to make the adoption of precautionary measures impossible, compulsory powers should be given to remove such individuals to a hospital or other suitable institution. It should rarely be necessary to use such powers, but I consider the possession of it indispensable in dealing with careless advanced consumptives.

I consider that one fully equipped tuberculosis institute should be sufficient for two of the North Wales counties.

I may state that there is a dearth of isolation hospitals in North Wales, therefore such institutions cannot be used for this purpose as suggested by the Local Government Board.

Tuberculosis Clinics.

It would be necessary for the physician in charge of the institute, or his trained medical assistant to visit once a fortnight or so at different centres in the two counties connected with the institute. There should be established what we may call tuberculosis clinics in every town, and also possibly in some of the larger villages.

The clinic should consist of a waiting room and a consulting room. The rent of such rooms would be trifling, as they would not be in continual use, or possibly the town council could provide the rooms.

It would be necessary, and a great convenience, if the doctor could visit these tuberculosis clinics on a market day. One of the nurses appointed by the county would be in attendance at the clinic on that special day. The patients to be examined would be contacts, that is, persons from the houses where individuals have been notified as suffering from consumption, or any case which the local medical practitioner requires the opinion of the visiting physician, also school children who are suspected to be suffering from tuberculosis. These cases can now be examined in such clinics with great thoroughness. We are not now confined to clinical methods of examination, but have valuable bacteriological methods of diagnosing tuberculosis, and these methods should be used in the tuberculosis clinics.

Sanatorium.

I consider such an institution absolutely necessary. If the scheme is in full working order, only cases who have gone through the tuberculosis institute and passed by the physician in charge as suitable cases for sanatorium treatment should be admitted to the sanatorium. I am hoping that many admitted in the early stages will have their disease arrested, but all the patients admitted will receive adequate treatment and will be trained thoroughly to appreciate the value of precautionary measures, not only to avoid infecting others, but to avoid also re-infecting themselves. They will also be taught the value of regular habits and of carefully regulating work and exercise.

I am fully alive to the necessity of the different forms of treatment adopted, such as graduated exercise, tuberculin, &c., but the most important point seems to me to be the appointment of a thoroughly trained and capable medical superintendent who would adopt a broad outlook and who would utilise every available means of treatment.

The discharged patients ought to be under supervision, and should be made to visit at intervals at the nearest tuberculosis clinic. Further, no doubt many would be discharged uncurd to pursue further home treatment; these should also be under the supervision of the physician at the clinic, or passed on to the family physician. The home should also be under the supervision of the duly appointed health visitor.

Looking at the problem again, from the point of view of North Wales, with a population of 512,228, I am of opinion that one sanatorium would be ample. If we regard one bed for every 5,000 of the population as sufficient, we would require about 100 beds. On the other hand, if we aim at one bed per 2,500 of the population we would require 200 beds. I am rather inclined to think that a 100 or 150 beds would be quite sufficient for North Wales, and such an institution would require a medical superintendent and an assistant.

Site.

It ought to be situated in a central place, with good railway facilities. The site should have an abundant supply of pure, dustless air, a low rainfall, and a sandy soil. It should be fairly isolated, have a good water supply, and facilities for drainage.

Bacteriological Laboratory.

The laboratory has an important function to perform in the fight against tuberculosis. There ought to be a bacteriological laboratory in connection with each county council, or possibly the six North Wales counties may join and contribute to the establishment of a first-class laboratory at Bangor University College. If so, this should be fully equipped and allowed to carry on research work.

Part taken by District Councils.

The district councils will have important functions to carry out, including improvement of housing, disinfection of premises, prevention of overcrowding, and general public health work. They must also through their officer supervise those who are undergoing home treatment. They have the power to provide the consumptive with the necessary equipment, such as any appliance, apparatus, or utensil which may be of assistance in preventing the spread of infection. They may also provide a certain number of

shelters for consumptives to put in their gardens, so that they may sleep in the open air.

Milk Supply.

The question of the freedom of the milk supply from the germs of consumption will also be part of the duties of the sanitary authorities; the promised Milk Bill is urgently needed. The present position is absurd. We demand that all who sell milk must be registered under the Dairies, Cowsheds, and Milkshops Order, and we make them comply with certain regulations, but those who do not sell milk but convert it into butter or cheese are not under any supervision. From my experience of such farms, I am very strongly of opinion that legislation is urgently needed to cover all such, whether they sell milk or not.

Part taken by Boards of Guardians.

In the past, boards of guardians have undoubtedly done a service by isolating advanced cases among the poor, and no doubt they will continue to do so. I must state from my experience of rural workhouses, that I do not agree with the Order of the Local Government Board, when it prohibits the medical officer of health to take any steps in poor-law institutions and hospitals. I am perfectly willing to admit that in large and well-conducted institutions such supervision is not necessary, but as regards the smaller urban and rural districts, I am convinced that such supervision is necessary, and this should be carried out by the county medical officer.

Further, where consumptive patients are in receipt of outdoor relief, they should also be under the supervision of the health officials of the local sanitary authority, and if any patient wilfully neglects to take precautions, the relief should be stopped, and he should be removed to an institution.

LLEWELYN WILLIAMS.
April 1912.

MEMORANDUM submitted by A. M. WILLIAMSON, M.D., B.Sc.

In conformity with your communication of yesterday's date, I would desire to direct the attention of the Committee on Tuberculosis to the following points:—

(1) Housing Accommodation: the all-important bearing of the whole Housing Question on the spread of this Disease.

I have recently shown how, in this city, cases of the disease follow almost exactly any increase in the density of the population of any particular ward or district, and that the occurrence of cases is nearly in exact proportion to the number of one-and two-roomed houses which exist in such districts.

It is impossible to disregard such figures, and, in my opinion, any suggestions by the Committee would be wanting in value if the whole question of the etiology, as is disclosed by such figures, had not the fullest weight attached to them.

I would beg to direct the attention of the Committee to the importance of such considerations "along the line of prevention" as occupying a relatively much more important position than any curative suggestions that may be made through the instrumentality of sanatoria or such other means as may be suggested.

Ward.	Number of one-and two-roomed houses.	Phthisis Death-rate (per 1,000 of population).
Calton -	1,715	.9
Canongate -	2,699	1.1
Newington -	530	.5
Morningside -	211	.5
Merchiston -	198	.9
Gorgie -	2,225	.9
Haymarket -	629	.3
St. Bernard's -	739	.6
Broughton -	867	.9
St. Stephen's -	1,070	.3

Ward.	Number of one-and two-roomed houses.	Phthisis Death-rate (per 1,000 of population).
St. Andrew's -	1,315	.9
St. Giles' -	6,978	1.0
Dalry -	3,332	.9
George Square -	5,462	.7
St. Leonard's -	3,731	1.2
Portobello -	665	.7

(2) Hospital Provision for Advanced Cases.

I would further beg leave to emphasise to the Committee the importance of the preventive measures adopted so largely in this city—probably, indeed, to a greater extent than in any other district—so far as hospital provision for advanced cases of the disease is concerned. Personally, I regard this step as being an all-important one in connection with the whole question.

Advanced cases of the disease, representing the most potent foci of infection, are removed from the small houses occupied by the poor, and treated in a portion of a general fever hospital. The number so dealt with during the past four years is 590, and the effect of this procedure has been to aid towards the altogether desirable result of increasing the institutional deaths from phthisis (as compared with those which occur in private dwelling-houses) from 27 per cent. in 1905 to 49 per cent. in 1909. As a preventive and precautionary measure, it is almost impossible to exaggerate the importance attachable to such results.

(3) Need for additional Legislation in regard to Cows affected with Tuberculosis.

For several years past I have directed attention by means of annual reports, and upon more than one

occasion through a direct communication to the Local Government Board for Scotland, to the anomaly which, under the present law, exists in connection with the power conferred on local authorities to deal with cows suffering from tuberculosis. There has been for some time abundant power to seize portions of meat or carcasses affected with tuberculous disease, but there is no power under which a local authority can seize a cow housed within its jurisdiction and supplying milk to its district, even although the disease is in a far advanced state with, it may be, aggravated affection of the udder. Such a condition carries with it a certainty of the tubercle bacillus being present in large numbers in the milk drawn from such an animal, and implies, therefore, a very real and potent danger to the community.

The danger of the use of such milk is quite obviously markedly greater than follows the use of meat affected with this disease, in so far as the latter is subjected to a boiling process before use. Despite this apparent fact, however, the law only constitutes

the sale of such milk an offence punishable by fine, and does not empower, even in advanced and urgent cases, local authorities or their officers to adopt such drastic methods as are necessary to put an end to such a dangerous source of infection.

In consequence of this weakness in the law, it is a matter of common experience that a cow yielding tuberculous milk, when detected in the district of a local authority, is passed on by its owner to another district where it continues the same disseminating process, and this, so far as the law is concerned, it may continue during the course of its natural life.

I desire to urge, in view of our present-day knowledge in connection with the admitted relationship existing between human and bovine tuberculosis, the propriety of extended powers being granted under which all animals proved to be yielding milk infiltrated with the tubercle bacillus would be liable to immediate seizure.

A. MAXWELL WILLIAMSON,
Medical Officer of Health.

MEMORANDUM submitted by G. SIMS WOODHEAD, M.D., Cambridge.

In the following notes I give merely the results of my own experience as Pathologist to the Royal Hospital for Sick Children, Edinburgh; and to the Royal Infirmary, Edinburgh; as Grocers' Company Research Scholar, as Scientific Assistant to Lord Basing's Royal Commission on Tuberculosis, and as Member of the 1902 Royal Commission on Tuberculosis. I say "notes" advisedly, as in the time at my disposal (the end of term) I am unable to give all the arguments in favour of the statements I make, or even to set out in full all that I should like to place before your Committee.

I have had considerable experience in examination of tuberculosis in children.

Tuberculosis of Bone, in which the infective agent, the tubercle bacillus, appears to be distributed by the blood vessels, either by the large nutrient arteries entering the shafts of the bone or, more rarely, by the arterial branches to the epiphyses and to the articular tissues of the joints. In certain cases the tubercle bacilli seem to be distributed from a primary lesion in the neighbourhood of a bone to the bone itself, such distribution taking place by the lymphatics. The synovial membranes covering and surrounding the articular cartilages may also be affected by tubercle bacilli distributed by the channels. In most instances there appears to have been some damage, mechanical injury or local inflammation, of the bone or joint, which has acted as a predisposing cause. The bovine type of tubercle bacillus is more frequently met with in these lesions in the child than in similar lesions in the adult.

Tuberculosis of Lymphatic Glands is almost invariably associated with some other lesion or primary focus of infection. In the child the cervical, pharyngeal, mesenteric, and mediastinal glands appear to be specially susceptible to infection. In adults the mediastinal and bronchial glands are more affected, along with the glands near an infected organ or tissue. In children a considerable proportion of the affected glands contain tubercle bacilli of bovine origin, especially where these glands are in the neighbourhood of the alimentary canal. In the adult the tubercle bacillus is far more frequently of human origin. In most of the cases the mode of extension is by the lymphatic channels, though in view of the fact that tubercle bacilli, especially those of low virulence, can be demonstrated in circulating the blood over long periods, it is possible that in certain cases the tubercle bacillus is conveyed to glands by the blood stream, and that when the gland is damaged in any way the tuberculous process is more readily initiated.

In considering the age incidence of the various forms of tuberculosis in children under 15, I think I can be most useful by giving my experience of 127 cases of tuberculous children, of the post-mortems of which I kept careful records.

Amongst these were 100 cases of tuberculosis of the mesenteric glands. The age incidence of these cases was as follows:—

Below 1 year of age	-	-	-	4 cases.
Between 1 and 2½ years of age	-	-	-	33 ..
.. 3 .. 5	..	..	..	29 ..
.. 6 .. 7½	..	..	..	12 ..
.. 8 .. 10	..	..	..	13 ..
.. 11 .. 15	..	..	..	9 ..

The higher figures are in the earlier years, and distinctly earlier than in cases of tuberculous meningitis.

In 14 cases the mesenteric glands only were affected and these glands must be looked upon as the seat of the primary infection.

It may be remarked that in 69 of the 100 cases the glands at the root of the lung were simultaneously affected and in 62 the lungs were also involved. In 13 there was tuberculous peritonitis, and in 18 ulceration of the intestine was found.

In 12 cases the mesenteric and mediastinal glands, the peritoneum, the intestine, and the lungs were all affected; whilst in no fewer than 53 of the 100 cases there was evidence of localised peritonitis recent, or old, occurring between the spleen or liver and the diaphragm. The importance of this is referred to below.

Tuberculosis Meningitis.—Of the 127 cases above mentioned 54 were cases of tuberculous meningitis. Here the age incidence was—

Below 1 year of age	-	-	-	1 case.
Between 1 and 2½ years of age	-	-	-	15 cases.
.. 3 .. 5	..	..	..	21 ..
.. 6 .. 7½	..	..	..	8 ..
.. 8 .. 10	..	..	..	8 ..
.. 11 .. 15	..	..	..	2 ..

In 39 of these cases the tuberculosis was widely disseminated—general—and in only two could no primary centre of infection be found.

In six the glands of the mesentery and mediastinum only were affected. In three the lungs were the only organs affected, and in one the lungs and mediastinal glands contained the older tubercles.

We are here dealing evidently with an embolic tuberculosis, and the special manifestation is merely part of a general infection.

Abdominal Tuberculosis.—In children this condition is most frequently alimentary in origin, though this is not invariably the case. A very large proportion of these cases appear to be of bovine origin. In fact they form by far the most important group of the cases of tuberculosis the origin of which may be directly traceable to the action of the tubercle bacillus of the bovine type. It must be borne in mind of course that many cases of this abdominal tuberculosis result from the action of the tubercle bacillus of human origin, the bacilli in these cases entering the alimentary tract from

infected utensils and from sputum-infected floors and articles of furniture on and about which young children crawl and play. In the adult the tubercle bacillus of bovine origin is far more rarely met with in this form of tuberculosis.

Intestinal Tuberculosis with ulceration was also fairly common. Age incidence in 43 cases out of the 127:—

Below 1 year of age	-	-	-	1 case.
Between 1 and 2½ years of age	-	-	-	14 cases.
" 3 " 5	"	"	"	10 "
" 6 " 7½	"	"	"	7 "
" 8 " 10	"	"	"	5 "
" 11 " 15	"	"	"	6 "

Pulmonary Tuberculosis is met with in young children pretty frequently. Its distribution in the lung is not the same as in the case of the adult. It occurs at the base of the lung, and near the root far more frequently than in the adult, where the apex is specially affected. I am of opinion that this distribution takes place in so many cases because the process in the lung is secondary to abdominal tuberculosis, and that (a) the base of the lung is functionally less active owing to the impeded movements of the diaphragm above the fixed and enlarged abdominal contents. This is more marked when there are adhesions between the upper surface of the liver and the diaphragm, and still more marked when the diaphragm is adherent to the base of the lung. (b) The root of the lung seems to be specially affected through an extension of the tuberculous process from the abdomen by the retroperitoneal and mediastinal lymphatic systems. In connection with these forms of tuberculosis, the aspirating forces of the heart, lungs, and chest walls must be fully kept in mind, otherwise what appear to be extensions against the lymph current will not be understood.

Age Incidence of the various Forms of Tubercle in Children under 15. I have given in the above notes. The numbers dealt with are not large, but they are valuable from the fact that the examination was so thorough.

Although I have no definite statistics as to the *relation of mortality to incidence*, I am satisfied that tuberculosis, both in adults and in children, is a far less fatal disease than we have been accustomed to recognise, and that a large number of both children and adults suffer from "undeclared" or undiagnosed tuberculosis than was at one time suspected. My experience in the post-mortem room has taught me that latent and healed tuberculous lesions are present in the patients who, at the time of death—from some quite different disease—have no sign or symptom of tuberculosis; in fact, have no lesion which could have been diagnosed without calling in the aid of the tuberculin test, and I am of opinion that many cases of "declared" tuberculosis are recovered from, but, so far as I know, we have no data on which we can base any estimate as to the relation of mortality to incidence, even in cases of phthisis, though the method of multiplying the deaths by three for the incidence is, for the present, a good working rule, whilst, if any figure is to be given for abdominal tuberculosis, it must be one that will lead to an under-estimate rather than to an over-estimate of the proportion of cases of tubercular lesions in the abdomen. I found that of the cases examined in which abdominal lesions were found after death, in one-fifth only of the cases was any mention made of the presence of abdominal tubercle on the diagnosis chart. I noted, moreover, the great tendency to calcification and cicatrization of the lesions, especially in cases where, from the general conditions, the tissues seemed to have had a high resisting power. Cases of localised tuberculosis are probably much more frequently present than is realised, and I think it would be reasonable to multiply the declared cases of abdominal tuberculosis by five, at least, if we are to give any idea as to the actual number of cases of this form of tuberculosis in children.

Infectivity and Infectiousness of each Form of Tuberculosis.—I look upon pulmonary tuberculosis as being by far the most infectious of all the forms of tuberculosis; the vehicle of transference being, of course, sputum. The bacillus of human origin plays in this case by far the most important role. Open tuberculous sores, sinuses, &c., are sources of danger, but the tubercle bacilli in urine and faeces from the cases of genito-urinary phthisis and tuberculous ulceration of

the intestine are, from the nature of the material in which they are lodged, less likely to be allowed to come into any direct contact with human beings, other than the patients themselves. In the case of the tubercle bacillus of bovine origin, the danger of infection is chiefly through the milk, and to children, in whom it may set up glandular and abdominal tuberculosis, and, more rarely, tuberculosis of bones and joints. The faeces of tuberculous cattle, from the fact that they may pass into milk readily, are more dangerous than are those of the human being (*vide supra*).

As regards *Prevention and Treatment* of tuberculosis, may we not say that these may be summed up in "proper nutrition," "rest and exercise," "good ventilation and light," in order that the tissues of the patient may be maintained in a healthy and resistant condition. These, with a reduction of the number of the tubercle bacilli that can come in contact with the vulnerable tissues of the body to as low a point as possible, are the gist of the whole matter.

In all experimental infections carried out up to the present, dosage has proved to be a most important factor in determining the positive or negative results of an experiment, and I am satisfied that it also plays a most important part in natural infections. Keep down the number of bacilli and increase the natural defences of the body by maintaining the integrity of the tissues, and you do what is to be done in the way of both prevention and treatment.

I do not minimise the importance of the employment of other agents, such as drugs, to meet symptoms as they arise, tuberculin, when given along with other treatment, and the like, but I am more and more convinced that the various methods of attacking tuberculosis, through dispensary systems, inspection, disinfection, sanatoria, and the like, should each and all be employed as required, and only as required, to bring about diminution in the concentration of the dose of the bacilli, and to maintain the integrity and repair the defences and tissues of the body.

The chief Conditions of the Child's Body which predispose to Tubercle may be divided into (a) general and (b) local.

(a) The general conditions are those involved in malnutrition, whether it be due to lack of nutriment or to impaired powers of digestion, of altered metabolic activities of the tissues, or to anaemia and other altered conditions of the blood.

(b) The local conditions are damage to the tissues, such as may be the result of mechanical injury, as in the case of bone and synovial membranes; of an inflamed serous surface, as in pleurisy; of the accumulation of inflammatory products, as in cases of catarrhal pneumonia in lungs weakened by other disease—measles, whooping cough, influenza, and similar conditions; of chronically irritated glandular tissue, such as, for example, the ring of adenoid tissue around the nasopharynx, in parts of which—the tonsils and in adenoids—I detected tubercle many years ago—an observation corroborated later by Dr. Walsham. Infection through cutaneous abrasions and around carious teeth I have observed on several occasions. In all the above conditions, and especially in the last named, I have been able to trace the tuberculous process from the point of entrance for some distance, by the chain of tuberculous nodules, lymphatic glands, and along inflammatory adhesions. Where the tonsils have been enlarged, and from the roots of carious teeth, I have been able to trace the process by the above channels to the adherent pleura, and so to the lungs.

It will be gathered that I am of opinion that, although the work of the Committee may in certain directions for a time be tentative and, perhaps, even incomplete, we have nevertheless ample knowledge at our disposal to justify the organisation of an administrative campaign which should enable those in authority to make a definite impression on both case-rate and death-rate from tuberculosis. It is evident, too, from the work of the various Commissions on

Tuberculosis that have sat in this country, in Germany, and in the United States of America, and from the work that has been done by private investigators and public officials in Holland, Denmark, and France, that in spite of the arguments raised ten years ago against the importance of bovine infection, any campaign undertaken must include measures against tuberculous infection from bovine sources as well as those against infection conveyed from the human subject.

The precautions to be taken against infection from the bovine must, in the first place, be those leading to the elimination of tuberculosis from our herds, whilst, until that is brought about, careful measures of inspection of the cattle (and the tuberculin test) and, if necessary, the examination and treatment or confiscation of the milk from these animals.

In the case of the human subject, on the other hand, the difficulties, though apparently not so formidable, are really greater, as it is almost impossible—especially under present conditions—to isolate all tuberculous patients, and thus prevent the spread of infection.

In the case of this infection through the human subject the danger appears to be gravest only when the disease "has declared itself clinically," and when the infective material is being discharged, along with broken-down and caseous tissues, especially, of course, from the lungs. The importance of this in taking measures for the prevention of infection from human sources is evident. For, in order to obtain the earliest and most impressive results, advanced cases of tuberculosis, cases from which there is abundant expectoration, must be placed under careful supervision, either at home or in hospital, in order that the infected material discharged by them may be destroyed or rendered inert as quickly as possible. By these means the enormous doses of infected material that are constantly being disseminated under present conditions will be diminished, and the large dosage factor will be minimised. Then, as to the question of the differences in susceptibility met with in different subjects, and under different conditions, we have most valuable evidence on this point in the Royal Commission on Tuberculosis, especially that derived from the work carried out by Dr. Cobbett. Diminish the dose of the virus and reduce the susceptibility of the patient, and you attack the disease both from flank and rear.

These advanced cases, however, constitute but a small proportion of the cases of tuberculosis with which the Commissioners have to deal. In a much larger number of cases early diagnosis comes to be the point of prime importance. In these cases the immediate danger of disseminating infective tuberculous material in large quantities is comparatively slight. But such a patient may at any time come to be an active centre of infection; and it is important that he or she should be kept under observation, and at the same time should receive such training that the danger of infection is minimised should the disease become progressive and lead to breaking down of the tissues, especially of the lungs. I believe that the measures necessary for bringing about the above ends must include a regular system of co-ordination and co-operation between any dispensary system or systems, the local health authorities, and sanatoria.

Along with all those who take a keen interest in this question, I am extremely anxious that no special system should be put too prominently forward, but that by co-operation, such as that indicated in the last paragraph, there may be a regular linking-up of authorities by whom the patients after being sought out, and the disease diagnosed, may be classified, drafted to sanatorium or hospital, and then be kept under continuous observation, during which time the history of the cases may be recorded and made the basis of further statistical and other research. We have now sufficient information at our disposal to determine the value, approximately at any rate, of each system now at the disposal of public authorities, and I believe that if these are used intelligently, and if co-ordination and co-operation be complete, much valuable work may be done under the new Act, and that the effects of this work will be manifest even in the near future.

As I have, for some time past, been engaged on the experimental study of tuberculosis, and as I hope still to

continue to carry on such work, may I be permitted to point out that the work of the Royal Commission on Tuberculosis, though complete in itself, has opened up a large number of questions which can only be answered by investigations carried out by skilled experts. Some of the suggested lines of research that are now being carried on are the following:—

1. Experiments on animals, to test the value of methods of raising local and general resistance, temporary or more permanent, passive or active, or combined, to tuberculosis, with a view to applying these methods, if successful in animals, to the treatment of the disease in man.

2. An investigation into the natural history of the living "human" tubercle bacillus, when passed as a protective vaccine into young bovines.

3. Some further study of the natural history of the "bovine" tubercle bacillus when found in the human subject.

4. A further investigation of the tubercle bacilli which are the cause of lupus and allied tuberculous skin diseases. The importance of these, as well as of the problems associated with equine tuberculosis, can scarcely be over-estimated; and more extended researches into these forms of tuberculosis promise results of the very greatest moment.

5. Further investigations of cases of *phthisis pulmonalis* are also necessary for the purpose of ascertaining, by the examination of the bacilli from a large number of cases of the disease, in what proportion of cases in this country pulmonary infection is derived from bovine sources, especially in view of the failure of continental authorities to corroborate the results obtained by means of the very carefully planned and executed experiments of the British Royal Commission.

6. A series of investigations carried out, by direct and careful *post-mortem* examination, with the object of determining what proportion of patients, dying at different ages, give evidence of "revealed clinical" or "latent" tuberculosis.

7. An investigation, carried on in different parts of the country, into the characters and source of the infecting tubercle bacilli that have given rise to the different types of tuberculosis met with in different positions and at the various age periods in the human subject.

8. A careful inquiry into the question of "carriers"—human and brute—of the various types of the tubercle bacillus.

9. A careful comparison of the various methods of differentiation recommended by the several observers who have worked at this subject.

The completion of these and similar sets of investigations is not essential to the success of the immediate work of the Insurance Commission, but as time goes on, and as the system adopted by the Insurance Committee achieves results, the answers to these questions may offer a fresh starting point from which future work may go out. For the proper carrying out of this work provision of a number of large and expensive animals is essential, as are also expert investigators. I calculate that much might be done on our University farm, taking that as an example farm, with a sum of 2,500*l.* or double that sum a year, but I realise that on such a farm only a few of the questions to be solved could be properly tackled, and that farms, laboratories, and investigating staffs might have to be duplicated several times. It seems to me, however, that a considerable fraction of the 40,000*l.* per year set apart for the scientific study of tuberculosis problems in England might be applied, with great advantage and with a promise of results out of all proportion to the money expended, to the conduct of such investigations as those above indicated.

May I be allowed to add that I believe, that as the result of experience, the Developments Grant Committee would not now be likely to recommend the collection of the above or other such work into any large central institution, but that they would, probably, be greatly in favour of utilising to the fullest extent the facilities already existing in various centres where work is already being done by men who have the training and some of the knowledge essential to the carrying of investigations to a successful issue.

March 1912.

MEMORANDUM submitted by Sir ALMROTH E. WRIGHT, M.D., F.R.S.

To plan a campaign against tuberculosis would be comparatively simple if it were a question of bringing into application preventive and remedial measures of proved efficacy. The problem which has to be solved is a very different one. It is the problem of bringing into application measures among which there are some which are probably entirely useless, some whose mode of operation is misapprehended, and very many—and these the methods of most promise—which are yet only very incompletely worked out.

It will be well to realise at the outset why our present methods are, and why, if things were to go on as they are going, they would remain very imperfect. This is due on the one hand to the fact that the medical profession receives remuneration not for seeking for new knowledge, but for doing its best with the knowledge which it has already at disposal, and, on the other hand, to the fact that practically all the gratuitous labour which the medical profession has contributed, and all the funds which have been collected and devoted to fighting tubercle have been expended in trying to do something for the individual who has been attacked by tubercle without any regard to the testing and improvement of our therapeutic weapons, and to the necessity of maintaining for the purposes of this work a special staff of scientific workers.

It would—and this is fully recognised—be fatal for a national scheme for combating tuberculosis to proceed upon such a short-sighted policy. To do so would not only be to waste the national funds, but also to incur, with regard to every patient who is treated with unimproved and untested methods, serious responsibility towards him, and an even graver responsibility towards future generations for the perpetuation of such methods.

Once this is realised it will follow that scientific verification and scientific research must be made the pivot of all Government effort, and that scientific methods must be brought into application everywhere in the combat against tuberculosis.

The necessity for this has not been fully realised, and it has been suggested that, while the methods of science and scientifically trained workers should be employed in the field of research, medical men who have received a purely clinical training might be employed in the treatment of patients on the understanding that these medical men would, as soon as science provides improved preventive and therapeutic methods, promptly and intelligently bring these into application.

A scheme which proceeds on this anticipation would inevitably fail. For experience has demonstrated—and the history of antiseptic surgery is a notable instance in point—that a new scientific treatment never comes to effective application in the field of practice until it has found its way into the curriculum of study of the rising generation of doctors. If therefore the treatment of tuberculous patients is not to lag always about a quarter of a century behind scientific discovery, provision for training in the methods of science will have to be placed in the forefront of the national scheme for fighting tuberculosis.

Before considering what ought to be done in this matter, and before developing any scheme for research or for dealing with the tuberculous patient, it will be well to make closer acquaintance with our problem by taking a general survey of the diagnostic methods and the preventive and therapeutic measures which we can take to our aid in fighting tuberculosis.

SYNOPSIS OF DIAGNOSTIC METHODS WHICH ARE AVAILABLE FOR ASCERTAINING THE PRESENCE OF TUBERCULOSIS, AND ESTIMATING THE GRAVITY OF THE INFECTION.

(1) *Physical Examination.*—The aim of this is to detect the physical changes produced in the body by the presence of a tubercular infection, and to determine whether the morbid process is stationary or progressive. The examination may be conducted :—

(a) By inspection, palpation, percussion, and auscultation, and such-like methods.

(b) By X-ray examination.

(2) *Thermometrical Readings and General Clinical Examination.*—The aim of these is to detect constitu-

tional disturbances produced by the poisonous products of the tubercle bacillus.

(3) *Search for the Tubercle Bacillus and Associated Bacteria* (e.g., examination of sputum and discharges).—This method is available only in those cases where we are dealing with an "open" focus of infection from which bacteria are being discharged.

(4) *Serum-diagnosis* (e.g., measurement of the opsonic index).—This method aims at the detection of changes in the blood which follow upon infection. The changes in question are, first, a diminution in the anti-tubercular power of the blood, and, secondly (when the body has responded to infection) an increase in this anti-tubercular power.

Where (owing to the infection being so limited in extent and so strictly confined as to leave the general health as yet quite unaffected) the changes in the blood are not yet sufficiently definite, these may be rendered definite by active or passive movements (appropriate exercises, or local massage), which will drive out into the blood any bacterial poisons which may be shut up in the tissue. This test is called the "auto-inoculation test."

The facility or difficulty with which auto-inoculations can be obtained furnishes a basis for estimating the gravity of an infection.

(5) *Allergic Reactions.*—By this method we seek for the altered reaction to tubercular poison which characterises the infected organism. The tubercular poison (tuberculin) may for this purpose be administered hypodermically (Koch's tuberculin reaction); or it may be applied to the eye (Wolff-Eisner and Calmette's reaction); or it may be applied upon the skin (von Pirquet's reaction).

Summary.—We have here five methods of diagnosis, and these fall into two classes. In the one class would be ranged methods which have been elaborated in the hospital ward, and which fall within the scope of the ordinary clinician. Under this heading would come Method 1 (with the exception of X-ray diagnosis) and Method 2. In the second class would be ranged methods which have been elaborated in the laboratory, and which fall within the scope of the laboratory worker. Under this heading would come Methods 3, 4, and 5.

These two classes of methods—we may speak of them as *clinical* and *laboratory* methods respectively—have quite different aims.

The *clinical methods*, dating as they do from the prebacteriological period, aim, as we have seen, at the detection of anatomical damage or physiological disturbance. The evidence which they furnish with respect to tubercular infection is accordingly only presumptive evidence. Further, owing to their comparative grossness, clinical methods cannot possibly furnish evidence of infection until it has already made very considerable progress.

Laboratory methods, on the contrary, aim directly at the detection of tubercular infection. By their aid the diagnosis of tuberculosis can be made at a very early stage of the infection:—In the case of Method 3, as soon as the tubercle bacillus escapes in the discharges; in the case of Method 4, as soon as there is even a minimal constitutional disturbance or any local accumulation of tubercular poison such as would be capable of producing such a disturbance; and, in the case of Method 5, at a quite prematurely early stage of the infection, i.e., at a stage when it has not yet appeared whether the organism will prove competent to gain the victory over the infection by its unaided efforts. In particular this applies to the allergic reaction of von Pirquet, which, though invaluable in the diagnosis of tuberculosis in very young children, and as an aid in research is, as applied to adults, fallacious, inasmuch as it detects a negligible amount of infection; in point of fact, such a minimal infection as may be found in almost every healthy person who has ever come in contact with the tubercle bacillus.

In connexion with diagnostic methods for tubercular infection, we have to consider not alone the first diagnosis and the evaluation of the gravity of the infection at the date of discovery. We have to consider also the after-diagnosis and the re-evaluation of the gravity of the infection. Such re-evaluation is obviously a desideratum in the case where the

sanatorium patient comes up for "after care," and in every case where we want to take stock of the situation, and determine whether treatment has extinguished the infection and may be given up.

Clinical methods will here furnish very little assistance: for (at any rate where we are dealing with phthisis) the anatomical lesions will still persist, while, *ex hypothesi*, all constitutional disturbance (such as fever or a significant rise of temperature after exercise) will have disappeared before the patient comes up for the test. In such cases the delicacy of laboratory methods is invaluable. By the aid of these, and in particular by the aid of the opsonic index, the question as to whether the original focus of infection has been extinguished, or whether it is still aglow, can be satisfactorily resolved.

PREVENTIVE MEASURES.

The measures which have to be thought of in connexion with the prevention of tuberculosis may be grouped under the headings of *measures for warding off tubercle bacilli from the uninfected* (including here among the uninfected those who are the subject of a perfectly negligible infection), and *measures for preventing the development of tuberculosis in those who have come in contact with a formidable amount of infective material*.

(a) *Measures for preventing the Dissemination of Tubercle Bacilli by Patients affected with "Open" Tubercular Lesions, and by Foodstuffs derived from Infected Animals.*—It will be clear that no one is in a position to give an authoritative decision as to what measures (other than the measure of disinfecting the sputum) ought to be adopted in these matters. A wise decision on points such as the compulsory isolation of certain classes of sick, repeated disinfections of the dwellings, bacteriological examination and condemnation of infected foodstuffs, the slaughter of tuberculous animals, and such-like can only be arrived at by painstaking and prolonged laboratory experiments, statistical study, and by careful weighing of the social and economic bearings of any measure that might be proposed. These are clearly matters for the decision of the Government; but it is for the expert to furnish and digest the scientific data which ought to be taken into consideration in arriving at that decision.

(b) *Measures for preventing the Development of Tuberculosis in those who have been exposed to a serious Amount of Infection.*—This problem arises in connexion with the "contacts" who have been in intimate contact with infective tubercular patients. The preventive methods which suggest themselves here, in addition to any hygienic measures which may prove practicable, are prophylactic and therapeutic inoculation with tuberculin. In connexion both with those who are destined to come into intimate contact with infection and those who have already been exposed to appreciable risks, such inoculations would appear to be deserving of study and trial.

THERAPEUTIC MEASURES.

It will be well to consider these, not under such headings as sanatorium, hospital, and home treatment (for this classification takes no account of the kind of treatment given), but under the headings of *non-specific constitutional treatment, specific anti-bacterial treatment, and surgical treatment*.

Non-specific Constitutional Treatment.—Under this heading would be included treatment by open air, sea air, air of pine-woods, light and sun baths, altitude, warm climates, cold climates, nudity (Rollier), and such-like. Not very long ago these formed the whole basis of treatment of tuberculosis; and it was with the idea of bringing such therapeutic agencies to bear that sanatoria were established. To the above-mentioned therapeutic agencies were added in sanatoria—still as non-specific measures—bodily rest (in the so-called Liegehalle of the foreign sanatorium) and—in connexion with cases that were improving—graduated walks.

The inspiration of all these measures is the idea that these physical agencies increase the resistance of the body to bacterial disease. It need only be said

here that while it is clear to the most superficial observation that general nutrition and the well-being which goes with it improve in open air surroundings under favourable climatic conditions, the *onus probandi* that a general increase of the anti-bacterial power of the body is by these means achieved lies with those who make this assertion. It lies also with them to show why these open air and climatic influences should increase our resistance specifically to tubercle and not to small-pox, plague, typhoid, or any other bacterial disease. And whatever the conclusion which may ultimately be arrived at by science upon these points, it is clear, in view of the enormous percentage of failures of simple open-air treatment, and in view of the fact that the well-nourished and muscularly well-developed succumb as well as the ill-nourished, that it would be dangerous to place too much reliance on the influence of open air and climatic influences, and that the influence which open air may exert upon resistance to bacterial disease does not, at any rate, enter into comparison with that which is exerted by an effective prophylactic or therapeutic inoculation.

Specific Anti-bacterial Treatment.—Specific anti-bacterial treatment, or more technically specific chemo-therapy of bacterial diseases, aims at destroying the infecting bacteria by chemical agents.

There are two forms of this treatment: pharmacotherapy and immuno-therapy.

The former aims at curing bacterial disease by the agency of drugs which shall exert a poisonous action upon the infecting bacteria while leaving the organism of the patient quite unaffected.

The scientific foundations of this method of treatment are already laid in the sense that a clear idea has been arrived at as to what is required, and the principles and methods for testing it have been worked out. But in the case of tuberculosis no practical progress has been made except in the respect that all the therapeutic rubble which has come down to us from the past has been cleared away from the foundations. It has been made practically certain by laboratory experiment as well as by experience on man that the ordinary antiseptic is incapable of killing tubercle bacilli in the interior of the organism.

The other form of specific chemo-therapy which goes by the name of vaccine-therapy introduces into the organism the chemical agents which are known as vaccines (in the case of tubercle the vaccine is known as tuberculin) which when administered in suitable doses cause the patient to elaborate for himself chemical agents which are antagonistic to the infecting bacteria and which attack these in the body—so far as they can get access to them. The time has not arrived for pronouncing judgment on the measure of success which has been achieved by vaccine-therapy with scientifically adjusted doses of tuberculin. But it is certain that tuberculin treatment has achieved a large percentage of successes. That inoculation methods properly carried out should succeed in all cases of tuberculosis was simply out of question, *first*, because we are still far from having arrived at a completely satisfactory system of dosage for tuberculin; *secondly*, because the blood—it is the blood which is influenced by inoculation—cannot in advanced cases of tuberculosis obtain access to anything like all the infective microbes; *thirdly*, because in phthisis it is often impossible to check excessive auto-inoculations; and, *fourthly*, because the organism which is thus poisoned is incapable of making satisfactory immunising response to inoculation. But it is certain that in the long run research will furnish the means for circumventing many of these difficulties; and it may confidently be assumed that inoculation treatment is destined to be successful in the treatment of the large majority of early cases of tuberculosis.

Under the heading of vaccine-therapy may be ranged also—for these are direct developments from it—treatment by the production of auto-inoculations, and treatment by arrest of excessive auto-inoculations. As has already been explained under the heading of diagnostic methods an auto-inoculation of the infected region into the blood stream. This fact, occurs whenever under the influence of muscular movements vaccinating substances are carried out of

which was unwittingly taken advantage of in the graduated exercises as originally prescribed in sanatoria, was first scientifically and very effectively exploited by Dr. M. Paterson at Primley.

While bodily exercise may in this way furnish a method of specific antibacterial therapy, rest in those cases where it is indicated may also play an important role in such treatment. It will do so in those cases where it succeeds in checking excessive auto-inoculations, and thus enabling the body to make effective immunising response. There is furnished to us here a rationale of the treatment by rest which figured so prominently in the treatment adopted in foreign sanatoria. The *absolute rest* which Dr. Paterson insists upon is a further scientific application and development of this therapeutic principle. A further but unconscious application is furnished by Forlanini's method, which is referred to below.

Surgical Treatment.—If we leave out of account as quite unworthy of scientific consideration the operations undertaken with intent to extirpate from the body all the infecting microbes, surgery finds two applications in connexion with the treatment of tuberculosis. The knife may upon occasion be usefully resorted to with a view to the extirpation of some focus of infection which is poisoning the organism and depriving it of its power of resistance. And scientific splinting and jacketing finds constant and eminently useful application in connexion with the treatment of tubercular affections of the joints and spine. These procedures not only give rest to the affected parts, but they also, by the fact that they restrain excessive auto-inoculations, react favourably on the health and increase the resisting powers of the patient. To the aforementioned methods for restraining excessive auto-inoculations has been recently added, for use in otherwise desperate cases of phthisis, the procedure of Forlanini, which secures rest for one of the lungs by bringing about its collapse by the injection of air or nitrogen into the cavity of the chest.

SCHEME FOR FORMING A SPECIAL MEDICAL RESEARCH SERVICE AND OF ENLISTING AND EDUCATING ITS MEMBERS FOR RESEARCH AND FOR PRACTICAL WORK IN CONNEXION WITH THE APPLICATION OF SCIENTIFIC METHODS TO THE PREVENTION AND TREATMENT OF TUBERCULOSIS.

The synopsis of methods of diagnosis, prevention, and treatment which has been set out above will have made it clear that no man can be regarded as fully equipped for the work of combating tuberculosis until he has received a thorough grounding in bacteriology, has received instruction in all the special clinical and laboratory methods which have been referred to above, and has seen something of the practical working of a properly conducted tubercle dispensary, of an inoculation department which deals with out-patients and in-patients, of a sanatorium for phthisis, a sanatorium for surgical tubercle (cripples home), and of a research laboratory.

The provision of such a complete education ought to be an essential feature of a National scheme for combating tuberculosis.

The programme of study ought to include the following:—

- (1) A course of lectures and laboratory work in general bacteriology.
- (2) A course of lectures and laboratory work in immunity, including prophylactic and therapeutic inoculation and serum-therapy, the measurement of protective substances in the blood, serum diagnosis, and the preparation of vaccines.
- (3) A short course of lectures and laboratory work on disinfectants and pharmako-therapy.
- (4) A short course of lectures on statistical methods.
- (5) A short course of lectures and demonstrations on the physiology of respiration (including ventilation) and nutrition.
- (6) A short course of lectures and demonstrations on veterinary work so far as it relates to tuberculosis.
- (7) Practical instruction in sanatorium work, in particular in treatment by induced auto-inoculations.

(8) Practical instruction in the work of a sanatorium for surgical tuberculosis, in particular in the making and fitting of splints and jackets.

(9) Practical instruction in the work of a tubercle dispensary, including the inspection of the home surroundings and examination of the contacts.

(10) Practical instruction in the bacteriological examination, serum diagnosis, and vaccine therapy of patients.

Requirements for carrying out such a Scheme of Education as has been outlined above.—The proper carrying out of such a scheme as has been outlined above involves almost as a necessity the creation of a Central Institute with a professorial staff, and with residential accommodation for those under instruction. This Central Institute would be at one and the same time the Staff College, the Central Therapeutical Research Laboratory, and the headquarters of the proposed Therapeutical Research Service. Such a Central Institute would be best placed in the country, *first*, for financial reasons; *secondly*, because the proper place for the sanatorium for phthisis and the sanatorium for surgical tubercle which would be required in connexion with the teaching and research would be the country; and *thirdly*, because life in the country at a distance from the distractions of town supplies the only proper atmosphere both for teacher and taught—the kind of atmosphere which is found at the Staff College, the School for Military Engineering, Oxford and Cambridge, and the smaller German universities.

Buildings and Grounds.—If the very large funds which would be required were available, and if a delay of two to three years were not a matter of consequence, the ideal site for a Central Institute would no doubt be somewhere within an hour's rail of London. There is, however, within a little over two hours of London very excellent if not ideal accommodation which might perhaps be made available and immediately available. In Netley Hospital there is practically all that is required: a good climate, splendid ground for a combined sanatorium for phthisis and surgical tuberculosis, and ample hospital space not only for the patients, but also for the provision of all the necessary laboratories. And Netley Hospital provides in addition—for it was till 10 years ago the home of the Army Medical School—very excellent residential quarters which would suffice for the accommodation of 60 or even more students.

Professorial Staff and Governing Body.—The staff of such a Central Institute might advantageously consist of a Director of Studies, who should be the chairman of the governing body, a certain number of professors, who should constitute that governing body, and a certain number of lecturers, who would not necessarily hold whole time appointments.

There ought at least to be five professorships (one of these might be held by the Director of Studies) and five assistant professorships.

A professorship and assistant professorship of Bacteriology and Hygiene with charge of research and instructional laboratories.

A professorship and assistant professorship of Immunisation with charge of research and instructional laboratories and a certain number of beds.

A professorship and assistant professorship of Clinical Medicine with charge of the sanatorium for phthisical patients.

A professorship and assistant professorship of Surgery with charge of the sanatorium for surgical tuberculosis.

A professorship and assistant professorship of Physiology with charge of research and instructional laboratories.

There ought to be in addition—

A lectureship in X-ray work;

A lectureship in statistical methods;

A lectureship in veterinary medicine; and

A scientific secretary, librarian, and editor.

It is suggested that the original appointments to the teaching staff should be made by the Chancellor of the Exchequer, and that all subsequent appointments should be made on the nomination of the Senate of the Central Institute.

Proposals with regard to working of the School.—It is suggested that the course of instruction for the

candidates for the Therapeutic Research Service ought to cover a period of at least eight months and that it might conveniently be divided into two sessions. It would be well, so far as the residential and laboratory accommodation might permit of this, to admit to this course of instruction also any other medical men on payment by these of such a fee as would cover the expenses.

Therapeutic Research Service.—As already indicated, the primary object of the instructional courses in the Central Institute would be to qualify men to take service under Government in the task of combating tubercle. It is suggested that after following such a course of instruction as has been outlined above and passing a qualifying examination at the end of the course, such candidates as had given satisfaction should receive appointments in the Therapeutic Research Service and should then take up appointments where they would be engaged primarily in working of the scheme for the treatment of the tubercular sick, or (exceptionally) appointments in which they would be occupied exclusively with research and instructional work. The following suggestions are made with respect to the conditions of service:—

The salaries should commence at 350*l.* a year and should go up by periodical increments to 900*l.*, with retirement on pension after 20 years' service.

There should be in connexion with the service also a certain number of important posts both in the Central Institute and in the more important local centres carrying a salary going up to 1,500*l.* and 2,000*l.*

The candidates should be legally qualified medical men from 22 to 30 years of age, but provision should be made for transferring to the middle and higher grades of the service where public advantage required it, officers of the R.A.M.C., officers of the Naval Medical Service, Indian Medical Service, and Colonial Medical Service, and on special occasions of civilian doctors.

Appointment to the service should be by nomination, such nomination to be exercised by Senate of Central Institute (provision being made if thought desirable for nominating a certain number of candidates from each of the divisions of the United Kingdom).

It is suggested that in making such nominations due regard should be taken not only of honours obtained in professional subjects and tenure of House appointments, but also of academic distinctions in non-professional subjects showing proficiency in languages, mathematics or science.

It is suggested that it would be well to provide the candidates for appointments in the Therapeutic Research Service with free quarters during the course of instruction, and to make them a grant sufficient to cover ordinary mess expenses.

All the posts in connexion with the scheme outlined below for the treatment of tubercular sick (with the possible exception of the tubercle dispensaries) should be reserved for members of the Therapeutic Research Service.

It is suggested that the disposal of the services and the promotion of the members of the Therapeutic Research Service should rest with the Senate.

With a view to keeping every member of the Therapeutic Research Service up to date throughout the whole course of his service and with a view to bringing him into personal touch with the professors who, as members of the Senate, would dispose over his employment and promotion, it is suggested that every member of the Service ought every two or three years to be brought back for a fortnight's course of instruction in the latest advances of medical science.

With a view to weeding out from the service all whose energies or zeal for research begin to flag, it is suggested that it would be proper to offer financial inducement (in the form, for instance, of a gratuity of 1,000*l.* on retirement after 10 years' service); and it would also be well, with a view to accelerating promotion, to permit retirement without loss of proportion of pension earned to any member on appointment to an outside professorship or Medical Officership of Health.

Scheme of Treatment for Patients.—Each administrative district ought ultimately to have at disposal (a) one or more tuberculosis dispensaries; (b) an out-patient and in-patient clinic with a fully equipped laboratory; and (c) a sanatorium, or, as the case may be,

separate sanatoria for the treatment of phthisis and surgical tuberculosis.

The Tuberculosis Dispensary.—The work of the tuberculosis dispensary ought to be confined (a) to diagnosis (using for this purpose ordinary clinical methods and bacteriological examination of the sputum); (b) inquiry into the economic condition of the patient, examination of contacts, and the making of such provision as may be possible for domestic hygiene; and (c) the preparation of a report of the case for the medical officer in charge of the clinic, and the transfer of the patient to him for further diagnosis (if necessary) or for treatment or disposal. The tuberculosis dispensary serving thus only as a clearing house and investigation bureau might quite well be staffed by a junior medical officer of the rank of a house physician. The dispensary might advantageously be attached to a hospital, and might perhaps be worked as the departments for the treatment of school children are worked under the London County Council.

The Clinic.—The clinic should consist of an out-patient department, an in-patient department, and a research laboratory. It should be staffed by one or more medical officers of the Therapeutic Research Department, and its work should consist (a) in the diagnosis of doubtful cases of tuberculosis, (b) in the treatment of cases, or as the case might be, disposal of these—meaning by disposal either the reference of the cases to sanatoria, or to the general hospital, or to private practitioners for treatment (in this last case such reference might advantageously include the supply of vaccine and the giving of advice with regard to dosage). A further important part of the work of the clinic would be the after diagnosis, and after care of patients on discharge from sanatoria.

The Sanatoria.—Such sanatoria might with advantage be worked in the case of the sanatoria for phthisis on the lines followed by Dr. M. Paterson at Frimley, and, in the case of those for surgical tuberculosis, on the lines followed by Mr. Gauvain at Alton respectively. The sanatoria should be staffed by medical officers of the Medical Research Department.

Finance.—The author of this memorandum is entirely devoid of the specialist knowledge which would be required for making any detailed recommendations on the subject of finance. Certain broad aspects of the matter, may, however, be briefly alluded to.

(1) *General Expenditure under the Act in connexion with the Treatment of the Sick. Comparative Advantages of Expenditure on Sanatoria and Expenditure on Clinics.*—(a) Where the financial resources at disposal are limited, money may much more profitably be expended on clinics such as have been suggested above than on sanatoria. For the rough calculation which is given in the footnote* below shows that at the price of one sanatorium we might have seven clinics, each of which would be capable of dealing with the same number of patients as the sanatorium, and each of

* Sanatorium for 200 patients:—	
Capital Account:—	£
Building and equipment of 200 beds at 150 <i>l.</i>	30,000
Building and equipment of laboratory	2,000
Total	32,000
Maintenance Account:—	
Interest on capital at 6 per cent.	1,920
Salaries of two medical officers	1,200
Maintenance of beds at 80 <i>l.</i> each	16,000
Maintenance of laboratory	200
Total	19,320
Clinic for 200 patients with beds for 5 per cent. of these:—	
Capital Account:—	£
Building and equipment of laboratory	2,000
Building and equipment of ward for 10 patients at 150 <i>l.</i> per bed	1,500
Total	3,500
Maintenance Account:—	
Interest on capital	210
10 in-patients at 80 <i>l.</i> per bed	800
200 out-patients at 2 <i>l.</i> per head	400
Salaries of two medical officers	1,200
Maintenance of laboratory	200
Total	2,810

which would be provided with beds for 5 per cent. of its patients.

There is also to be reckoned the fact in favour of the seven clinics that they would, in addition to treatment, do a very great deal of propaganda work. They would also raise the general tone of every hospital with which they were connected, and would also be free to undertake a very great deal of research work.

(b) *Financial Arrangements in connexion with the Establishment of Clinics.*—It would be desirable as soon as trained men to staff them became available to institute tuberculosis clinics in connexion with every poor-law infirmary, and so far as possible in connexion with every general hospital.

In order to secure this object negotiations might be entered into with each hospital on the following terms:—

The Government to supply the services of one or, as the case might be, of more officers of the Therapeutic Research Service; to build, equip, and maintain a laboratory; to provide any additional accommodation that might be required for the working of an out-patient and in-patient clinic and to maintain these departments.

The hospital to provide facilities for the proper working of the aforesaid clinics under the before-mentioned medical officers and to undertake the administration and nursing of the in-patients at a fixed charge per head.

The hospital might be allowed an option in the matter of the medical officer to be appointed from the Therapeutic Research Service.

It might also be made a part of the bargain that the hospital should provide facilities for the formation of a tubercular dispensary in connexion with the hospital, and should furnish the junior medical officer required for the working of that dispensary on conditions similar to those which obtain under the London County Council in connexion with school children.

(c) *Grants in aid of existing Charitable Institutions.*—It would be inadvisable to disburse much (if, indeed, any) of the funds which are available for the treatment of tuberculosis in subsidising existing charitable institutions, for such grants in aid would inevitably be followed by a progressive falling off in the subscriptions of the charitable, which are an all-important asset in connexion with the conflict against tuberculosis. The best way to bring aid to such institutions would be to notify publicly that the Government did not propose directly to subsidise such institutions but would give aid to them by supplying them with a medical officer of the Therapeutic Research Service. Such appointment would of course be made upon the understanding that the medical officer should, in return for the services he would render in connexion with the diagnosis and treatment of tuberculosis and its superadded infections, be afforded facilities for research and observation.

(d) *Cost of Central Institute.*—The larger part of the expenses connected with the patients might perhaps be met by arranging with the local authorities to take their patient at a sum somewhat less than what they would otherwise cost those authorities; and if the Central Institute were at Netley an arrangement might perhaps be come to with the naval and military authorities to take over from them the tubercular patients who are now discharged from the army and navy. It might also be possible to make arrangements to take—for these are, I believe, excluded from Osborne—officers suffering from tuberculosis.

The balance of the cost of the patients and other expenses of the Central Institute might perhaps be charged in equal shares to the general fund for the treatment of the sick (for the training of the medical officers to undertake that treatment would properly be a charge against such fund) and to the fund for research (for the whole staff of the Central Institute would be engaged in research and the training of men to take up that work).

(2) *Expenditure on Medical Research.*—There are three ways of spending money on research.

The first—and it is this which has found most favour in England—is the institution of research scholarships which are tenable for one to three years.

Such expenditure, though it may, on occasion, enable a man to devote himself to a life of medical research, generally fails in that object because the scientific worker, knowing that there will be no further provision when his scholarship expires, has to make preparation for going into ordinary medical practice. The system of endowing research by scholarships is open also to other objections. It invites a man to undertake original research before his education is anything like complete, in fact, to undertake it at a time when he ought only to be serving his apprenticeship. It makes no provision for the upkeep of laboratories, and the research scholar becomes a source of expense to the laboratory which receives him. Lastly—and this is the worst feature—the system of research scholarships encourages the idea that a new fact in science, and especially a new fact which looks as if it were likely to lead on to the discovery of other facts, is a valuable piece of private property, and that the pursuit of such facts is best undertaken by men working each man for himself, mounting guard over his own property. In reality the proper idea to instil into the scientific worker is that the secret of success is to be found in co-operation, and that new found scientific facts, and in particular facts which open up new issues, ought as soon as possible to be notified to the whole body of scientific workers.

The second method of expending money on research is to make grants to laboratories which are doing good work.

The grant may be made without any promise of renewal and on the implied condition that money shall be expended in the purchase of apparatus, or in doing a particular piece of research work or in enlisting additional assistants. This is the worst form of grant, first because a windfall does not permit of any permanent addition to the staff of workers, or even of the calling off of a single worker from money earning occupations to research; secondly, because it is bad economy to employ in the work of research the newly enlisted assistant when by giving release from money earning occupations the more effective work of the director of the laboratory and his closer supervision of other workers could be secured.

The most valuable form of grant to a laboratory would accordingly be the grant given for a term of years with prospect of renewal, and which offered to the man in the laboratory who is capable of taking most advantage of it release from less useful money earning occupations.

But a system of endowment by grants—even if the grants were of this nature—would not make any provision for the pensioning of a scientific worker who had grown old or had contracted disease in the pursuit of new scientific facts.

The third method of endowing scientific research—and it is in the opinion of the author of this memorandum incomparably the best form of endowment, and therefore the form of endowment upon which every penny of the money which will be provided under the Insurance Act ought to be expended—is to institute a scientific research service such as that suggested above, to provide the necessary scientific teachers and laboratories, and to give the young men who should be recruited for the service the widest possible training and then to set them to work together.

This scheme of endowment, which would bring about a fusion of forces, supplementing one man's activities by another's while co-ordinating them all towards the attainment of a common end, would have every advantage over a system of giving grants to workers who would stand quite apart from each other. It would prevent the duplication of work and the repeated going up of alleys which have been found to be blind, which consumes so much time in research laboratories; it would furnish the man of many ideas with the fellow workers who would be required to carry out those ideas, and it would provide ideas for the worker who has himself few ideas; and it would in the case where the findings of different workers differed avoid waste of time in polemical discussion by bringing together the different workers for personal discussion, mutual criticism, and the institution of decisive experiments on the point at issue.

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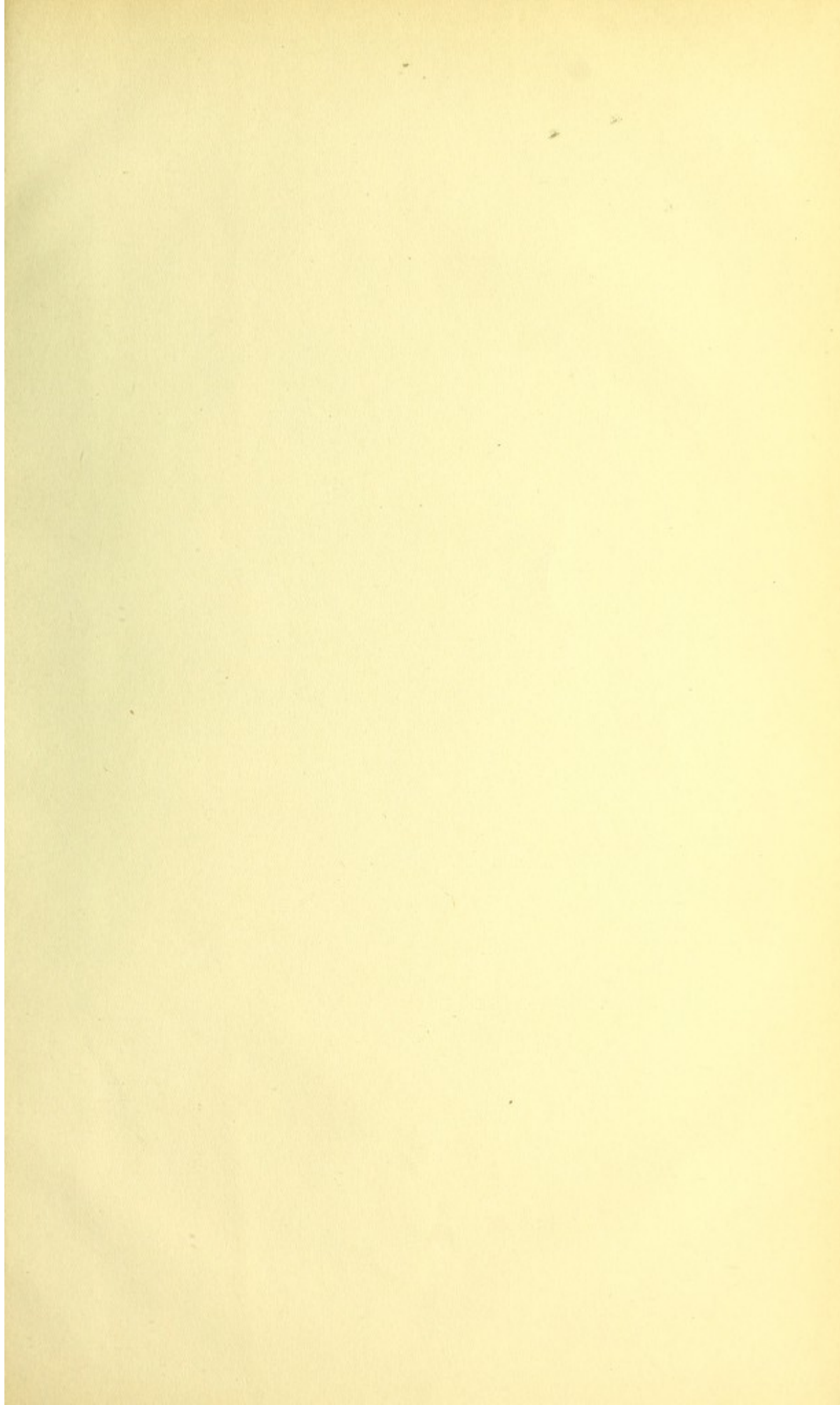
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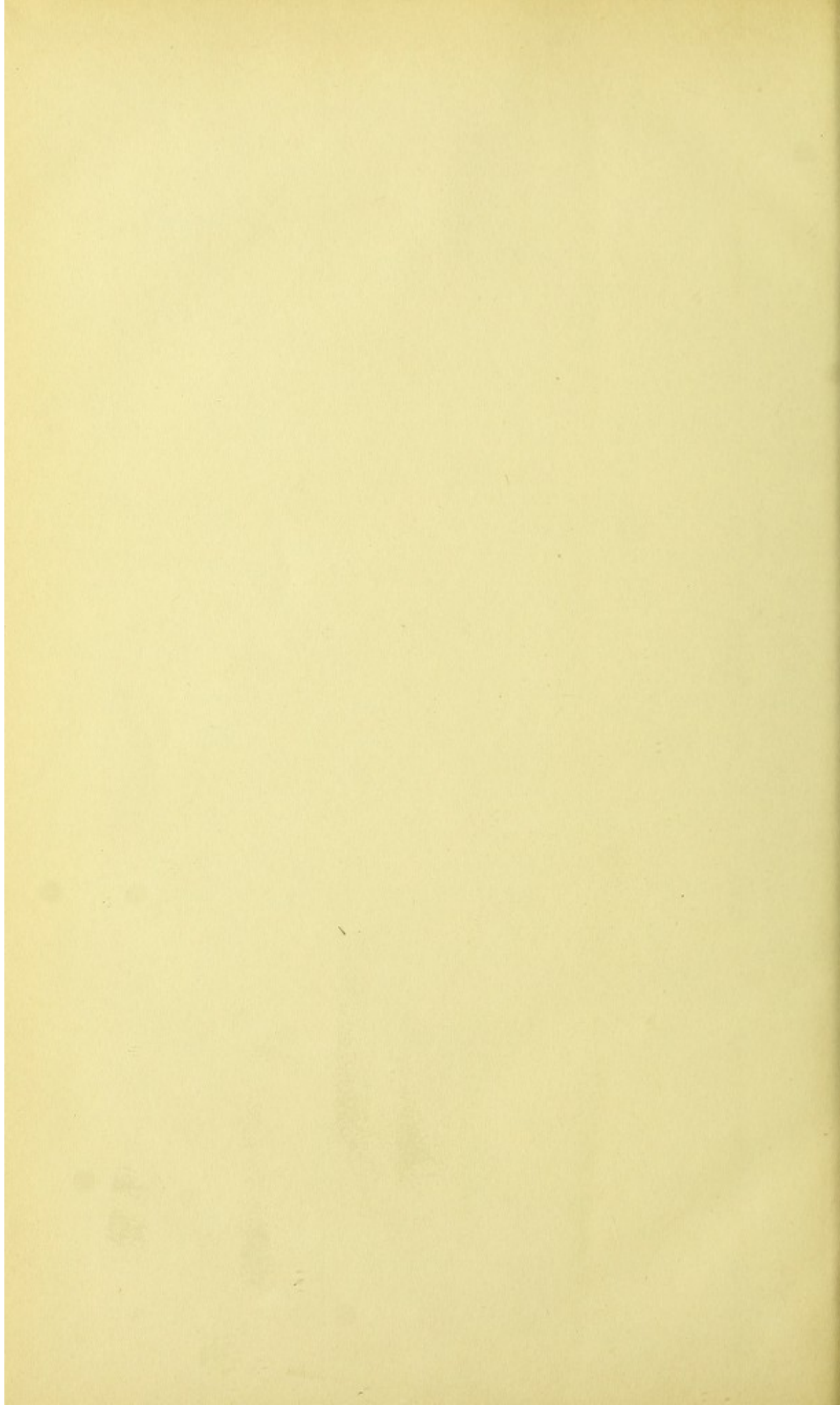
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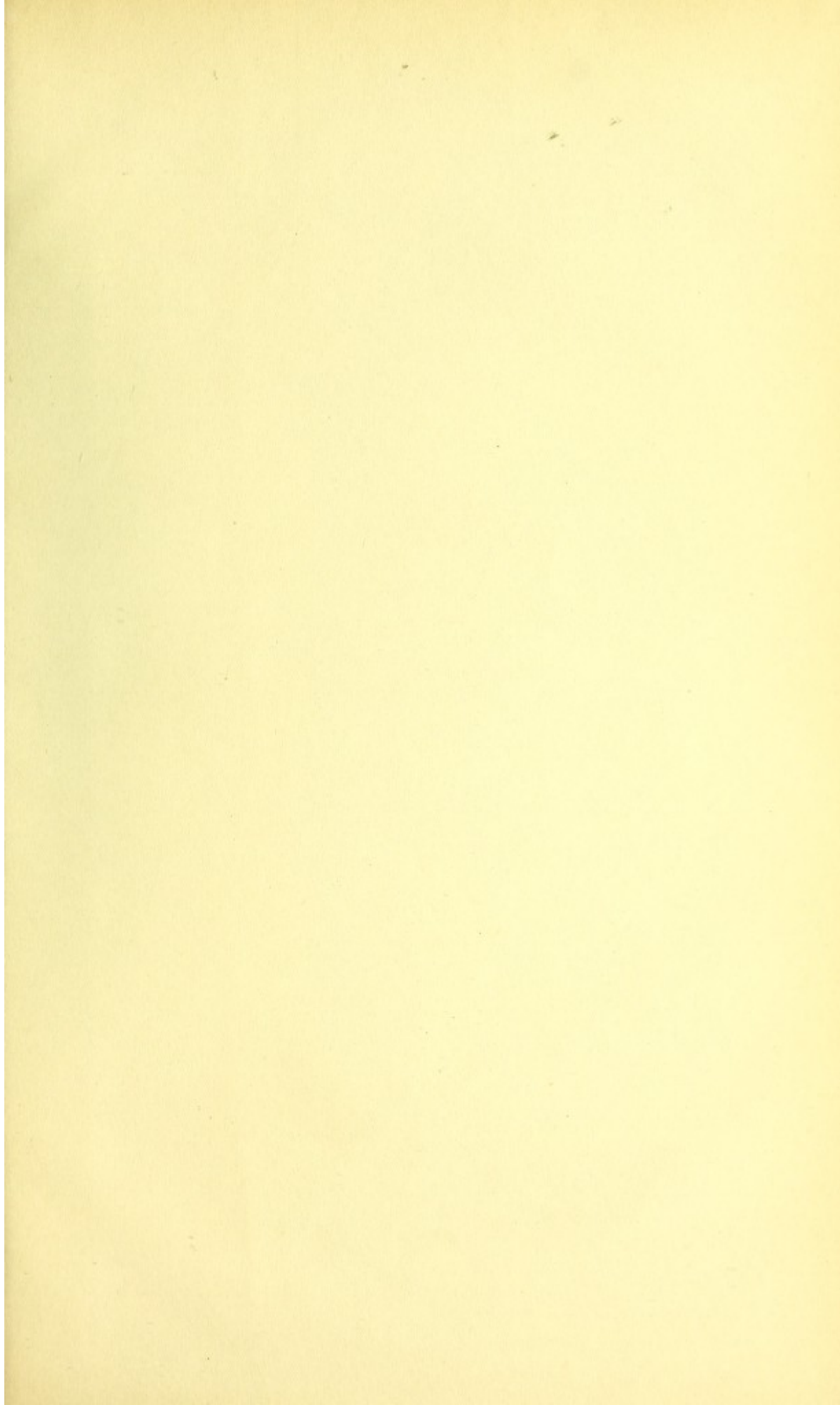
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